CARESCAPE ONE
User Manual
Software version 1

CARESCAPE ONE
English
1st edition
2094480-001 paper

The information in this manual applies to the software version listed on the first page of the manual. 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.

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About this manual

Intended use of this manual

This manual is an integral part of the device and describes its intended use. It should always be kept in a place accessible to users, and information indicating that place should be available close to the equipment. Observance of the manual is mandatory for proper performance and correct operation and ensures patient and user safety. Information which refers only to certain versions of the product(s) is accompanied by the model number(s) of the product(s) concerned. The model number is given on the device plate of the product.

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 ONE
- CARESCAPE ECG
- CARESCAPE Pressure
- CARESCAPE Temperature
- CARESCAPE SpO_2
- CARESCAPE SpO_2 – Masimo
- CARESCAPE SpO_2 – Nellcor
- CARESCAPE CO_2 – LoFlo
- CARESCAPE Dock F0
- Mini Dock
- Parameter Dock 1
- Parameter Dock 5

Intended audience of this manual

This manual is intended for clinical professionals. Clinical professionals are expected to have a working knowledge of medical procedures, practices and terminology required to provide patient care. Using the system should never replace nor impede the human intervention and required patient care provided by clinical professionals.

Training requirements

No product-specific training is required for the use of the CARESCAPE ONE.

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 software terms.
italic	Indicates terms for emphasis.
>	Indicates menu options to select consecutively.
select	The word select means choosing and confirming.
NOTE	Note statements provide application tips or other useful information.

Monitor naming conventions

In this manual, the CARESCAPE ONE is also referred to as CS ONE. When a generic term is more appropriate, it is referred to as the device, acquisition platform, or monitor.

In this manual, the CARESCAPE B850 monitor is referred to as the host.

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 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 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.
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.

Graphic on the CARESCAPE Parameter	Explanation
CARESCAPE SpO_2 - Masimo	CARESCAPE Parameter for measuring SpO_2 with Masimo 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, CARESCAPE SpO_2 device is used as a generic term when referring to all of the following products: CARESCAPE SpO_2, CARESCAPE SpO_2 — Nellcor, and CARESCAPE SpO_2 — Masimo.

In this manual, acquisition platform refers to the CARESCAPE ONE. Note that software references to ***Monitor*** also apply to the acquisition platform when it is used as an independent device.

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 User Manual
- CARESCAPE B850 Supplemental Information Manual
- CARESCAPE ONE Service Manual

Ordering manuals

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

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.

12RL, DINAMAP, IntelliRate, Ohmeda, and TruSignal are trademarks of General Electric Company or one of its subsidiaries.

Third party trademarks

Masimo SET is a trademark of Masimo Corporation.

Nellcor and OxiMax are trademarks of a Medtronic company.

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

LoFlo is a trademark of Koninklijke Philips Electronics N.V.

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.

WARNING 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.

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Safety

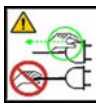
Safety message signal words

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. Unless noted otherwise, the DANGER, WARNING, and CAUTION statements within this manual correspond to the use of this symbol on the equipment.
	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. Connections should not be made to this device unless ESD precautionary procedures are followed.
	Non-ionizing electromagnetic radiation. Interference may occur in the vicinity of this device.
	Type BF (IEC 60601-1) protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient, excluding direct cardiac application.
	Type BF (IEC 60601-1) defibrillator-proof protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient, excluding direct cardiac application.
	Type CF (IEC 60601-1) protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient, including direct cardiac application.
	Type CF (IEC 60601-1) defibrillator-proof protection against electric shock. Isolated (floating) applied part suitable for intentional external and internal application to the patient including direct cardiac application.
	Safety ground. Remove power cord from the mains source by grasping the plug. Do not pull on the cable.
	Class II equipment with Functional Earth.

System safety

System safety messages apply to the entire system. Safety messages specific to parts of the system are found in the relevant section.

System warning safety messages

The following warning safety messages apply to this monitoring system.

Accessories warnings

WARNING Single-use products are not designed to be reused. Reuse may cause a risk of cross-contamination, affect the measurement accuracy and/or system performance, and cause a malfunction as a result of the product being physically damaged due to cleaning, disinfection, re-sterilization and/or reuse.

WARNING Use only approved accessories, including mounts, and defibrillator-proof cables and invasive pressure transducers. For a list of approved accessories, see the supplemental information provided. Other cables, transducers and accessories may cause a safety hazard, damage the equipment or system, result in increased emissions or decreased immunity of the equipment or system, or interfere with the measurement.

WARNING ELECTRIC SHOCK. Only use protected leadwires and patient cables with this device. The use of unprotected leadwires and patient cables creates the potential for making an electrical connection to ground or to a high voltage power source which can cause serious injury or death to the patient.

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

Cables warnings

WARNING CABLES. Route all cables away from patient's throat to avoid possible strangulation.

WARNING CABLES. Route all cables in such a way that they are not under the patient to avoid the risk of possible pressure sores.

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 SAFETY GROUND. Remove power cord from the mains source by grasping the plug. Do not pull on the cable.

Defibrillation warnings

WARNING Do not touch the patient, table, bed, instruments, modules or the monitor during defibrillation.

WARNING DEFIBRILLATOR PRECAUTIONS. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires. Using other cables or leadwires may result in damage to the equipment and compromise patient and user safety.

Electrical warnings

WARNING POWER SUPPLY. Always connect the device power cable to a properly installed power outlet with protective earth contacts before connecting any other interface cables. If the integrity of the protective earth conductor is in doubt, disconnect the monitor from the power line and use it with the battery option. If the installation does not provide for a protective earth conductor, disconnect the device power cable from the power line after having disconnected all other interface 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.

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

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 IEC 60601-1 clause 16 must be complied with.

WARNING EXCESSIVE LEAKAGE CURRENT. Connect only certified UL 60950/IEC 60950 equipment to the CARESCAPE Dock F0 RJ-45 connection.

WARNING INTERFACING OTHER EQUIPMENT. Connect only items that are specified as part of the system and as compatible. For more information, see the supplemental information provided.

WARNING INTERFACING OTHER EQUIPMENT. 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 IEC 60601-1 clause 16 must be complied with.

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

WARNING During intracardiac application of a device, a defibrillator and pacemaker whose proper functioning has been verified must be kept at hand.

WARNING If liquid has accidentally entered the system or its parts, disconnect the power cord from the power supply and have the equipment serviced by qualified service personnel.

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 INTRACARDIAC APPLICATION. When applying devices intracardially, electrically conductive contact with parts connected to the heart (pressure transducers, metal tube connections and stopcocks, guide wires, etc.) must be avoided in all cases. To prevent electrical contact, we recommend the following:

- always wear isolating rubber gloves,
- keep parts that are conductively connected to the heart isolated from ground,
- if possible, do not use tube fittings or stopcocks made of metal.

System warnings

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

WARNING If an error message appears during operation, it is the licensed medical practitioner's responsibility to decide whether the device is still suitable for patient monitoring. As a general rule, monitoring should only continue in extremely urgent cases and under the direct supervision of a licensed healthcare practitioner. The device must be repaired before being used again on a patient. If an error message appears after power-up, the device must be repaired before being used on a patient.

WARNING PATIENT SAFETY. To avoid risks to patient safety, never modify or alter the connectors on product or accessories in any way. Alterations or modifications may affect patient safety, performance, and accuracy.

WARNING Do not place the CARESCAPE ONE in a patient bed.

Site requirement warnings

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.

System caution safety messages

The following caution safety messages apply to this monitoring system.

Loss of data

CAUTION LOSS OF DATA. Should the monitor at any time temporarily lose patient data, the potential exists that active monitoring is not being done. Close patient observation or alternate monitoring devices should be used until monitor function is restored. If the monitor does not automatically resume operation within 60 seconds, power cycle the monitor by turning it off and then on again. Once monitoring is restored, you should verify correct monitoring state and alarm function.

Electrical caution

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

Site requirement caution

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.

Notice safety messages

The following notice safety message applies to this monitoring system:

NOTICE The warranty does not cover damages resulting from the use of accessories and consumables from other manufacturers.

Indications for use

Contraindications for using the monitor

The CARESCAPE ONE is not intended for use in a controlled MR environment.

CARESCAPE ONE indications for use

The CARESCAPE ONE is both a multi-parameter physiological patient monitor and an accessory to a multi-parameter patient monitor intended for use in multiple areas and intra-hospital transport within a professional healthcare facility.

The CARESCAPE ONE is indicated for the monitoring of hemodynamic (including ECG, ST segment, arrhythmia detection, invasive pressure, non-invasive blood pressure, pulse oximetry, and temperature), and respiratory (impedance respiration and CO_2 airway gas) physiological parameters.

The CARESCAPE ONE includes an integrated display, touchscreen, alarm light, user input buttons, and an audio subsystem. Real-time physiological parameter measurements and waveforms are displayed on the integrated display. Visual alarms are conveyed using both the integrated display and alarm light. Audible alarms are conveyed using the integrated audio subsystem. User input for configuration control and interaction is provided via the touchscreen. In addition, both a power button and touchscreen lock button are provided.

The CARESCAPE ONE can be used as a standalone monitor. In this mode of operation, the CARESCAPE ONE provides ECG, ST segment, arrhythmia detection, impedance respiration, SpO_2, non-invasive blood pressure, invasive pressure, temperature, and CO_2 airway gas parameter acquisition and monitoring.

The CARESCAPE ONE can be connected as an accessory to the CARESCAPE Monitor B850. In this mode of operation, the CARESCAPE ONE provides ECG, ST segment, impedance respiration, SpO_2, non-invasive blood pressure, invasive pressure, temperature, and CO_2 airway gas parameter acquisition. Visual and audible alarms, user controls, and user interface on the CARESCAPE ONE are not active in this mode.

The CARESCAPE ONE is intended for use on adult, pediatric, and neonatal patients and on one patient at a time.

The CARESCAPE ONE is intended for use under the direct supervision of a licensed healthcare practitioner, or by personnel trained in the proper use of the equipment in a professional healthcare facility.

The CARESCAPE ONE is not intended for use within a controlled MR environment.

Indications for use safety precautions

Indications for use warnings

WARNING Read all the safety information before using the device for the first time. This manual contains instructions necessary to operate this device safely and in accordance with its functions and intended use. This manual is intended for clinical professionals. Clinical professionals are expected to have a working knowledge of medical procedures, practices and terminology, as required for the monitoring of all patients.

WARNING SINGLE PATIENT USE. This equipment is designed for use on one patient at a time. Using this equipment to monitor different parameters on different patients at the same time compromises the accuracy of data acquired.

WARNING INSTRUCTIONS FOR USE. For continued safe use of this equipment, it is necessary that the listed instructions are followed. However, instructions listed in this manual in no way supersede established medical practices concerning patient care.

WARNING INTRAHOSPITAL TRANSPORT. Vibrations during intrahospital transport may disturb SpO_2, ECG, impedance respiration, NIBP, and IP measurements.

Indications for use cautions

CAUTION U.S. Federal law restricts this device to sale by or on the order of a physician.

CAUTION SUPERVISED USE. This equipment is intended for use under the direct supervision of a licensed healthcare practitioner.

Training requirements

No product-specific training is required for the use of the CARESCAPE ONE.

Electromagnetic compatibility

EMC warnings

WARNING Use only approved accessories, including mounts, and defibrillator-proof cables and invasive pressure transducers. For a list of approved accessories, see the supplemental information provided. Other cables, transducers and accessories may cause a safety hazard, damage the equipment or system, result in increased emissions or decreased immunity of the equipment or system, or interfere with the measurement.

WARNING Pins of connectors identified with the ESD warning symbol should not be touched. Connections should not be made to these connectors unless electrostatic discharge (ESD) precautions are used.

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

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 Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally. Consult qualified personnel regarding device/system configuration.

WARNING PARTIAL LOSS OF PARAMETERS. To prevent partial loss of parameters, do not route patient cables along with the AC mains power cord or ePort cable. Doing so may affect acquisition of parameter data.

EMC cautions

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

ESD safety precautions

- To avoid electrostatic charges building up, it is recommended to store, maintain and use the equipment at a relative humidity of 30% or greater.
- To prevent applying a possible electrostatic charge to the ESD sensitive parts of the equipment, touch the metallic frame of the component or a large metal object located close to the equipment. When working with the equipment and specifically when the ESD sensitive parts of the equipment may be touched, a grounded wrist strap intended for use with ESD sensitive equipment should be worn. See the documentation provided with the wrist straps for details of proper use. Floors should be covered by ESD dissipative carpets or similar. Special ESD-protective clothing, or optionally cotton-based clothing with natural fibres, should be used when working with the component.

3

System introduction

System safety precautions

System warnings

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

WARNING If an error message appears during operation, it is the licensed medical practitioner's responsibility to decide whether the device is still suitable for patient monitoring. As a general rule, monitoring should only continue in extremely urgent cases and under the direct supervision of a licensed healthcare practitioner. The device must be repaired before being used again on a patient. If an error message appears after power-up, the device must be repaired before being used on a patient.

WARNING PATIENT SAFETY. To avoid risks to patient safety, never modify or alter the connectors on product or accessories in any way. Alterations or modifications may affect patient safety, performance, and accuracy.

WARNING Do not place the CARESCAPE ONE in a patient bed.

Operation warnings

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

WARNING ACCURACY. If the accuracy of any value displayed on the monitor is questionable, determine the patient's vital signs by alternative means. Verify that all equipment is working correctly.

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

CARESCAPE ONE installation points to note

- To avoid electrostatic charges building up, it is recommended to store, maintain and use the equipment at a relative humidity of 30% or greater. Floors should

be covered by ESD dissipative carpets or similar ESD dissipative products. Non-synthetic clothing should be used when working with the component.

- Choose a location that affords an unobstructed view of the display and easy access to the operating controls. Position the equipment so that access to disconnection via appliance coupler or mains plug is easy and unobstructed.
- Set up the monitor in a location that affords sufficient ventilation.
- The environmental operating conditions specified in the technical specifications must be ensured at all times.
- The monitor is designed to comply with the requirements of IEC 60601-1.
- Normal operating position of the CARESCAPE ONE is mounted in a CARESCAPE Dock F0 or Mini Dock.

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

Short description of the equipment

The CARESCAPE ONE is both a multi-parameter physiological patient monitor and an acquisition device to a multi-parameter patient monitor intended for use in multiple areas and intrahospital transport within a professional healthcare facility.

The CARESCAPE ONE includes an integrated display, touchscreen, alarm light, user input buttons, and an audio subsystem. Realtime physiological parameter measurements and waveforms are displayed on the integrated display. Visual alarms are conveyed using both the integrated display and alarm light. Audible alarms are conveyed using the integrated audio subsystem. User input for configuration control and interaction is provided via the touchscreen. In addition, both a power button and touchscreen lock button are provided.

The CARESCAPE ONE can be used as a standalone monitor. In this mode of operation, the CARESCAPE ONE provides ECG, ST segment, arrhythmia detection, impedance respiration, SpO_2, non-invasive blood pressure, invasive pressure, temperature, and CO_2 airway gas parameter acquisition and monitoring.

The CARESCAPE ONE can be connected as an accessory to a host monitor. In this mode of operation, the CARESCAPE ONE provides ECG, ST segment, arrhythmia detection, impedance respiration, SpO_2, non-invasive blood pressure, invasive

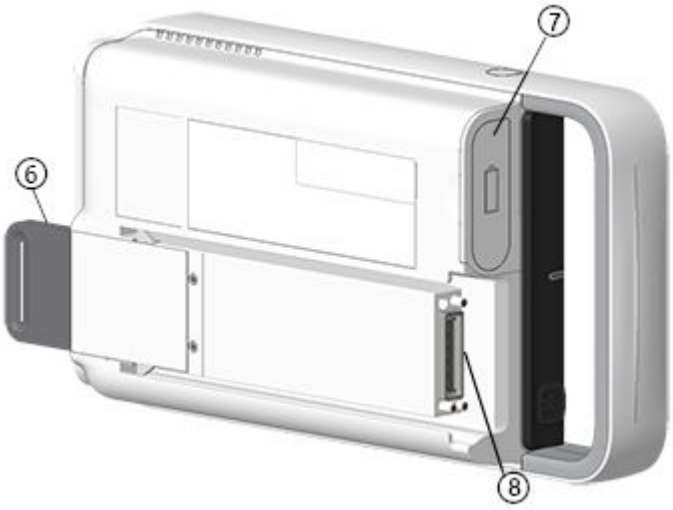
pressure, temperature, and CO_2 airway gas parameter acquisition. It also enables ECG diagnostic analysis and measurement. Visual and audible alarms, user controls, and user interface on the CARESCAPE ONE are not active in this mode.

CARESCAPE ONE system components

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

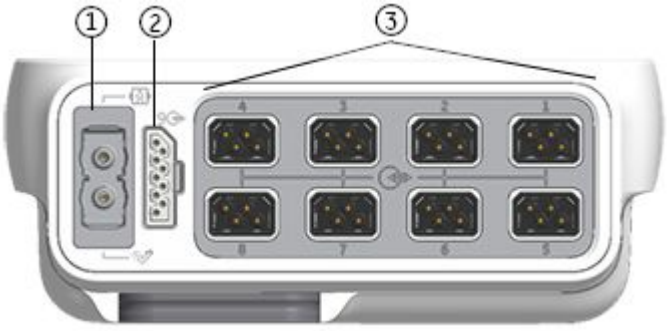
1. CARESCAPE ONE
2. CARESCAPE Dock F0: Provides powered docking and battery charging for CARESCAPE ONE.
3. Mini Dock: Provides unpowered docking for CARESCAPE ONE.
4. CARESCAPE Parameters used with CARESCAPE ONE:
   - CARESCAPE ECG
   - CARESCAPE Pressure
   - CARESCAPE Temperature
   - CARESCAPE CO_2
   - CARESCAPE SpO_2
   - CARESCAPE SpO_2 — Masimo
   - CARESCAPE SpO_2 — Nellcor
5. Parameter Dock 1 and Parameter Dock 5: Allows CARESCAPE Parameters to be mounted.

CARESCAPE ONE front and back views



1	Alarm light area (blue, yellow, or red)
2	Audio alarm paused/off indicator (blue)
3	Battery status indicator (yellow or green)
4	Power on/standby button
5	Screen lock/unlock button
6	Pull tab
7	Battery door
8	Docking interface connector to the CARESCAPE Dock F0

CARESCAPE ONE side view



1	NIBP hose connector
2	Analog out / Defibrillator synchronization connector Connect IEC 60601-1 compliant medical devices to this port only.
3	CARESCAPE Parameter connectors

CARESCAPE Parameters

Parameter	CARESCAPE Parameter
ECG	CARESCAPE ECG 3, 5, or 6 leads, or 12 leads viewed with a 10-leadwire set
Impedance respiration	CARESCAPE ECG
Invasive pressures	CARESCAPE Pressure 2
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

Power status indicator

The on/standby key indicates the power status.

LED	Description
On/standby (yellow) 	The yellow on/standby key should be lit when one of the following occurs: • The device is connected to an external power source and the device is turned off. • The device is booting up or is in standby.
On/standby (green) 	The green on/standby key indicates the device is ready for operation.
On/standby (unlit) 	The unlit on/standby key indicates there is no power applied to the device.

Battery

The CARESCAPE ONE is designed to operate on battery power when used in transport or whenever AC power is interrupted. A complete battery management system allows you to obtain maximum battery performance. On-screen capacity gauges indicate battery charge condition and capacity.

The Lithium-Ion battery is a rechargeable battery containing Lithium-Ion cells. Each battery contains an integrated electronic fuel gauge and a safety protection circuit. The processor within the equipment communicates with both the battery and the charger.

Battery status indicator

LED	Description
Yellow	Solid yellow indicates the battery is being charged.
Yellow, blinking once every 1 to 5 seconds	Slow blinking yellow indicates one of the following: • The device battery is not present. • A battery is present, but device communication with the battery cannot be established.
Yellow, blinking multiple times per second	Fast blinking yellow indicates the battery charge capacity is less than 60% of the design capacity.
Green and yellow, blinking once every 1 to 5 seconds	Slow blinking green and yellow indicates the battery time to empty is 20 minutes or less.
Green	Solid green indicates the device battery is in use.
Green and yellow, blinking multiple times per second	Fast blinking green and yellow indicates the battery time to empty is 5 minutes or less.

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 PHYSICAL INJURY. Do not install the device 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 EXPLOSION HAZARD. Do not incinerate a battery or store at high temperatures. Serious injury or death could result.

Batteries must be installed and fully charged prior to taking into use.

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.

Inserting and removing the CARESCAPE ONE battery

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 PHYSICAL INJURY. Do not install the device 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 device 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.

CAUTION LOSS OF MONITORING. To prevent loss of monitoring, only change the CARESCAPE ONE battery when CARESCAPE ONE is connected to a powered CARESCAPE Dock F0.

1. To insert a battery:
   a. Open the battery door by gently peeling down the corner of the battery door pull tab.

   b. Position the battery with the connector end facing towards the battery slot and insert the battery all the way into the battery slot.

   c. Close the battery door. Ensure that the battery door tightly seals the battery into the battery slot.

2. To remove a battery:
   a. Open the battery door by gently pulling on the battery door pull tab.
   b. Pull on the battery cord to remove the battery from the battery slot.

Checking the battery status

WARNING The battery is replaceable. Periodically check the battery and replace it when necessary.

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 battery status information.

Docks

Connecting the CARESCAPE ONE to a dock

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 Never install equipment above the patient.

WARNING Use only manufacturer specified mounts.

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

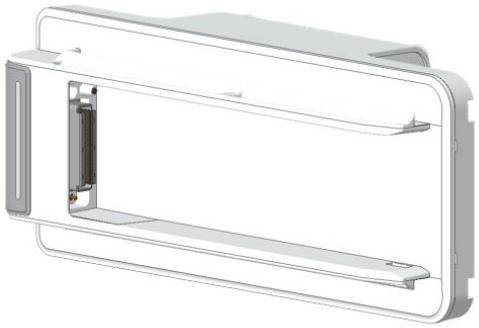
The CARESCAPE ONE has an integrated slide mount for mounting onto the CARESCAPE Dock F0 or the Mini Dock. The docks facilitate all mounting options for the CARESCAPE ONE. Refer to the supplemental information provided to identify compatible mounting hardware options.

1. Align the CARESCAPE ONE with the dock rails.
2. Push the CARESCAPE ONE into the dock until it stops. You will hear a click when it is fully docked.

Disconnecting the CARESCAPE ONE from a dock

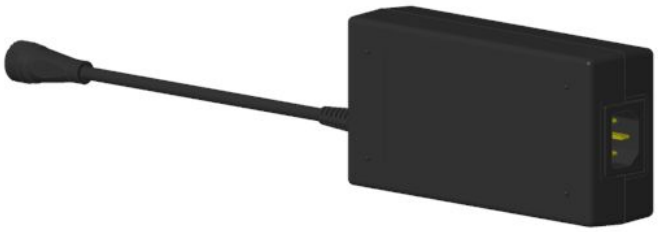
1. Pull the pull tab out and slide the CARESCAPE ONE out of the dock rails.
2. Hold onto the CARESCAPE ONE to make sure it does not drop when it comes out.

CARESCAPE Dock F0



The CARESCAPE Dock F0 provides a DC power source to a docked CARESCAPE ONE, which also charges the CARESCAPE ONE battery. The CARESCAPE Dock F0 connects with a host monitor to provide a docked CARESCAPE ONE with communication to the host monitor.

AC mains to DC power supply for CARESCAPE Dock F0

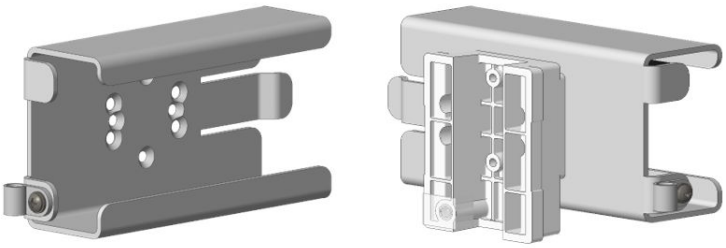


The AC mains to DC power supply connects to the CARESCAPE Dock F0 power receptacle and provides power to a docked CARESCAPE ONE. When connected to the host monitor as an acquisition device, the host monitor provides power to the CARESCAPE ONE, unless a 30 m host cable is used for the connection. In this case, the host monitor does not provide power and the CARESCAPE ONE must be connected to the AC mains to DC power supply for power.

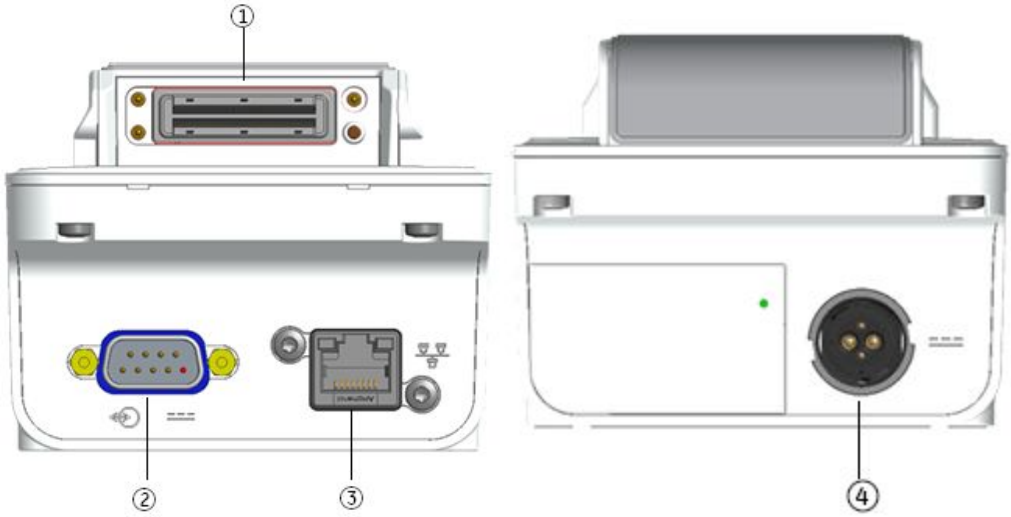
Power supply mounting bracket

The power supply mounting bracket captures the power supply and allows the power supply to be mounted to a roll stand.

Front and back views.



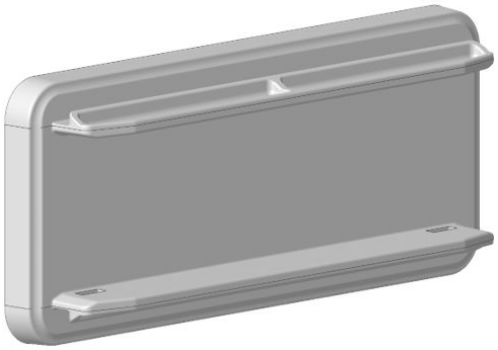
CARESCAPE Dock F0 side views



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

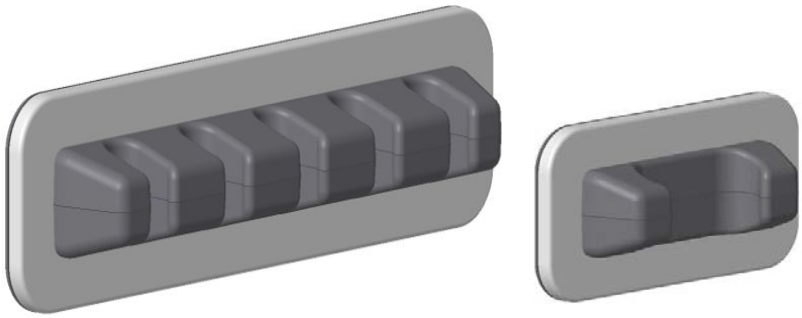
3	RJ–45 connector. The service port is configured for direct connection to a service PC only. Do not connect the service port to a network.
4	Power receptacle for the AC mains to DC power supply.

Mini Dock



The Mini Dock is an unpowered mount that allows the docked CARESCAPE ONE to be mounted to a bed rail for use during transport.

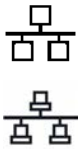
Parameter Dock 1 and Parameter Dock 5



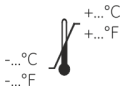
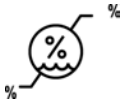
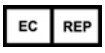
The Parameter Dock 1 and Parameter Dock 5 provide a mounting option for the CARESCAPE Parameters.

Equipment symbols

The following symbols may appear on one or more of the devices.	
	Bell cancel. Audio off.
	General alarm.
	Battery.
	On/standby button.

The following symbols may appear on one or more of the devices.	
	Non-invasive blood pressure.
	USB connectors.
	Ethernet connectors.
	Input/output.
	Gas inlet.
	Gas outlet.
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.
	Electrical equipment designed primarily for indoor use.
	Direct current.
	Stacking limit by number (number varies).
	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.

The following symbols may appear on one or more of the devices.	
	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 hardware version.
UDI	Every device has a unique marking for identification. The UDI marking appears on the device label.
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 SpO_2	CARESCAPE Parameter for measuring SpO_2 with GE TruSignal technology
CARESCAPE SpO_2 - Masimo	CARESCAPE Parameter for measuring SpO_2 with Masimo SET technology
CARESCAPE SpO_2 - Nellcor	CARESCAPE Parameter for measuring SpO_2 with Nellcor Oximax technology
	Mass of typical portable RGM (respiratory gas monitor) configuration. The indicated mass (12 kg in this example) varies per RGM configuration.
	Locked. Touchscreen lock key.
	Atmospheric pressure limitations.

The following symbols may appear on one or more of the devices.	
	Temperature limitations.
	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.
	European Union Conformity Mark
	Indicates that the product is certified for both the U.S. and Canadian markets, to the applicable U.S. and Canadian standards. Applies to Medtronic components only.
	Indicates that the product is compliant to North American safety standards. Applies to Masimo components only.
	FCC. USA only. Complies with applicable US government (Federal Communications Commission) radio-frequency interference regulations.

The following symbols may appear on one or more of the devices.	
Rx ONLY U.S.	**CAUTION** U.S. Federal law restricts this device to sale by or on the order of a physician.
	Russia only. GOST-R mark.
	Eurasian Economic Union countries only. Eurasian Conformity mark. Conformity to applicable technical regulations of Customs Union.
	Brazil only. INMETRO certificate.
	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. 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. Applies to GE design components only.
IC	Canada only. Industry Canada certification number indicates that this product meets the applicable Industry Canada technical specifications.

The following symbols may appear on one or more of the devices.	
	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.
N410	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.
PS E	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.
ANATEL	Brazil only. Approved under ANATEL (Agência Nacional de Telecomunicações) requirements.
ICASA	South Africa only. Approved under ICASA (Independent Communications Authority of South Africa) requirements.
KCC-XXX-XXX-XXXXXXXXXXXX	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

Unique Device Identifier (UDI)

UDI (01) 1234567891234(21) SJN14241237HA(11) 150628	Unique Device Identifier. (UDI) Every medical device has a unique marking for identification. The UDI marking appears on the device labeling. 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) = GS1 application identifier for the batch or lot number, followed by the batch or lot number.
- (17) = GS1 application identifier for the expiration date of the device, followed by the expiration date.

CE marking application year

CE marking application year: 2018

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 Do not perform any service activities on the monitor in the patient vicinity while a patient is connected to the monitor.

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.

4

Monitoring basics

Main screen layout

The main screen displays alarms, information, waveforms, parameter windows, and the main menu in pre-defined areas.

<table>
<tr><td>Alarm area</td><td colspan="2">Information area</td></tr>
<tr><td colspan="2">Waveform area</td><td>Upper parameter windows</td></tr>
<tr><td colspan="3">Lower parameter windows (option)</td></tr>
<tr><td colspan="3">Main menu area</td></tr>
</table>

When the information area of the screen is selected via touch, it opens the ***Admit/Discharge*** or ***Case Setup*** menu and provides access to settings related to patient information, standby and profile selections.

In addition, the information area of the screen displays the following information:

- Patient name (if entered). The patient name may be covered by an alarm message if there are three or more active alarms.
- Profile name that is being used for patient monitoring. The profile name may be covered by an alarm message if there are three or more active alarms.
- Patient icon. You can access the ***Admit/Discharge*** or ***Case Setup*** menu by selecting this icon.

- Battery icon. You can access the ***Battery Status*** menu by selecting this icon.
- Current time of day.

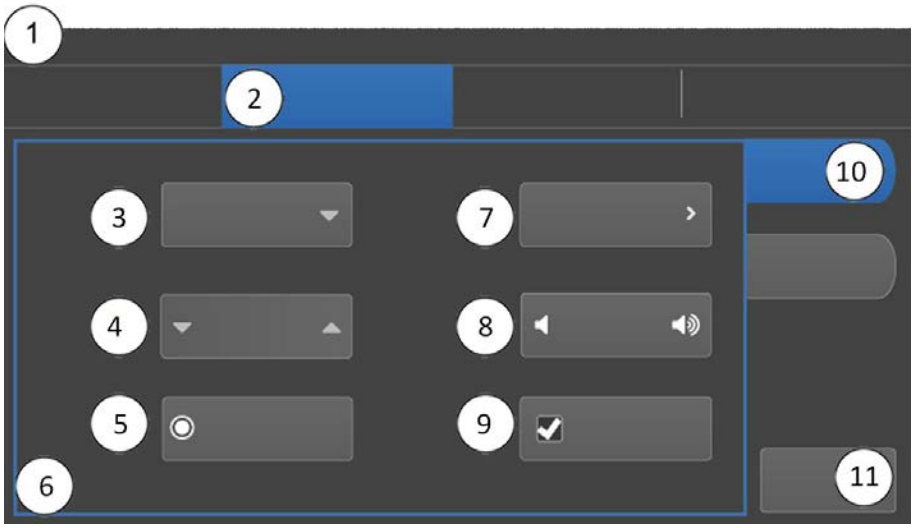
Main keys

Various functions of the monitor can be accessed through the main menu keys.

Key	Function
	Home. Close all menus/applications displayed on the monitor.
Alarms Setup	Allows access to alarm limits and priorities, arrhythmia alarm settings, audible and visual alarm indicators, and pause monitoring.
Monitor Setup	The ***Main Setup*** tab allows access to screen setup, colors, sound volumes, parameter setup, battery status, brightness settings, admit/discharge (ICU, ED, NICU software packages) or case setup (OR, PACU software packages), and standby settings. The ***Defaults & Service*** tab allows access to default setup, service calibrations, and service. The ***Monitor Info*** tab presents monitor hardware and software information.
Pt. Data & Trends	Allows access to numeric trends, trends time interval, and admit/discharge (ICU, ED, NICU software packages) or case setup (OR, PACU software packages).
NIBP Start or ***NIBP Cancel***	Start or stop a non-invasive blood pressure measurement. After selection, the key toggles to ***NIBP Cancel***. Measurement does not start unless the cuff size is defined.
NIBP Auto Start or ***NIBP Auto Stop***	Start or stop automatic non-invasive blood pressure measurements at timed intervals. After selection, the button toggles to ***NIBP Auto Stop***. Measurement does not start unless the cuff size is defined.
Zero All Pressures	Zero all invasive pressure channels. This does not apply to ICP.
	Pause audio alarm. Pause active audio alarms or pre-pause audio for incoming active alarms.

An example of a menu

The following is an example of a menu illustrating some of the components and how they are referred to in this manual:



1. Menu title (for example, ***ECG***)
2. Submenu tabs (for example, ***Setup***, ***ST***)
3. Selection lists: when selecting the arrow, a list of options appears
4. Arrow selector spinner for increasing/decreasing a value
5. Radio button for selecting or deselecting a feature from the available options
6. Help text area
7. Further menu selections
8. Selector for increasing or decreasing the volume
9. Check box for selecting or deselecting a feature
10. Tabs to access additional pages (for example, ***Page 1***, ***Page 2***)

    NOTE These tabs may also be labeled with feature names (for example, ***HR***, ***PVC/SVC Arrhythmia***).

11. Exit key (for example, ***Previous Menu***, ***Close***)

NOTE Not all menus have these same components.

Menu options

In this manual, the term select means using the touchscreen display to select an item on the screen.

Selecting menu options with a touchscreen

CAUTION To prevent loss of touchscreen functionality, the device screen should be kept clean.

NOTE Do not use pencils, pens, or other sharp objects to activate the touchscreen. The touchscreen will not function properly if tape or paper is stuck to the display surface.

1. Touch the menu option with your finger.
2. The highlight on screen moves to this option.

3. Lift your finger off the screen, and the selected function is performed (e.g., a list opens).

Data field entries

You can use the on-screen keyboard to type data into a data field. Data fields are selectable with the touchscreen.

Entering data

When data entry is required, the monitor automatically displays an on-screen keyboard for you to use.

1. Select the desired data field.

   The selected field turns yellow, indicating that you can begin entering the text.

2. Enter data by selecting the characters using the touchscreen.

About the user default settings

User default settings mean those settings (like profiles) that the user has saved into the monitor to replace the factory default settings. The monitor uses these settings when it is turned on, after a power off situation that lasts more than 2 hours, or after a patient is discharged/case is reset. If there are no user default settings, factory default settings are used.

About profiles

When you start monitoring a patient, you can use the startup profile (set during configuration) or select another profile. According to the configuration, your software may have up to eight profiles to choose from. Profiles control many settings, including parameter defaults, alarm detection limits, and alarm functionality.

Profiles are set and changes to them are saved through ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup*** > ***Save Profiles***, and they are password protected.

For more information, see the supplemental information provided.

Selecting a profile

Monitoring starts with the startup profile, but you can select another profile according to your needs. You can also change the profile while monitoring a patient without losing any patient data.

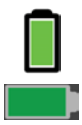
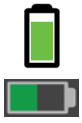
1. Select the information area on the screen.
2. Select the ***Patient*** tab.
3. Select a profile from the ***Profile*** list.

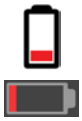
If you make changes to a profile while using it and need to return to its previous settings, first select another profile and then re-select the one you were using. If only one profile has been enabled during configuration, the only way to return to saved profile settings is through patient discharge/case end or device reset.

Supply mains interruption

If the supply mains to the equipment is interrupted for less than 2 hours and the equipment shuts down, the monitor keeps the trend data and the latest user-made settings. After 2 hours, all patient information and trend data is lost, and the monitor returns to the user default settings. For more information, see the service manual.

User interface indicators

The following indicators appear in the software user interface.	
	Alarm volume adjustment for high and medium priority. Can also be used to adjust low priority alarm volume when high, medium, and low priority alarms are configured in ***Care Unit Settings*** to ***Common for All***.
	Alarm volume adjustment for low priority.
	Audio alarms off indicator.
	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.
	Alarms audio pause indicator. Indicates that alarm audio pause has been activated.
	Acknowledge alarms indicator. Indicates that the alarm can be acknowledged by touching the alarm message.
	Low priority audio off alarm indicator.
	General warning sign. Displays when the priority setting deviates from the recommendation of international alarm safety standards.
	Touch indicator.
	Home indicator. Close all menus/applications displayed on the monitor.
	Patient indicator.
	CARESCAPE ONE battery is full indicator.
	CARESCAPE ONE battery indicator (green). The higher the charge, the bigger the green bar within the indicator.

The following indicators appear in the software user interface.	
	CARESCAPE ONE battery indicator (yellow). Appears when there is less than 20 minutes of run time left.
	CARESCAPE ONE battery indicator (red). Appears when there is less than 5 minutes of run time left.
	CARESCAPE ONE battery is charging indicator.
	CARESCAPE ONE no battery or battery error indicator.
	Red indicator (blinking): beat source indicator.
	Respiration indicator. Indicates a breath is detected by the impedance respiration algorithm.
	Volume indicator. Adjust the volume of the tone that sounds.
	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 strongest signal.
	Non-invasive blood pressure progress bar indicator. Indicates the amount of time remaining until the next automatic measurement.
*	Required input indicator.
	Normal screen page 1 and page 2 indicators. The left dot indicates page 1 and the right dot indicates page 2. The dot for the page being viewed is illuminated white.

5

Setting up the monitor before use

Normal screen and other pages

When monitoring begins, the main page appears automatically. This preconfigured page is called the normal screen. Any changes you make to the screen setup during monitoring are changes to this normal screen. These changes are not permanent unless they are saved to a profile. They are valid until the case is reset/the patient is discharged. They are also kept in the device memory for 2 hours after the power is turned off.

A second page is available to display measured parameters that do not fit on page 1 of the normal screen. Simply swipe the touchscreen with your finger to move back and forth between the pages.

Selecting the normal screen (main page)

You can return to the normal screen (main page) any time during monitoring.

1. Select  twice.

Adjusting sound volumes

You can adjust various sound volumes according to your care environment needs. While you are adjusting the volume, you will hear a corresponding sound that will guide you in determining a suitable level. All volumes other than ***Alarm Volume*** can be set to 0 if required.

1. Select ***Monitor Setup*** > ***Main Setup***.
2. Select ***Sound Volumes***.
3. Adjust the different sound volumes:
   - ***Alarm Volume***
   - ***Beat Volume***
   - ***Completed NIBP Volume***
   - ***Touch Volume***. This selection is not adjustable if it has been locked.

Brightness settings

Adjusting the display brightness

You can set the display brightness level according to your needs.

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Brightness***.
2. Use the ***Display %*** arrows to adjust the display brightness in the range of 30% to 100%.

Adjusting the alarm light brightness

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Brightness***.
2. Use the ***Alarm Light %*** arrows to adjust the brightness in the range of 40-100%.

NOTE You can also adjust the alarm light brightness through ***Alarms Setup*** > ***Audible & Visual*** > ***Volume & Light*** > ***Alarm Light %***.

Screen setup modifications

Parameter windows

The parameter windows show numeric or graphic presentation of the measurement data.

The parameter windows can be of four different sizes according to the number of selected and active parameters on screen. The sizes can be described as big (full width, full height), wide (full width, half height), extra wide (double width, half height), and tiny (full width, one quarter height). Extra wide windows can only appear in the lower parameter area, and the tiny window only appears when the ***Enter Password*** window is open (for example, when entering ***Default Setup***) and there is an active waveform:

<table>
<tr><td rowspan="2">BIG</td><td>WIDE</td><td colspan="2">EXTRA WIDE</td><td>TINY</td></tr>
<tr><td></td><td colspan="2"></td><td rowspan="2"></td></tr>
</table>

NOTE The parameter window size representations shown here are meant as comparative examples only. They do not represent the actual parameter window sizes on the monitor. Parameter window sizes on the monitor adjust automatically and the user cannot size them manually.

You can configure parameters to the lower parameter area (horizontal, lower part of the screen) and/or to the upper parameter area (vertical, on the right).

Upper parameter area

You can configure individual waveforms and parameter windows in the ***Upper Parameter Area***. The maximum number of parameter windows and waveforms that can be displayed in the upper parameter area on page 1 is four, available when no lower parameter windows are displayed.

For more information, see the supplemental information provided.

Lower parameter area

You can configure a maximum of four lower parameter windows. When the lower parameter windows are on, they reduce the space used for waveforms and upper parameter windows. You can display up to three parameter windows in the upper parameter area of the screen.

Normal screen pages

The normal screen displays parameter windows for parameters being monitored. A second page is also available. When the normal screen is full, the parameters are automatically configured to display on page 2 in a predefined priority order:

- ***ECG1***
- Invasive pressure channel 1
- Invasive pressure channel 2
- SpO_2
- CO_2
- Impedance respiration
- NIBP
- Temperature
- ***ECG2***
- ***ECG3***

Points to note about the normal screen pages:

- Parameters that have been selected to the page 1 upper parameter area will not be shown on page 2.
- Temperature is shown on page 2 only if it has not been selected to the page 1 upper parameter area or the page 1 lower parameter area.
- The NIBP parameter window is displayed on one of the pages even if nothing is connected to the NIBP connector. NIBP is shown on page 2 only if it has not been selected to the page 1 upper parameter area or the page 1 lower parameter area. There are two normal screen configurations where NIBP is not displayed:
  - Page 1 has only ***ECG1*** selected. The software will select invasive pressure channel 1, invasive pressure channel 2, SpO_2, and CO_2 for display if they are active.
  - Page 1 has only ***ECG1*** and invasive pressure channel 1 selected. The software will select invasive pressure channel 2, SpO_2, CO_2, and impedance respiration for display if they are active.
- If there is not enough space on page 2 to show all active parameters, the lowest priority parameters will not be shown.

Selecting normal screen pages

When all active parameters do not fit on the first page of the normal screen, they are automatically displayed on the second page of the normal screen. Follow these steps to move between the pages.

1. Select  to ensure that page 1 of the normal screen is displayed.

   You will see two dots at the bottom center of the waveform area. The left dot indicates page 1 of the normal screen, and the right dot indicates page 2. The dot for the active page is illuminated white.

2. Touch the waveform area on the screen and swipe your finger horizontally to the left to move from page 1 to page 2.

   The right dot illuminates white, indicating that page 2 of the normal screen is now displayed.

   If the screen does not change to page 2, you may need to swipe again using a longer stroke. The page does not change if the swipe is too short.

3. To move back from page 2 to page 1, touch the waveform area on the screen and swipe your finger horizontally to the right.

Selecting parameters to the normal screen

Most parameters appear on screen automatically when their measurement starts. However, if you cannot see the parameter you are measuring, select it to be displayed on the screen:

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Screen Setup***.
2. Select ***Upper Parameter Area*** or ***Lower Parameter Area***. On the ***Lower Parameter Area*** tab, the radio button ***On*** must be selected in order for the lower parameter area options to be selectable.
3. Select the parameters to display in the upper or lower parameter area.

Waveform field safety precautions

WARNING Always make sure that the waveform size is sufficient for the care environment.

CAUTION The waveform autoscaling feature automatically updates the display from the best possible signal amplitude. Always make sure that the waveform display scale is correctly understood and does not lead to delayed patient treatment.

Locked alarm and parameter settings

Some profile settings can be locked. Clinicians cannot adjust the locked settings for the admitted patient. These settings are indicated with a lock symbol: .

The alarm and parameter settings that can be locked are set in ***Locking Settings*** and they are password protected.

For more information, see the supplemental information provided.

Color selections

You can select display colors for all parameters according to your needs.

For more information, see the supplemental information provided.

Selecting colors for IP channels

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Colors***.
2. Select the ***Invasive Pressures*** tab.
3. Select colors from the dropdown lists for each label.

Selecting colors for other parameters

1. Select ***Monitor Setup*** > ***Main Setup*** > ***Colors***.
2. Select the ***Other Parameters*** tab.
3. Select the colors for the parameters from the dropdown lists.

Parameter configurations

Before monitoring a patient, always check the parameter setup settings and alarm limit values. Parameter settings and alarm limit values can be configured by selecting ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup***, then selecting a parameter. You can also access setup and alarm settings by selecting the parameter window of a parameter that has already been configured to the screen.

Checking the battery status

WARNING The battery is replaceable. Periodically check the battery and replace it when necessary.

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 battery status information.

Setting the touchscreen off

You can turn the touchscreen feature off when you need to clean the screen.

1. Press the touchscreen lock key on the CARESCAPE ONE once to lock the touchscreen and prevent user interaction.
2. To enable the touchscreen, press the touchscreen lock key on the CARESCAPE ONE again.

Other setup changes

All other setup changes, like care unit settings, profile settings, and time and date settings require a password. Also entering the ***DEMO mode*** requires a password.

For more information, see the supplemental information provided.

6

Starting and ending monitoring

Software packages and terminology

The terminology used in different software packages varies: in OR and PACU, you start or reset a case, and in other software packages you admit or discharge a patient. Read all instructions carefully.

Turning on the CARESCAPE ONE

CARESCAPE ONE can operate via battery power using its own battery, or via DC power when connected to a powered docking station. Refer to the device labeling for voltage and current requirements.

1. Ensure all cables are properly connected.
2. Press the on/standby button on the handle side of the CARESCAPE ONE. The welcome screen will appear.

Turning off the CARESCAPE ONE

1. Ensure that the patient has been discharged/the case has been ended.
2. Press the on/standby button for approximately 1 second.

   The ***Powering Down*** window appears to confirm you want to shut down the CARESCAPE ONE.
3. Press the on/standby button again within 10 seconds to shut down the CARESCAPE ONE.

   If you do not press the on/standby button again within 10 seconds, the CARESCAPE ONE remains on and the ***Powering Down*** window is removed from the display.

Starting monitoring

A case automatically starts/a patient is admitted when the monitor detects any of the following vital signs: ECG, impedance respiration, Art, Fem, UAC, NIBP, SpO_2, or CO_2. Each vital sign has activation criteria that must be met before the vital sign is considered active. Refer to the individual parameter chapters for more information.

A case manually starts/a patient is admitted when any patient data is entered.

Always observe the monitor and the patient carefully during startup periods and when connecting CARESCAPE Parameters.

WARNING LOSS OF MONITORING and MISSED ALARMS. When starting to monitor a patient, always make sure that you are in the normal monitoring mode and not in the ***DEMO mode***. Ensure that there is no ***DEMO MODE*** text in the waveform fields, no low priority ***DEMO MODE Not for clinical use!*** alarm in the alarm area, no ***DEMO*** MRN identification, and no ***DEMO PATIENT*** name in the patient information area. You can exit the ***DEMO mode*** by restarting the device or through ***Monitor Setup*** > ***Defaults & Service*** > ***Exit DEMO***. If the ***DEMO mode*** is active when you start monitoring, there is a risk of loss of monitoring and missed alarms.

WARNING MISINTERPRETATION OF DATA. To identify the ***DEMO mode*** data, special attention should always be paid to the ***DEMO mode*** indications (like ***DEMO Patient*** name, ***DEMO*** MRN identification). Otherwise there is a risk of misinterpreting the ***DEMO mode*** data as actual clinical data.

CAUTION DISCHARGE TO CLEAR PATIENT DATA. When admitting a new patient/starting a new case, you must clear all previous patient data from the system. To accomplish this, disconnect the patient cables, then discharge the previous patient/end the case.

The following are generic instructions listing the basic steps for starting monitoring. Parameter-specific instructions are more detailed and should always be followed as well.

1. Connect the patient to the CARESCAPE ONE according to the measurement setup requirements in the parameter-specific chapters of this document. The alarms and parameter settings become active.
2. If the startup profile is not suitable, select another profile.
3. Enter patient demographics.
4. Start the measurement.
5. Zero invasive pressure lines. Refer to the invasive pressures chapter in this document.
6. If required, change the parameters displayed on screen.
7. Check alarm limits and adjust if necessary.

Pre-monitoring checklist

Before you start monitoring a patient check the following:

- CARESCAPE Parameters are properly connected.
- Accessories are intact and properly connected.
- The CARESCAPE ONE is displaying the monitoring screen.
- No messages display indicating the CARESCAPE ONE or CARESCAPE Parameters are not functioning.
- Desired parameters are selected to view on the screen.
- Alarm signals are working and can be seen and heard in your care environment.
- Required parameter calibrations are completed.

Performance check

After turning on the CARESCAPE ONE, and during operation, the monitor runs automatic self-tests. If a malfunction is detected, the CARESCAPE ONE displays a message or an alarm, depending on the severity of the malfunction.

Entering patient data

1. Select the patient information area on the screen, or select ***Pt. Data & Trends*** > ***Admit/Discharge*** or ***Start / Reset Case***.
2. Select the ***Patient*** tab.
3. Edit or enter patient data:
   a. Select ***MRN: Second ID:***, select the field to be edited, and enter the data.

      Entering the ***Second ID:*** in addition to the ***Medical Record Number*** allows a flexible use of local patient identification methods.

   b. Select ***Name:***, select the field to be edited, and enter the data.
   c. Select ***Date of Birth: Age:*** to enter or edit the patient's date of birth or age.

      If ***Day***, ***Month***, and ***Year*** are entered, ***Age*** is automatically calculated.

   d. Select the ***Height: Weight: BSA: Gender: Ethnicity:*** field, then select values for different types of data.

      If height and weight are entered, the patient's BSA (body surface area) is automatically calculated.

Resetting a case/discharging a patient

Resetting a case/discharging a patient deletes all patient information and returns the monitor to the defined startup profile. This also happens when the CARESCAPE ONE is in ***DEMO MODE***.

All settings, including alarm limits, return to their default values. All patient data is removed from the monitor.

The CARESCAPE ONE may be configured in care unit settings with an automatic case reset/patient discharge timer. Care unit settings are password protected. If an automatic case reset/patient discharge is configured and there are no active parameters and no use of the touchscreen, monitoring will end automatically after the configured time has elapsed.

1. Disconnect patient cables.
2. Select the patient information area on the screen or select ***Pt. Data & Trends*** > ***Admit/Discharge*** or ***Start / Reset Case***.
3. Select the ***Discharge*** / ***Reset Case*** tab > ***Confirm***.

About continuing monitoring

The ***Continue*** menu opens when a decision must be made about continuing a patient case. The menu may open after a warm start (monitor shut down for 2 hours or less) or after standby. The message ***Patient in the monitor*** appears in the menu, along

with the current patient's ***MRN:***, ***Second ID:***, and ***Name:*** if they are available. Those fields are blank if the information has not previously been entered.

When CARESCAPE ONE is used as an acquisition module with a host monitor, the host monitor ***Continue*** menu provides options for handling patient data that may be stored in the CARESCAPE ONE. Refer to the host monitor user's manual for more information.

The ***Continue*** menu remains open until you select one of these options:

- Select ***Continue Current*** to continue monitoring the current patient with the settings and patient information in the monitor.
- Select ***New Patient*** (***New Case*** in OR and PACU software packages) to discharge the current patient from the monitor, deleting all patient information and resetting the monitor to the default values for all settings, including alarm limits. You can then admit the new patient to the monitor.
- Select ***Standby*** to return the monitor to standby mode. This option only appears when the monitor has come out of standby mode and there is no patient connected. It is not possible to enter standby mode if the CARESCAPE ONE detects any active parameter data.

About standby

When you remove the patient temporarily from the monitor, you can use the standby option to put the monitor on standby until the patient is reconnected to the monitor. You can also use the standby option before a patient is admitted to the monitor/patient case is started. Configure the current patient settings for the incoming patient, then put the monitor in standby to prevent nuisance alarms or automatic discharge due to monitor inactivity.

Starting standby

1. Select the patient information area on the screen or select ***Pt. Data & Trends*** > ***Admit/Discharge*** or ***Start / Reset Case***.
2. Select the ***Standby*** tab.
3. If a patient is connected, select ***Prepare for Standby*** to pause audible alarms for 2 minutes. This allows time to disconnect patient cables.

   If no patient is connected (no CARESCAPE Parameters are connected to the CARESCAPE ONE), select ***Standby*** from the ***Standby*** tab, and the monitor will immediately enter standby.
4. Disconnect the patient cables and check that ***NIBP Auto*** is turned off.

   If patient cables are still connected and the monitor receives vital signs, a message indicating that audio alarms have been paused appears.

   If you do not disconnect the cables and vital signs are still present after the audio pause time expires, the standby is canceled. You can also cancel the standby before the timer expires by selecting ***Cancel Standby***.

   The monitor will automatically enter standby when all cables are disconnected and ***NIBP Auto*** is turned off. The screen goes blank and the GE logo with the message ***Standby*** appears.

End of standby

The monitor ends the standby automatically when any of the following conditions occur:

- The touchscreen is pressed.
- At least one CARESCAPE Parameter is connected and active parameter data is detected.

7

Alarms

Alarm safety precautions

Alarm warnings

WARNING When the alarms are off or while alarm audio is paused either temporarily or indefinitely, observe the patient frequently.

WARNING MISSED ALARMS. Always make sure that the audio alarm volume level is adequate in your care environment to avoid missing alarms or not recognizing them due to too low a volume. Audio levels that are less than ambient levels may lead to unrecognized or missed alarms.

WARNING Always make sure that the alarm light brightness is adequate in your care environment.

WARNING Always make sure that necessary alarm limits are active and set according to the patient's clinical condition when you start monitoring a patient.

WARNING Verify alarm processing is active and check the patient to ensure no arrhythmias occurred during a power interruption.

WARNING Always check the alarm status after a prolonged power interruption.

WARNING Alarms do not sound and alarm histories are not stored when the alarms are turned off.

WARNING There are no alarm indications until parameter-specific alarm prerequisites have been met.

WARNING Alarm messages may not be visible on the alarm display area when three higher priority alarms are active.

WARNING Latched alarms are not retained through a monitor reset if the alarm condition has been removed.

WARNING Equipment malfunctions and alarm volume settings may result in missed alarms. Always keep the patient under close surveillance.

WARNING MIXED ENVIRONMENT. A hazard can exist when the same type of monitors in the same care area are using different monitoring profiles and default configuration settings.

WARNING MISSING CRITICAL EVENTS. Reducing the physiological alarms' priority levels lower than the default level can lead to missed detection of critical or serious events and therefore to adverse patient outcome. Keep the patient under close surveillance if you adjust the priority levels lower than the default value for the following physiological alarms:

- V Tach
- Ventricular and atrial arrhythmias
- Tachy/Brady high/low
- Frequent PVCs and SVCs
- ST high/low
- SpO_2
- RR (Impedance) high/low, RR (CO_2) high/low
- Apnea (Impedance), Apnea (CO_2)
- NIBP high/low
- IP, CPP high/low
- CO2 high/low
- Temperature high/low

WARNING Reducing the technical alarms' priority levels lower than the default level can lead to missed detection of critical events and therefore to adverse patient outcome. If you adjust the priority levels for ECG lead off, ECG Leads off, Noisy ECG, Arrhythmia paused, or SpO_2 probe off alarms lower than the default value, keep the patient under close surveillance.

Alarm overview

Alarm types

There are two types of alarm settings, system and patient-specific. System alarm settings are set globally across an entire care environment. They are configured at the time of installation and are password protected. Examples of configurable system alarm settings are:

- Minimum alarm volume allowed
- Audio and alarm light off allowed

Patient-specific alarm settings are individualized, based on a patient's current condition. Examples of patient-specific alarm settings are:

- Parameter alarm limits
- Arrhythmia alarm priority settings

Alarm conditions

- Physiological alarm conditions are triggered by a patient measurement being outside the parameter limits, by apnea, or by an arrhythmia condition.
- Technical alarm conditions are triggered by an electrical, mechanical, or other failure of the equipment, or by failure of a sensor or component. Technical alarm conditions may also be caused when an algorithm cannot classify or interpret the available data. The visual manifestation of a technical alarm is active as long as the reason for that alarm exists.
  - Certain technical alarms can be deactivated with the pause audio key. Some alarms can be configured in the ***Care Unit Settings*** and it is password protected. For more information, see the supplemental information provided.

Alarms in dual monitoring

NOTE During preparation for and return from transport, the CARESCAPE ONE is connected to a host monitor in dual monitoring. In dual monitoring, alarm messages are not shown in the alarm area and parameter window numerics do not flash on the CARESCAPE ONE display during an alarm condition because the CARESCAPE ONE is acting as an acquisition device for the host monitor.

At all other times when the CARESCAPE ONE is connected to a host monitor, the CARESCAPE ONE display remains off and all information is presented on the host monitor only.

Alarm transfer from CARESCAPE ONE to a host monitor

When the CARESCAPE ONE with an active patient case/admitted patient and active or latched alarms is connected to a host monitor, these alarms will become latched on the host monitor. Transferred alarms are considered newer than the existing alarms on the host monitor, which affects the priority order of the displayed alarms. Also note that after connection, CARESCAPE ONE alarms are reevaluated against the host monitor alarm limits and may be reactivated. If the ***Continue*** menu is opened, the alarm transfer only happens after a selection is made, meaning that alarm evaluation is happening independently on the CARESCAPE ONE and the host monitor until a selection is made.

Checking alarm function

1. Set a parameter alarm limit outside of the current measured patient values. For example, connect the SpO_2 sensor and adjust the SpO_2 high limit under the measured SpO_2 values.
2. Confirm that the following alarm notification events occur:
   - The audible alarm sounds the correct tone.
   - The alarm light illuminates.
   - The SpO_2 numeric value flashes in the parameter window with the correct color.
3. Audio pause the alarms and confirm that the alarms are paused and that the alarm silence indicator light is a solid blue color.
4. Return the parameter alarm limit to the original value.

Visual alarm indications

Alarm icons on the screen

Icon	Explanation
	Alarm off indicator
	Alarm volume indicator. Adjust the minimum alarm tone volume.
	Alarm volume high or medium indicator. Adjust the tone volume.
	Alarm volume low indicator. Adjust the tone volume.
	Audio alarms off indicator. The indicator will include a text indication of the silenced alarms.
	Audio alarms paused indicator with countdown timer. Indicates that all audio alarms are paused and the amount of time remaining for the alarm pause period as a countdown timer.
	Alarms audio pause indicator.
	Acknowledge alarms indicator. Displays in the upper right corner of the alarm message and indicates that the alarm can be acknowledged by touching the alarm message. (Alarms can also be acknowledged by selecting pause audio.)
	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.

Description of alarm and information messages

Alarm and information messages can be displayed in three areas:

- The parameter window
- The waveform field
- Alarm area (upper part of the screen)

In the alarm area, up to three alarm or information messages may be displayed from left to right, from the newest highest priority alarm to the oldest lowest priority alarm.

Alarm and information messages are stored in the clinical logs. Access to the clinical logs is a service-level function and it is password protected. The alarm and information messages stored in the clinical logs include:

- Time of occurrence
- Alarm or information message text
- Current value and the associated alarm limit if a limit alarm
- Alarm priority

About alarm message functionality

Alarm messages have alarm icons with touchable functionality. The audio pause functionality will affect all active alarms, but the alarm acknowledged only applies to the alarm you touch except when you have latched physiological alarms. They all disappear when you touch any alarm. Alarms can also be acknowledged with the pause audio key.

Touchable alarms have the following icons:

Icon	Explanation
	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.

Visual alarm signals and priority levels

Alarm signals indicate that an alarm condition is present. The alarm priority levels are also indicated. The alarm signals assume that the patient monitor and the operator are within the patient environment (1 meter / 3.3 feet).

The following table lists visual alarm signals for different alarm priority levels:

Visual signals	Priority level			
	High	Medium	Low	Informational
Parameter window physiological data values	Black text flashes inside a red box.	Black text flashes inside a yellow box.	Black text inside a cyan (blue) box.	Not applicable.
Alarm area	White text inside a red box.	Black text inside a yellow box.	White text inside a cyan (blue) box.	Black text inside a gray box.
Waveform field messages	Text	Text	Text	Text
Alarm light indicator[1]	Flashes red	Flashes yellow	Solid blue	No effect
[1] When the audible alarms are turned off or are paused, the silence alarm indicator light is a solid blue color.				

Setting the alarm light brightness

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Audible & Visual*** tab.
3. Select the ***Volume & Light*** tab.

4. Use the arrows to select an ***Alarm Light %*** value.

   The greater the value, the brighter the light.

Audible alarm indications

Audible alarm signals

When more than one alarm occurs at the same time, the monitor will sound an alarm tone for the highest priority alarm. Any lower priority audible alarm tones are suppressed by the higher priority alarm tone.

Alarm tones

The alarm tones may be configured to sound in one of two different tone patterns: ***Legacy*** or ***IEC***. ***IEC*** tones are 60601-1-8 compliant. ***Legacy*** alarm tones match the tones used on some previous GE monitoring devices.

For more information, see the supplemental information provided.

Adjusting the alarm volume

The selections in the ***Alarms Setup*** menu vary according to what has been configured in the ***Care Unit Settings*** > ***Alarms*** (password protected).

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Audible & Visual*** tab.
3. Select the ***Volume & Light*** tab.
   - Adjust the ***Alarm Volume*** value. This is the volume for all alarms.
   - Adjust the ***Alarm Volume for:*** separately for ***High & Medium Priority*** and ***Low Priority***.

The lower the number, the quieter the alarm volume. Note that the minimum allowed alarm volume levels are set in the ***Care Unit Settings***.

Audible alarm signals and priority levels

Alarm signals indicate that an alarm condition is present. The alarm priority levels are also indicated. The alarm signals assume that the patient monitor and the operator are within the patient environment (1 meter / 3.3 feet).

The following table lists alarm signals for different alarm priority levels:

Audible signals	Priority level			
	High	Medium	Low	Informational
Audible tone pattern[1] (IEC 60601-1-8)	Repeats a pattern of 5-beep tones played two times	Repeats pattern of 3-beep tones	1-beep tone once or repeatedly at 25 ±0.5 second interval (user-selectable)	None
Audible tone pattern (legacy)	Repeats pattern of 3-beep tones (crisis)	Repeats pattern of 2-beep tones (warning)	1-beep tone (advisory) once or repeatedly at 5.5 ±0.5	None

Audible signals	Priority level			
	High	Medium	Low	Informational
			second interval (user-selectable)	

[1] The IEC audible tone pattern is the factory default setting.

Auditory information signals

The monitor performs a self-diagnostic procedure at startup and generates an auditory test signal. There are also other auditory information signals indicating the status of some parameter measurements.

For more information, see the supplemental information provided.

Parameter alarms

Alarm locks

Alarm locks prevent parameter alarm limits from being turned off. When an alarm is locked, a lock icon appears next to the ***Alarm On/Alarm Off*** setting. Parameter alarm locks are set in the ***Locking Settings*** and they are password protected.

For more information, see the supplemental information provided.

Setting parameter alarm limits

Parameter alarm limits may be set in the ***Alarms Setup*** menu, or in the parameter menus' own ***Alarms*** tab. Alarm limits should not be set beyond reasonable physiological boundaries in order to maintain patient safety. Setting outside of reasonable boundaries would cause the alarms to be ineffective.

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Alarm Limits*** tab.
3. Select a parameter label.

   If you are unable to find a specific parameter, select the right arrow to display additional labels. Note that each alarm group has one common alarm adjustment window. If all alarms of an alarm group (like NIBP sys/dia/mean) are turned off, the alarm limits are replaced by the alarm off indicator: 

   Selecting a parameter label takes you to that parameter menu's ***Alarms*** tab where you can select alarms on or off, and set their limits.

Setting alarm limits automatically

When selected, the ***Auto Limits*** feature automatically sets new high limit and low limit values, based upon the current physiological value. The ***Auto Limits*** should only be used for patients whose currently measured values are considered safe.

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Alarm Limits*** tab.

3. Select ***Auto Limits***.

If you need to undo these changes and return to the previous alarm limit settings, select ***Undo Settings*** before closing the menu.

Default auto alarm limits

Parameter	High limit	Low limit
NIBP	Adult and child cuff: S/D/M: NIBP*1.25+10 Infant cuff: S/D/M: NIBP*1.25+2	Adult and child cuff: S/D/M: NIBP*0.75-10 Infant cuff: S/D/M: NIBP*0.75–2
All HR/PR parameters (ECG, SpO_2, UAC, Art, Fem)	All HR*1.25 of the current HR value	All HR*0.75 of the current HR value
PVC	PVC+10	Not applicable
SVC	SVC+10	Not applicable
$EtCO_2$	$EtCO_2$ +1%	$EtCO_2$ -1%
SpO_2	SpO_2 +5%	SpO_2 -5%
Art, Fem	Sys/Dia/Mean: Value*1.25+10mmHg Value*1.25+1.3kPa	Sys/Dia/Mean: Value*0.75-10mmHg Value*0.75-1.3kPa
FemV, CVP, PA, RAP, RVP, LAP, ICP, CPP, P1, P2	Mean: Value*1.25+5mmHg Value*1.25+0.67kPa	Mean: Value*0.75-5mmHg Value*0.75-0.67kPa
UAC	Sys/Dia/Mean: Value*1.25+5mmHg Value*1.25+0.67kPa	Sys/Dia/Mean: Value*0.75-5mmHg Value*0.75-0.67kPa
UVC	Mean: Value*1.25+5mmHg Value*1.25+0.67kPa	Mean: Value*0.75-5mmHg Value*0.75-0.67kPa
Temperature	Tx+1°C Tx+1.8°F	Tx-1°C Tx-1.8°F
Tx-Ty (e.g., T2-T1)	Tx-Ty+1°C Tx-Ty+1.8°F	Tx-Ty-1°C Tx-Ty-1.8°F
RR	RR*1.25+2	RR*0.75-2

Returning the default alarm limits

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Alarm Limits*** tab.
3. Select ***Default Limits***.

If you need to undo these changes, select ***Undo Settings*** before closing the menu. Be aware that returning to the default alarm limits will also return the stored alarm on/off status, and using the ***Undo Settings*** options will not revert any changes to the alarm on/off status.

Alarm priorities and escalation

Alarm priority levels

Physiological and technical alarms are categorized by priority level:

- High priority alarms require an immediate response.
- Medium priority alarms require a prompt response.
- Low priority alarms require you to be aware of this condition.
- Informational priority messages provide information you should know.

Alarm priority escalation

An escalating alarm starts at a designated priority level (low or medium) and will escalate to the next higher priority level of alarm (after a set number of seconds) if the alarm condition has not been resolved. It is important to note that these escalate up to the next level but will not reset until the condition has been resolved.

NOTE Alarm priority escalation affects the currently ongoing alarm condition, not any future alarms of the same type. Any new alarms will alarm at their designated priority level, not at the escalated level.

For more information, see the supplemental information provided.

Selecting parameter alarm priority levels

Escalating an alarm priority increases the priority of the alarm condition or increases the sense of urgency of an alarm signal. The alarm priority is based on clinical considerations.

The allowed priorities for different alarm groups are defined in the ***Care Unit Settings*** and they are password protected.

For more information, see the supplemental information provided.

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Alarm Priorities*** tab.
3. Select the alarm group: ***ECG***, ***Invasive Pressures***, or ***Other Parameters***.
4. Select the alarm and its priority from the list.

Selectable alarms are:

ECG	Invasive pressures	Other parameters
HR/PR high/low	*Art high/low*	*SpO2 high*
ST Segment high/low	*Fem high/low*	*SpO2 low*
Frequent PVCs	*UAC high/low*	*SpO2 probe off*
Frequent SVCs	*CVP high/low*	*NIBP high/low*
ECG lead off	*UVC high/low*	*RR (Imped.) high/low*
ECG leads off	*FemV high/low*	*Apnea (Imped.)*

ECG	Invasive pressures	Other parameters
Noisy ECG	*PA high/low*	*Resp (Imped.) measurement paused*
Arrhythmia paused	*RAP high/low*	*RR (CO2) high/low*
	RVP high/low	*Apnea (CO2)*
	LAP high/low	*CO2 high/low*
	ICP high/low	*Temp high/low*
	CPP high/low	
	P1 high/low and *P2 high/low*	

According to what has been allowed in the ***Care Unit Settings***, the selectable priorities may include the following:

- ***Escalating***, ***High***, ***Medium***, ***Low***, ***Informational***

The possible selections in the ***Care Unit Settings*** vary per parameter, so not all priorities are available for all of the alarms. The general warning sign displays when the selected alarm priority setting for the following deviates from the recommendation of international alarm safety standards:

- ***Tachy/Brady PR high/low***
- ***- V Tach***
- ***- IP high/low***
- ***NIBP high/low***
- ***- SpO2 low***
- ***- Et/Fi CO2 high/low***

Setting arrhythmia alarms

You can set the arrhythmia alarms in the ***Alarms Setup*** menu, or in the ***ECG*** menu.

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Arrhythmia*** tab.
3. Select ***Lethal Alarms***.

   You can now select the ***Alarm Priority*** and ***Create Snapshot*** options per arrhythmia. For ***V Tach***, you can also select the ***V Tach Criteria:***.
4. If Full Arrhythmia license is enabled, you can also select options for the ***Ventricular Alarms*** and ***Atrial Alarms***.
   - ***Ventricular Alarms***: You can select the ***Alarm Priority*** and ***Create Snapshot*** options.
   - ***Atrial Alarms***: You can select the ***Alarm Priority*** and ***Create Snapshot*** options. In addition, you can set the detection criteria for ***SV Tachy***: ***SVT Length***, ***HR for SVT/min***, and ***Pause Interval***.

Pausing and silencing alarms

Audible alarms off behavior

Depending on the ***Audio Alarm*** default settings configured during installation (password protected), you can turn on or turn off audible alarms.

For more information, see the supplemental information provided.

When audible alarms are turned off:

- All audible alarms are turned off except for breakthrough alarms.
- The audio off bell icon displays in the upper left corner of the display screen.
- The silence alarm indicator light is solid blue when audible alarms are paused or when audio off is selected for an alarm group.

Turning audible alarms on/off

You can turn on/off the audible physiological alarm tones for an alarm group or for all alarms.

NOTE This feature must be enabled in ***Care Unit Settings***.

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Audible & Visual*** tab.
3. Select the ***Audio On/Off*** tab.
4. Select an alarm group. Choices are:
   - ***None***: No audible alarms are turned off.
   - ***Apnea Audio Off***: Turns off audible alarms for apnea, $EtCO_2$, $FiCO_2$, and respiration rate limit alarms.
   - ***ECG Audio Off***: Turns off audible alarms for all HR and PR source limit and arrhythmia alarms.
   - ***Apnea & ECG Audio Off***: Turns off audible alarms for all HR and PR source limit, arrhythmia, apnea, $EtCO_2$, $FiCO_2$, and respiration rate limit alarms.
   - ***All Alarms Audio Off***: Turns off all audible alarms.

     NOTE The General warning sign (deviation from international alarm safety standards) is hidden when ***All Alarms Audio Off*** is selected.
5. To turn on all audible alarms again, select ***Activate All Audible Alarms*** from the ***Audio Pause*** tab, or select ***None*** as instructed above.

NOTE If alarms are turned off for any of the defined alarm groups and an alarm occurs within the alarm group, a beep tone will sound every 2 minutes as a reminder that alarms are turned off.

Pause audio behaviors

Selecting the pause audio results in different alarm behaviors depending on whether the alarms are active and/or latched or not. Acknowledging or pausing audio alarms does not affect other alarm indicators. They will still continue indicating alarms.

Active and/or latched alarms	
Selection	**Result**
Select  once	• Pauses all active audio alarms for 2 minutes. • Removes all latched alarms. • Deactivates some technical alarms.
Second selection of  during the 2 minute pause	• Starts a 2 or 5 minute audio pause period for all alarms except the breakthrough alarms. The following alarms will break through when escalated to or activated at high priority alarm condition: Asystole, V Fib/V Tach, V Tach in all software packages; in addition, Brady in the NICU software package. The 2 or 5 minute duration is a care unit setting and password protected. • Removes all new latched alarms. Some technical alarms may also be deactivated with this selection.
Select  once during audio pause	• Ends the audio pause period. • Restores all audio paused alarms if the alarm condition still exists.

No active or latched alarms	
Selection	**Result**
Select  once	• Starts a 2 or 5 minute audio pause period for all alarms except the breakthrough alarms. The following alarms will break through when escalated to or activated at high priority alarm condition: Asystole, V Fib/V Tach, V Tach in all software packages; in addition, Brady in the NICU software package.
Select  once during audio pause	• Ends the audio pause period. • Restores all audio paused alarms if the alarm condition still exists.

Pausing alarms for 5 minutes

You can pause audible alarms with the pause audio key for 2 or 5 minutes according to the care unit settings. You can also pause all alarms for 5 minutes through the ***Alarms Setup*** menu.

1. Select ***Alarms Setup*** from the main menu.
2. Select the ***Audible & Visual*** tab.
3. Select the ***Audio Pause*** tab.
4. Select ***Pause All Audio for 5 min***. This will pause all alarms, including the breakthrough alarms. It also removes latched alarms.

NOTE The General warning sign (deviation from international alarm safety standards) is hidden when ***Pause All Audio for 5 min*** is selected.

Activating all audible alarms

If necessary, you can activate all paused audible alarms before the 2 or 5 minute pause expires. Use the pause audio key, or:

1. Select ***Alarms Setup*** from the main menu.

2. Select the ***Audible & Visual*** tab.
3. Select the ***Audio Pause*** tab.
4. Select ***Activate All Audible Alarms***.

Technical alarms' deactivation with the pause audio key

Certain technical alarms can be deactivated with the pause audio key. The ***Alarm Deactivation*** setting is configured in the ***Care Unit Settings*** and it is password protected.

For more information, see the supplemental information provided.

Technical alarms for which the deactivation with the pause audio key can be allowed are:

- ***ECG Leads Off***
- ***Arterial Disconnect*** (***Art***, ***Fem***, ***UAC***)
- ***SpO2 Probe Off***

Apnea alarms' deactivation with the pause audio key

Apnea alarms can be deactivated with the pause audio key if the ***Allow alarm deactivation with the Audio Pause key for:*** setting ***Apnea (CO2/Imped.)*** is enabled in the ***Care Unit Settings***. This setting is password protected.

For more information, see the supplemental information provided.

Breakthrough alarms

The following alarms will break through when escalated to or activated at high priority alarm condition regardless of the 2 to 5 minute audible alarm pause: ***Asystole***, ***V Fib / V Tach***, ***V Tach*** (in all software packages), and ***Brady*** (in the NICU software package only).

NOTE If ***Alarms Setup*** > ***Audible & Visual*** > ***Audio Pause*** > ***Pause All Audio for 5 min*** is selected before an alarm is triggered, no alarms break through the alarm pause. The pause audio behavior is configured in ***Care Unit Settings*** and the setting is password protected.

Latched alarms

When alarms are latched, the audible alarm and visual message remain after the alarm condition no longer exists. The audible alarm can be paused with the pause audio key, and this also clears the alarm message from the screen. Alarms can be configured to latch for high priority alarms only, all alarm priorities, or none. Only physiological alarms can be latched. The ***Latching Alarms*** setting is configured in the ***Care Unit Settings*** and it is password protected.

For more information, see the supplemental information provided.

Alarm settings after a power loss

If the CARESCAPE ONE loses power, the amount of time without power affects whether or not you need to reset the alarm settings.

Power loss duration	Alarm setting status after a power loss
Up to 2 hours	The alarm settings that are in effect before the power loss are restored automatically.
Greater than 2 hours	The alarm settings revert back to the user default settings (startup profile). You must reconfigure any patient-specific alarm settings.

Alarm data stored in Clinical logs

Access to the Clinical logs is a service-level function and it is password protected.

CARESCAPE ONE stores a record of patient-related alarms and information messages as well as any adjustments to the alarm limits in the Clinical logs.

Stored alarm data during a power cycle or power loss

If the CARESCAPE ONE goes through a power cycle or a loss of power, the stored alarm data in the Clinical log is not affected. The alarm data remains stored in the Clinical log until the monitor automatically clears the oldest stored data to allow new data to be stored.

8

Transport use

Transport monitoring

You can use the CARESCAPE ONE for uninterrupted monitoring when transferring a patient from one location to another. When the CARESCAPE ONE is used as an acquisition module with a host monitor, you can disconnect it from the host monitor, retain the patient data in the CARESCAPE ONE, and continue to monitor as you move the patient.

After transport, you can return the CARESCAPE ONE to the host monitor, reconnect it as an acquisition module, and resume monitoring the patient on the host monitor.

Dual monitoring and transport

During normal monitoring when the CARESCAPE ONE is connected to the host monitor as an acquisition device, the CARESCAPE ONE display is not active. A screen saver is displayed, and all parameter data and alarm signals are presented on the host monitor because the CARESCAPE ONE is acting as an acquisition device. You can activate the CARESCAPE ONE display screen by touching it. When the CARESCAPE ONE display is activated, the message ***Acquisition mode - view only*** is displayed on it, indicating that only viewing is allowed. Parameter data will be shown on the CARESCAPE ONE for two minutes before it returns to the screen saver.

NOTE Although parameter data is displayed on the CARESCAPE ONE when you touch the screen, alarm messages are not shown in the alarm area and parameter window numerics do not flash on the CARESCAPE ONE display during an alarm condition because the CARESCAPE ONE is acting as an acquisition device for the host monitor.

When you prepare the host monitor to enter standby mode in preparation for transport, the CARESCAPE ONE display will illuminate simultaneously with the host display (dual monitoring) so you can ensure that waveforms and parameter data are visualized before disconnecting the CARESCAPE ONE for transport. If the CARESCAPE ONE is not disconnected from the host monitor within two minutes, the CARESCAPE ONE display will return to the screen saver and all monitoring will return to the host monitor. Upon return from transport when the CARESCAPE ONE is reconnected to the host monitor, the CARESCAPE ONE display remains illuminated for two minutes so you can ensure the host monitor is displaying waveforms and parameter data. During these two minute dual monitoring periods, any alarms are generated on the host monitor only.

Preparing to transport a patient

1. Place the host monitor into standby mode. Refer to the host monitor user manual for instructions.
2. Add parameters needed for transport to the CARESCAPE ONE, or remove those not needed for transport.
3. Ensure that the parameters you need to monitor during transport are selected to display on the CARESCAPE ONE screen. Refer to the chapter "Setting up the monitor before use" for more information on selecting parameters to the screen.
4. Ensure that there is a charged battery installed in the CARESCAPE ONE.
5. Disconnect the CARESCAPE ONE from the CARESCAPE Dock F0.
6. Place the CARESCAPE ONE in the transport location. Use a Mini Dock and/or a Parameter Dock 1 or Parameter Dock 5 to secure the CARESCAPE ONE and CARESCAPE Parameters during transport.

   WARNING Do not place the CARESCAPE ONE in a patient bed.

   NOTE Make sure the cables do not drag on the floor or interfere with the movement or operation of the transport bed. The cables must be placed so that they do not entangle infusion pump lines or become a hazard to the patient.

   NOTE To maintain visibility of the CARESCAPE ONE display, the bedrail mount should be mounted on a rail or headboard that provides support to the back of the mount. The bedrail mount should be used on stationary bedrails or headboards only.

   NOTE The pole mount is intended for use on a vertical pole only, and should not be used on a horizontal bedrail.

7. Transport the patient.

Returning a patient from transport

Follow these steps to return the patient to the same host monitor after transport, retaining the patient data.

1. Return the patient to the room.
2. Remove the CARESCAPE ONE from the Mini Dock.
3. Connect the CARESCAPE ONE to the CARESCAPE Dock F0 at the host monitor.

   Patient monitoring will automatically resume on the host monitor if the patient case matches. Patient data acquired on the CARESCAPE ONE during transport will be available on the host monitor.

   If the patient case does not match between the host monitor and the CARESCAPE ONE, then the ***Select Patient and Data*** window will open on the host monitor. There are four possible options:

   - You can select the patient in the CARESCAPE ONE to continue the CARESCAPE ONE patient case. This option is shown as CS ONE, along with the patient name and MRN number.

- You can select the patient in the host monitor to continue the host monitor patient case. This option will only appear if a patient is admitted to the host monitor. It is shown as the host monitor bed name plus the patient name and MRN number.
- You can merge the CARESCAPE ONE patient case with the host monitor patient case. This option is shown as the host monitor bed name + CS ONE.
- You can select ***New Patient*** to discharge the patient from the CARESCAPE ONE, deleting all patient data and history, and start monitoring a new patient/case at the host monitor

4. If needed, reconnect any parameters that were disconnected during transport.

Transport transfer settings

If a CARESCAPE ONE is taken to another unit and connected to a different host monitor as an acquisition device, the CARESCAPE ONE uses the receiving host monitor's care unit settings. For example, if the CARESCAPE ONE is disconnected from a host monitor in the ICU, the care unit settings used during transport are those from the ICU host monitor. If that same CARESCAPE ONE is then taken to the OR and connected to a different host monitor there, upon connection the CARESCAPE ONE will use the OR host monitor's care unit settings. Any changes made during transport when the CARESCAPE ONE is not docked to a host monitor are not saved when the CARESCAPE ONE is connected to another host monitor.

There are limits on the amount of data that the CARESCAPE ONE provides to a different host monitor upon connection after transport from another host monitor. The transferred history is limited to 36 ECG and arrhythmia related events, 10 ST events, and 24 hours of trended data excluding high resolution trends.

For more information, see the Transport settings section in this chapter, and the About continuing monitoring section in the Starting and ending monitoring chapter.

Transport settings

The following settings are transferred between the CARESCAPE ONE and the host monitor when the CARESCAPE ONE is connected to the host monitor.

The listed settings are transferred when patient data is transferred; either when a CARESCAPE ONE with an active patient case is connected to an empty host monitor with no patient case, when a patient case from a CARESCAPE ONE is loaded to the host monitor, or when an active CARESCAPE ONE patient case is merged with an existing host monitor patient case.

If you make changes to any of the listed settings on the host monitor, the changes are synchronized with the CARESCAPE ONE as long as the CARESCAPE ONE remains connected to the host monitor.

Current patient settings transferred from the CARESCAPE ONE to the host monitor

The following current patient settings are transferred from the CARESCAPE ONE to the host monitor at connection when a patient is admitted on the CARESCAPE ONE. If a patient is not admitted on the CARESCAPE ONE at connection, the current patient settings are not transferred from the CARESCAPE ONE to the host monitor. Instead, the current patient settings from the host monitor are transferred to the CARESCAPE ONE as described in the table Current patient settings transferred from the host monitor to the CARESCAPE ONE.	
ECG	• ***ECG 1 Lead*** • ***ECG 2 Lead*** • ***ECG 3 Lead*** • ***Lead Analysis*** • ***ST Analysis*** • ***Va Lead Position*** • ***Vb Lead Position***
Impedance respiration	• ***Resp Lead*** • ***Resp Measurement*** on/off
SpO_2	None
Non-invasive blood pressure	• ***NIBP Auto***
Invasive blood pressure	• Channel label (if the CARESCAPE ONE channel is zeroed) • ***Filter Hz*** (if the CARESCAPE ONE channel is zeroed) • ***IABP On*** (if the CARESCAPE ONE channel is zeroed)
Temperature	• ***T1 Measurement*** • ***T2 Measurement***
CO_2	None

Current patient settings transferred from the host monitor to the CARESCAPE ONE

ECG	**NOTE**	When a CARESCAPE ONE is connected to a host monitor, the host monitor displays the heart rate reading sent by the CARESCAPE ONE until the host monitor's ECG algorithm has successfully learned the ECG rhythm.
	NOTE	CARESCAPE ONE does not have group ST alarm settings in standalone mode. When a host monitor is using the group settings for ST alarm limits, individual ST alarm limits and on/off statuses are transferred to the CARESCAPE ONE when it is disconnected from the host monitor for transport. Upon reconnection after transport, the host monitor group settings are used again. You should always check the ST alarm settings on the CARESCAPE ONE after disconnecting for transport to make sure they are appropriate for the patient being transported.
	• ***A Fib*** > ***Alarm Priority***	

- ***A Fib*** > ***Create Snapshot***
- ***Accelerated Ventricular*** > ***Alarm Priority***
- ***Accelerated Ventricular*** > ***Create Snapshot***
- ***Arrhythmia Level***
- ***Arrhythmia paused*** alarm priority
- ***Asystole*** > ***Create Snapshot***
- ***Bigeminy*** > ***Alarm Priority***
- ***Bigeminy*** > ***Create Snapshot***
- ***Couplet*** > ***Alarm Priority***
- ***Couplet*** > ***Create Snapshot***
- ***ECG 1 Lead***
- ***ECG 2 Lead***
- ***ECG 3 Lead***
- ***ECG Lead Off*** alarm priority
- ***ECG Leads Off*** alarm priority
- ***Frequent PVCs*** high alarm priority
- ***Frequent SVCs*** high alarm priority
- ***HR*** alarm limits
- ***HR*** alarm on/off
- ***HR for V Tach/min***
- ***HR for SVT/min***
- ***HR/PR high/low*** alarm priority
- ***Irregular*** > ***Alarm Priority***
- ***Irregular*** > ***Create Snapshot***
- ***ISO Point***
- ***J Point***
- ***Lead Analysis***
- ***Missing Beat*** > ***Alarm Priority***
- ***Missing Beat*** > ***Create Snapshot***
- ***Multifocal PVCs***> ***Alarm Priority***
- ***Multifocal PVCs*** > ***Create Snapshot***
- ***Noisy ECG*** alarm priority
- ***Pacemaker Detection***
- ***Pause*** > ***Alarm Priority***
- ***Pause*** > ***Create Snapshot***
- ***Pause Interval***
- ***PR (SpO2/IP) high/low*** alarm delay
- ***Primary HR Source***

	• ***Frequent PVCs*** alarm limits • ***Frequent PVCs*** alarm on/off • ***QRS Width*** • ***R on T*** > ***Alarm Priority*** • ***R on T*** > ***Create Snapshot*** • ***Size*** • ***ST XXX*** alarm limits; where XXX = ECG site label • ***ST XXX*** alarm on/off; where XXX = ECG site label • ***ST Analysis*** • ***ST Point*** • ***ST Segment high/low*** alarm priority • ***SV Tachy*** > ***Alarm Priority*** • ***SV Tachy*** > ***Create Snapshot*** • ***Frequent SVCs*** alarm limits • ***Frequent SVCs*** alarm on/off • ***SVT Length*** • ***Trigeminy*** > ***Alarm Priority*** • ***Trigeminy*** > ***Create Snapshot*** • ***Va Lead Position*** • ***Vb Lead Position*** • ***V Brady*** > ***Alarm Priority*** • ***V Brady*** > ***Create Snapshot*** • ***V Fib / V Tach*** > ***Create Snapshot*** • ***V Tach*** > ***Alarm Priority*** • ***V Tach*** > ***Create Snapshot*** • ***VT > 2*** > ***Alarm Priority*** • ***VT > 2*** > ***Create Snapshot***
Impedance respiration	• ***Apnea (Imped.)*** limit seconds • ***Apnea (Imped.)*** alarm priority • ***Cardiac Artifact*** alarm on/off • ***Imped. Resp Smoothing*** • ***Resp (Imped.) measurement paused*** alarm priority • ***Resp Rate (Imped.)*** alarm limits • ***Resp Rate (Imped.)*** alarm on/off • ***RR (Imped.) high/low*** alarm priority • ***RR (Imped.) high*** alarm delay • ***RR (Imped.) low*** alarm delay • ***Sensitivity***

	• ***Size***
SpO_2	• ***Averaging*** • ***PR(SpO2)*** alarm limits • ***PR(SpO2)*** alarm on/off • ***Response*** • ***Sensitivity*** • ***Show Sat. Seconds*** • ***Saturation Seconds*** • ***SpO2*** alarm limits • ***SpO2*** alarm on/off • ***SpO2 high*** alarm delay • ***SpO2 high*** alarm priority • ***SpO2 low*** alarm delay • ***SpO2 low*** alarm priority • ***SpO2 probe off*** alarm priority
Non-invasive blood pressure	• ***Cuff Size*** • ***Cycle Time*** • Diastolic alarm limits • Diastolic alarm on/off • Mean alarm limits • Mean alarm on/off • ***NIBP high/low*** alarm priority • Systolic alarm limits • Systolic alarm on/off
Invasive blood pressure	• Channel 1 and 2 systolic alarm limits • Channel 1 and 2 systolic alarm on/off • Channel 1 and 2 diastolic alarm limits • Channel 1 and 2 diastolic alarm on/off • Channel 1 and 2 mean alarm limits • Channel 1 and 2 mean alarm on/off • Channel label (if the CARESCAPE ONE channel is not zeroed) • ***Filter Hz*** (if the CARESCAPE ONE channel is not zeroed) • ***IABP On*** (if the CARESCAPE ONE channel is not zeroed) • ***Art high/low*** alarm priority • ***CPP high/low*** alarm priority • ***CVP high/low*** alarm priority • ***Fem high/low*** alarm priority • ***FemV high/low*** alarm priority

	• ***ICP high/low*** alarm priority • ***IP High/Low*** alarm priority levels allowed • ***P1 high/low*** alarm priority • ***P2 high/low*** alarm priority • ***PA high/low*** alarm priority • ***LAP high/low*** alarm priority • ***RAP high/low*** alarm priority • ***RVP high/low*** alarm priority • ***UAC high/low*** alarm priority • ***UVC high/low*** alarm priority
Temperature	• ***T1*** alarm limits • ***T1*** alarm on/off • ***T1 Label*** • ***T2 Label*** • ***T2-T1*** alarm limits • ***T2*** alarm limits • ***T2*** alarm on/off • ***Temp high/low*** alarm priority
CO_2	• ***Apnea limit seconds*** • ***Apnea (CO2)*** alarm priority • ***CO2 Average*** • ***CO2 high/low*** alarm priority • ***EtCO2*** alarm limits • ***FiCO2*** alarm limits • ***FiCO2*** alarm on/off • ***FiO2 level %*** • ***N2O level %*** • ***RR (CO2) high/low*** alarm limits • ***RR (CO2) high/low*** alarm priority

Care unit settings transferred from the host monitor to the CARESCAPE ONE

ECG	• ***Allowed Arrh. Levels*** • ***Arrhythmia Alarms Informational Allowed*** • ***ECG Lead Off*** alarm priority levels allowed • ***ECG Leads Off*** alarm priority levels allowed • ***HR Alarms*** (***Single*** or ***Multiple***) • ***HR/PR Alarms Low Priority Allowed*** • ***Noisy ECG, Arrh. Paused*** alarm priority levels allowed

	• ***Size*** • ***ST Alarms Informational Allowed*** • ***ST Point*** • ***V Tach*** alarm priority levels allowed
Impedance respiration	• ***Apnea (Imped.)*** alarm priority levels allowed • ***Resp (Imped.) Meas. Paused*** alarm priority levels allowed • ***RR (Imped.) High/Low*** alarm priority levels allowed
SpO_2	• ***SpO2 low Low Priority Allowed*** • ***SpO2 Probe Off*** alarm priority levels allowed
Non-invasive blood pressure	• ***NIBP High/Low*** alarm priority allowed levels
Invasive blood pressure	None
Temperature	• Configurable label • ***Temperature Alarms Informational Allowed***
CO_2	• ***CO2 High/Low Escalating Allowed***

Transport troubleshooting

Problem	Solution
A parameter is not visible on the CARESCAPE ONE during transport	• Check that the CARESCAPE Parameter is connected to the CARESCAPE ONE. • Check that the parameter is selected to the CARESCAPE ONE screen. Keep in mind that the parameter may be configured for display on page 2. • The parameter may only be available when CARESCAPE ONE is operating as an acquisition module at a host monitor.
The host monitor does not recognize the patient case when returning from transport	• Check that the CARESCAPE ONE is securely connected to the F0 dock. • Is the host monitor the same one used for this patient previously? If yes, the host monitor may have been discharged remotely while the patient was on transport. Use the host monitor ***Select Patient and Data*** window to select the CARESCAPE ONE patient.

9

ECG

ECG compatibility limitations

For detailed information regarding CARESCAPE ONE, CARESCAPE Parameter, and accessory compatibility, see the supplemental information provided.

ECG safety precautions

ECG warnings

WARNING Make sure that the leadwire set clips or snaps do not touch any electrically conductive material including earth.

WARNING When using an electrosurgery unit, note that the measurement cables do not incorporate means to protect against burns in case of a defective ESU return electrode. To avoid burns at the monitor measurement sites, ensure the following:

- Proper contact of the ESU return electrode to the patient.
- ESU return electrode near the operating area.
- Measurement electrodes, leadwires and probes far from the surgical site and the ESU return electrode.

WARNING This device is intended to record electrocardiograms from surface ECG electrodes. It is not meant for positioning (floating) temporary pacemaker leadwires, performing pericardiocentesis, or other internal applications.

WARNING The ***Maximum*** filter may alter the displayed ECG morphology. Do not make measurements from the displayed or printed ECG when this filter is selected. Displayed ST values are calculated before applying the ***Maximum*** filtering and may differ from values measured from the displayed or printed ECG.

WARNING When transitioning from a 10-lead cable to a 6-, 5-, or 3-lead cable, select the ***Update Lead Set*** option to clear the ***Lead off*** message from the display.

WARNING Disconnected electrodes or loose electrode connections can lead to missed critical severity ECG alarms. If the device reports ***Leads off*** after selecting ***Update Lead Set*** option, always check the electrode connections to the patient.

WARNING CONDUCTIVE CONNECTIONS. Extreme care must be exercised when applying medical electrical equipment. Many parts of the human/machine circuit are conductive, such as the patient, connectors, electrodes, transducers. It is very important that these conductive parts do not come into contact with other grounded, conductive parts when connected to the isolated patient input of the device. Such contact would bridge the patient's isolation and cancel the protection provided by the isolated input.

WARNING DELAYED ASYSTOLE ALARM. The pulsatile heart rate may have a slower response time than the electrical heart rate where there is a low perfusion patient condition. When using the IntelliRate feature in this situation, the device may delay calling an ASYSTOLE patient alarm. The user may elect to turn the IntelliRate feature off for patients at risk of these events, otherwise patient treatment may be delayed. Such patients should always be kept under close observation.

WARNING NOISY ECG alarm. The ***Noisy ECG*** alarm indicates that the system is no longer monitoring ECG and there may be no ***HR high***, ***HR low***, ***Tachy*** or ***Brady*** alarms. If you adjust the alarm priority level lower than the default value, keep the patient under close surveillance.

WARNING ARRHYTHMIA PAUSED alarm. The ***Arrhythmia paused*** alarm indicates that the system is no longer monitoring ECG and there may be no ***HR high***, ***HR low***, ***Tachy*** or ***Brady*** alarms. If you adjust the alarm priority level lower than the default value, keep the patient under close surveillance.

WARNING INACCURATE HEART RATE INDICATION. The electrical and pulsatile heart rate values provided by the various monitored parameters (ECG, SpO_2, blood pressures) may differ markedly. These differences may be due to underlying physiologic conditions (e.g., electromechanical dissociation, pulseless electrical activity, non-perfusing rhythms) or to inaccuracies in the heart rate values caused by artifact, poor signal quality, or arrhythmias. The user may elect to turn the IntelliRate feature off for patients at risk of these events, otherwise patient treatment may be delayed. Such patients should always be kept under close observation.

WARNING ELECTRODES. Whenever patient defibrillation is a possibility, use non-polarizing (silver/silver chloride construction) electrodes for ECG monitoring. Polarizing electrodes (stainless steel or silver constructed) may cause the electrodes to retain a residual charge after defibrillation. A residual charge will block acquisition of the ECG signal.

WARNING DEFIBRILLATOR PRECAUTIONS. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires.

WARNING HEART RATE ALARM INTERFERENCE. Poor cable positioning or improper electrode preparation may cause line isolation monitor transients to resemble actual cardiac waveforms and thus inhibit heart rate alarms. To minimize this problem, follow proper electrode placement and cable positioning guidelines provided with this device.

ECG cautions

CAUTION The patient's skin may become irritated after prolonged contact with electrode gel or adhesive.

ECG measurement limitations

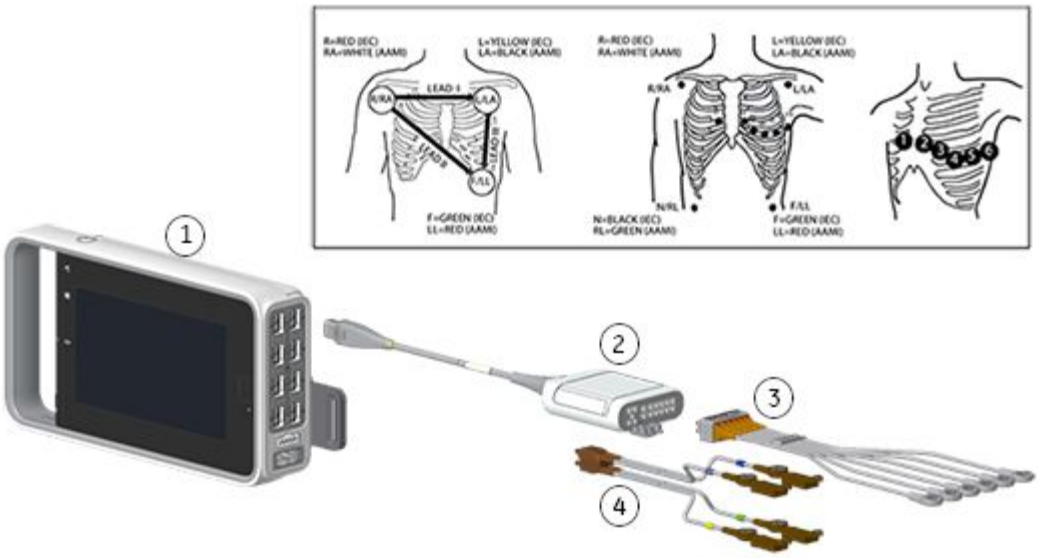
- The monitor will display a ***Leads off*** message in an input overload condition, or upon disconnection of electrode leadwires.

ECG points to note

- This equipment is suitable for use in the presence of electrosurgery, as tested according to IEC 60601-2-49 clause 202.6.2.101 Electrosurgery interference.
- For information on materials used in accessories and their biocompatibility, refer to the instructions for use in the accessory package.
- Defibrillator discharge may affect the ECG measurement. Refer to the supplemental information provided for details regarding the recovery time from defibrillator discharge.
- Pre-gelled ECG electrodes are recommended. Check the expiration date.
- Make sure the electrode gel is moist.
- Make sure the electrodes have good skin contact.
- Replace all electrodes at least every 24 to 48 hours.
- Select the ***Deactivate ECG Leads Off*** option to remove a ***Leads off*** message from the display when a cable is off.

ECG measurement setup

ECG equipment to patient connection with CARESCAPE ONE



1. CARESCAPE ONE
2. CARESCAPE ECG
3. AAMI/AHA or IEC 3-leadwire, 5-leadwire, or 6-leadwire set
4. AAMI/AHA or IEC precordial leads leadwire set

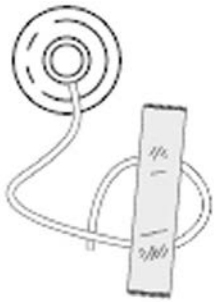
Preparing the patient's electrode sites

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.

Applying the electrodes to the patient

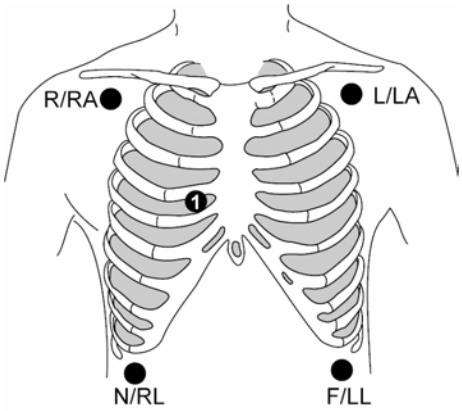
1. Place the electrodes on the prepared sites.
2. Stabilize the electrode and leadwire with a leadwire stress loop near the electrode.
3. Tape the stress loop to the patient (excluding neonates).



A secured stress loop prevents leadwire rotation about the electrode snap, leadwire tugging at the electrode, and ECG artifact.

3- lead or 5-lead ECG electrode placement

For a 3-leadwire electrode placement, the R/RA, L/LA, and F/LL electrodes should be used.

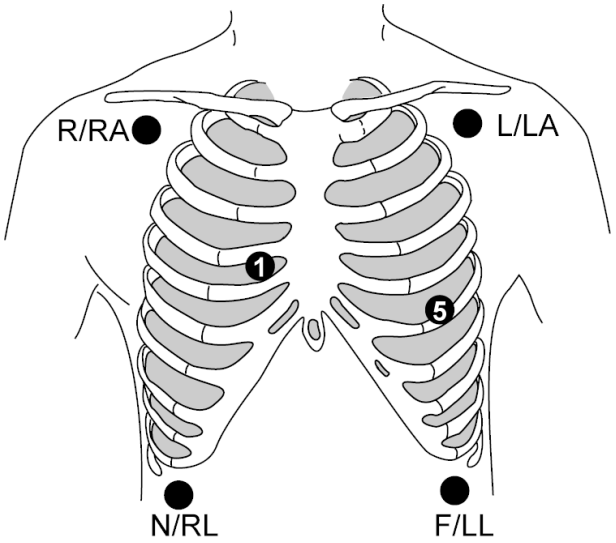


IEC	AAMI/AHA	Electrode placement
R (red)	RA (white)	Just below the right clavicle.
L (yellow)	LA (black)	Just below the left clavicle.
User defined C1-C6 (Indicated as 1 in the electrode placement graphic.)	User defined V1-V6 (Indicated as 1 in the electrode placement graphic.)	For the 5-lead placement, 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

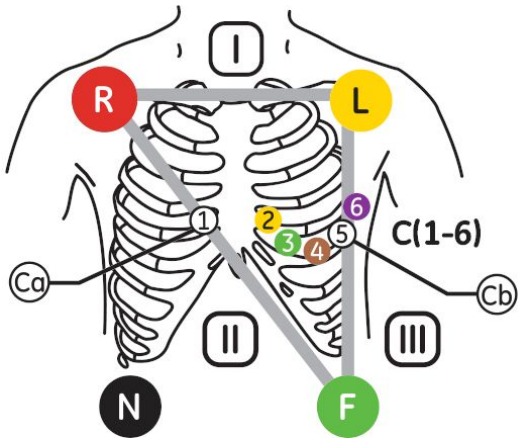
NOTE A 6-leadwire cable should be used for 12RL™ monitoring. Position the Ca/Va electrode in the C1/V1 position and place the Cb/Vb electrode in the C5/V5 position. The leadwire

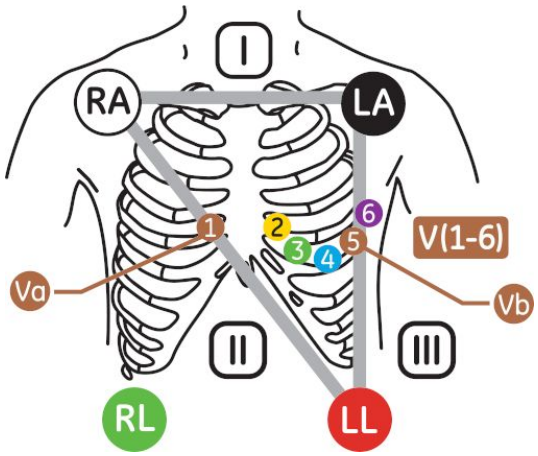
labels for the Ca/Va and Cb/Vb leads are white (IEC) or brown (AAMI/AHA). The 12RL should be used for adult patients only.



IEC	AAMI/AHA	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

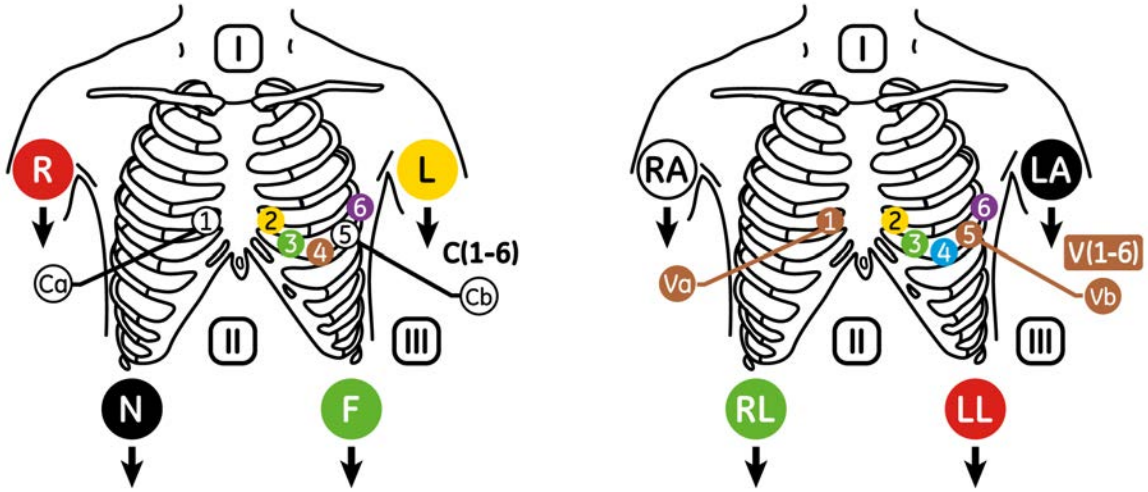




IEC	AAMI/AHA	Electrode placement
R (red)	RA (white)	Just below the right clavicle.
L (yellow)	LA (black)	Just below the left clavicle.

IEC	AAMI/AHA	Electrode placement
N (black)	RL (green)	Lower right edge of the rib cage.
F (green)	LL (red)	Lower left edge of the rib cage.
Ca/C1 (white)	Va/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/V4.
C4 (white/brown)	V4 (brown/blue)	5th intercostal space, mid-clavicular line.
Cb/C5 (white/black)	Vb/V5 (brown/orange)	Left anterior axillary line at C4/V4 level.
C6 (white/purple)	V6 (brown/purple)	Mid-axillary line at C4/V4 and Cb/C5/Vb/V5 levels.

Standard resting 10–lead ECG electrode placement



IEC	AAMI/AHA	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.
Ca/C1 (white)	Va/V1 (brown)	4th intercostal space, right border of the sternum.
C2 (white/yellow)	V2 (brown/yellow)	4th intercostal space, left border of the sternum.
C3 (white/green)	V3 (brown/green)	Midway between C2/V2 and C4/V4.
C4 (white/brown)	V4 (brown/blue)	5th intercostal space, mid-clavicular line.

IEC	AAMI/AHA	Electrode placement
Cb/C5 (white/black)	Vb/V5 (brown/orange)	Left anterior axillary line at C4/V4 level.
C6 (white/purple)	V6 (brown/purple)	Mid-axillary line at C4/V4 and Cb/C5/Vb/V5 levels.

Checking the ECG measurement

1. Check that the waveforms and parameter values are displayed without any error messages when the cable is connected to the patient.

About the ECG analog output signal

Maximum delay of the ECG analog output signal is 35 ms. Pacemaker pulse indication is included when appropriate and it is summed in to the ECG waveform.

ECG synchronization pulse delay from the R-wave peak is <35 ms, with the exception of wide QRS (120 ms/0.5 mV).

For more information and detailed specifications, refer to the supplemental information provided.

The analog output signal is ECG 1 lead (top waveform position).

Using the ECG measurement

The first three displayed ECG leads

You can choose the order of the ECG waveforms displayed in the ECG waveform area.

Lead selection depends on the type of ECG cable used.

The ***ECG 1 Lead*** setting affects arrhythmia detection.

When ***ECG 1 Lead***, ***ECG 2 Lead***, or ***ECG 3 Lead*** are changed manually and the lead becomes inactive due to a disconnection, the monitor looks to the ECG lead saved in the patient profile. If the saved ***ECG 1 Lead*** is not available, the monitor looks for lead II, then lead I, and lastly lead III. Later, if the manually selected lead becomes available again, the monitor will change back to this lead.

Selecting the first displayed ECG lead

The ***ECG 1 Lead*** is the first ECG lead displayed in the ECG waveform area. For single-lead analysis when aVR, aVL, or aVF is set as the ***ECG 1 Lead***, the following mapping is used: aVR = II, aVL = I, aVF = III.

1. Select the HR parameter window > ***Setup*** > ***Page 1***.
2. Select a lead from the ***ECG 1 Lead*** list.

Selecting the second displayed ECG lead

The ***ECG 2 Lead*** is the second ECG lead displayed in the waveform area. Depending on the configuration of parameters and waveforms selected to display, the ***ECG 2 Lead*** may appear on page 2 of the display.

1. Select the HR parameter window > ***Setup*** > ***Page 1***.

2. Select a lead from the ***ECG 2 Lead*** list.

   If your selection is ***Cascade***, the displayed ***ECG 1 Lead*** waveform continues into the ***ECG 2 Lead*** waveform area.

Selecting the third displayed ECG lead

The ***ECG 3 Lead*** is the third ECG lead displayed in the waveform area. Depending on the configuration of parameters and waveforms selected to display, the ***ECG 3 Lead*** may appear on page 2 of the display.

1. Select the HR parameter window > ***Setup*** > ***Page 1***.
2. Select a lead from the ***ECG 3 Lead*** list.

   If your selection is ***Cascade***, the displayed ***ECG 2 Lead*** waveform continues into the ***ECG 3 Lead*** waveform area.

Selecting the Va ECG lead

NOTE 12RL™ monitoring - The Va lead is the first V-lead label used with a 6-leadwire ECG cable for 12RL monitoring. An accurate 12RL is possible only if the Va is set to V1. Be sure to place the leads correctly to obtain an accurate 12RL.

The factory default for the Va lead is V1, however you may choose a different lead.

The Va lead is the only V-lead used with a 5-leadwire ECG cable.

1. Select the HR parameter window > ***Setup*** > ***Page 1***.
2. Select a lead from the ***Va Lead Position*** list.

Selecting the Vb ECG lead

NOTE 12RL™ monitoring - The Vb lead is the second V-lead label used with a 6-leadwire ECG cable for 12RL monitoring and must be set to ***V5*** for an accurate 12RL. Be sure to place the leads correctly to obtain an accurate 12RL.

When using a 6-leadwire ECG cable, the factory default for the Vb lead is V5, however you may choose a different lead.

1. Select the HR parameter window > ***Setup*** > ***Page 1***.
2. Select a lead from the ***Vb Lead Position*** list.

Changing to an ECG cable with fewer leadwires

This selection will update the measurement mode among 3-, 5-, 6-, and 10-lead mode when changing to fewer leadwires.

1. Select the HR parameter window > ***Setup*** > ***Page 1***.
2. Select ***Update Lead Set***.

Deactivating the ECG leads off alarm

The selection is available when there are not enough leads connected for arrhythmia or heart rate detection. This selection will acknowledge the ***ECG Leads Off*** alarm, but it will not change the measurement mode to fewer leads.

1. Select the HR parameter window > ***Setup*** > ***Page 1***.
2. Select ***Deactivate ECG Leads Off***.

Setting the beat volume

1. Select the HR parameter window > ***Setup*** > ***Page 2***.
2. Set the beat tone volume with the ***Beat Volume*** selector.

   The range is 0 (volume off) to 10.

Selecting the beat source

1. Select the HR parameter window > ***Setup*** > ***Page 2***.
2. Select the beat source from the ***Beat Source*** list:
   - ***Primary HR*** (The beat source is the same as the primary HR source selection.)
   - ***ECG*** (The beat source is ECG regardless of the primary HR source selection.)
   - Invasive pressure channel(s) labeled ***Art*** X, ***Fem*** X, or ***UAC*** X, where X = channel number.
   - ***Pleth (SpO2)***

The beat source indicator ❤ will appear beside the chosen beat source on the screen, and the beat sound will reflect the beat of that source.

Setting the beep tone during bradycardia alarms

NOTE NICU software package only.

This selection is available if the ***Beat Volume*** for QRS is set to 0 (off).

If the alarm for bradycardia has been set to off or silenced, or the ECG alarms are silenced permanently, then the QRS tone does not sound, either.

1. Select the HR parameter window > ***Setup*** > ***Page 2***.
2. Select the ***Beat Tone on Brady Only*** check box to enable the beep tone.

   When the beep tone is on, the QRS tones will sound only with ***Brady*** alarm conditions.
   - If the alarm volume has been set to below 8, the QRS tones will sound at the selected alarm volume level +2 more levels.
   - If the alarm volume has been set to 8 or more, the QRS tones will sound at alarm volume level 10.

Selecting the ECG waveform size

This selection adjusts the size of the displayed ECG waveform.

1. Select the HR parameter window > ***Setup*** > ***Page 2***.
2. Select a value from the ***Size*** list.

   The selections are ***0.5x***, ***1x***, ***2x***, ***4x***. The smaller the value, the smaller the waveform.

NOTE The ***Size*** setting affects arrhythmia detection and heart rate calculation sensitivity. Normal waveform size/QRS detection sensitivity is ***1x***. Size ***2x*** and greater increases the QRS detection sensitivity. This may be helpful for low amplitude QRS waveforms. Use with caution since baseline artifact may be detected as a QRS complex.

Selecting the hemodynamic waveform sweep speed

NOTE This setting adjusts the waveform speed for all of the hemodynamic parameters.

1. Select the HR parameter window > ***Setup*** > ***Page 2***.
2. Select a numeric value from the ***Hemo Sweep Speed*** list.

   The smaller the value, the slower the sweep speed.

Selecting the ECG waveform filter

You can select how the waveform appears on the display.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 1***.
3. Select a filter from the ***Waveform Filter*** list. Choices are:
   - ***Diagnostic***: 0.05 Hz to 150 Hz
   - ***Monitoring***: 0.05 Hz to 32 Hz (with 50 Hz powerline frequency), 0.05 Hz to 40 Hz (with 60 Hz powerline frequency)
   - ***Moderate***: 0.05 Hz to 23 Hz
   - ***Maximum***: 4.5 Hz to 27 Hz
     When the ***Maximum*** filter is selected, the prompt text ***Warning: Maximum filter alters the displayed ECG morphology*** is displayed at the bottom of the setting window.

Setting the QRS width

NOTE This setting affects the arrhythmia detection sensitivity.

If the ***QRS Width*** is locked in the ***Locking Settings***, the option is not selectable.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 1***.
3. Select a setting from the ***QRS Width*** list. Choices are:
   - ***Narrow***: Intended for use with all neonates and the pediatric patient with a QRS complex width of 100 ms or less. This is the default setting for the NICU software package and for the ***Infant*** and ***Pediatric*** profiles.
   - ***Normal***: Intended for ECG rhythms that have wider QRS complex widths, for example, almost all adult patients and any patient with electronic ventricular pacing.

Selecting the leads for ECG analysis

You can choose whether the monitor performs an ECG analysis using single lead ECG data or data from multiple ECG leads. Multiple ECG leads will typically reduce false alarms and improve the detection sensitivity. However, if most leads are noisy or low amplitude, the ***Single lead*** mode using the best available ECG lead will help.

With a 3-leadwire cable the setting is ***Single lead*** and cannot be changed. If the measurement mode is changed from the 3-leadwire mode to 5-, 6-, or 10-lead mode, the setting changes to ***Multi lead***.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 1***.
3. Select an option from the ***Lead Analysis*** list. The choices are:
   - ***Single lead***: The EkPro algorithm uses one of the leads I, II, III, or V1 for the analysis. For single-lead analysis when aVR, aVL, or aVF is set as the ***ECG 1 Lead***, the following mapping is used: aVR = II, aVL = I, aVF = III. Also note that the ST values are only calculated for the single lead.
   - ***Multi lead***: The EkPro algorithm uses the following leads:
     - 5-lead and 6-lead mode: I, II, III, and any lead assigned to Va.
     - 10-lead mode: I, II, III, and V1.

Relearning the patient's QRS pattern

During ECG monitoring, you may need to use the ***Relearn QRS*** feature when a dramatic change in the patient's ECG pattern has occurred. Allowing the monitor to learn the new ECG pattern corrects false arrhythmia alarms and heart rate values, and restores the ST measurements. Relearning takes typically 30 seconds or less. The message ***Relearning...*** displays in the ECG1 waveform area while the monitor relearns the QRS pattern. During this time, arrhythmia detection is not available. If the monitor is not able to relearn due to a low amplitude QRS, for example, the ***Arrhythmia paused*** alarm is triggered. Be aware that if arrhythmia is turned off, the ***Noisy ECG*** alarm is triggered instead.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 1***.
3. Select ***Relearn QRS***.

Automatic relearning takes place when:

- The measurement mode changes between the 3-lead mode and any other lead mode.
- The ***ECG 1 Lead*** selection is changed in the 3-lead mode or in single-lead analysis.
- The Va lead selection is changed in the 5- and 6-lead modes.
- The ***Lead Analysis*** setting is changed from ***Multi lead*** to ***Single lead***.
- The patient is discharged/case is ended.

Setting the primary HR source

The primary heart rate can be calculated from the ECG leads, SpO_2 measurement, or invasive pressure waveform.

NOTE This setting adjusts the primary heart rate source for all of the hemodynamic parameters.

1. Select the HR parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select a parameter from the ***Primary HR Source*** list. The selection list will only show active measurements and ***AUTO***, ***IntelliRate***, or ***ECG***. Choices are:
   - Single HR: ***AUTO***, ***IntelliRate***, ***ECG***, invasive pressure channel(s) labeled ***Art*** X, ***Fem*** X, or ***UAC*** X where X = channel number, ***Pleth (SpO2)***.
   - Multiple HR: ***AUTO***, ***IntelliRate***, ***ECG***.

   For more information about ***AUTO*** and ***IntelliRate***, see the ECG measurement practicalities section in this chapter.

Selecting HR alarm range

With the ***Single HR Alarms*** setting only.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 2***.
3. Select the heart rate alarm range from the ***HR Alarm Range*** list:
   - ***30 - 240*** (set and disabled if the ***Primary HR Source*** is ***IntelliRate***, ***AUTO***, or ***Pleth (SpO2)***.)
   - ***20 - 300***

Showing another value in the HR parameter window

In addition to the primary HR, you can display another value in the HR parameter window.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 2***.
3. Select an option to display in the HR parameter window from the ***Show with HR*** list:
   - ***ST***
   - ***PVC***
   - ***2nd HR***
     - If the primary HR source is ***ECG***, ***AUTO*** (ECG), or ***IntelliRate*** (ECG), the secondary HR source displayed in the order: primary arterial source (***Art*** X, ***Fem*** X, or ***UAC*** X, where X = channel number), ***SpO2***.
     - If the primary HR source is anything other than mentioned above, the secondary HR source is always ***ECG***.
   - ***Off***

Displaying the ECG grid

You can have a reference grid in the ***ECG1***, ***ECG2***, and ***ECG3*** waveform areas. The grid points will be at 200 ms horizontally and 0.5 mV vertically.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 2***.
3. Select the ***ECG Grid*** check box to display the grid.

ECG alarm limits

The ***HR Alarms*** can be set to ***Single*** or ***Multiple*** through ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup*** > ***Care Unit Settings*** > ***Parameters***. This setting is password protected.

The ***Single*** heart rate alarm setting allows you to set one common HR limit for multiple sources (e.g., ECG, SpO_2, Art) and the PVC and SVC alarm limits for ECG from the ***HR Alarms Arrhythmia*** tab. With this setting activated, turning off the SpO_2 or invasive pressure (Art, Fem, UAC) HR alarm limits also turns off the primary HR alarm, and adjusting the SpO_2 or invasive pressure (Art, Fem, UAC) HR limit values also adjusts the primary HR limit value.

The ***Multiple*** heart rate alarm setting allows you to set a primary heart rate/pulse rate source and up to three individual heart rate/pulse rate alarms and limits from the ***HR Alarms Arrhythmia*** tab. It also allows you to set PVC and SVC alarm limits for ECG. With the ***Multiple*** heart rate setting activated, turning off the SpO_2 HR alarm limits does not turn off the primary HR alarm. The invasive pressure channels that appear in the ***HR Alarms Arrhythmia*** tab depend on the channels that are configured for arterial pressures. A maximum of 2 channels will appear if both invasive pressure channels are configured to arterial pressures, (e.g., ***Fem 1***, ***Art 2***).

The HR alarm delay is configurable from 0 to 20 seconds in increments of 5 seconds for the invasive pressure and SpO_2 parameters. For more information, see the supplemental information provided.

Setting HR alarm limits for a single HR source

1. Select the HR parameter window.
2. Select the ***HR Alarms Arrhythmia*** tab, then select the ***HR*** tab.
3. Check that the required alarm is turned on.
4. Select ***Alarm On*** to enable the alarms.
5. Adjust the alarm limits with the arrows.

Setting HR/PR alarm limits for multiple HR sources

1. Select the HR parameter window.
2. Select ***HR Alarms Arrhythmia*** > ***HR/PR***.
3. Check that the required alarm is turned on.
4. Select the ***Alarm On*** check box for those alarms you wish to set.
5. Adjust the alarm limits with the arrows.

Setting PVC alarm limits

Available only when full arrhythmia detection is enabled.

1. Select the HR parameter window.
2. Select ***HR Alarms Arrhythmia*** > ***PVC/SVC Arrhythmia***.
3. Check that the ***PVC*** alarm is turned on.

   If a feature is not active, the alarm limits are greyed out.
4. Select ***Alarm On*** to enable the alarms.
5. Adjust the alarm limits with the arrows.

Setting SVC alarm limits

Available only when full arrhythmia is enabled.

1. Select the HR parameter window.
2. Select ***HR Alarms Arrhythmia*** > ***PVC/SVC Arrhythmia***.
3. Check that the ***SVC*** alarm is turned on.

   If a feature is not active, the alarm limits are greyed out.
4. Select ***Alarm On*** to enable the alarms.
5. Adjust the alarm limits with the arrows.

ECG alarm priorities

You can set the alarm priorities for certain ECG alarms through ***Alarms Setup*** > ***Alarm Priorities*** > ***ECG***. The allowed priorities are defined in the ***Care Unit Settings***, and they are password protected.

ECG measurement practicalities

Alternate pulse rate source

The alternate pulse rate source allows clinicians to acquire a pulse rate from a source other than ECG (Art, Fem, UAC, or SpO_2). The following circumstances may warrant the use of an alternate pulse rate source:

- Excessive artifact due to an electrical interference from equipment (e.g., electrosurgical device).
- Excessive patient movement causing significant artifact (e.g., seizure activity).
- Inability to use standard lead placement (e.g., burns).

IntelliRate algorithm

The ***IntelliRate*** algorithm extracts information from multiple physiological signals (ECG, SpO_2, and Art, Fem or UAC when selected as the primary arterial channel) and applies rule-based logic to determine which heart rate source has the highest likelihood of being accurate. The ***IntelliRate*** algorithm can also suppress alarms for ***Asystole***, ***V Fib / V Tach***, and ***V Tach*** if the algorithm determines that there is a high likelihood of a false arrhythmia call. By reporting the most accurate rate, the trended pulse rate is more accurate, and occurrences of false pulse rate limit violation alarms

are greatly reduced. The alternate pulse rate source value replaces the standard heart rate value in the HR parameter window.

Auto algorithm

The ***AUTO*** algorithm selects the first available heart rate source based on a pre-defined parameter priority:

1. ECG
2. Primary arterial site
3. SpO_2

ECG troubleshooting

Problem	Solution
ECG signal is noisy or no QRS is detected	• Ensure that the patient is not shivering. • 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 ***Size 2x*** or ***4x***. • Try an alternative location for the Va lead to improve signal quality. In some cases, like if the patient has a significant heart failure, changing for example from V5 to V1 can result in a considerable difference in the signal amplitude. • Select the appropriate filter to apply to the displayed waveforms by selecting the HR parameter window > ***Advanced*** > ***Page 1*** > ***Waveform Filter***. This does not affect QRS detection or arrhythmia analysis. • Check all cable connectors.
Why are the QRS complexes marked with an X?	Defibrillator synchronization markers are identified with an X on the QRS complexes.
Numeric values are replaced by dashes.	• Reconnect the CARESCAPE ECG. • Replace the CARESCAPE ECG. • If the problem persists, contact qualified service personnel.

About the 12RL™ feature

NOTE 12RL is not available with the NICU software package.

NOTE Although reconstructed (interpolated) leads can be viewed on the CARESCAPE ONE in standalone mode, the CARESCAPE ONE must be connected to a host monitor as an acquisition device to obtain a 12RL report.

NOTE Reconstructed (interpolated) leads cannot be selected for pacemaker detection or impedance respiration monitoring.

12RL uses a standard 6-leadwire electrode placement to acquire leads I, II, III, AVR, AVF, AVL, V1 and V5. The four precordial leads (V2, V3, V4, V6) are not acquired from the patient. This reconstruction assumes accurate electrode placement and typical anatomy.

For 12RL monitoring, a 6-leadwire cable should be used.

On the monitor, reconstructed (interpolated) leads can be identified by a "d" before the lead name: ***dV2***, ***dV3***, ***dV4***, and ***dV6***.

Pacemaker detection

Pacemaker detection warnings

WARNING RATE METERS. Keep pacemaker patients under close observation. Rate meters may continue to count the pacemaker rate during cardiac arrest and some arrhythmias. Therefore, do not rely entirely on rate meter alarms. See the supplemental information provided for disclosure of the pacemaker pulse rejection capability of this device.

WARNING FALSE CALLS. False low heart rate indicators or false Asystole calls may result with certain pacemakers because of pacemaker artifact such as electrical overshoot of the pacemaker overlapping the true QRS complexes.

WARNING MONITORING PACEMAKER PATIENTS: The monitoring of pacemaker patients can only occur with the pace program activated.

WARNING PACEMAKER INDICATION. Pacemaker activity is indicated on the electrocardiogram through the display of a different colored pacemaker marker pulse. All pacemaker marker pulses appear upright and uniform and should not be used for diagnostic interpretation.

WARNING PATIENT HAZARD. A pacemaker pulse can be counted as a QRS during Asystole when pacemaker detection is on. Keep pacemaker patients under close observation.

WARNING PATIENT HAZARD. Asystole may not be detected if the patient has a pacemaker that produces high-amplitude pacer spikes and pacemaker detection is on. Keep pacemaker patients under close observation.

Pacemaker detection points to note

- Pacemaker detection is on by default. If you turn pacemaker detection off, you should turn it back on for patients with pacemakers. Pacemaker detection must be used whenever the monitored patient has a pacemaker.
- The following leads are used for pacemaker detection:
  - 5-lead mode: Leads R/RL, L/LA, F/LL, and C/V

  - 10-lead mode: Leads R/RL, F/LL, C1/V1, and C5/V5
- Pacemaker detection is done on leads I, II, and V simultaneously.
- The V lead plays a critical role in pacemaker detection.

Selecting the pacemaker detection

Pacemaker detection must be turned on. However, you may disable pacemaker event processing by turning off pacemaker detection. When pacemaker detection is turned off, the monitoring device ignores pacemaker pulse detections, which may adversely affect the heart rate accuracy of the monitoring device.

1. Select the HR parameter window.
2. Select ***Advanced*** > ***Page 1***.
3. Select a value from the ***Pacemaker Detection*** list.
   - ***Sensitive (Pace 2)***: Includes pacemaker marker pulses in the waveform with a more sensitive lower threshold on the pace pulse amplitude.
   - ***Normal (Pace 1)***: Detects and draws pacemaker marker pulses in the waveform. The detection is less sensitive to electromagnetic interference. This option is recommended when the interference level is high, for example due to an LVAD device or infusion pumps.
   - ***Off***: Pacemaker pulse are not detected or marked with pacemaker marker bars. Pacemaker pulses are shown as they appear in the waveform signal.

Pacemaker detection troubleshooting

Problem	Solution
How does activating pacemaker detection impact monitoring?	• Beats that would otherwise be classified as ventricular are instead classified as V-paced if a ventricular pacemaker event is detected. • Residual pacemaker energy that might otherwise appear in the ECG is removed, and a pacemaker enhanced spike is placed in the ECG. • On the ECG waveform, pacemaker detection is indicated by uniform, upright pacemaker enhancement spikes in the ECG data.
How can pacemaker detection be improved?	• Possible problems include: ▪ Heart rate double counting. ▪ Inaccurate alarms for low heart rate or asystole. ▪ Pacemaker spikes not recognized by the software. ▪ False PVC detections and arrhythmia alarms. • Possible solutions include: ▪ Relearn ECG. ▪ Re-prepare the patient skin, replace the electrodes, and adjust the electrode placement. ▪ Try an alternate electrode placement. ▪ Try single-lead analysis, if available.

Problem	Solution
	▪ Switch to another pacemaker detection mode.
Why is the monitor double-counting the heart rate, alarming for a low heart rate, or not detecting pacemaker spikes?	The monitor is not detecting pacemaker activity. Causes may include: • The pacemaker detection program is turned off. Turn it on, reprep the skin and reposition the electrodes if necessary. Relearn ECG. • The pacemaker signal is too weak for the monitor to detect. • The ECG signal is too weak for the monitor to detect. • The monitor is detecting atrial pacemaker artifact or non-QRS features as beats. If the monitor is alarming for low heart rate or asystole, assess the QRS amplitude: • View each ECG lead 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. • If necessary, reprep the skin and reposition the electrodes. • Relearn ECG.

Arrhythmia monitoring

Arrhythmia monitoring warnings

WARNING V Fib/V Tach should not be considered a substitute for the V Tach arrhythmia alarm. Efforts to lower the V Tach alarm level can result in missed ventricular tachycardia alarms.

WARNING LOSS OR DETERIORATION OF ARRHYTHMIA DETECTION. Automated arrhythmia analysis programs may incorrectly identify the presence or absence of an arrhythmia. A physician must therefore interpret the arrhythmia information in conjunction with other clinical findings. Please take special note of the following ECG waveform conditions:

- Noisy waveforms. Noisy portions of ECG waveforms are typically excluded from analysis. The exclusions are necessary to reduce the occurrence of inaccurate beat interpretations and/or rhythm alarms. If the excluded noisy portions of the ECG waveform contain true arrhythmia events, those events may remain undetected by the system.
- Beat amplitude and duration. Accurate detection and interpretation of beats becomes increasingly difficult as the amplitude and/or duration of those beats approach

the design limits of the analysis program. Thus, as beats become extremely wide or narrow, or especially as beats become small, arrhythmia interpretation performance may degrade.

- Other morphology considerations. Automated arrhythmia detection algorithms are designed fundamentally to detect significant changes in QRS morphology. If an arrhythmia event is present and does not exhibit a significant change from the patient's predominant morphology, it is possible for those events to remain undetected by the system.

WARNING PAUSED ANALYSIS. Certain conditions pause arrhythmia analysis. When paused, arrhythmia conditions are not detected and alarms associated with arrhythmias do not occur. Conditions causing paused arrhythmia analysis include arrhythmia off, arrhythmia paused, leads fail, alarm pause, all alarms off, and discharged patient.

WARNING FAILURE TO DETECT LETHAL ARRHYTHMIA. Always monitor ECG for arrhythmia detection purposes. HR calculated from pulsatile SpO_2 waveform may differ significantly from ECG HR measured values. Users should be aware that the ***SpO2 probe off*** and ***Check probe*** technical alarms escalate no higher than a ***Medium*** priority.

WARNING FAILURE TO DETECT LETHAL ARRHYTHMIA. The SpO_2 parameter pulsatile heart rate measurement is based on the optical detection of a peripheral flow pulse and therefore cannot detect arrhythmias. The pulse oximetry parameter should not be used as a replacement or substitute for ECG based arrhythmia analysis.

WARNING ARRHYTHMIA PAUSED alarm. The ***Arrhythmia paused*** alarm indicates that the system is no longer monitoring arrhythmia or heart rate from ECG. If you adjust the alarm priority level lower than the default value, keep the patient under close surveillance.

Arrhythmia measurement limitations

- Since the arrhythmia detection algorithm sensitivity and specificity is less than 100%, sometimes there may be some false arrhythmias detected and also some true arrhythmia events may not be detected. This is especially true when the signal is noisy.
- The ECG size and QRS width settings affect arrhythmia detection and heart rate calculation sensitivity.
- If QRS amplitude is low, the monitor might not be able to calculate HR and false Asystole, Arrhythmia Paused, or Brady alarms may occur.
- During the learning phase of the algorithm, arrhythmia detection is not available. As a result, the patient condition should be closely monitored during the learning phase and for several minutes after the learning phase to allow the algorithm to reach optimal detection performance.

Setting the arrhythmia category to alarm

Depending on what has been allowed in ***Care Unit Settings*** > ***Parameters*** > ***Allowed Arrh. Levels***, you can select different arrhythmia categories to alarm.

1. Select ***Alarms Setup***.
2. Select the ***Arrhythmia*** tab.
3. Select ***Setup***.
4. Select the ***Arrhythmia Level*** category you want to alarm:
   - ***Full***: All arrhythmias alarm.
   - ***Lethal***: Only lethal arrhythmias alarm.
   - ***Off***: No arrhythmia alarms are generated.

Setting arrhythmia alarms

While monitoring ECG, you can adjust the settings for arrhythmia alarm conditions.

1. Select ***Alarms Setup***.
2. Select the ***Arrhythmia*** tab.
3. Select ***Lethal Alarms***, ***Ventricular Alarms***, or ***Atrial Alarms***.
4. Select an arrhythmia from the list.
5. Select the arrhythmia alarm's ***Alarm Priority***.
6. Select the check box for ***Create Snapshot*** if you wish to activate an arrhythmia snapshot creation.

   Snapshots are not displayed on the CARESCAPE ONE, but they can be viewed on a host monitor when the CARESCAPE ONE is connected as an acquisition device.

Setting HR for V Tach

This setting determines the minimum value for the HR to trigger the ***V Tach*** alarm.

1. Select ***Alarms Setup***.
2. Select the ***Arrhythmia*** tab.
3. Select ***Lethal Alarms*** > ***V Tach*** tab.
4. Select a value from the ***HR for V Tach/min*** list. The options are 90 to 300 beats per minute, in increments of 10.

Setting the pause interval

You can set the time interval between the two adjacent beats before the pause alarm condition is annunciated.

1. Select ***Alarms Setup***.
2. Select the ***Arrhythmia*** tab.
3. Select ***Atrial Alarms*** > ***Pause*** tab.
4. Select a value from the ***Pause Interval*** list.

Setting the SVT length

This setting determines how many consecutive SVCs are needed to trigger the ***SV Tachy*** alarm.

1. Select ***Alarms Setup***.
2. Select the ***Arrhythmia*** tab.
3. Select ***Atrial Alarms*** >***SV Tachy*** tab.
4. Select a value from the ***SVT Length*** list.

Setting HR for SVT

This setting determines the minimum value for the HR to trigger the ***SV Tachy*** alarm.

1. Select ***Alarms Setup***.
2. Select the ***Arrhythmia*** tab.
3. Select ***Atrial Alarms*** > ***SV Tachy*** tab.
4. Select a value from the ***HR for SVT/min*** list.

Arrhythmia alarm messages

NOTE A clinician must analyze the arrhythmia information in conjunction with the other clinical findings.

Alarm message	Arrhythmia analysis	Alarm priority default	Arrhythmia detection criteria
A Fib	***Full*** All software packages except NICU	According to priority setting	Absence of P-waves and irregular RR-interval.
Accel. Ventric.	***Full***	According to priority setting	Accelerated ventricular rhythm - Run of PVCs with a run length of at least six beats and the rate requirements have not been met for the ***HR for V Tach /min*** setting.
Asystole	***Full, Lethal***	High	HR decreased to zero, or beat detection has not occurred in the last 5 seconds.
Bigeminy	***Full***	According to priority setting	Every other beat is PVC (N-V-N-V-N-V).
Couplet	***Full***	According to priority setting	Two consecutive PVCs are detected between normal beats, N-V-V-N. The coupling interval between the PVCs must be less than 600 ms.
Irregular	***Full*** NICU software package only	According to priority setting	Six consecutive normal RR intervals vary by 100 ms or more.

Alarm message	Arrhythmia analysis	Alarm priority default	Arrhythmia detection criteria
Missing Beat	***Full*** All software packages except NICU	According to priority setting	Actual RR interval more than 1.8 times the average RR interval.
Multifocal PVCs	***Full***	According to priority setting	Within 16 previous beats two or more PVCs with different morphologies are detected.
Pause	***Full***	According to priority setting	Coupling interval between two beats exceeds 1 to 5 seconds (configurable).
R on T	***Full***	According to priority setting	Isolated PVC is detected within 100 ms of the peak of the T-wave of the patient's predominant normal beat.
SV Tachy	***Full***	According to priority setting	A run of SVCs is detected with a run length of at least the set ***SVT Length*** and the heart rate is at least the set ***HR for SVT /min***.
V Brady	***Full***	According to priority setting	Run of PVCs are detected with a run length of at least three beats. In addition, at least two consecutive RR intervals in the run must have an effective heart rate less than 50 bpm.
V Fib / V Tach	***Full, Lethal***	High	ECG waveform indicates a chaotic ventricular rhythm.
V Tach	***Full, Lethal***	According to priority setting. Always High if V Tach duration >30 seconds, and HR ≥180 bpm in NICU or ≥150 bpm in other software packages, and HR is over the user adjusted HR high limit.	A run of PVCs is detected with a run length of six beats or more and the effective HR exceeds the selected ***HR for V Tach /min*** value.
VT > 2	***Full***	According to priority setting	A run of PVCs is detected with a run length of more than two beats but less than the number required for ***V Tach***. In addition at least two consecutive RR intervals in the run must have an effective HR that

Alarm message	Arrhythmia analysis	Alarm priority default	Arrhythmia detection criteria
			exceeds selected ***HR for V Tach /min*** value.

About the arrhythmia detection

When an ECG signal is detected at the start of monitoring, the arrhythmia detection algorithm begins acquiring and analyzing QRS complexes in the leads used for arrhythmia detection. This phase is known as learning. Once learning is complete, the dominant QRS complex is stored as a reference template. The reference template is used as a normal morphology of that patient and it is compared with incoming beats to identify possible arrhythmias.

The EK-Pro arrhythmia detection algorithm is used. EK-Pro simultaneously analyzes leads I, II, III, and V or Va. Once learning is complete, the dominant QRS complex becomes the template.

The algorithm uses continuous correlation, incremental template updating and contextual analysis. Continuous correlation attempts to find the best match between each incoming complex and the set of stored (learned) templates. If no match is found with the existing template, a new template is stored for the identified new QRS shape. Incremental template updating allows information from each beat, that correlates over time, to be reflected in the associated template. Contextual analysis uses information from neighboring QRS complexes along with existing template measurements to make the best possible decision regarding the beat's origin (e.g., early, wide).

Arrhythmia troubleshooting

Problem	Solution
Why is the monitor 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. 1. Assess the patient. 2. Check the ECG signal acquired from the patient. 3. 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. 4. Relearn the ECG rhythm. It is important to relearn the patient's ECG pattern any time the electrode configuration is adjusted. 5. The ECG size settings affect the arrhythmia detection and heart rate calculation. Increase the ECG size by selecting a value from the ***Size*** list. If the problem continues, switch to the ECG lead with the greatest amplitude, display that lead, then

Problem	Solution
	switch to single lead analysis so all arrhythmia interpretations are based on this single ECG lead.
How does the IntelliRate algorithm impact an ***Asystole*** alarm with a QRS waveform?	IntelliRate will report ***Asystole*** when the following conditions are met: • The ECG HR has been valid and stable during the previous 30 seconds. • The invasive pressure pulse rate was valid earlier, but does not indicate beat detections in the previous 30 seconds. • The mean arterial blood pressure of the invasive pressure pulse rate source is below the user-selected limit. • The SpO_2 parameter if available does not indicate beat detections in the previous 30 seconds. **NOTE** IntelliRate performs this analysis only when pacemaker detection is configured on.
Why is the monitor 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 each ECG lead 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 the ECG rhythm. It is important to relearn the patient's ECG pattern any time the electrode configuration is adjusted. 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.

ST detection

About the ST analysis

If enabled, ST analysis starts automatically after the ECG leads have been connected and QRS detection has started. Once the program has completed the learning phase, ST values are updated every 10 seconds.

ST detection

During the learning period, the algorithm uses the isoelectric reference and the J+ reference points to calculate the ST values. The algorithm automatically searches for the J and ISO points.

ST detection measurement limitations

- ST values may be affected by such factors as some drugs or metabolic and conduction disturbances.
- Changes in heart rate may affect ST.
- The ST algorithm has been tested for accuracy of the ST segment data. The significance of the ST segment changes needs to be determined by a physician.

ST detection points to note

ST segment deviations are not displayed for patients with ventricular pacemakers or if the rhythm is considered as from ventricular origin.

Starting the ST detection

1. Select the ST parameter window or select the HR parameter window and the ***ST*** tab.
2. Select ***On*** from the ***ST Analysis*** list.

ST alarm limits

You may set the ST alarm limits for individual leads.

Setting alarm limits for individual leads

1. Select the ST parameter window.
2. Select ***ST Alarms***.
3. Select ***Alarm On*** for an ECG lead to adjust its alarm limits.

   If the alarm is locked, there is a lock symbol beside the check box and the selection is not available.
4. Set ***High*** and ***Low*** alarm limits.

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Impedance respiration

Impedance respiration compatibility limitations

For detailed information regarding CARESCAPE ONE, CARESCAPE Parameter, and accessory compatibility, see the supplemental information provided.

Respiration safety precautions

Respiration warnings

WARNING Make sure that the leadwire set clips or snaps do not touch any electrically conductive material including earth.

WARNING The impedance respiration measurement is inherently very sensitive as it measures very small physiological signals (changes of impedance of the patient's chest area). Electromagnetic interference may cause erroneous measurements at various frequencies, for example interference with the signal/ waveform, leading to respiration rate readings inconsistent with the patient's true respiration rate. If you notice this, use another form of respiration monitoring, for instance end-tidal CO_2.

WARNING When using an electrosurgery unit, note that the measurement cables do not incorporate means to protect against burns in case of a defective ESU return electrode. To avoid burns at the monitor measurement sites, ensure the following:

- Proper contact of the ESU return electrode to the patient.
- ESU return electrode near the operating area.
- Measurement electrodes, leadwires and probes far from the surgical site and the ESU return electrode.

WARNING APNEA EVENTS. The device may not detect all episodes of inadequate breathing, nor does it distinguish between central, obstructive, and mixed apnea events.

WARNING DEFIBRILLATOR PRECAUTIONS. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires.

WARNING ELECTRODE CONFIGURATION. Impedance respiration monitoring is not reliable when ECG electrodes are placed anywhere but on the chest.

WARNING ELECTRODES. Whenever patient defibrillation is a possibility, use non-polarizing (silver/silver chloride construction) electrodes for ECG monitoring. Polarizing electrodes (stainless steel or silver constructed) may cause the electrodes to retain a residual charge after defibrillation. A residual charge will block acquisition of the ECG signal.

WARNING If the ***Cardiac Artifact*** alarm is turned off, apnea events may not be detected.

Respiration cautions

CAUTION The impedance respiration measurement may cause rate changes in Minute Ventilation Rate Responsive Pacemakers. Set the pacemaker rate responsive mode off or turn off the impedance respiration measurement on the monitor.

Respiration measurement limitations

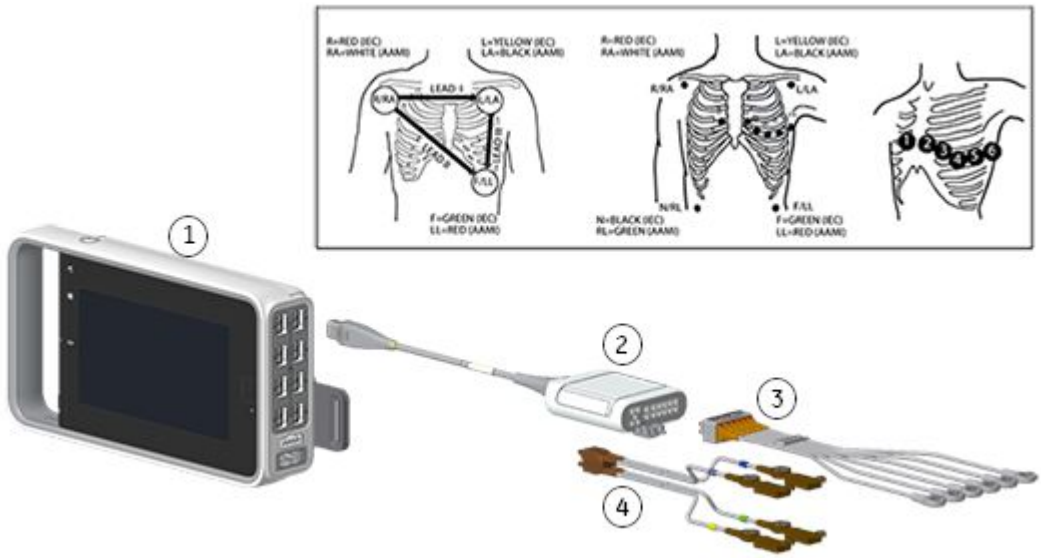
- Electrical devices, such as electrosurgery units and infrared heaters, that emit electromagnetic disturbance, may cause artifacts or disable the respiration measurement completely.
- Movement artifacts, shivering, and interference from the heart may interfere with the respiration measurement.

Respiration points to note

- This equipment is suitable for use in the presence of electrosurgery, as tested according to IEC 60601-2-49 clause 202.6.2.101 Electrosurgery interference.
- For information on materials used in accessories and their biocompatibility, refer to the instructions for use in the accessory package.
- Connect only one CARESCAPE ECG to the CARESCAPE ONE.
- Do not place electrodes on obvious layers of fat, or major muscles.
- Make sure the electrode gel is moist.
- Make sure electrodes have good skin contact.
- Since respiration monitoring is so closely linked with ECG monitoring, patient preparation and electrode placement are important.
- Intermittent mechanical ventilation: During spontaneous breathing the ventilator may at times support the patient's ventilation with an extra inspiration. If these ventilator inspirations are substantially larger than the spontaneous breaths, the respiration calculation may mistakenly count only the inspirations and expirations produced by the ventilator.

Respiration measurement setup

Respiration equipment to patient connection with CARESCAPE ONE



1. CARESCAPE ONE
2. CARESCAPE ECG
3. AAMI/AHA or IEC 3-leadwire, 5-leadwire, or 6-leadwire set
4. AAMI/AHA or IEC precordial leads leadwire set

Preparing the patient's respiration electrode sites

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 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.

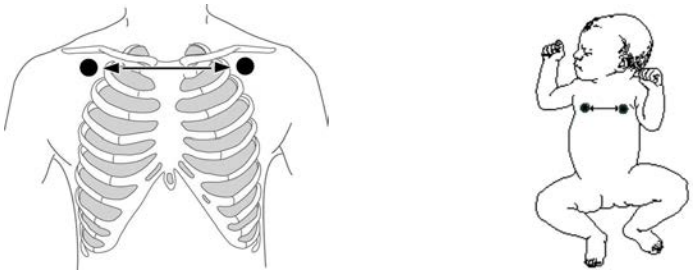
Respiration lead and breath detection

Respiration leads identify the ECG leads used for respiration measurement. Each respiration lead is suited for specific breath detection conditions:

Lead	Description
Lead I	Best for detecting thoracic breathing, but is more susceptible to cardiogenic artifact.
Lead II	Equally good at detecting thoracic or abdominal breathing, but is more susceptible to cardiogenic and motion (head, neck, or arm) artifact.
Lead RL-LL	Best at detecting abdominal breathing and is not as susceptible to cardiogenic or motion artifact. Not available for 3-lead measurement.

Even though the same electrodes are used for ECG and respiration monitoring, it is possible to get a lead fail message for respiration without one for ECG. The impedance may be too high for respiration detection, but the electrode is still good for ECG detection.

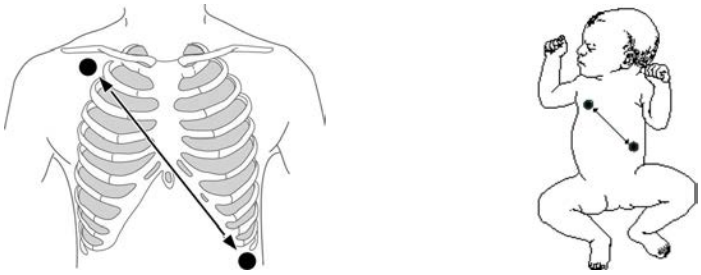
Respiration lead I electrode placement



ECG lead I for upper chest breather

IEC	AAMI/AHA	Electrode placement
R (red)	RA (white)	Just below the right clavicle.
L (yellow)	LA (black)	Just below the left clavicle.

Respiration lead II electrode placement

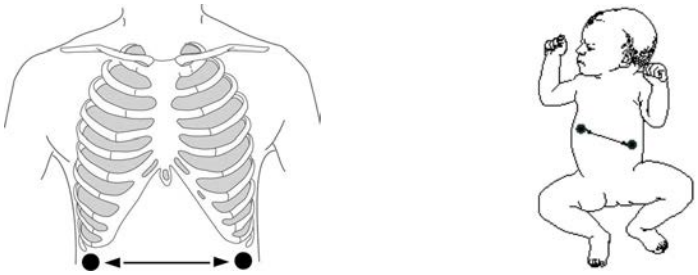


ECG lead II for chest or upper abdominal breather

IEC	AAMI/AHA	Electrode placement
R (red)	RA (white)	Just below the right clavicle.
F (green)	LL (red)	Lower left edge of the rib cage.

Respiration lead RL-LL electrode placement

When monitoring respiration through the RL-LL vector, use a standard 5- or 6-leadwire electrode placement, except place the RL electrode on the fifth intercostal space on the right side of the chest. Impedance respiration lead between V5R and LL provides maximum respiration signal strength, minimum noise/artifact content, and minimum cardiogenic artifact.



RL-LL vector for abdominal breather

IEC	AAMI/AHA	Electrode placement
N (black)	RL (green)	Fifth intercostal space on the right.
F (green)	LL (red)	Lower left edge of the rib cage.

Respiration measurement checks

NOTE The factory default setting for respiration monitoring is off. You need to turn respiration on when the cable is connected to the patient.

1. Check that the waveform and parameter value are displayed when the cable is connected to the patient.

   NOTE There may also be a respiration rate value displayed in the CO_2 parameter window. Only the value in the respiration parameter window is measured from the impedance respiration source.

Respiration measurement on the monitor screen

- When inspiration and expiration markers are turned on, the spikes in the waveform indicate detected inspiration and expiration.
- A text similar to ***APN 15 s*** indicates the value to which the apnea alarm delay is set. In this example, the value is set to 15 seconds. It means that the apnea alarm will activate after 15 seconds from the last detected breath. This text is not displayed when the apnea alarm delay is set to the default (20 seconds).

Using the respiration measurement

Turning on the respiration measurement

Follow these steps if the respiration measurement is not displaying and you want to turn it on.

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select ***Resp Measurement*** > ***On***.

When the respiration measurement is on, the message ***Imped. on*** is displayed in the ***ECG1*** waveform field.

Selecting the respiration lead

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select lead ***I (RA-LA)***, ***II (RA-LL)***, or ***RL-LL*** from the ***Resp Lead*** selection list.

Selecting the respiration waveform size automatically

You can automatically size the current waveform to fit the available space.

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select ***Autosize Waveform***.

Selecting the respiration waveform size manually

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select a value from the ***Size*** list.

The greater the value, the larger the waveform size.

Selecting the waveform sensitivity

Breath detection accuracy may be enhanced by increasing or decreasing the waveform sensitivity.

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select a value from the ***Sensitivity*** list.

The lower the value, the greater the sensitivity.

Enabling respiration smoothing

When respiration smoothing is enabled, 10 seconds of respiration rate values are averaged.

1. Select the impedance respiration parameter window.

2. Select ***Setup*** > ***Page 2***.
3. Select the ***Imped. Resp Smoothing*** check box to enable smoothing. Deselect it to disable smoothing.

Turning inspiration and expiration markers on or off

You can select whether or not the inspiration and expiration markers are displayed on the respiration waveform.

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select the ***Insp./Exp. Markers*** check box to turn the inspiration and expiration waveform markers on. Deselect it to turn them off.

Selecting the waveform speed

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select a value from the ***Sweep Speed*** list.

The lower the value, the slower the sweep speed.

Relearning the respiration pattern

If the patient's breathing pattern changes after the initial learning process has taken place, it may be necessary to relearn. There is no respiration rate displayed during the relearning process. When relearning is complete, the ***Relearning*** message will clear and the respiration rate will be displayed.

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select ***Relearn Respiration***.

The detection threshold (sensitivity) and the waveform size update after the new respiration pattern is learned.

Turning on or off the respiration rate alarm

1. Select the impedance respiration parameter window.
2. Select the ***Alarms*** tab.
3. Select the ***Alarm On*** check box to turn the alarm on for ***Resp Rate (Imped.)***. Deselect it to turn the alarm off.

   If you deselect ***Alarm On***, you cannot adjust the alarm limits.

The delays for respiration rate high and low alarms are configurable from 0 to 30 seconds in increments of 5 seconds. For more information, see the supplemental information provided.

Setting the respiration alarm limits

1. Select the impedance respiration parameter window.
2. Select the ***Alarms*** tab.

3. Set the ***Resp Rate (Imped.)*** limits.

Apnea alarms' deactivation with the pause audio key

Apnea alarms can be deactivated with the pause audio key if the ***Allow alarm deactivation with the Audio Pause key for:*** setting ***Apnea (CO2/Imped.)*** is enabled in the ***Care Unit Settings***. This setting is password protected.

For more information, see the supplemental information provided.

Setting the apnea alarm delay

You can select the apnea alarm delay by defining seconds in the ***Apnea Limit Seconds*** setting (3 - 30 seconds). If anything other than the default (20 seconds) is selected, the selected seconds are displayed in the parameter window.

1. Select the impedance respiration parameter window.
2. Select the ***Alarms*** tab.
3. Set the ***Apnea Limit Seconds*** with the arrow selectors.

Enabling the respiration cardiac artifact alarm

The cardiac artifact alarm can be enabled to display the ***Cardiac Artifact*** message when the respiration rate is within tolerance of 6.25% of the ECG heart rate. It takes about 30 breaths before a cardiac artifact alarm condition is detected.

1. Select the impedance respiration parameter window.
2. Select the ***Alarms*** tab.
3. Select ***Cardiac Artifact*** > ***Alarm On***.

Respiration alarm priorities

You can select priorities for the ***Apnea (Imped.)***, ***Resp (Imped.) measurement paused***, and ***RR (Imped.) high/low*** alarms through ***Alarms Setup*** > ***Alarm Priorities*** > ***Other Parameters***. The available choices depend on what has been allowed in the ***Care Unit Settings*** (password protected setting). If all priorities have been allowed, you can select one of the following:

- ***Escalating***
- ***High***
- ***Medium***
- ***Low***
- ***Informational***
- ***Off***, for ***Resp (Imped.) measurement paused*** only

Turning off the respiration measurement

1. Select the impedance respiration parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select ***Resp Measurement*** > ***Off***.

Respiration measurement description

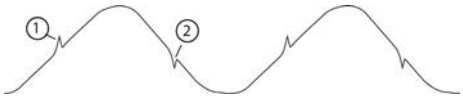
When starting respiration monitoring, the system "learns" the patient's respiration pattern. The respiration rate is calculated from impedance changes and a respiration waveform is displayed.

Eight breaths are averaged and the average amplitude of the respiration waveform is found. Detection sensitivity is automatically set at 40% of the average amplitude. Once learning is complete, the user can adjust the detection sensitivity to 10, 20, 30, 40, 50, 60, 70, 80, or 90%.

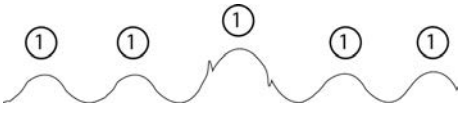
How to interpret the respiration values

The following is an example of a regular and even respiratory waveform, with the inspiration and expiration markers identified (1 = inspiration marker, 2 = expiration marker).

NOTE The inspiration and expiration markers are only present on the waveform if they are turned on in the respiration parameter settings.



Respiration troubleshooting

Problem	Solution
What can I do if the respiration measurement fails?	• Relearn respiration. • 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.
Why does the waveform have 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, where the 1's indicate breaths, but only the breath with the inspiration and expiration markers was counted (1 = breath).  • Decrease the detection sensitivity percentage until the markers correctly identify each inspiration and expiration. The following is an example of correct detection, as indicated by the inspiration and expiration markers on each breath. 

Problem	Solution
	Respiration detection is not dependent on the size of the waveform. Size is for visual purposes only.
Why is the monitor detecting cardiac artifact as breaths?	The breath detection threshold is too low (1 = breath, 2 = artifact). The following is an example of incorrect detection, where the 1's are correctly detected breaths, but the 2's are artifact incorrectly detected as breaths, as can be seen by the inspiration and expiration markers on the 2's.  • Increase the detection sensitivity percentage until the markers correctly identify each inspiration and expiration. The following is an example of correct detection, where the inspiration and expiration markers only appear on the breaths and not the artifact. 

11

SpO_2

SpO_2 compatibility limitations

For detailed information regarding CARESCAPE ONE, CARESCAPE Parameter, and accessory compatibility, see the supplemental information provided.

SpO_2 safety precautions

SpO_2 warnings

WARNING DEFIBRILLATOR PRECAUTIONS. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires. Using other cables or leadwires may result in damage to the equipment and compromise patient and user safety.

WARNING The operator is responsible for checking the compatibility of the pulse oximetry device, sensor, and patient cable prior to use. Incompatible components can result in degraded performance and/or device malfunction.

WARNING If the accuracy of any measurement does not seem reasonable, first check the patient's vital signs, then check for conditions that may cause inaccurate SpO_2 readings. If the problem is still not resolved, check the CARESCAPE ONE, CARESCAPE SpO_2 , and sensor for proper functioning.

WARNING A pulse oximeter should not be used as an apnea monitor. A pulse oximeter should be considered an early warning device. As a trend toward patient deoxygenation is indicated, blood samples should be analyzed by a laboratory CO-oximeter to completely understand the patient's condition.

WARNING Check that the pulse oximetry waveform is physiological in shape to ensure waveform quality and minimize noise spikes caused by motion conditions. (Not applicable when monitoring SpO_2 with Masimo SET technology.)

WARNING To prevent erroneous readings, do not use a physically damaged CARESCAPE SpO_2 or sensors. Discard damaged sensors immediately. Never repair a damaged sensor or CARESCAPE SpO_2; never use a sensor or CARESCAPE SpO_2 repaired by others.

WARNING Pulse rate measurement is based on the optical detection of a peripheral flow pulse and therefore does not detect certain arrhythmias. The pulse oximeter should not be used as a replacement or substitute for ECG-based arrhythmia analysis.

WARNING Cable/sensor after care:

- Do not reuse sensors intended for single patient use.
- Do not sterilize sensors or patient cables by irradiation, steam, or ethylene oxide.
- Clean the surface of the reusable probe before and after each patient use.
- Allow sensor and cable to dry completely after cleaning. Moisture and dirt on the connector can affect the measurement accuracy.
- If a probe is damaged in any way, discontinue use immediately.
- Inaccurate SpO_2 data can result if a sensor is past its useful life. Therefore, re-evaluate the measurement periodically by performing additional assessment of the patient and equipment, including consideration of use of alternate monitoring methods such as direct measurement of arterial oxyhemoglobin saturation (SaO_2).
- A damaged sensor may cause burns during electrosurgery.

WARNING Oximetry performance may be impaired when patient perfusion is low or signal attenuation is high.

WARNING NEONATAL. The display of inaccurate pulse oximetry (SpO_2) values has been linked to the presence of poor signal strength or artifact due to patient motion during signal analysis. This condition is most likely to be encountered when the monitor is used on neonates or infants. These same conditions in adults do not impact the SpO_2 values to the same extent.

We recommend the application of the following criteria when using the pulse oximetry function on neonates and infants:

- The peripheral pulse rate (PPR) as determined by the SpO_2 function must be within 10% of the heart rate, and
- The SpO_2 signal strength should be adequate. This is indicated by the display of two or three asterisks or the absence of the ***Low signal quality*** message.

Procedures or devices previously applied in your facility for SpO_2 monitoring should be used in the event the SpO_2 value from the monitor cannot be validated by the above criteria.

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

- Interfering substances:
  - Carboxyhemoglobin may erroneously increase SpO_2 reading.
  - Methemoglobin (MetHb) usually represents less than 1% of the total Hb, but in the case of methemoglobinemia that can be congenital or induced by some IV dyes, antibiotics (such as sulphas), inhaled gases, etc., this level increases sharply and thus can cause inaccuracies in the SpO_2 reading.
  - Intravascular dyes (such as indocyanine green, methylene blue, etc.)
- Physiological characteristics:
  - Cardiac arrest
  - Hypotension
  - Shock
  - Severe vasoconstriction
  - Severe anemia
  - Hypothermia
  - Venous pulsations
  - Darkly pigmented skin
  - Ventricular septal defects (VSDs)
  - Nail polish or artificial nails at the measurement site
- 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.
- Sensor placement:
  - Incorrect sensor placement - prolonged monitoring or incorrect sensor application can cause skin irritation or impaired circulation. It is recommended that you check the probe site every four hours (more frequently for poor perfusion or for neonates). Refer to the instructions supplied with the sensor.
  - Sensor placement on the same extremity as a blood pressure cuff, arterial catheter or intravascular line; or arterial occlusion proximal to the sensor.

- Poor sensor fit or sensor applied too tightly.
- Do not allow tape to block the sensor light emitter and detector.
- Improper connection to the monitor or interconnect cable.
- Contamination of lenses inside the sensor.

WARNING FAILURE TO DETECT LETHAL ARRHYTHMIA. Always monitor ECG for arrhythmia detection purposes. HR calculated from pulsatile SpO_2 waveform may differ significantly from ECG HR measured values. Users should be aware that the ***SpO2 probe off*** and ***Check probe*** technical alarms escalate no higher than a ***Medium*** priority.

WARNING FAILURE TO DETECT LETHAL ARRHYTHMIA. The SpO_2 parameter pulsatile heart rate measurement is based on the optical detection of a peripheral flow pulse and therefore cannot detect arrhythmias. The pulse oximetry parameter should not be used as a replacement or substitute for ECG based arrhythmia analysis.

WARNING Using the ***Maximum*** sensitivity setting delays the ***SpO2 probe off*** detection alarm. It is recommended to use the ***Maximum*** sensitivity setting in care areas where the application site is inspected frequently. (Available when monitoring SpO_2 with Masimo SET technology.)

WARNING With deactivated ***SpO2 probe off*** alarm, keep the patient under close surveillance.

WARNING MISSED ALARM. Check the SpO_2 measurement when switching the SpO_2 measurement sources to avoid missed SpO_2 alarms.

WARNING Prolonged monitoring or incorrect sensor application can cause skin irritation or impaired circulation. It is recommended that you check the probe site every four hours (more frequently in case of poor perfusion or neonatal patients). Refer to the instructions supplied with the sensor.

The following warnings apply to CARESCAPE SpO_2 – Nellcor only.

WARNING CHOKING HAZARD. The CARESCAPE SpO_2 – Nellcor contains small detachable parts.

WARNING Do not insert any foreign objects into the connector of the CARESCAPE SpO_2 – Nellcor.

SpO_2 cautions

CAUTION A damaged sensor or a sensor soaked in liquid may cause burns during electrosurgery.

SpO_2 measurement limitations

- The pulse oximeter cannot distinguish between oxyhemoglobin and dyshemoglobins.
- Poor perfusion may affect the accuracy of measurement, especially when using an ear sensor.
- To avoid erroneous measurements, do not use a blood pressure cuff on the same limb as the SpO_2 sensor.
- There are several factors that may cause inaccurate readings and alarms. Familiarize yourself with the SpO_2 safety precautions so that you are aware of these factors and can take them into consideration.

SpO_2 points to note

- This equipment is suitable for use in the presence of electrosurgery, as tested according to IEC 60601-2-49 clause 202.6.2.101 Electrosurgery interference.
- For information on materials used in accessories and their biocompatibility, refer to the instructions for use in the accessory package.
- GE TruSignal sensors are not made with natural rubber latex.
- For more detailed information regarding sensor accuracies, refer to the supplemental analysis graphs provided.
- Use dry and clean sensors only.
- Do not use damaged sensors.
- Check that you are not re-using a disposable sensor or other disposable accessories.
- Refer to the sensor instructions for use for the recommended maximum application times for different sensor types.
- Always check the patient and the sensor site if the accuracy of the SpO_2 values is questionable.
- Depending on the SpO_2 technology used, not all SpO_2 measurements and settings are available to view or change.
- With Nellcor™ sensors with OxiMax™ technology and Masimo SET technology, the pulse oximetry waveform is a normalized waveform. It is not normalized with GE TruSignal technology. GE TruSignal technology provides the actual IrMod% values.
- There are three supported pulse oximetry technologies:
  - GE TruSignal
  - Masimo SET
  - Nellcor sensors with OxiMax technology (Covidien)

Masimo safety precautions

Masimo warnings

WARNING As with all medical equipment, carefully route patient cabling to reduce the possibility of patient entanglement or strangulation.

WARNING Do not place the pulse oximetry device or accessories in any position that might cause it to fall on the patient.

WARNING Do not start or operate the pulse oximetry device unless the setup was verified to be correct.

WARNING Do not use the pulse oximetry device during magnetic resonance imaging (MRI) or in an MRI environment.

WARNING Do not use the pulse oximetry device if it appears or is suspected to be damaged.

WARNING Explosion hazard: Do not use the pulse oximetry device in the presence of flammable anesthetics or other flammable substance in combination with air, oxygen-enriched environments, or nitrous oxide.

WARNING To ensure safety, avoid stacking multiple devices or placing anything on the instrument during operation.

WARNING To protect against injury, follow the directions below:

- Avoid placing the device on surfaces with visible liquid spills.
- Do not soak or immerse the device in liquids.
- Do not attempt to sterilize the device.
- Use cleaning solutions only as instructed in this operator's manual.
- Do not attempt to clean the device while monitoring a patient.

WARNING To protect from electric shock, always remove the sensor and completely disconnect the pulse oximetry device before bathing the patient.

WARNING If any measurement seems questionable, first check the patient's vital signs by alternate means and then check the pulse oximetry device for proper functioning.

WARNING Inaccurate SpO_2 readings may be caused by:

- Improper sensor application.
- Elevated levels of COHb or MetHb: High levels of COHb or MetHb may occur with a seemingly normal SpO_2. When elevated levels of COHb or MetHb are suspected, laboratory analysis (co-Oximetry) of a blood sample should be performed.
- Intravascular dyes, such as indocyanine green or methylene blue.
- Externally applied coloring and texture, such as nail polish, acrylic nails, glitter, etc.
- Elevated levels of bilirubin
- Severe anemia

- Low arterial perfusion
- Motion artifact

WARNING Interfering Substances: Dyes or any substance containing dyes that change usual blood pigmentation may cause erroneous readings.

WARNING The pulse oximetry device should not be used as the sole basis for medical decisions. It must be used in conjunction with clinical signs and symptoms.

WARNING The pulse oximetry device is not an apnea monitor.

WARNING The pulse oximetry device may be used during defibrillation, but this may affect the accuracy or availability of the parameters and measurements.

WARNING The pulse oximetry device may be used during electrocautery, but this may affect the accuracy or availability of the parameters and measurements.

WARNING The pulse oximetry device should not be used for arrhythmia analysis.

WARNING SpO_2 is empirically calibrated in healthy adult volunteers with normal levels of carboxyhemoglobin (COHb) and methemoglobin (MetHb).

WARNING Do not adjust, repair, open, disassemble, or modify the pulse oximetry device or accessories. Injury to personnel or equipment damage could occur. Return the pulse oximetry device for servicing if necessary.

Masimo cautions

CAUTION Do not place the pulse oximetry device where the controls can be changed by the patient.

CAUTION Electrical shock and flammability hazard: Before cleaning, always turn off the instrument and disconnect from any power source.

CAUTION When patients are undergoing photodynamic therapy they may be sensitive to light sources. Pulse oximetry may be used only under careful clinical supervision for short time periods to minimize interference with photodynamic therapy.

CAUTION Do not place the pulse oximetry device on electrical equipment that may affect the instrument, preventing it from working properly.

CAUTION If the SpO_2 values indicate hypoxemia, a laboratory blood sample should be taken to confirm the patient's condition.

CAUTION If the Low Perfusion message is frequently displayed, find a better perfused monitoring site. In the interim, assess the patient and, if indicated, verify oxygenation status through other means.

CAUTION If using pulse oximetry during full body irradiation, keep the sensor out of the radiation field. If the sensor is exposed to the radiation, the reading might be inaccurate or the instrument might read zero for the duration of the active irradiation period.

CAUTION The instrument must be configured to match your local power line frequency to allow for the cancellation of noise introduced by fluorescent lights and other sources.

CAUTION To ensure that alarm limits are appropriate for the patient being monitored, check the limits each time the pulse oximetry device is used.

CAUTION Variation in hemoglobin measurements may be profound and may be affected by sampling technique as well as the patient's physiological conditions. Any results exhibiting inconsistency with the patient's clinical status should be repeated and/or supplemented with additional test data. Blood samples should be analyzed by laboratory instruments prior to clinical decision making to completely understand the patient's condition.

CAUTION Do not submerge the pulse oximetry device in any cleaning solution or attempt to sterilize by autoclave, irradiation, steam, gas, ethylene oxide or any other method. This will seriously damage the pulse oximetry device.

CAUTION Electrical Shock Hazard: Carry out periodic tests to verify that leakage currents of patient-applied circuits and the system are within acceptable limits as specified by the applicable safety standards. The summation of leakage currents must be checked and in compliance with IEC 60601-1 and UL60601-1. The system leakage current must be checked when connecting external equipment to the system. When an event such as a component drop of approximately 1 meter or greater or a spillage of blood or other liquids occurs, retest before further use. Injury to personnel could occur.

CAUTION Disposal of product - Comply with local laws in the disposal of the instrument and/or its accessories.

CAUTION To minimize radio interference, other electrical equipment that emits radio frequency transmissions should not be in close proximity to the pulse oximetry device.

Masimo points to note

- A functional tester cannot be used to assess the accuracy of the pulse oximetry device.
- High-intensity extreme lights (such as pulsating strobe lights) directed on the sensor, may not allow the pulse oximetry device to obtain vital sign readings.

- When using the Maximum Sensitivity setting, performance of the Sensor Off detection may be compromised. If the instrument is in this setting and the sensor becomes dislodged from the patient, the potential for false readings may occur due to environmental "noise" such as light, vibration, and excessive air movement.
- Do not loop the patient cabling into a tight coil or wrap around the device, as this can damage the patient cabling.
- Additional information specific to the Masimo sensors compatible with the pulse oximeter, including information about parameter/measurement performance during motion and low perfusion, may be found in the sensor's directions for use (DFU).
- Cables and sensors are provided with X-Cal technology to minimize the risk of inaccurate readings and unanticipated loss of patient monitoring. Refer to the cable or sensor directions for use for the specified duration of the patient monitoring time.

SpO_2 measurement guidelines

GE TruSignal technology and sensor measurement guidelines

The following measurement guidelines apply to GE TruSignal SpO_2 technology:

- The time period for acquiring a measurement average is adjustable.
- The SpO_2 waveform corresponds to (but is not proportional to) the arterial pressure waveform.
- Only TruSignal sensors are supported.
- Use the following guidelines when using TruSignal sensors and cables:
  - Read the sensor instructions for use of the SpO_2 sensor before using it.
  - Periodically inspect extension cables and sensors for damage.
  - Do not use damaged sensors.
  - Refer to the cleaning instructions in the instructions for use of reusable TruSignal sensors.
  - Do not use NIBP or constricting instruments on the same appendage as the SpO_2 sensor.

Masimo SET technology and sensor measurement guidelines

With motion, the plethysmographic waveform (or SpO_2 waveform) is often distorted and may be obscured by the artifact. With Masimo SET technology, the plethysmographic waveform is not an indication of signal quality or validity. Even with a waveform obscured by artifact, Masimo SET technology is able to read through the noise and locate the arterial pulsation.

Although Masimo SET technology processes SpO_2 measurements differently than other SpO_2 technologies, the function and appearance is essentially the same as other technologies. The following measurement guidelines apply to Masimo SET technology only:

- The time period for acquiring a measurement average is adjustable.

- Only Masimo RD SET, M-LNCS, LNCS, and LNOP sensors are supported. Masimo RD SET, M-LNCS, LNCS, or LNOP sensors non-invasively measure pulse rate and the amount of oxygenated hemoglobin. Use the following guidelines when using Masimo RD SET, M-LNCS, LNCS, or LNOP sensors:
  - Read the sensor directions before use.
  - Only use sensors with Masimo SET technology.
  - Do not use damaged sensors.
  - Do not use a sensor with exposed optical components.
  - Refer to the cleaning instructions in the directions for use for reusable Masimo RD SET, M-LNCS, LNCS, or LNOP sensors.

Additional information for Masimo SET technology

NO IMPLIED LICENSE: Possession or purchase of this device does not convey any express or implied license to use the device with unauthorized replacement parts which would, alone, or in combination with this device, fall within the scope of one or more of the patents relating to this device. Sensors that are designated for single use are licensed for use on a single patient only, and are not sold. There is no license, implied or otherwise, that would allow use of single use Masimo Sensors beyond their intended single use. After use of single use Masimo Sensors, the license is exhausted, there is no further license granted by MASIMO, and they must be discarded.

This device is covered under one or more patents as set forth at http://www.masimo.com/patents.htm.

Masimo SET SpO_2 technology is designed to be used with Masimo Sensors only. Use of sensors other than Masimo Sensors may yield unreliable results. We recommend the use of Masimo SET sensors for use with Masimo technology.

Nellcor™ sensors with OxiMax™ technology and sensor measurement guidelines

The following measurement guidelines apply to Nellcor sensors with OxiMax technology:

- The SpO_2 waveform corresponds to (but is not proportional to) the arterial pressure waveform.
- Only Nellcor sensors with OxiMax technology are supported. Use the following guidelines when using OxiMax technology accessories and sensors:
  - Periodically inspect interconnect cables and sensors for damage and discontinue use if damage is found.
  - Do not immerse sensors.
  - Do not use NIBP or constricting instruments on the same appendage as the SpO_2 sensor.

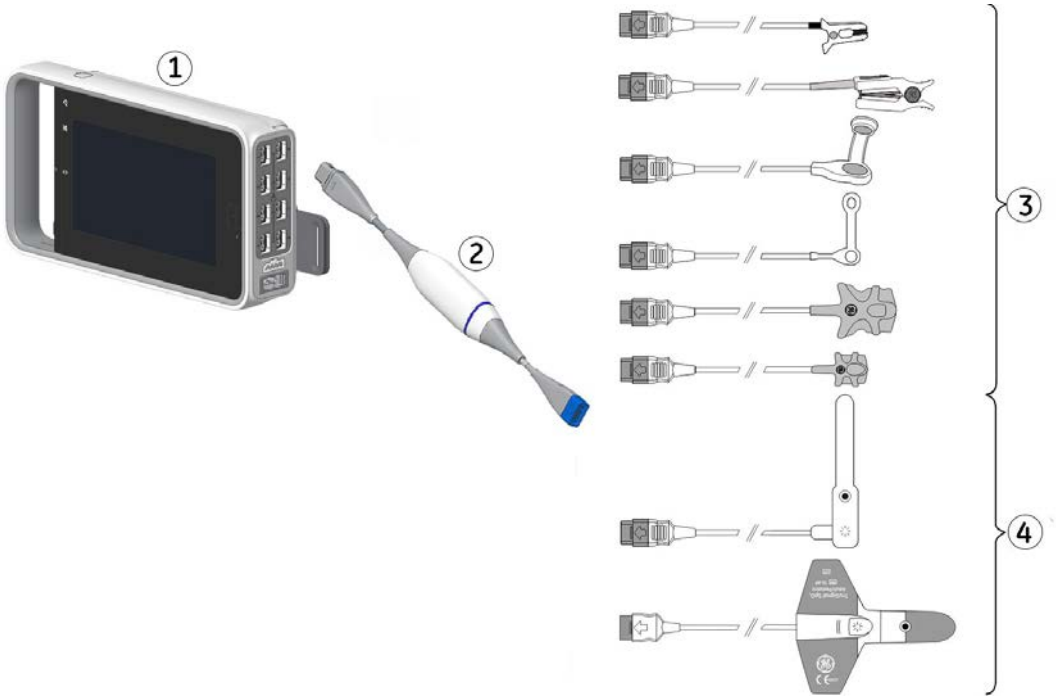
Additional information for Medtronic technology

NOTICE: Purchase of this instrument confers no express or implied license under any Medtronic patent to use this instrument with any oximetry, level of consciousness, regional oxygen saturation, respiration rate, or other Sensor that is not manufactured or licensed by Medtronic.

For patients with SpO_2 levels in the 60% to 80% range, the LoSat accuracy feature is available. For more information, see the supplemental information provided.

SpO_2 measurement setup

SpO_2 equipment to patient connection with CARESCAPE ONE



1. CARESCAPE ONE
2. CARESCAPE SpO_2
3. Reusable sensors and sensor cables
4. Disposable sensors and sensor cables

Preparing the SpO_2 connection

1. Connect the CARESCAPE SpO_2 device to the CARESCAPE ONE.
2. Connect the sensor cable to the CARESCAPE SpO_2 device.
3. Clean the surface of reusable sensors.
4. Prepare the application site. Remove nail polish and earrings.
5. Follow the sensor manufacturer's instructions to position the sensor.
6. Attach the sensor to the patient.
7. Stabilize the sensor cable to minimize sensor movement.

Checking the SpO_2 measurement

1. Check that the red light is lit in the sensor.
2. Check that the waveforms and parameter values are displayed when the sensor is connected to the patient.

SpO_2 functional testers

You can verify the functionality of pulse oximeter sensor and monitor with a functional SpO_2 tester but you cannot evaluate their accuracy with such a device. For more information, refer to the standard ISO 80601-2-61 Annex FF (Simulators, calibrators and functional testers for pulse oximeter equipment).

Using the SpO_2 measurement

Changing the SpO_2 waveform scale

NOTE GE TruSignal technology only.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select the scale from the ***Scale*** list:
   - ***AUTO***: The scale is automatically selected according to the IrMod % (infrared modulation percentage) received from the measurement source.
   - Other scale options are ***2***, ***5***, ***10***, ***20***, or ***50*** %.

Changing the SpO_2 waveform size

NOTE Masimo SET technology and Nellcor™ sensors with OxiMax™ technology only.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select the size from the ***Size*** list.

Selecting the SpO_2 hemodynamic sweep speed

NOTE This setting adjusts the waveform speed for all of the hemodynamic parameters.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select a numeric value from the ***Hemo Sweep Speed*** list.

   The smaller the value, the slower the sweep speed.

Selecting the SpO_2 as the primary heart rate source

The primary heart rate can be calculated from the ECG leads, SpO_2 measurement, or invasive pressure waveform.

NOTE This setting adjusts the primary heart rate source for all of the hemodynamic parameters.

NOTE ***HR Alarms*** must be configured as ***Single*** to enable the SpO_2 as the primary heart rate source. This setting is in ***Care Unit Settings*** and is password protected.

SpO_2 can be the ***Primary HR Source***.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select the heart rate source from the ***Primary HR Source*** list.

Showing the SpO_2 pulse rate

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select ***Show Pulse Rate***.

Adjusting the SpO_2 pulse beep volume

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Adjust the volume with the ***Beat Volume*** selector.

Selecting the beat source

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select the beat source from the ***Beat Source*** list.

The beat source indicator ❤ will appear beside the chosen beat source on the screen, and the beat sound will reflect the beat of that source.

Setting the variable beat tone

The SpO_2 variable beat tone can be set to affect the pitch of the heart rate beep tone. When turned on, the heart rate beep pitch changes according to increasing and decreasing SpO_2 values. Higher SpO_2 saturation values have a higher pitch beep tone, and lower values have a lower pitch.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select ***Variable Beat Tone Source*** > ***SpO2*** or ***Off***.

For more information, see the supplemental information provided.

Masimo SET data averaging and updating

For Masimo SET technology, when using the default averaging time of 8 seconds, there is a maximum data-averaging signal processing time of 10 seconds from real time plus an additional delay of 2 seconds to update the displayed waveform.

Selecting the SpO_2 averaging time

NOTE Masimo SET technology and Masimo sensors or GE TruSignal technology and TruSignal sensors only.

You can have an average of the SpO_2 measurement on screen, and you can select how many seconds are used for this averaging. With Masimo SET technology, the

options are: ***2 s***, ***4 s***, ***8 s***, ***10 s***, ***12 s***, ***14 s***, or ***16 s***. With GE TruSignal technology, the options are ***5 s*** and ***12 s***.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select the number of seconds from the ***Averaging*** list.

Selecting the Masimo SpO_2 sensor sensitivity level

NOTE Masimo SpO_2 technology and Masimo sensors only.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select the appropriate ***Sensitivity*** radio button:
   - Use the ***Normal*** sensitivity setting for normal patient monitoring purposes.
   - Use the ***Maximum*** sensitivity setting for improved poor perfusion performance.

   Using the ***Maximum*** sensitivity setting can reduce the ***SpO2 probe off*** detection alarm. It is recommended to use this setting in care areas where the application site is inspected frequently.

Nellcor™ sensors with OxiMax™ technology data averaging and updating

The Nellcor sensor with OxiMax technology algorithm automatically extends the amount of data required for measuring SpO_2 and pulse rate depending on the measurement conditions. During normal measurement conditions in the normal response mode, the averaging time is 6 to 7 seconds.

During difficult measurement conditions, which can be caused by low perfusion, motion, ambient light, electrocautery, other interference, or a combination of these factors, the OxiMax algorithm automatically extends the dynamic averaging time required beyond 7 seconds.

If the resulting dynamic averaging time exceeds 20 seconds, a low signal quality status is reported, while SpO_2 and pulse rate values continue to be updated every second.

As the measurement conditions become even more difficult, the amount of data required continues to expand. If dynamic averaging time reaches 40 seconds, a ***Check probe*** status is reported and the device will report dashes during pulse timeout and pulse search condition.

Selecting the SpO_2 response time

NOTE Nellcor™ sensors with OxiMax™ technology only.

You can select the response (averaging) time. ***Normal*** (default) is the recommended setting.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select the radio button for the response time: ***Normal*** or ***Fast***.

Nellcor™ OxiMax™ SatSeconds™ alarm management

NOTE Nellcor sensors with OxiMax technology only.

Nellcor OxiMax technology uses SatSeconds alarm management to decrease the likelihood of false SpO_2 saturation alarms caused by motion artifact. It does not apply to pulse rate.

With both traditional and SatSeconds pulse oximetry alarm management, upper and lower saturation alarm limits are set. With traditional alarm management, as soon as a limit is reached or violated, an alarm is generated. With SatSeconds alarm management, a cumulative limit violation index is calculated, and when this index reaches the SatSeconds alarm management limit, an alarm is generated. The cumulative limit violation index is simply the sum of violation magnitudes calculated each second the limit is being violated.

For example, suppose that the SpO_2 low alarm limit is 90%, meaning that 91% is the lowest value not producing an alarm in the traditional case. Now suppose the following consecutive values are recorded each second: 92%, 89%, 87%, 87%, 80%. The corresponding violation magnitudes are 0, 2, 4, 4, 11, and the cumulative limit violation index is correspondingly 0, 2, 6, 10, 21. If the Saturation Seconds limit setting was 20, an alarm would be annunciated at this point, or after four seconds. When the SpO_2 saturation value is no longer in violation, the alarm notification clears and the cumulative limit violation index decrements in the same manner in which it increments.

With some patients, saturation levels may frequently drop below the limit, but not staying below the limit long enough for the SatSeconds alarm management time setting to be reached. In such situations, that is, when three or more limit violations occur within 60 seconds, an alarm sounds even if the cumulative limit violation index has not reached the SatSeconds alarm management time setting value.

SatSeconds™ alarm management response example

Saturation levels may fluctuate above and below an alarm limit, re-entering the acceptable range (non-alarm range) several times. During such fluctuation, the SpO_2 device integrates the number of SpO_2 saturation points, both positive and negative, until either the SatSeconds alarm management limit is reached or the saturation level returns to within the normal range and remains there.

When an SpO_2 saturation value exceeds an alarm limit, a pie chart (circular graph) in the SpO_2 parameter menu begins to fill in a clockwise direction. As seconds pass and the value is compared against the alarm limits and the SatSeconds alarm management setting, the chart fills proportionately. When the pie chart is completely filled, indicating that the SatSeconds alarm management limit has been reached, an alarm sounds. When the SpO_2 value is within the set limits, the SatSeconds alarm management pie chart empties in a counterclockwise direction.

Showing SatSeconds™ alarm management in the SpO_2 parameter window

NOTE Nellcor™ sensors with OxiMax™ technology only.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 3***.
3. Select ***Show Sat. Seconds***.

Setting the SatSeconds™ alarm management threshold

NOTE Nellcor™ sensors with OxiMax™ technology only.

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 3***.
3. Set the threshold with the ***Saturation Seconds*** arrows.

Setting the SpO_2 alarms and alarm limits

1. Select the SpO_2 parameter window.
2. Select the ***Alarms*** tab.
3. Set the alarm limits for ***SpO2***, ***HR***, or ***PR SpO2***.

   If a feature is not active, alarm limits are greyed out. Select ***Alarm On*** to set the alarm limits. ***HR*** appears when the ***HR Alarms*** option is set to ***Single*** in the ***Care Unit Settings***. ***PR SpO2*** appears when the ***HR Alarms*** option is set to ***Multiple*** in the ***Care Unit Settings***. Care unit settings are password protected. For more information, see the supplement information provided.
4. Set the alarm limits.

Deactivating the *SpO2 probe off* alarm

This feature is meant to be used when ending SpO_2 monitoring. It should not be used during active SpO_2 monitoring. This setting can be enabled in ***Default Setup*** and the setting is password protected. There are two options to deactivate the SpO_2 probe off alarm, from the SpO_2 menu or using the audio pause key. If it has been enabled, there will be a button on the ***SpO2*** tab that allows you to deactivate the alarm:

1. Select the SpO_2 parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select ***Deactivate SpO2 Probe Off***.

If deactivation with the audio pause key has been enabled, ***SpO2 probe off*** deactivation can be acknowledged by selecting  twice.

When the alarm is deactivated, there will be no audible or visual ***SpO2 probe off*** alarm indications. The alarm is automatically reactivated if SpO_2 vital signs are detected and alarm condition is met again.

WARNING With deactivated ***SpO2 probe off*** alarm, keep the patient under close surveillance.

SpO_2 alarm priorities

You can select priorities for the ***SpO2 high***, ***SpO2 low***, and ***SpO2 probe off*** alarms through ***Alarms Setup*** > ***Alarm Priorities*** > ***Other Parameters***. The choices are ***Low***, ***Medium***, ***High***, and ***Escalating***. For ***SpO2 high*** and ***SpO2 low***, ***Low*** priority is only available if it has been enabled during configuration in the ***Care Unit Settings***. For ***SpO2 probe off***, ***Low*** and ***Medium*** priorities are only available if they have been enabled during configuration in the ***Care Unit Settings***. Care unit settings are password protected. For more information, see the supplemental information provided.

Stopping the SpO_2 measurement

1. Remove the SpO_2 sensor from the patient.
2. Disconnect the sensor from CARESCAPE SpO_2.
3. Disconnect the CARESCAPE SpO_2 from the CARESCAPE ONE.
4. Select  to acknowledge the ***SpO2 measurement removed*** alarm.
5. Discard single-use sensors.
   - For Masimo SET technology, always disconnect the RD SET, M-LNCS, LNCS, or LNOP sensor from CARESCAPE SpO_2 before repositioning the sensor. Reconnect the RD SET, M-LNCS, LNCS, or LNOP sensor after it has been repositioned.
   - Use only sensors and cables listed in the supplemental information provided.

How to interpret the SpO_2 values

SpO_2 signal strength

For GE TruSignal technology and Nellcor™ sensors with OxiMax™ technology, signal strength is indicated with asterisks in the parameter window. The signal strength indicator refers to the amplitude of the plethysmographic waveform, not the quality of the waveform. Three asterisks indicate strong pulsation.

For Masimo SET technology, the signal strength indicator refers to Masimo's proprietary measurement, Signal Identification and Quality (Signal IQ) indicator. The Signal IQ provides an indicator of the assessment of the confidence in the displayed SpO_2 value.

SpO_2 waveform quality

NOTE Not for Masimo SET technology.

Under normal conditions, the SpO_2 waveform corresponds to (but is not proportional to) the arterial pressure waveform. The typical SpO_2 waveform can help the user find a sensor location with the fewest noise spikes.

Normal waveform

If noise (artifact) is seen on the waveform because of poor sensor placement, the photodetector may not be flush with the tissue. Check that the sensor is secured and the tissue sample is not too thick. Pulse rate is determined from the SpO_2 waveform, which can be disrupted by hemodynamic pressure disturbances. Motion at the sensor site is indicated by noise spikes in the normal waveform.

Abnormal waveform

SpO_2 waveform stability

The stability of the displayed SpO_2 values can also be used as an indication of signal validity. To aid you in successful SpO_2 monitoring, messages are provided in the SpO_2 parameter window.

SpO_2 wavelengths and optical output power

GE TruSignal, Nellcor™ sensors with OxiMax™ technology, and Masimo SET pulse oximetry technologies are calibrated to display functional saturation.

This information may be useful to clinicians such as those performing photodynamic therapy:

- Nellcor sensors with OxiMax technology contain LEDs that emit red light at a wavelength of approximately 660 nm and infrared light at a wavelength of approximately 900 nm. The total optical output power of the sensor LEDs is less than 15 mW.
- Masimo SET pulse oximetry sensors contain LEDs that emit red light at a wavelength of approximately 660 nm and infrared light at a wavelength of approximately 905 nm for RD SET, M-LNCS, LNCS, and LNOP, and approximately 653 nm and 880 nm for RD SET, M-LNCS, LNCS, and LNOP tip clips. The total optical output power of the LEDs is less than or equal to 15 mW.
- GE TruSignal pulse oximetry sensors contain LEDs that emit red light at a wavelength of approximately 663 nm and infrared light at a wavelength of approximately 890 or 940 nm. The maximum optical output power for each LED is less than 15mW.

SpO_2 measurement and interference

These types of interference can influence the function of SpO_2:

- Incorrect sensor application, e.g., sensor placement on an extremity with a blood pressure cuff, arterial catheter, or intravascular line, sensor applied too tightly.
- Intravascular dyes, such as idocyanine or methylene blue.
- Externally applied coloring agents with opaque materials in high ambient light conditions, e.g., conditions created from one or more of the following sources:
  - Surgical lights, especially xenon light sources
  - Bilirubin lamps
  - Fluorescent lights
  - Infrared heating lamps
  - Direct sunlight
- Excessive patient activity
- Venous pulsation
- Dysfunctional hemoglobin
- Poor (low) peripheral perfusion
- Arterial occlusion proximal to the sensor
- Loss of pulse (cardiac arrest)
- Electromagnetic interference (EMI)
- Ventilator-induced pressure change

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 weak to measure.
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.
Why does the pulse oximeter sometimes read differently than a blood gas analyzer?	Blood gas analyzers calculate the O_2 saturation based on normal values for pH, $PaCO_2$, Hb, temperature, etc. (i.e., a normal oxyhemoglobin dissociation curve). Depending on the patient's physiologic and metabolic status, this curve and all values may be shifted away from normal. Thus the oximeter, which measures O_2 saturation, may not agree with the blood gas.
What effect can ambient light have on pulse oximetry monitoring?	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. Shielding the sensor with opaque tape, the posey wrap, or other dark or opaque material can increase oximetry accuracy, verified by good waveform and signal strength.
What does electrosurgical interference look like and how can it be minimized?	Electrosurgical interference is most obvious on the displayed waveform. It is a very spiky, erratic looking waveform caused by the electrosurgical unit's overwhelming interference. It can result in grossly inaccurate pulse oximeter results. Electrosurgical interference can be minimized by: • Making sure the pulse oximeter sensor is as far away from the return pad and operating site as possible. • Making sure the sensor is not between the return pad and operating site. • Keeping the power cord and sensor cable away from the power cord of the electrosurgical unit. • Plugging the electrosurgery unit into a separate set of outlets from the monitoring device.
What does motion artifact look like, what problems can it cause, and how can it be corrected?	Motion artifact occurs with excessive motion of the sensor, the cable leading to the sensor, or the cable/sensor junction. In other words, anything that causes any of these things to move, like the patient moving his hands, or the cable lying across the ventilator tubing and being moved with every cycle, can cause motion artifact. A non-arterial, often erratic looking waveform and a pulse rate that does not coincide with the heart rate on the ECG will result. Motion artifact can be reduced, if not eliminated, by selecting a "quieter" site on the patient. An ear sensor if the hands do not remain still, an adhesive sensor on the toe, or an adhesive sensor on the little finger for an adult or on the sole of the foot in a newborn can help greatly. Cable movement can be reduced by applying the sensor with the cable leading toward the patient, then taping the cable to the side of the hand or foot. The cable and sensor can also be stabilized with a stress loop near the sensor. Tape the stress loop to the patient (excluding children). In the case of the butterfly sensor, the tape was designed to secure the cable to the finger.

Problem	Solution
	It has been noted that letting the patient view the SpO_2 waveform enables the patient to assist in reducing motion artifact.
Why is the parameter window not displayed on screen after connecting the SpO_2 interface cable and sensor?	No SpO_2 data is displayed due to a hardware failure or an unrecognized or defective sensor or cable. • Make sure the accessories are compatible. • Make sure the sensor is attached to the CARESCAPE SpO_2 device and the CARESCAPE SpO_2 device is connected to the CARESCAPE ONE. • Disconnect and reconnect the sensor. • Disconnect and reconnect the cable. • Change the sensor. • Change the cable. If the problem persists, contact qualified service personnel.

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Non-invasive blood pressure

NIBP compatibility limitations

For detailed information regarding CARESCAPE ONE, CARESCAPE Parameter, and accessory compatibility, see the supplemental information provided.

NIBP safety precautions

NIBP warnings

WARNING The NIBP parameter will not measure blood pressure effectively on patients who are experiencing seizures or tremors.

WARNING Arrhythmias will increase the time required by the NIBP parameter to determine a blood pressure and may extend the time beyond the capabilities of the parameter.

WARNING Do not apply external pressure against the cuff while monitoring. Doing so may cause inaccurate blood pressure values. Use care when placing the cuff on an extremity used to monitor other patient parameters.

WARNING NIBP cuff inflation/deflation may lead to inaccurate values from other monitored patient parameters that are measured distally from the NIBP measurement site at the same extremity.

WARNING PATIENT SAFETY. Ensure that the connection tubing is not kinked. Kinked tubing may cause continuous cuff pressure, which can interfere with the blood flow and cause injury to the patient.

WARNING PATIENT SAFETY. Do not place the cuff on the arm on the side of a mastectomy as this may lead to injury or swelling of the arm due to cuff pressurization. To avoid this risk, use another limb if possible.

WARNING Do not place the cuff over a wound as this may cause further injury.

WARNING PATIENT SAFETY. To prevent injury to the patient, do not place the cuff on a limb being used for A-V fistulas, intravenous infusion or on any area where circulation is compromised or has the potential to be compromised. To avoid this risk, use another limb if possible.

WARNING GE NIBP devices are designed for use with dual-hose cuffs and tubing. The use of single-hose cuffs with dual hose tubing can result in unreliable and inaccurate NIBP data.

WARNING Accuracy of NIBP measurement depends on using a cuff of the proper size. It is essential to measure the circumference of the limb and choose the proper size cuff.

WARNING NIBP READINGS MAY TIME OUT WHEN USING IABP. An IABP creates non-physiological arterial waveforms. These waveforms create an oscillometric signal that may not be interpreted by the NIBP algorithm, causing NIBP to time out. The patient's invasive blood pressure can be monitored from the balloon pump device.

WARNING The NIBP cuff size must be correctly selected in the NIBP ***Setup*** window to obtain reliable NIBP data and to prevent excessive cuff pressure during infant or child use.

WARNING PATIENT SAFETY. Always ensure that you are using NIBP infant settings when monitoring neonatal patients. Using other settings may lead to risks to the patient due to wrong alarm limits or cuff pressure, for example.

WARNING If a patient's beat-to-beat pulse amplitude varies significantly (e.g., because of pulsus alternans, atrial fibrillation, or the use of a rapid-cycling artificial ventilator), blood pressure and pulse rate readings can be erratic, and an alternate measuring method should be used for confirmation.

WARNING For SuperSTAT NIBP (Adult/Child) only. It takes one to three minutes for the NIBP parameter to identify an irregular rhythm after ECG is connected. For patients with irregular rhythms, wait three minutes after ECG has been connected and ECG heart rate is present on the screen before performing an NIBP determination.

NIBP cautions

CAUTION The NIBP device sets the inflation pressure automatically according to the previous measurement. Reset the case or discharge the patient to reset the inflation limits before measuring NIBP on a new patient.

CAUTION Devices that exert pressure on tissue have been associated with purpura, skin avulsion, compartmental syndrome, ischemia, and/or neuropathy. To minimize these potential problems, especially when monitoring at frequent intervals or over extended periods of time, make sure the cuff is applied appropriately and examine the cuff site and the limb distal to the cuff regularly for signs of impeded blood flow. Periodically check patient limb circulation distal to the cuff. Check frequently when using auto NIBP in 1 and 2 minute intervals. The 1 and 2 minute intervals are not recommended for extended periods of time.

NIBP measurement limitations

- A patient's vital signs may vary dramatically during the use of cardiovascular agents such as those that raise or lower blood pressure or those that increase or decrease heart rate.
- Although automated NIBP is generally safe and accurate, it has some limitations. It may be difficult to obtain reliable readings under the following circumstances:
  - Shock accompanied by low blood pressure and pulse.
  - Variations in blood pressure and pulse rate.
  - In patients with anatomic abnormalities, such as calcified (hardened) arteries or subclavian compression.
  - Compression of the cuff caused by shivering, seizures, arm movement, or bumping against the cuff.
- Proper sizing and position of the cuff are essential to obtaining reliable readings:
  - Too large a cuff is better than too small a cuff, which may yield falsely high readings.
  - The cuff should also fit properly over the brachial artery (or whatever artery is being used) so that the cuff is sufficiently sensitive to vibrations in the artery.

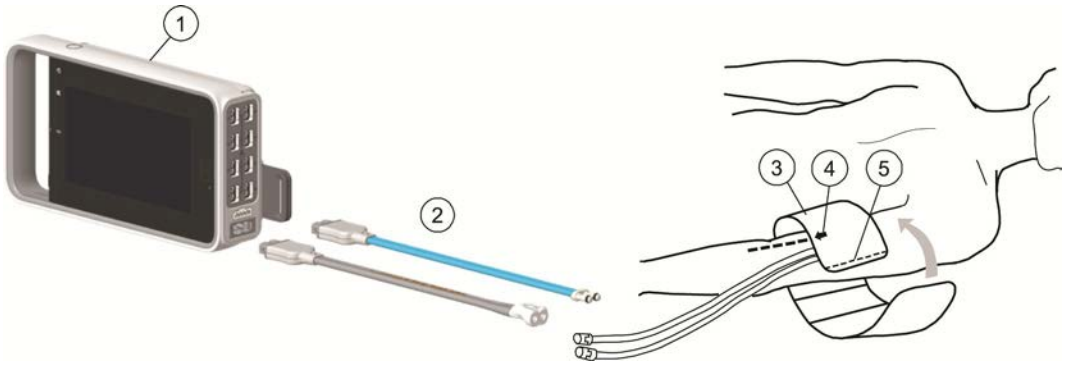
NIBP points to note

- This equipment is suitable for use in the presence of electrosurgery, as tested according to IEC 60601-2-49 clause 202.6.2.101 Electrosurgery interference.
- For information on materials used in accessories and their biocompatibility, refer to the instructions for use in the accessory package.
- The measurement has been validated with patient populations requiring clinical investigations according to ISO 81060–2:2013 apart from pregnant or pre-eclamptic patients.
- Use the appropriate size NIBP cuff for the patient (adult, child, or infant).
- The NIBP ***Infant*** software settings apply to the following patient populations:
  - Neonates from birth to 29 days of age.
  - Infants from 1 month to 3 years of age.
- Operator position: Make sure you do not lean on the cuff or hoses, and do not disturb the patient in any way during the measurement. Position yourself accordingly.
- The measurement site, patient's position (standing, sitting, lying down), exercise, or physiologic condition can affect the NIBP readings.

- With mobile patients and when taking routine resting blood pressure, ensure that:
  - The patient is comfortably seated, with their legs uncrossed and feet flat on the floor.
  - The patient's arms and back are supported.
  - The middle of the cuff is at the level of the right atrium of the patient's heart.
- Also consider the following recommendations:
  - Allow 5 minutes to pass before taking the first measurement.
  - Ensure that the patient is relaxed and does not talk during the measurement.

NIBP measurement setup

NIBP equipment to patient connection with CARESCAPE ONE



1. CARESCAPE ONE
2. Cuff hose (blue for neonatal, gray for adult)
3. Cuff of correct size
4. Brachial artery arrow (printed on cuff)
5. Cuff index line (printed on cuff)

Preparing the NIBP patient connection

1. Select an appropriate NIBP cuff size for the patient.
2. Connect the NIBP cuff hose to the NIBP connector on the acquisition platform.
3. Position the NIBP cuff on the patient:
   - Place the cuff arrow over the brachial artery (or whatever artery is being used).
   - Make sure that the cuff index line falls within the range markings on the cuff.
   - Wrap the cuff around the limb.
4. Make sure that the NIBP cuff tubes are not kinked, compressed, or stretched.
5. Select the NIBP parameter window > ***Setup***. Verify or select the correct:
   a. ***Page 1*** > ***Cuff Size***.
   b. ***Page 2*** > ***Init. Pressure***.

Checking the NIBP measurement

1. Check that the pressure values are displayed.

2. Always select the NIBP cuff size before starting a measurement. If you are trying to start the measurement without selecting the cuff size first, the NIBP ***Setup*** menu opens automatically with the ***Cuff Size*** list open.

NIBP measurement on screen

You can have a time progress bar in the NIBP parameter window with ***NIBP Auto*** and ***STAT*** modes:  5 min.

With ***NIBP Auto*** mode this may be replaced by a count down indicator. The selection of either the ***Graphical*** progress bar or the ***Numerical*** indicator is a care unit setting and it is password protected.

- ***NIBP Auto***: Auto mode uses clock synchronization. The number of lit segments indicates the difference between the cycling time since the last measurement and the time remaining until the next measurement.
- ***STAT***: The bar indicates the time that the mode will continue. ***STAT*** holds multiple measurements for 5 minutes.

Manual NIBP measurements

Starting or stopping a single NIBP measurement from the main menu

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

Starting or stopping a single NIBP measurement from the NIBP setup menu

1. Select the NIBP parameter window > ***Page 1***.
2. Start the measurement by selecting ***Start Manual NIBP***.
3. Stop the measurement by selecting ***Cancel NIBP***.

Automatic NIBP measurements

NIBP Auto mode

The ***NIBP Auto*** mode initiates repeated measurements for the selected ***Cycle Time***. There will be at least a 30 second delay between two consecutive NIBP measurements during auto cycling.

Starting or stopping the NIBP Auto from the main menu

1. Select ***NIBP Auto Start***.
2. Stop the measurement by selecting ***NIBP Auto Stop***.

Starting or stopping the NIBP Auto from the NIBP Setup menu

1. Select the NIBP parameter window > ***Page 1***.

2. Select ***NIBP Auto*** > ***Start Cycling*** .
3. Stop the measurement by selecting ***NIBP Auto*** > ***Stop Cycling***.

Setting the cycle time between NIBP measurements

To automatically measure NIBP at set time intervals, you must first set the cycle time.

1. Select the NIBP parameter window > ***Page 1***.
2. Select the cycle time from the ***Cycle Time*** list.

Automatic NIBP measurements and monitor clock synchronization

Clock synchronization timing (cycling sync) automatically synchronizes your automatic NIBP measurement time intervals with the monitor clock. For example, if automatic measurements are initiated for five minute intervals at 4:02, the first measurement is taken immediately at 4:02. The next measurement will be taken at 4:05 (interval and clock are now synchronized). All measurements will continue at five minute intervals (i.e., 4:10, 4:15, etc.)

There will always be at least a 30 second delay between two consecutive NIBP measurements during auto cycling. If an automatic measurement completes with less than 30 seconds to the next scheduled measurement, the monitor will delay the scheduled measurement until 30 seconds have passed. The cycling synchronization is not done during these 30 seconds but it will be done after the delayed auto measurement starts.

Examples with a 5 minute cycling time:

Completion with less than 30 seconds to the next scheduled measurement	**Completion after the next scheduled measurement should have started**
• First auto measurement starts: 4:59:00 • First auto measurement completes: 4:59:40 • Second auto measurement starts: 5:00:20 (not clock synchronized) • Third auto measurement starts: 5:05:00 (clock synchronized)	• First auto measurement starts: 4:59:00 • First auto measurement completes: 5:00:10 • Second auto measurement starts: 5:05:00

STAT mode

NOTE Not available in the NICU software package.

The ***STAT*** mode initiates a continuous cycle of measurements for five minutes. The message ***STAT*** displays in the NIBP parameter window when ***STAT*** is started. There is also a graphical bar indicator in the parameter window. A new NIBP measurement starts after the previous measurement completes. The amount of time between measurements varies. It is at least four seconds for adult and child cuff sizes and at least eight seconds for infant cuff size. The early systolic value is measured and displayed until the final result is available, but is never produced for the first measurement in a series of ***STAT*** mode measurements. After five minutes, the monitor automatically returns to the previously selected cycling interval or manual mode.

Starting or stopping a Stat NIBP measurement

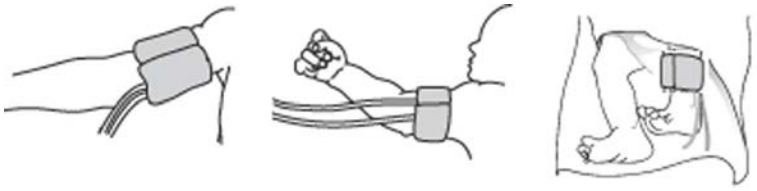
You can set the NIBP measurement to continue for five consecutive minutes.

1. Select the NIBP parameter window > ***Page 1***.
2. Select ***Start STAT***.
3. Stop the measurement by selecting ***Stop STAT***.

NIBP cuffs

NIBP cuff selection and placement

Always choose the appropriate blood pressure measurement site. In adult and child patients, the upper arm is preferred for convenience and because normative values are generally based on this site. When factors prohibit use of the upper arm, the clinician must plan patient care accordingly, taking into account the patient's cardiovascular status and the effect of an alternative site on blood pressure values, proper cuff size, and comfort.



Adult and child Infant

Always measure patient's limb and select appropriately sized cuff according to size marked on cuff or cuff packaging. When cuff sizes overlap for a specified circumference, choose the larger size cuff.

If patient is standing, sitting, or lying, ensure that cuffed limb is supported to maintain the cuff at level of patient's heart. If the cuff is not at heart level, the difference in the measured pressure values due to hydrostatic effect must be considered.

Selecting NIBP cuff size

You must first select the NIBP cuff size before starting an NIBP measurement. The cuff size must be selected for each individual patient.

NOTE In the NICU software package, infant ranges are equal to neonatal ranges.

1. Select the NIBP parameter window > ***Page 1***.
2. Select ***Cuff Size*** > ***Adult***, ***Child***, or ***Infant***.

Initial NIBP cuff inflation pressure

Cuff size	Initial inflation pressure
Adult	135 mmHg (18 kPa)
Child	125 mmHg (16.7 kPa)
Infant	100 mmHg (13.3 kPa)

NOTE When the ***Auto Initial Inflate*** setting is enabled, the initial cuff inflation pressures are dependent on the selected cuff size. The initial target pressure preset can be adjusted if you desire a lower or higher initial target pressure.

Selecting the initial NIBP cuff inflation pressure

You can determine the cuff inflation pressure automatically based on the cuff size.

1. Select the NIBP parameter window > ***Page 2***.
2. Select ***Auto Initial Inflate***.

Setting the target NIBP inflation pressure

You can manually change the target inflation pressure for the first NIBP measurement.

1. Select the NIBP parameter window > ***Page 2***.
2. Check that ***Auto Initial Inflate*** is not selected.
3. Select the ***Init. Pressure mmHg*** (or ***Init. Pressure kPa***) value with arrows.

NIBP volume and display settings

Adjusting the NIBP measurement completion tone volume

1. Select the NIBP parameter window > ***Page 2***.
2. Set the ***Completed NIBP Volume***.

   The lower the value, the softer the tone.

Setting the NIBP display format

1. Select the NIBP parameter window > ***Page 2***.
2. Select the format from the ***Display Format*** list:
   - ***Sys/Dia (Mean)***: All values are shown, but the sys/dia values are shown in a bigger font.
   - ***(Mean) Sys/Dia***: All values are shown, but the mean value is shown in a bigger font.

NIBP alarms

Setting NIBP alarms

NOTE The most recent saved alarm on/off settings apply to all cuff sizes.

1. Select the NIBP parameter window.
2. Select the ***Alarms*** tab.
3. Select ***Systolic (SYS)***, ***Mean (M)***, or ***Diastolic (DIA)*** pressure.

   If the feature is not active, the alarm limits are greyed out. Select ***Alarm On*** to set the alarms.

4. Set the alarm limits.

NIBP alarms' deactivation with pause audio key

Unlike the continuously monitored parameters, NIBP is measured periodically, and its physiological alarms can be deactivated with the pause audio key. Deactivating a physiological NIBP alarm will clear that active alarm until the next NIBP measurement is taken. If the new measurement is outside the alarm limits, the alarm is activated again.

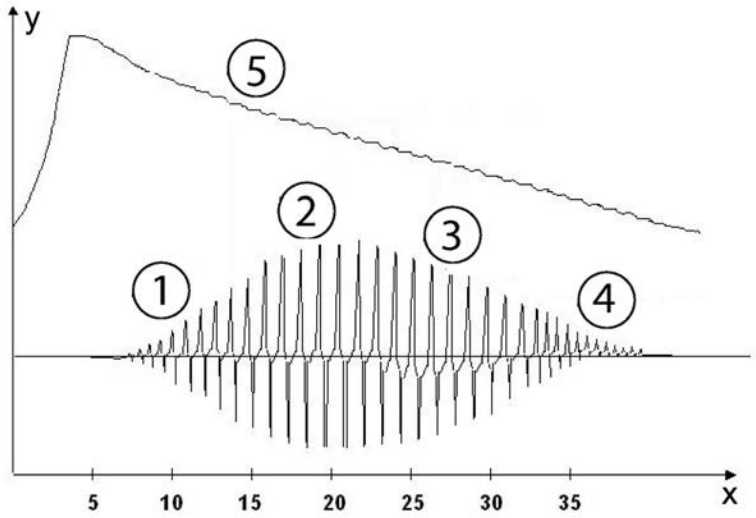
NIBP recheck after alarm violation (control measurement)

If the NIBP value exceeds the alarm limits and the NIBP alarm priority selection is ***Escalating***, a new measurement takes place automatically. If the NIBP measurement is taken manually, the recheck measurement is taken 4 seconds (***Adult***, ***Child*** cuff) or 8 seconds (***Infant*** cuff) after the first measurement. When the NIBP measurement is taken automatically, the recheck measurement is delayed by 30 seconds before the second measurement is taken.

NIBP measurement description

NIBP is acquired using oscillometric technology. Oscillometry is the most commonly used means of indirect blood pressure measurement in automated devices. It is based on the principle that pulsatile blood flow through an artery creates oscillations of the arterial wall.

Oscillometric devices use a blood pressure cuff to sense these oscillations that appear as tiny pulsations in cuff pressure. By measuring and analyzing at various cuff pressures, the amplitude (which changes based on the pressure within the cuff) and the frequency of these pulsations (which is dependent on the patient's heart rate), oscillometric devices can non-invasively determine blood pressure.



- x = Time(s)
- y = Pressures

1. Systolic
2. Mean
3. Diastolic

4. Extracted pulse wave
5. Cuff pressure

NIBP measurement technologies

DINAMAP SuperSTAT NIBP technology

The DINAMAP SuperSTAT technology estimates the systolic, mean arterial, and diastolic values by evaluating all cuff pressure data gathered during an NIBP determination.

For adults and children, when ECG is being monitored it provides and confirms more detailed timing information for the SuperSTAT algorithm. At the beginning of a SuperSTAT NIBP determination, the coefficient of variation from the previous 120 ECG RR intervals is used to determine if an irregular rhythm is present.

The first determination initially pumps up to a default target cuff pressure of about 135 mmHg for adults, 125 mmHg for child, or 100 mmHg for infant. The initial target pressure preset can be adjusted if you desire a lower (or higher) initial target pressure. To allow for rapid settling of cuff pressure, the monitor will momentarily inflate to a higher pressure, then immediately deflate to the target pressure.

As a determination is taken, the pattern of the patient's oscillation size is stored as a function of pressure. In any subsequent determination, as few as four pressure steps may be necessary to complete the process. When employing fewer pressure steps, the system uses the stored information from the previous blood pressure determination to decide the best pressure steps to take. The consistency of pulse sizes are measured to tell if the oscillations taken at a step are good and if more steps are needed.

If the current blood pressure reading is similar to the previous reading, some information from the previous blood pressure may be used in the current determination. The data is constantly evaluated during a measurement to try to perform a blood pressure determination in the shortest possible time, providing greater comfort to the patient.

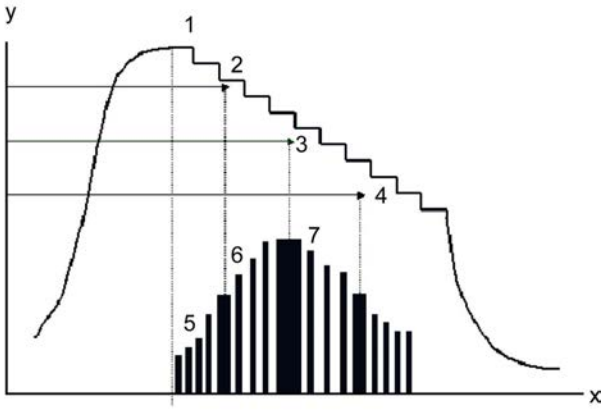
If it has been 16 minutes or less since the last determination and the current blood pressure is similar to the previous reading, the monitor will try to make an accelerated determination of blood pressure.

During irregular rhythms, only pulses from the current determination are used in calculating the blood pressure values. In order to ensure adequate artifact rejection capability and optimal SuperSTAT NIBP performance, several criteria used to match and qualify the oscillometric pulses at each pressure step are relaxed while supplementing the criteria with additional information from ECG.

DINAMAP Step Deflation technology

The DINAMAP SuperSTAT technology includes the DINAMAP Step Deflation technology. During the deflation process, the CARESCAPE ONE measures two consecutive pulsations in cuff pressure. If their amplitude differs by an acceptably small amount and the time interval between the pulsations matches the previous time intervals, the pulsations are averaged and stored along with the corresponding cuff pressure. The cuff is then deflated to the next step (in steps of 5-10 mmHg). As the deflation occurs, oscillation waves are assessed for strength and amplitude until the maximum oscillation amplitude or MAP is obtained.

If either of the above criteria is not met, the cuff pressure is maintained until two consecutive pulsations are detected that meet the criteria. Eventually, if the cuff is maintained at one pressure step for longer than one minute or the determination time exceeds 85 seconds (infant cuffs) or two minutes (adult and child cuffs), the CARESCAPE ONE will time out and display an error.



- x = Cuff pulsation waveform
- y = Cuff pressure

1. Cuff deflation
2. Systolic pressure (ratio of maximum amplitude)
3. Mean arterial pressure (maximum pulsation amplitude)
4. Diastolic pressure (ratio of maximum amplitude)
5. Cuff pulsations (each pulsation represents one heart beat)
6. Amplitude (changes based on cuff pressure)
7. Resulting waveform

Systolic and diastolic determinations are based on a mathematical calculation within the algorithm. The deflation mode is heart rate dependent, it is typically longer with heart rates that are slow and/or irregular.

This patented process of finding two matched pulsations of relatively equal amplitude and frequency at each step rejects artifact due to patient movement or other deviations from ideal conditions (e.g., cuff disturbances) and greatly enhances the overall accuracy of the measurement.

NOTE NIBP values are based on the oscillometric method of non-invasive blood pressure measurement taken with a cuff on the arm of adult and child patients, and a cuff on the calf of infants. The values correspond to comparisons with intra-arterial values within IEC particular standards for accuracy (a mean difference of ± 5 mmHg, and a standard deviation of < 8 mmHg).

NIBP calibration

The NIBP calibration procedure is explained in the service manuals. The calibration procedure is password protected.

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.
NIBP measurement does not start.	• Ensure that the cuff size has been selected.
Why is the cuff re-inflating 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, a systolic reading is searched by re-inflating the cuff to a higher pressure. During a systolic search, the maximum cuff inflation pressure will not exceed the normal pressure range of the cuff. For more information, refer to the technical specifications. A control measurement may be taking place. If the measured NIBP value exceeds the alarm limits, a single low priority alarm sounds and a new measurement is automatically taken. If the new value (the control measurement) also exceeds the alarm limits the alarm priority escalates to medium. In ***Manual*** mode and ***STAT*** mode there are at least four seconds between the first measurement and the control measurement for ***Adult*** and ***Child*** cuffs, eight seconds for ***Infant*** cuffs. In ***Auto*** mode there are at least 30 seconds between the first measurement and the control measurement.
Unexpected NIBP readings	• Ensure that the correct cuff size for the patient has been selected. • Check that the cuff is positioned correctly. • Reduce sources of motion artifact. • Calibrate the device.

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Invasive pressures

Invasive pressures compatibility limitations

For detailed information regarding CARESCAPE ONE, CARESCAPE Parameter, and accessory compatibility, see the supplemental information provided.

Invasive pressure safety precautions

Invasive pressure warnings

WARNING DEFIBRILLATOR PRECAUTIONS. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires. Using other cables or leadwires may result in damage to the equipment and compromise patient and user safety.

WARNING All invasive procedures involve risks to the patient. Use aseptic technique. Incorrect use of the catheter can lead to vessel perforation. Follow catheter manufacturer's instructions.

WARNING Make sure that no part of the patient connections touches any electrically conductive material including earth.

WARNING When using an electrosurgery unit, note that the measurement cables do not incorporate means to protect against burns in case of a defective ESU return electrode. To avoid burns at the monitor measurement sites, ensure the following:

- Proper contact of the ESU return electrode to the patient.
- ESU return electrode near the operating area.
- Measurement electrodes, leadwires and probes far from the surgical site and the ESU return electrode.

WARNING Mechanical shock to an invasive blood pressure transducer may cause severe shifts in the zero balance and calibration, and cause erroneous readings.

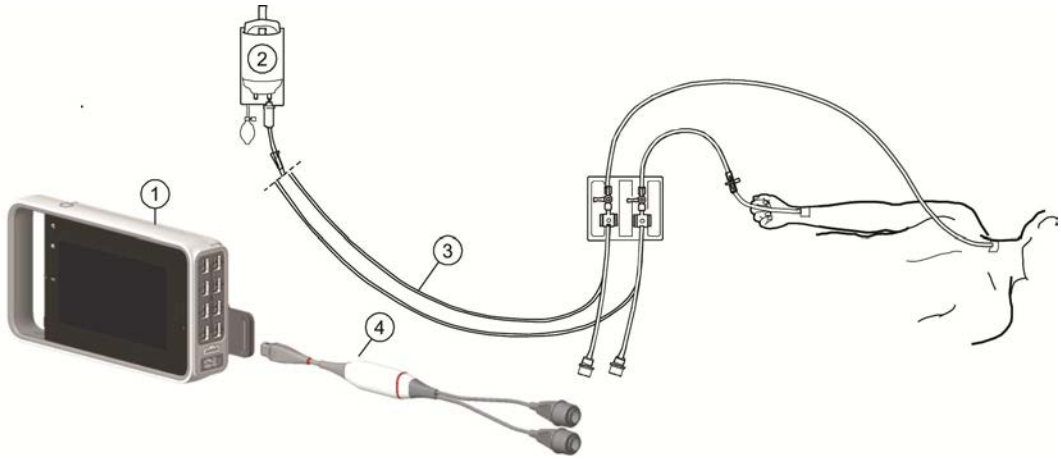
WARNING Repositioning the patient after a completed zeroing procedure may cause incorrect measurement values.

Invasive pressure points to note

- This equipment is suitable for use in the presence of electrosurgery, as tested according to IEC 60601-2-49 clause 202.6.2.101 Electrosurgery interference.
- For information on materials used in accessories and their biocompatibility, refer to the instructions for use in the accessory package.
- Defibrillator discharge may affect the invasive pressure measurement. Refer to the supplemental information provided for details regarding the recovery time from defibrillator discharge.
- Do not turn on the IABP algorithm unless a balloon pump is in use.

Invasive pressure measurement setup

Invasive pressure equipment to patient connection with CARESCAPE ONE



1. CARESCAPE ONE
2. Fluid bag with pressure infusor
3. Transducer setup
4. CARESCAPE Pressure

Connecting the invasive pressure transducer and cable

1. Prepare the transducer kit according to the manufacturer's instructions.
2. Connect the transducer setup to the CARESCAPE Pressure.
3. Remove entrapped air from within the transducer setup by tapping the setup and by turning it into different positions.
4. Connect the CARESCAPE Pressure to the CARESCAPE ONE.
5. Connect the transducer to the patient line.

Checking the invasive pressure measurement

1. Make sure that all the transducers are zeroed correctly.

2. Check that the monitor recognizes cable connections (activates the display) for all the pressure channels used and the pressure values and appropriate waveforms are displayed.

Invasive pressure measurement on the monitor screen

The invasive pressure channel labels are as follows. "X" indicates the channel number, for example, ***Art 2***. Throughout this document, when an invasive pressure label is followed by an "X", the "X" represents the channel number.

With the exception of PA, more than one channel can have the same channel label, for example, ***Art 1*** and ***Art 2***. Only one channel can be labeled ***PA***.

Label	Description
Art X	Arterial pressure
Fem X	Femoral arterial pressure
FemV X	Femoral venous pressure
PA X	Pulmonary arterial pressure
CVP X	Central venous pressure
LAP X	Left atrial pressure
RAP X	Right atrial pressure
ICP X	Intracranial pressure
RVP X	Right ventricular pressure
UAC X	Umbilical arterial pressure
UVC X	Umbilical venous pressure
P1 to ***P2***	Non-specific pressure channel labels

Using the invasive pressure measurement

Invasive pressure analog output

CARESCAPE ONE sets the first available arterial channel (***Art*** X, ***Fem***X, ***UAC*** X) for invasive pressure analog output.

- If there are no arterial channels available, the first zeroed channel will be used.
- If there are no zeroed channels available, a flat line will be the output of the IP Analog output channel.

About zeroing the invasive pressure transducers

- Prior to monitoring, zero transducers at the patient's phlebostatic axis. Zeroing the pressure transducers is very important for accurate pressure measurements. To avoid inaccurate measurements, you must zero the pressure transducers:
  - Before measuring invasive pressures.
  - Before initiating treatment changes reliant upon pressures data.
  - When using a new transducer or tubing.
  - After reconnecting the transducer cable to the CARESCAPE Pressure.

  - Whenever the patient's position is changed.
  - Whenever the pressure reading is questionable.
- Pressures can be zeroed individually by selecting ***Zero*** in the pressure menu. You can zero all pressures except ICP by selecting ***Zero All Pressures*** in the main menu.

Zeroing the invasive pressure transducers

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 Sensed*** displays.
4. You can zero all connected pressure transducers simultaneously by selecting ***Zero All Pressures*** from the main menu, or you can zero a single active pressure transducer by selecting the invasive pressure parameter window > ***Setup*** > ***Page 1*** > ***Zero***.

   NOTE ***Zero All Pressures*** does not zero a connected ICP channel. The ICP channel must be zeroed separately. When the ***Zero ICP separately*** message displays, you can zero the ICP channel by selecting ***Zero*** from the ICP ***Setup*** > ***Page 1*** tab.

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 channel label

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select a channel label from the ***Label*** list.

   The channel label ***PA*** can only be used for one channel label. All other labels names can be used for more than one channel label, if desired.

Selecting the size of the invasive pressure waveform

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Set the waveform scale with the ***Scale*** arrows.

   The larger the scale value, the smaller the waveform size.

Optimizing the invasive pressure waveform scale

You can select an automatic calculation for an optimized waveform size. This size will then be used for the waveform.

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

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select ***Optimize Scale***.

The ***Scale*** selection will now show the automatic limit range.

NOTE The ***Optimize Scale*** selection will not automatically change to match the waveform, you will always have to select it manually every time.

Selecting the hemodynamic waveform sweep speed

NOTE This setting adjusts the waveform speed for all of the hemodynamic parameters.

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select a numeric value from the ***Hemo Sweep Speed*** list.

   The smaller the value, the slower the sweep speed.

Selecting the displayed invasive pressure format

You can choose to display systolic, diastolic or mean pressure values in different formats.

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select the format from the ***Display Format*** list:
   - ***Mean only***: Only the mean value is shown.
   - ***Sys/Dia (Mean)***: All values are shown, but the sys/dia values are shown in a bigger font.
   - ***(Mean) Sys/Dia***: All values are shown, but the mean value is shown in a bigger font.
   - ***Sys/Dia/Mean***: All values are shown in the same size font.

Selecting invasive pressure as the primary heart rate source

The primary heart rate can be calculated from the ECG leads, SpO_2 measurement, or invasive pressure waveform.

NOTE This setting adjusts the primary heart rate source for all of the hemodynamic parameters.

NOTE This setting is available for ***Art*** X, ***Fem***X, or ***UAC*** X invasive pressure channels only.

NOTE ***HR Alarms*** must be configured as ***Single*** to enable invasive pressure as the primary heart rate source.

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select the heart rate source from the ***Primary HR Source*** list.

NOTE Only channels that have been configured with arterial pressure labels will appear in the list.

Showing the pulse rate in the invasive pressure parameter window

NOTE This setting is available for ***Art*** X, ***Fem*** X, or ***UAC*** X invasive pressure channels only.

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select ***Show Pulse Rate***.

Showing the CPP value in the ICP parameter window

A valid mean arterial pressure is required to compute the cerebral perfusion pressure (CPP) value.

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 2***.
3. Select ***Show CPP***.

Using the IP channel standby

If you wish to prepare and zero a channel beforehand, you can use the channel standby.

1. Select the invasive pressure parameter window.
2. Select ***Setup*** > ***Page 1***.
3. Select ***Standby*** [channel label channel number]. The channel label and channel number text depends on the channel label and channel number of the invasive pressure parameter window that was selected, for example, ***Standby Art 2***.

   Channel alarms and measurement are disabled until ***Activate*** [channel label channel number] is selected or pressure is detected. The channel label and channel number text depends on the channel label and channel number of the invasive pressure parameter window that was selected, for example, ***Activate Art*** 2.

Selecting the invasive pressure noise reduction filter

NOTE If arterial pressure is used to trigger the intra-aortic balloon pump, use the 40 Hz pressure filter.

1. Select the invasive pressure parameter window.
2. Select the ***Advanced*** tab.

3. Select a numeric value from the ***Filter Hz*** list.

   The smaller the filter value, the greater the degree of filtering that occurs.

Selecting the primary arterial source

The arterial pressure channel selected as the primary arterial source is used as the source for the primary HR, the secondary HR, CPP, and MAP.

1. Select the invasive pressure parameter window.
2. Select the ***Advanced*** tab.
3. Select an option from the ***Primary Arterial Source*** list.

   The selection applies to all invasive pressure channels with an arterial pressure label (***Art***, ***Fem***, ***UAC***).

   The ***AUTO*** option defaults to the first zeroed arterial site that has had a valid pulse rate for at least 10 seconds. For example, if both the ***Art*** 1 channel and the ***Fem*** 2 channel are zeroed and have valid pulse rates for at least 10 seconds, the ***AUTO*** option will be ***AUTO Art*** 1 because that is the lowest valid channel number.

   If the selected primary arterial source's site label is changed to another arterial site label, for example, ***Art*** to ***Fem***, the primary arterial source label will be updated to the new label. If the primary arterial source's site label is changed to a non-arterial site label, such as ***CVP***, the primary arterial source selection will change to ***AUTO***.

Selecting Smart BP

NOTE ***Art*** and ***Fem*** invasive pressure channels only. Not available in the NICU software package.

Smart BP is an algorithm that temporarily deactivates the arterial and femoral alarms when it detects the zeroing of a transducer, fast flushing of the system, or blood draws. The message ***Artifact***displays during the alarm deactivation. When pulsatile pressure returns and 15-20 beats are detected, numerics are displayed and alarms are reactivated.

1. Select the invasive pressure parameter window.
2. Select the ***Advanced*** tab.
3. Select ***Smart BP***.

Compensating for intra-aortic balloon pump (IABP) waveform irregularities

WARNING INCORRECT PULSE RATE. Be sure to turn off the IABP setting when the cardiac assist device is no longer used. Failure to do so could result in incorrect pulse rate readings.

CAUTION PATIENT HAZARD. If you choose to trigger the balloon pump from the monitor, contact the balloon pump manufacturer directly for interface requirements, as they vary among manufacturers. Some trigger modes on certain balloon pump devices may not be compatible with the GE analog output signal, and use may contribute to patient injury or sub-optimal pumping results.

NOTE ***Art*** and ***Fem*** invasive pressure channels only. Not available in the NICU software package.

1. Select the invasive pressure parameter window.
2. Select the ***Advanced*** tab.
3. Select ***IABP On***.

   IABP now displays in the invasive pressure channel parameter window.

Setting an arterial invasive pressure disconnection alarm

The catheter disconnection alarm activates if the mean ***Art***, ***Fem***, or ***UAC*** pressure falls below 10 mmHg (1.33 kPa). The catheter disconnection alarm for each arterial pressure (Art, Fem, UAC) is enabled by default. If the ***Alarm Off Allowed*** option is enabled in ***Care Unit Settings***, you can enable or disable the alarm for each arterial pressure. ***Care Unit Settings*** are password protected. Refer to the supplemental information provided for more information.

1. Select the invasive pressure parameter window.
2. Select the ***Advanced*** tab.
3. Select ***Catheter Disconnect***.

Setting invasive pressure alarm limits

1. Select the invasive pressure parameter window.
2. Select the ***Alarms*** tab.
3. Select the tab for the desired alarms setting:
   - [Channel label] [Channel number] ***Alarms*** (e.g., ***Art*** 2 ***Alarms***): Settings for the selected invasive pressure channel.
   - ***HR Alarms***: Settings when the heart rate alarms are from a single source.
   - ***PR(***[Channel label] [Channel number]***) Alarms*** (e.g., ***PR(Art)*** 2 ***Alarms***): Settings when the heart rate alarms are calculated from multiple sources.

   NOTE If a feature is not active, the alarm limits are greyed out. You can set them on by selecting ***Alarm On***.

4. Set the alarm limits.

Invasive pressures alarm priorities

You can select priorities for the ***Art high/low***, ***Fem high/low***, ***FemV high/low***, ***CVP high/low***, ***PA high/low***, ***RAP high/low***, ***RVP high/low***, ***LAP high/low***, ***ICP high/low***, ***CPP high/low***, ***UAC high/low***, ***UVC high/low***, and ***P1 high/low*** to ***P2 high/low*** alarms through ***Alarms Setup*** > ***Alarm Priorities*** > ***Invasive Pressures***. The choices are ***Escalating***, ***High***, ***Medium***, and ***Low***.

Escalating and ***Low*** priorities are only available if they have been allowed in ***Care Unit Settings***. ***Care Unit Settings*** are password protected. When an invasive pressure alarm priority has been set to ***Escalating*** or ***Low***, a warning text appears in the

invasive pressure alarms tab, indicating that the alarm priority has been set to ***Escalating*** or ***Low***.

Invasive pressure practicalities

Invasive pressure parameters

The measured invasive pressure parameters are systolic, diastolic, and mean. Pulse rate can be monitored with any arterial site. CPP is a calculated value that requires a valid ICP value and a valid arterial site value.

You can monitor up to two pressures.

The following table lists the available site names and displayed values. The "X" after the site name represents the channel number, for example, ***Art*** 2:

Site	Site name	CARESCAPE ONE displayed values
General site name for the specific invasive pressure channels 1 and 2	***P1*** to ***P2***	Mean
Arterial	***Art*** X	Pulse rate, systolic, diastolic, mean
Central venous	***CVP*** X	Mean
Femoral arterial	***Fem*** X	Pulse rate, systolic, diastolic, mean
Femoral venous	***FemV*** X	Mean
Intracranial	***ICP*** X	Mean
Left atrial	***LAP*** X	Mean
Pulmonary artery	***PA*** X	Systolic, diastolic, mean
Right atrial	***RAP*** X	Mean
Right ventricular	***RVP*** X	Mean
Umbilical artery catheter	***UAC*** X	Pulse rate, systolic, diastolic, mean
Umbilical venous catheter	***UVC*** X	Mean

Intra-aortic balloon pump

NOTE Not available in the NICU software package.

GE recommends that the signal source used to trigger an IABP should be the intra-aortic balloon pump itself. This ensures that the trigger signal is compatible with all modes of the IABP. An extra set of ECG electrodes or an additional connection from the arterial line can be connected to the monitor to produce waveforms on the monitor's display for consolidated viewing.

When using the monitor for triggering, the IABP triggers off the Defib Sync port and uses the first zeroed arterial invasive pressure channel. If the intra-aortic balloon pump triggers off arterial pressure, the analog output defaults to the numerically first

zeroed arterial pressure: ***Art*** X, ***Fem*** X, or ***UAC*** X. If no arterial pressure is available, the numerically first zeroed pressure is used.

Triggering intra-aortic balloon pumps

NOTE If you choose to use the monitor for triggering, use the following instructions. Failure to follow these instructions may result in an incompatible analog output signal, which may contribute to patient injury.

1. Contact the balloon pump manufacturer for interface requirements. See the technical specifications for the ECG analog output delay specification for the acquisition device.
2. Connect a compatible analog output cable to the Defib Sync connector.
3. Adjust the invasive pressure filter. If arterial pressure is used to trigger the balloon pump, use the 40 Hz pressure filter.
4. Primary displayed ECG lead: If the balloon pump triggers off the R wave of the ECG, review the patient's ECG leads and place the one with the greatest amplitude in the top (primary) position on the monitor display.
5. Pacemaker detection: If the patient has a pacemaker, be sure the pacemaker detection is turned on. Failure to turn pacemaker detection on may cause poor beat detection, which may result in inadequate triggering of the balloon pump.

Effects of IABP on displayed values

Displayed pressure values are affected by the intra-aortic balloon pump. The IABP program displays three values, for example 150/45 (98). The first value is the systolic value, the second is the diastolic value, and the third is the mean value. The displayed numeric values are indicating a rapidly varying waveform generated during IABP treatment and do not always reflect a true arterial blood pressure.

For accuracy and reliability, combine these recommended methods for reading arterial and/or femoral blood pressure:

- The IABP waveform displayed on the screen (use scales for evaluation)
- The display on the balloon pump device, if available

Since there are a number of points along the IABP waveform that could be the displayed value, it is important to know which points the program uses. The values displayed will differ depending on the timing of the pump.

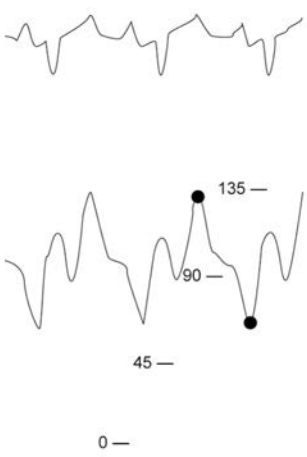
1:1 or 1:2 timing

Diastolic numerics: The displayed diastole always equals the balloon end diastole.

Systolic numerics:

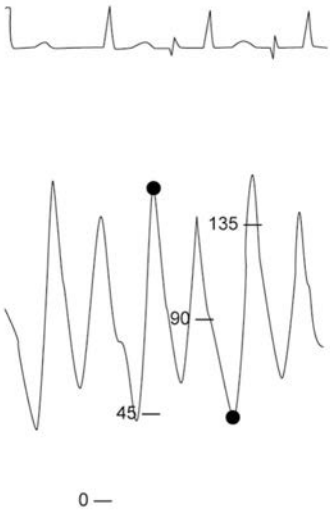
- When the augmented diastole is greater than the patient systole, the displayed systole equals the augmented diastole.

Art 134/63



- When the patient systole is greater than the augmented diastole, the displayed systole equals the patient systole.

Art 160/45

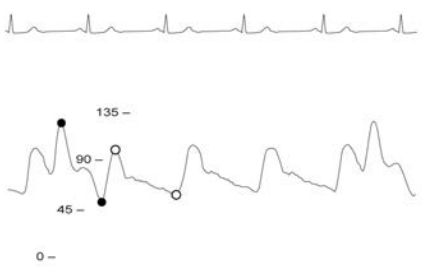


1:3 or more timing

Diastolic numerics: The displayed diastole switches between the balloon end diastole and the patient end diastole.

Systolic numerics: The displayed systolic numerics switch between the augmented diastole and patient systole.

Displayed values will switch between: Art 123/51 (●) and Art 100/60 (○)



Invasive pressure troubleshooting

Problem	Solution
Artifact detected and the ***Smart BP*** option is turned on.	• Check the patient. • Reposition the catheter. • Zero the transducer. • If the problem persists, turn off the ***Smart BP*** option. • If the ***Smart BP*** option is turned off, use the audio pause feature before drawing blood and before zeroing to reduce nuisance alarms.
Invasive pressure readings seem unstable.	• Make sure there are no air bubbles in the transducer systems. • Flush and zero. • Place the transducer on the patient's phlebostatic axis.
---/--- (80) Systolic and diastolic pressure values do not display.	This may be due to the ***Smart BP*** option detecting artifact. When artifacts are detected, only ***Mean*** values are displayed. • Check the patient. • Turn off the ***Smart BP*** if required.
Invasive pressure waveform is displayed but no numeric values are displayed.	• Zero the channel. Invasive pressure numeric values are displayed only for successfully zeroed channels.
Zeroing of invasive pressure channel(s) fails.	• Ensure that the channels are open to air.
The channel standby is not selectable, or it is terminated without the user giving the activation request.	• If the pressures remain between 10 mmHg and 250 mmHg for 10 seconds or more, the selection is disabled or the standby is terminated.

Problem	Solution
Why are displayed pressure values different than expected?	• Check the patient. Values could be valid, the patient could be lying on the tubing, or the tubing could be kinked. • Check tubing for bubbles. • Remove excess tubing. • Check phlebostatic axis placement of transducer. • Rezero pressure. • If patient is on IABP, verify that the monitor's IABP program is turned on. If necessary, turn it on.
Why are the arterial, non-invasive (oscillometric), and auscultated blood pressure readings indicating different values?	The three measurement methods use different technologies. Auscultation and oscillometric are both indirect methods of measuring blood pressure. In auscultation, changes in arterial sounds during cuff deflation are related to systolic and diastolic pressure. With oscillometric measurement, changes in measured pressure oscillations during cuff deflation are related to systolic, mean and diastolic pressures. Changes in the vascular tone of the arterial system can cause these two indirect methods to differ from one another and from direct arterial pressure measurements. Invasive arterial blood pressure is a direct method of measuring blood pressure. Differences between direct and indirect blood pressure measurements are expected. These differences occur because direct methods measure pressure and indirect methods measure flow. In addition, differences occur because the measurement location is not the same (e.g., brachial artery for NIBP vs. radial artery for invasive arterial pressure monitoring).
Why is the monitor alarming arterial disconnect?	• Check the patient immediately in the event the catheter has been dislodged. • If the arterial disconnect alarm is turned on and the mean pressure falls below 10 mmHg, the monitor alarms. When zeroing a pressure line, start the zeroing process within 8 seconds. After that time the disconnect alarm is activated. • If zeroing, close the stopcock. Once the monitor detects the return of waveform and numeric data, the alarm will reset.
Why is there a flashing heart icon displayed next to the PR value in the corresponding parameter window?	***Art***X, ***Fem*** X, or ***UAC*** X (where X represents the channel number) has been selected as the ***Beat Source*** in the ***ECG*** or ***SpO2*** menu. • No action is required.

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Temperature

Temperature compatibility limitations

For detailed information regarding CARESCAPE ONE, CARESCAPE Parameter, and accessory compatibility, see the supplemental information provided.

Temperature safety precautions

Temperature warnings

WARNING DEFIBRILLATOR PRECAUTIONS. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires. Using other cables or leadwires may result in damage to the equipment and compromise patient and user safety.

WARNING When using an electrosurgery unit, note that the measurement cables do not incorporate means to protect against burns in case of a defective ESU return electrode. To avoid burns at the monitor measurement sites, ensure the following:

- Proper contact of the ESU return electrode to the patient.
- ESU return electrode near the operating area.
- Measurement electrodes, leadwires and probes far from the surgical site and the ESU return electrode.

WARNING There are hazards associated with the reuse of single-use temperature probes.

WARNING Use of devices containing phthalates should be limited to the amount of time treatment is medically necessary, especially for neonates and pregnant or nursing mothers.

Temperature cautions

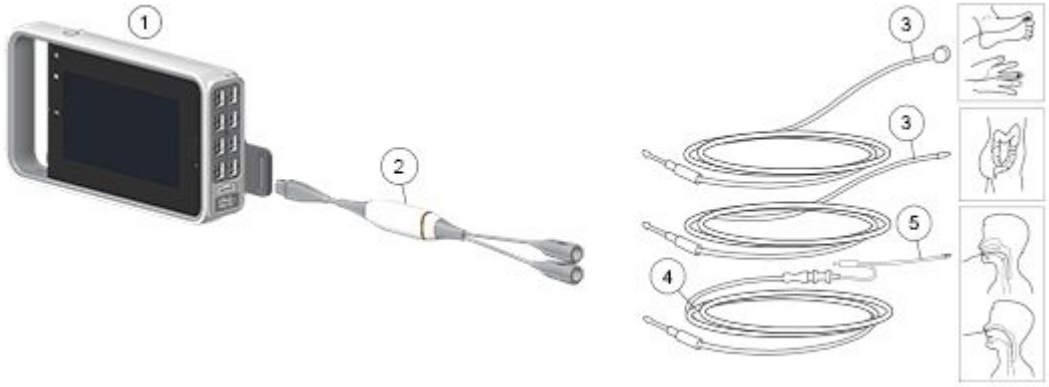
CAUTION INACCURATE READINGS. To obtain accurate temperature measurements, use only 400 series temperature probes. Using other types of probes can lead to inaccurate readings.

Temperature points to note

- This equipment is suitable for use in the presence of electrosurgery, as tested according to IEC 60601-2-49 clause 202.6.2.101 Electrosurgery interference.
- For information on materials used in accessories and their biocompatibility, refer to the instructions for use in the accessory package.
- Use only GE approved temperature accessories.
- For more detailed information regarding the temperature probes, refer to their own instructions for use.
- The temperature measurement uses direct mode. Displayed temperature values represent the probe temperature of the measurement site on the patient.
- A temperature channel is activated when the CARESCAPE ONE detects the CARESCAPE Temperature.
- A temperature channel is deactivated when the CARESCAPE Temperature is detached from the CARESCAPE ONE.

Temperature measurement setup

Temperature equipment to patient connection with CARESCAPE ONE



1. CARESCAPE ONE
2. CARESCAPE Temperature (dual)
3. Reusable temperature probe (example)
4. Temperature interconnect cable for disposable temperature probes
5. Disposable temperature probe (example)

Preparing the patient for temperature measurement

1. Follow the manufacturer's instructions for probe application.
2. Connect the CARESCAPE Temperature to a CARESCAPE Parameter connector on the CARESCAPE ONE.

Checking the temperature measurement

1. Check that the temperature value is displayed when the probe is connected to the CARESCAPE Temperature.

Temperature measurement on screen

Up to two temperature measuring sites can be simultaneously measured and monitored.

Temperature monitoring provides numerics only. No waveform is generated or displayed. The default temperature measuring site labels are as follows:

T1, ***T2*** = general label	
Eso = esophageal	***Skin*** = skin
Naso = nasal	***AirW*** = airway
Tymp = tympanic	***Room*** = room
Rect = rectal	***Myo*** = myocardial
Blad = bladder	***Core*** = core
Axil = axillary	***Surf*** = surface

Using the temperature measurement

Temperature mappings

Temperature measurements are mapped to channels ***T1*** or ***T2***.

Starting the temperature measurement

Connect the temperature probe to start the measurement. If the parameter window displays ***OFF*** in the value field:

1. Select the temperature parameter window.
2. Confirm that the check box for the measurement (e.g., ***T1 Measurement***) is selected.

   The temperature delta value ***T2-T1*** has no selection of its own, but it will be shown in the ***T1&T2*** parameter window. If you do not want to display the temperature delta value, you can remove the ***T1&T2*** parameter window from the screen.

Changing the temperature site label

1. Select the temperature parameter window.
2. Choose a site label from the label list (e.g., ***T1 Label***).

Setting temperature alarms

1. Select the temperature parameter window.
2. Select the ***T1, T2 Alarms*** tab.

3. Select ***T1***, ***T2*** or ***T2-T1*** alarm field.

   If the feature is not active, the alarm limits are greyed out. Activate the alarm by selecting ***Alarm On***. If informational priority level has been selected for the alarm, the menu selection is ***Message On***.

4. Set the alarm limits.

If the setting of an alarm limit has been disabled during configuration, the setting is marked with a lock symbol:

Stopping the temperature measurement

1. Select the temperature parameter window.
2. Deselect the measurement check box (e.g., ***T1 Measurement***).

Temperature practicalities

- Each temperature label can be changed to reflect the temperature measurement site.
- Individual temperature sites can be turned off.
- The difference between two temperature sites can be calculated and displayed.
- The CARESCAPE Temperature allows a two-channel measurement.
- The signal input is a high-insulation port to ensure patient safety and to protect the device during defibrillation and electrosurgery.
- The temperature measurements are automatically calibrated at startup and then at least once a minute.

Temperature troubleshooting

Problem	Solution
Temperature measurement fails	• Check that the CARESCAPE Temperature is properly connected to the acquisition platform. • Check that there is only one CARESCAPE Temperature connected to the acquisition platform. • Check that the probe is properly connected to the CARESCAPE Temperature or interconnect cable. • Check that you are using the correct probe for the anatomical location being monitored. • Use a probe that is compatible with your system. • Try using a known good probe in case the probe is damaged. • If you are using the CARESCAPE ONE with a Bx50 host, check the connection between the acquisition platform and the host. • Check the patient connection.

Problem	Solution
	• If the problem persists, contact qualified service personnel.
Measurement with CARESCAPE ONE triggers error messages.	• Check the CARESCAPE Temperature placement and ensure that it is not covered by anything that might lead to overheating. • Wait until the message disappears. • Try connecting the CARESCAPE Temperature to another CARESCAPE Parameter connector. • If the problem persists, contact qualified service personnel.
Numeric values are replaced by dashes. In addition, the message ***Temperature malfunction*** appears on screen.	• Reconnect the CARESCAPE Temperature. • Replace the CARESCAPE Temperature. • If the problem persists, contact qualified service personnel.

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CO_2

CO_2 safety precautions

CO_2 warnings

WARNING Always inspect the airway adapter for a tight connection and proper operation before attaching it to the breathing circuit.

WARNING Leaks in the gas sampling circuit (sampling line) may cause inaccurate readings.

WARNING Remove the airway sampling line from the patient's airway while nebulized medications are being delivered.

WARNING Since sample gas may contain anesthetic agents, make sure that it is not released in the room. Connect exhaust to a scavenging system to prevent exposure to anesthetic agents.

WARNING Route all tubing away from the patient's throat to avoid strangulation.

WARNING To avoid the spread of infectious disease, do not allow the exhaust to discharge in the direction of the patient or user.

WARNING APNEA EVENTS. The device may not detect all episodes of inadequate breathing, nor does it distinguish between central, obstructive, and mixed apnea events.

WARNING O_2, N_2O and anesthetic agent gases may interfere with $EtCO_2$ readings.

WARNING To avoid the risk of patient cross-infection, do not return the sampled gas to the breathing system.

WARNING Strong scavenging suction may change the operating pressure of the module and cause inaccurate readings or excessive sample gas flow.

WARNING Do not allow the exhaust line to become kinked or blocked. Back pressure may cause inaccurate gas readings.

WARNING The device should not be used in close proximity to wireless networking equipment, or in the presence of strong electromagnetic fields such as those generated by radio station transmitters, citizens band radios, cellular phones, electrocautery, etc. Using the device under the above conditions may cause one or all of the following to occur:

- Artifact may be induced on the capnogram.
- The CO_2 parameter values may be replaced by —.
- A message prompting to check or zero the adapter or to check the sample line may be displayed in the parameter window.

WARNING An alarm for low flow rate is generated when the flow drops to approximately 20% of the nominal flow rate of 50 ml/min. This rate is below the lowest specified flow rate of 40 ml/min.

WARNING Do not use this device on patients that cannot tolerate the removal of 50 ml/min ±10 ml/min from their total minute ventilation.

WARNING Use of devices containing phthalates should be limited to the amount of time treatment is medically necessary, especially for neonates and pregnant or nursing mothers.

WARNING Always ensure the correct size and fit of accessories according to patient type and application, especially when monitoring pediatric and neonatal patients. The size and fit of accessories may impact the measured gas concentration values at low tidal volumes. It is recommended to have the gas sampling port close to the proximal end of the endotracheal tube. Excessive dead space in the circuit, including the accessories, may cause re-breathing of gases. Very low accessory dead space between the breathing circuit Y-piece and the gas sampling site may impact the measured gas concentration due to dilution of the sampled exhaled gas with fresh gas from the ventilator. To confirm accurate correlation with measured gases and blood, check arterial blood gas values to confirm a suitable setup is used.

CO_2 cautions

CAUTION Do not apply pressurized air or gas to any outlet or tubing connected to CARESCAPE CO_2 or CARESCAPE ONE. Pressure may destroy sensitive elements.

CAUTION Do not apply excessive tension to any cable.

CAUTION Do not insert any appendage, tool, sharp object, or liquid into the sample receptacle.

CO_2 points to note

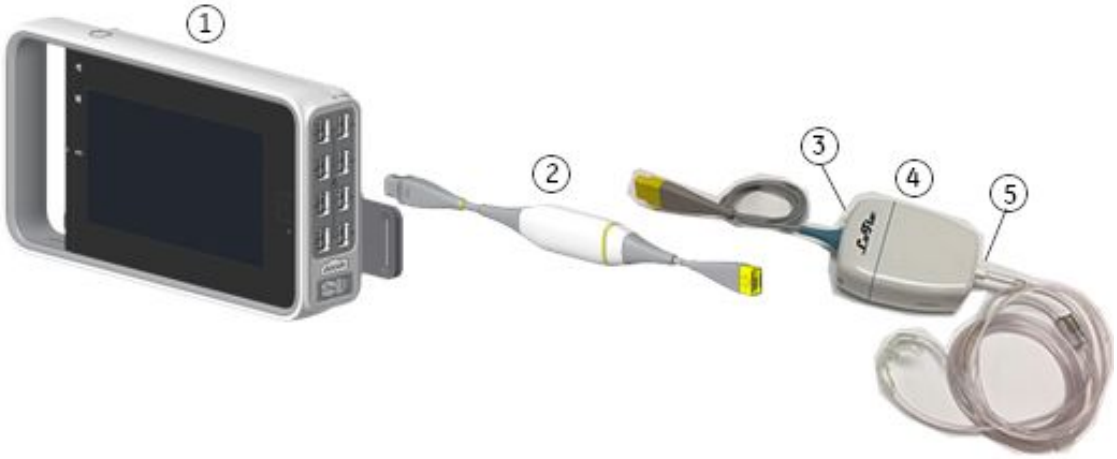
- This equipment is suitable for use in the presence of electrosurgery, as tested according to IEC 60601-2-49 clause 202.6.2.101 Electrosurgery interference.

- For information on materials used in accessories and their biocompatibility, refer to the instructions for use in the accessory package.
- The water trap is contained within the sample lines.
- Place the airway adapter with all sampling ports upwards.
- Always check the tightness of all connections.
- Materials used in accessories are not toxic. Accessories do not contain natural rubber latex. Also see the instructions for use in the accessory package.
- The system automatically performs barometric pressure compensation to meet the stated accuracy of the LoFlo Sidestream Module.
- Nitrous oxide, elevated levels of oxygen, helium, xenon, halogenated hydrocarbons, and barometric pressure can influence the CO_2 measurement with Respironics LoFlo.
- If nitrous oxide is used, always use N_2O compensation.

CO_2 measurement setup

Equipment connection with CARESCAPE CO_2

For intubated and non-intubated patients.



1. CARESCAPE ONE
2. CARESCAPE CO_2
3. Exhaust port
4. LoFlo Sidestream Module
5. Accessory port (for sample lines, nasal cannulas, etc.)

Preparing the setup for CARESCAPE CO_2

1. Connect the LoFlo Sidestream Module to CARESCAPE CO_2.
2. Connect CARESCAPE CO_2 to the CARESCAPE ONE.
3. Connect the sample line to the LoFlo Sidestream Module.
4. Zero the LoFlo Sidestream Module.

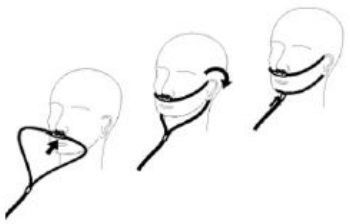
5. Connect the sample line to the patient's breathing circuit if an airway adapter accessory is used, or place on the patient if a nasal cannula is used.

About sidestream kits

CAUTION The nasal and oral/nasal cannula kits are intended for single use. Do not reuse or sterilize the cannula kit as system performance will be compromised.

Sidestream kits are intended for monitoring CO_2 of non-intubated patients.

- Select the kit that has the best fit and most comfort for the patient. For example, the kit labeled as Pediatric may have the best fit and be more comfortable on a small-statured adult than the adult cannula kit. The cannula kits are equally functional regardless of which is used.
- Verify that the cannula kit is clean, dry and undamaged. Replace the cannula kit if necessary.
- Insert the sample cell into the sample cell receptacle. You will hear a click when the sample cell is properly inserted.
- Zero the LoFlo Sidestream Module.
- Place the nasal cannula kit onto the patient:



See the accessory-specific instructions for use for more detailed information.

Using the CO_2 measurement

Pump on or off with CARESCAPE CO_2

The pump is automatically turned on when a sample line is inserted into the LoFlo Sidestream Module. When connected properly, you will hear a click. When the sample line is removed, the pump turns off immediately. When a blocked line occurs, the pump turns off after 2 minutes of unsuccessfully trying to remove the blockage.

Selecting the CO_2 scale

If $EtCO_2$ is above 6% (45 mmHg), change the scale for the capnogram.

1. Select the CO_2 parameter window.
2. Select ***Setup***.
3. Select an option from the ***Scale*** list.

Selecting the CO_2 sweep speed

This selection changes the speed at which the capnogram is displayed.

1. Select the CO_2 parameter window.
2. Select ***Setup***.
3. Select an option from the ***CO2 Sweep Speed*** list. The options are ***0.625 mm/s***, ***6.25 mm/s***, ***12.5 mm/s***, ***25 mm/s***, and ***50 mm/s***.

The smaller the value, the slower the sweep speed.

Setting CO_2 limit alarms

1. Select the CO_2 parameter window.
2. Select ***Alarms***.
3. Select ***Page 1*** to set the high and/or low limit values for ***EtCO2*** and ***FiCO2***. Select ***Page 2*** to set the high and/or low limit values for ***Resp Rate (CO2)***.
4. Select the parameter and then set the limits.

Deactivating the apnea alarm

NOTE This feature is meant to be used when ending CO_2 monitoring. It should not be used during active CO_2 monitoring.

This setting can be enabled in ***Care Unit Settings***. Care unit settings are password protected. If it has been enabled, there will be a selection in the CO_2 ***Setup*** menu that allows you to deactivate the alarm:

1. Select the CO_2 parameter window.
2. Select ***Setup***.
3. Select ***Deactivate Apnea Alarm***.

WARNING With deactivated ***Apnea*** alarm, keep the patient under close surveillance.

NOTE When the alarm is deactivated, there will be no audible or visual ***Apnea*** alarm indications. The alarm is automatically reactivated if CO_2 vitals signs are detected and alarm condition is met again.

NOTE $EtCO_2$, $FiCO_2$, and respiration rate are not trended while apnea is deactivated.

Apnea alarm deactivation with the pause audio key

Apnea alarms can be deactivated with the pause audio key if the ***Allow alarm deactivation from the parameter menu for:*** setting ***Apnea (CO2/Imped.)*** is enabled in the ***Care Unit Settings***. This setting is password protected.

NOTE The following parameters are not trended while apnea is deactivated: $EtCO_2$, $FiCO_2$, respiration rate.

For more information, see the supplemental information provided.

Selecting CO_2 average

You can select a time window that is used to select the displayed CO_2 value. The highest peak $EtCO_2$ value within the time window is selected as the CO_2 value displayed.

1. Select the CO_2 parameter window.
2. Select ***Setup***.
3. Select an option from the ***CO2 Average*** list.

Selecting the FiO_2 level

The presence of a large concentration of oxygen causes the CO_2 level to appear lower than the actual value. Use this option to compensate for the presence of O_2.

1. Select the CO_2 parameter window.
2. Select ***Setup***.
3. Select an option from the ***FiO2 level*** list: ***21-40*** or ***40-100*** percent.

Selecting the N_2O level

The presence of N_2O causes the CO_2 value to appear higher than the actual value. Use this option to compensate for the presence of N_2O.

1. Select the CO_2 parameter window.
2. Select ***Setup***.
3. Select an option from the ***N2O level*** list: ***0-40*** or ***40-80*** percent.

Selecting the apnea alarm limit

The apnea alarm can be enabled to select a time delay before an apnea alarm is generated. The delay is defined with the ***Apnea limit seconds*** setting. If anything other than the default (20 seconds) is selected, the number of seconds selected for the delay displays in the parameter window.

1. Select the CO_2 parameter window.
2. Select ***Alarms*** > ***Page 2***.
3. Select an option from the ***Apnea limit seconds*** list.

Zeroing the LoFlo Sidestream Module

When the message ***CO2 zero required*** appears in the alarm messages area, or the message ***Zero required*** appears in the CO_2 parameter window, the LoFlo Sidestream Module needs to be zeroed.

NOTE For best results, allow five minutes for module warm-up before starting the zero.

You should also zero the LoFlo Sidestream Module after connecting or reconnecting a sample line.

1. Disconnect the patient from CO_2 monitoring.
2. Connect the LoFlo Sidestream Module and, if necessary, wait until the sensor warm-up message disappears.

3. Connect a LoFlo sampling accessory to the LoFlo Sidestream Module. Ensure that the accessory is exposed to room air and away from all sources of CO_2, including the ventilator, the patient's breath, and your own breath.
4. Select the CO_2 parameter window.
5. Select the ***Zeroing*** tab.
6. Select ***Zero to room air***.

   A status message ***Zero OK*** appears in the ***Zeroing*** window when the zero is complete. This message disappears automatically.
7. Reconnect the patient to resume CO_2 monitoring.

Preventing care area pollution

When N_2O and volatile anesthetics are used, prevent care area pollution by connecting the sample gas outlet to the scavenging system.

Connecting to scavenging systems

The gas exhaust may be scavenged using the scavenging adapter package.

1. Remove the exhaust tube from the package.
2. Attach the connector end of the exhaust tube to the LoFlo Sidestream Module exhaust port.
3. Install the exhaust adapter into an open scavenging system, following the manufacturer's recommended procedure.

   NOTE Do not use a strong vacuum scavenging system.
4. Drape the exhaust tube so that it does not interfere with the work area.

Stopping the CO_2 measurement

1. Remove the added adapters from the patient's breathing circuit and gas scavenging, or remove the cannula from a non-intubated patient.
2. Check the patient's breathing circuit to ensure it is reassembled properly.
3. Remove the sample cell from the LoFlo Sidestream Module and discard the sampling kit.
4. Remove all components of CARESCAPE CO_2 from the CARESCAPE ONE when it is not in use.

Basics of CO_2 measurement

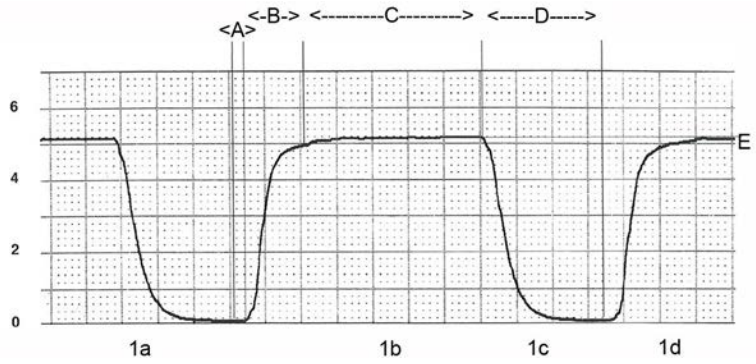
Normal CO_2 waveform

The CO_2 waveform is referred to as capnogram and it reflects the different stages in breathing. The capnogram of a healthy patient under controlled ventilation has a normal shape. Changes in the CO_2 waveform may indicate compromised patient respiratory and/or circulatory function or improper mechanical ventilator functionality.

The origin of the CO_2 waveform

The following illustration shows a normal capnogram. In this illustration, the letters indicate the following:

- A: The gas first exhaled is from the anatomical and apparatus dead-space. It contains no CO_2 because it has not been in the alveoli and no gas exchange has taken place.
- B: Briefly, the exhaled gas is a mixture of gas from the anatomical dead-space and gas from the alveoli.
- C: A plateau is reached when the gas exhaled is entirely from the alveoli. The end-tidal CO_2 ($EtCO_2$) concentration is measured at the end of this plateau.
- D: When the next inspiration starts the capnogram rapidly falls towards the baseline. The minimum level of CO_2 measured during the inspiratory phase is called the inspired CO_2 concentration (normally 0.0%).
- E: With a scale, the height of the capnogram tells you the end-tidal CO_2 concentration. $EtCO_2$ is automatically calculated and displayed in numbers. $EtCO_2$ approximates the alveolar CO_2 concentration because it is measured when the patient exhales virtually pure alveolar gas.



- 1a and 1c = inhalation
- 1b and 1d = exhalation

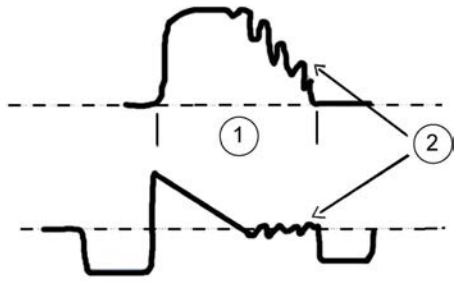
$EtCO_2$ value %	$EtCO_2$ value mmHg	Indicates
4.5% to 5.5%	34 mmHg to 41 mmHg	normocapnia
< 4%	< 30 mmHg	hypocapnia
> 6%	> 45 mmHg	hypercapnia

Dips in capnogram

The dips seen in the capnogram during expiration are related to the sidestream gas sampling, the continuous gas flow to the Y-piece, and patient's cardiac contractions, which cause intra-thoracic pressure changes and therefore flow variations.

The alterations in expired CO_2 waveform are cardiogenic movements of exhaled and circuit gas at the sidestream gas sampling site. When the respiratory gas flow drops below the gas sampling rate, a variable mixture of CO_2-free fresh gas and exhaled CO_2-rich gas is sampled. This causes variations in sampled CO_2 concentrations.

In the illustration below, the CO_2 waveform is the one on top, and flow is the lower waveform.



1. Expiration
2. Cardiogenic oscillations

Cardiogenic oscillations appear when:

- A continuous fresh gas flow is fed into the patient Y-piece.
- Sidestream gas sampling is done at the Y-piece.
- The patient is ventilated with a long expiration time or low respiration times, and when there is a long zero flow at end-expiration for some other reason.

CO_2 measurement practicalities

Ventilation management

Normoventilation (adequate alveolar ventilation of a patient) can be maintained by monitoring the end-tidal carbon dioxide and oxygen concentrations, and adequacy of ventilation can be maintained by monitoring airway pressures, volumes and spirometry loops. Alveolar minute ventilation is usually adjusted to achieve normocapnia, where $EtCO_2$ is in the range of 4.5% to 5.5% (34 mmHg to 41 mmHg). This is called normoventilation as it is the normal situation in healthy people.

A low $EtCO_2$ concentration ($EtCO_2$ < 4% / 30 mmHg) indicates hyperventilation.

NOTE A low $EtCO_2$ value in itself is dependent on the ventilation volume vs. circulation status (lung perfusion). This means that in case of low blood pressure (e.g. shock), shunting, a pulmonary embolism, or a leak, low $EtCO_2$ values may be observed while using a “normal” TV/MV.

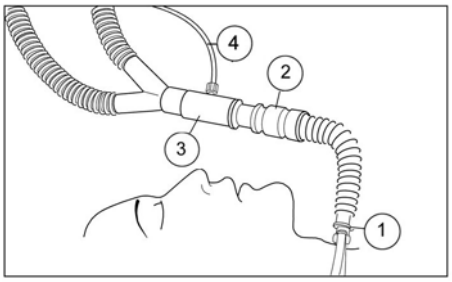
Increased $EtCO_2$ concentration ($EtCO_2$ > 6.0% / 45 mmHg) indicates hypoventilation or ineffective alveolar ventilation, which will lead to hypercapnia and respiratory acidosis. Increased inspiratory CO_2 ($FiCO_2$) concentrations may also be caused by:

- Exhausted CO_2 absorber.
- Malfunction of the breathing system valves.
- Rebreathing when a rebreathing system without a CO_2 absorber is used with inadequate fresh gas flows.

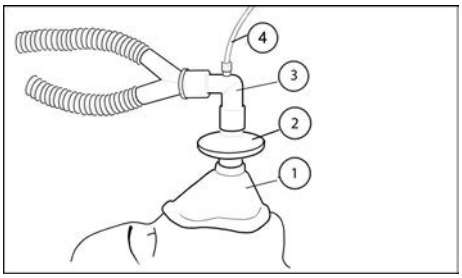
NOTE During some surgical procedures, e.g. laparoscopy, CO_2 may be used to inflate the abdomen which may result in rise of $PaCO_2$ due to the absorption of CO_2 into the blood via the vascular wound bed. This may lead to an increase in the $EtCO_2$.

Prevention of the breathing system contamination

You can use a microbial filter between the endotracheal tube and the airway adapter. Change the filter for every patient. Change the patient circuit at intervals given in the circuit manufacturer's documentation, and according to your hospital protocols. The following illustrations show examples of placement.



1. Tracheostomy tube with 15 mm connector
2. Heat and Moisture Exchanger (HME)
3. Airway adapter
4. Sample line



1. Mask
2. Bacterial filter
3. Airway adapter
4. Sample line

How to prevent effects of humidity

Mechanical ventilation with active humidification system used in intensive care increases the humidity in the breathing system. More humidity and heat enter the circuit from the CO_2 absorber and from the air exhaled by the patient. During low flow anesthesia, more rebreathed gas circulates through the CO_2 absorber. Water traps placed in the inspiratory and expiratory limbs of the breathing system are useful for collecting condensed water from the breathing system during mechanical ventilation with active humidification system or long-lasting anesthesia.

CO_2 troubleshooting

Problem	Solution

CO_2 waveform seems abnormal.	• Check the patient:
	  ▪ Check for any change in patient condition.
	  ▪ If the patient has a cannula, check for proper placement of the nasal prongs.
	  ▪ If the patient is breathing through the mouth, ensure that an oral/nasal accessory is used.
	  ▪ Abnormal waveforms can be seen if the patient is talking.
	• Check the sample lines and airway adapters. Replace if necessary.

Elevated baseline.	• Check the patient status. • Check the LoFlo Sidestream Module. • Make sure the patient is not breathing CO_2. Check that the amount of fresh gas is sufficient for the patient, and check that the CO_2 absorber is in good condition. • Make sure the sample cell is properly connected (a click is heard upon connection) before zeroing. • If the elevated baseline is seen when the accessory is sampling room air, perform a zero.
Excessive secretions in sample lines.	• Check the orientation of the airway adapter port. • Use accessories with dehumidification tubing. • If the message ***Sample line blocked*** appears, replace the sample lines and airway adapters.
Measurement is not working.	• Check the LoFlo Sidestream Module and adapter positioning.
CARESCAPE CO_2 or LoFlo Sidestream Module is not working.	• Contact qualified service personnel.
Readings seem inaccurate.	• Check the patient status. • Check that the gas exhaust line is not kinked or blocked. • Check the breathing circuit for possible leaks.

Problem	Solution
Why can we see dips in the capnogram during expiration?	• Dips in the capnogram can be due to patient conditions. "Clefts" in the capnogram are seen as action of muscle relaxant is impacted by spontaneous ventilation. • The dips seen in the capnogram during expiration may be related to the sidestream gas sampling, the continuous gas flow to the Y-piece, and patient's cardiac contractions, which cause intra-thoracic pressure changes and therefore flow variations. A pressure transducer in the LoFlo Sidestream Module minimizes flow variations by measuring and adjusting for changes in airway pressures.
Why is the $EtCO_2$ value considerably lower than the CO_2 partial pressure determined by blood gas analysis?	• $EtCO_2$ values are always lower than $paCO_2$ values measured by blood gas analysis. • The typical clinical reasons are dead-space ventilation, ventilation/perfusion mismatch, a drop in cardiac output, alveolar shunts, and incomplete emptying of the alveoli. • The $EtCO_2$ - $paCO_2$ gradient can be an indicator of a clinical condition such as an increase in alveolar dead space. • Also check the integrity of the breathing circuit; blood-gas analysis corrected to a lower temperature in case of hypothermia.
The sample cell is inserted, but the pump does not turn on and the ***Check Adapter*** message is displayed.	• Check that the sample cell is fully inserted. • The LoFlo Sidestream Module may need to warm up to be detected. • Check that the LoFlo Sidestream Module is connected to the CARESCAPE CO_2. • Check the sample cell of the accessory for damage or occlusion.

16

Trends

Viewing numeric trends

Numeric trends contain three pages with 72 hours of trend data. The lowest row shows the time indication and the top of the view shows the highest priority realtime waveform. You cannot configure the layout of the ***Numeric Trend*** view.

1. Select ***Pt. Data & Trends***.
2. Select ***Numeric Trends***.
3. Select a parameter group tab to view the trends:
   - ***Vital***: ***HR***, ***SpO2***, invasive pressure 1, ***NIBP S/D(M)***, ***RR(Imp)***, ***RR(CO2)***
   - ***Pressures***: ***HR***, invasive pressure 1, invasive pressure 2, ***NIBP S/D(M)***
   - ***Temp & Gases***: ***T1***, ***T2***, ***CO2 ET/FI***

To see more numeric trend data, use the scroll bar to scroll the data in horizontal direction.

Changing the time interval of numeric trends

Numeric trends display values according to the selected time interval. Numeric trends are updated with averaged measurement data once a minute independent of the selected time interval.

1. Select ***Pt. Data & Trends***.
2. Select a value from the ***Trends Time Interval*** list.

   The options are ***1 min***, ***5 min***, ***15 min***, ***30 min***, and ***60 min***.

For example, a 5 minute interval will show data for every 5 minutes, and a 30 minute interval will show data for every 30 minutes. The data is displayed in columns on the screen.

About snapshots and graphic trends

The CARESCAPE ONE records snapshots when it is operating as a standalone monitor. However, snapshots are only viewable on the host monitor when the CARESCAPE ONE is connected to a host monitor as an acquisition device.

Graphic trends are only viewable on the host monitor when the CARESCAPE ONE is connected to a host monitor as an acquisition device. Only numeric trends are available on the CARESCAPE ONE when it is operating as a standalone monitor.

17

Cleaning and care

Cleaning and care overview

The following cleaning, disinfection, and care information applies to devices, device components, supplies, and accessories manufactured by GE.

The information provided in this chapter does not supersede any instructions for use provided by the manufacturer or provided with a device, device component, supply, or accessory.

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.

Cleaning

Cleaning safety precautions

Cleaning warnings

WARNING Avoid using other chemicals than the ones described in this manual as they may damage device surfaces, labels, or cause equipment failures.

WARNING If liquid has accidentally entered the system or its parts, disconnect the power cord from the power supply, remove the battery, and have the equipment serviced by qualified service personnel.

WARNING Cleanup and disposal of broken displays must be in compliance with the safety and waste control guidelines regulating this product.

WARNING Never immerse any part of the device, cables, or leadwires in liquids or allow liquid to enter the interior of the device.

WARNING Do not autoclave any part of the system with steam (including cables or leadwires) or sterilize with ethylene oxide.

WARNING Do not pour or spray any liquid so that it may seep into connections or openings.

WARNING Never use conductive solutions, oxidizing compounds, wax, or wax compounds to clean devices, cables or leadwires.

Cleaning cautions

CAUTION Do not apply pressurized air or gas to any outlet or tubing connected to the monitor. Pressure may destroy sensitive elements.

Permitted detergents

The following permitted detergents can be used to clean the device and other non-applied parts unless there are separate part-specific instructions. Non-applied parts refer to those parts of the system that are not in direct contact with the patient (e.g., CARESCAPE Dock F0).

- Water
- Enzymatic or neutral pH detergents

Cleaning points to note

- Warranty does not cover any damages caused by using other than GE approved substances and methods.
- GE makes no claims as to the efficacy of the listed substances or methods to control infection.
- Your hospital guidelines permitting, all cleaning and disinfection activities can be carried out at the bedside.
- Do not let liquid pool around connection pins. If this should happen, blot dry with a soft, lint-free cloth.
- Do not use excessive drying techniques, such as oven, forced heat, or sun drying.
- Do not spray cleaner directly on the display screen.
- Never connect any device or applied part to a patient until it is thoroughly dry.
- If you discover any signs of deterioration or damage in the device, discontinue its use.

Setting the touchscreen off for cleaning

You can lock the touchscreen when you need to clean the screen.

1. Press the touchscreen lock key  to lock the display.
2. Press the touchscreen lock key again to unlock the display.

General cleaning instructions

Follow these instructions to clean the device and other non-applied parts unless the other parts provide part-specific instructions. Non-applied parts refer to those parts of the system that are not in direct contact with the patient (e.g., CARESCAPE Dock F0). Be especially careful when cleaning the display.

1. Remove all cables and the battery, and close the battery door.
2. Dampen a soft lint-free cloth with one of the permitted detergents.

3. Wring excess liquid from the cloth and wipe the exterior surface. Pay special attention to hard to clean areas, like grooves and crevices.

   Any contact of cleaning or disinfecting solutions with metal parts may cause corrosion.

   Do not damage or bend connector pins when cleaning or drying.

4. Remove any soil as soon as possible after use by wiping the device.

   Do not let fluid pool around connection pins. If this happens, blot dry with a cotton swab or soft cloth.

5. Wipe off the cleaning solutions with a clean, lightly moistened cloth.
6. Dry thoroughly with a dry, lint-free cloth and let air dry for at least 30 minutes.

   Drying times may vary based on the environmental conditions.

7. Visually ensure that the device is clean. If visible soil remains, repeat cleaning procedure until the device is thoroughly clean.
8. Insert the battery and close the battery door.
9. Turn on the power to the equipment.

Other manufacturer cleaning instructions

The information provided in this chapter does not supersede any instructions for use provided by the manufacturer or provided with a device, device component, supply, or accessory.

For cleaning, disinfection, and care information for devices, device components, supplies, and accessories (e.g., ECG leadwires, NIBP cuffs, NIBP hoses, SpO_2 cables, SpO_2 sensors) made by manufacturers other than GE, see the applicable instructions for use provided by the manufacturer.

Do not reuse single-use disposable accessories.

CARESCAPE SpO_2 – Masimo cleaning instructions

The surfaces of the CARESCAPE SpO_2 – Masimo may be cleaned with the following cleaning agents:

- Water
- Mild soap (diluted)
- Isopropyl alcohol 70%
- 10% bleach with water
- Glutaraldehyde 2%
- Ethyl alcohol 99.7%
- PDI Sani Cloth HB
- Steris Vesphene IIse
- PDI Sani-Cloth Bleach Germicidal Disposable Wipes
- PDI Sani-Cloth Plus Germicidal Disposable Wipes
- PDI Sani-Cloth AF-3 Germicidal Disposable Wipes
- Diversey Oxivir Tb Wipes
- Clinell Universal Sanitising Wipes

Nellcor™ sensor and cable cleaning instructions

Before attempting to clean a Nellcor sensor, read the Instructions for Use enclosed with the sensor. Each sensor has cleaning instructions specific to that sensor.

Materials:

- Paper towels
- Soft, lint-free cloths
- Water (tap water is acceptable)
- Cleaning agents:
  - Isopropyl alcohol, maximum 60% by weight, or
  - Bleach, mix ten parts water to 1 part 5.25% bleach to create an 0.5% bleach concentration, or
  - PDI Sani-Cloth Bleach Germicidal Disposable Wipes

Ensure at least 30 seconds of contact time between the cleaning agent and all surfaces being cleaned.

To clean the monitoring cable:

1. Power off the host monitoring system.
2. If a sensor is connected to the monitoring cable, disconnect the sensor.
3. Moisten (but do not saturate) a paper towel with water. Remove excess water as necessary.
4. Starting at the sensor port end of the monitoring cable, use the moistened paper towel to soften and loosen any bulky soils on the exterior of the monitoring cable, then wipe them off.
5. Moisten (but do not saturate) a clean lint-free cloth with one of the cleaning agents listed.

   Do not spray the cleaning agent into the sensor port.

   Do not clean the metal USB connector with the cleaning agent. The cleaning agent can damage the connector.
6. Wipe down all external surfaces of the monitoring cable, removing all visible soil, ensuring not to wipe the USB connector. Begin at the sensor port end of the cable and work toward the opposite end. Pay special attention to the areas shown in the following figure.

7. If there is soil beneath the sensor latch, clean the latch and the area under the latch as shown in the following figure.

   a. With the sensor latch in the open (up) position, gently pull one side of the latch away from the body of the monitoring cable until the latch disengages from the pegs on both sides.
   b. Moisten (but do not saturate) a paper towel with water. Remove excess water if necessary.
   c. Use the moistened paper towel to soften and loosen any bulky soils on the latch and in the area under the latch, then wipe them off.
   d. Moisten (but do not saturate) a clean lint-free cloth with one of the cleaning agents.
   e. Use the moistened cloth to remove all visible soil from the latch and the area under the latch, with special attention to the areas shown in the figure above.
   f. Rinse the latch in tap water until all residual cleaning agent has been removed.
   g. Use a clean lint-free cloth to dry the latch.
   h. Wipe the surfaces of the monitoring cable where the latch was attached until all residual cleaning agent has been removed as shown in the figure below.

   i. Use a clean lint-free cloth to dry the area where the latch was attached.

      Do not use pressurized air or gas to dry inside the sensor port.
   j. If visible soil remains, repeat the cleaning process.
   k. Ensure all areas are dry before reattaching the sensor latch.
   l. Replace the sensor latch by positioning it directly in front of the sensor port in the closed position. Slide the latch over the sensor port until it snaps into position on the pegs on both sides of the sensor port body. Ensure that the latch opens and closes freely over the sensor port. If the latch is damaged, contact authorized service personnel.

8. Moisten a clean lint-free cloth with water and wipe the monitoring cable until all residual cleaning agent has been removed.
9. Use a clean lint-free cloth to dry the monitoring cable.

   Do not use excessive drying techniques, such as oven, forced heat, or sun drying.

   Ensure that the monitoring cable is completely dry before connecting a sensor and returning it to patient use.

Disinfection

Disinfection cleaning precautions

Disinfection cautions

CAUTION IMMERSION. Never immerse CARESCAPE ONE components in cleaning fluids or disinfecting agents.

Disinfection notices

NOTICE STRESS CRACKING. Some rigid plastics used in this product are susceptible to stress cracking as a result of prolonged exposure to some disinfecting agents, Quaternary Ammonium based agents in particular. Cracks may be precipitated and crack growth accelerated from subsequent rough handling or unintended use. Continued use of this type of disinfecting agents and/or disinfecting methods may degrade materials and lead to eventual fracture.

NOTICE SOFT MATERIALS. The plastics used in this product are porous and may absorb alcohol. Improper use of alcohol based agents could result in softening, swelling, tackiness, or change in appearance of the soft materials.

NOTICE COLOR SHIFT. Some plastics may experience a slight change in color over time due to effects of disinfecting agents. This effect is cosmetic and not associated with product safety or normal function.

NOTICE SPOTTING, STAINING, CORROSION. Metal components including fasteners may corrode or become stained or spotted in appearance from continuous exposure to chlorine compounds like bleach. These effects are not associated with product safety or normal function.

Disinfection points to note

- Always clean before disinfecting.
- Always dilute cleaning and disinfectant agents according to their manufacturer's instructions. Always consider your hospital guidelines as well.
- Use only the permitted substances.
- Your hospital guidelines permitting, all cleaning and disinfection activities can be carried out at the bedside.
- Before drying a surface after wiping it, wait the minimum time required according to the substance manufacturer's instructions.
- Visually ensure that no substance residue remains on the equipment.

Permitted disinfectants

About the following table:

- All third party trademarks are property of their respective owners.

- Trademark names and product availability may vary in different countries. Consult the column that lists ingredients to determine if an equivalent disinfectant is available in your country.
- The following permitted disinfectants can be used to disinfect the device and other non-applied parts unless there are separate part-specific instructions. Non-applied parts refer to those parts of the system that are not in direct contact with the patient (e.g., CARESCAPE Dock F0).

Disinfectant	Manufacturer	Ingredients	Type of disinfectant
CaviWipes*	Metrex Research, LLC.	• Disobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride - 0.28% • Isopropanol 17.20% • Ethylene Glycol Monobutyl Ether (2-Butoxyethanol) 1 to 5%	Quaternary ammonium and alcohol
Cleanisept Wipes	Dr. Schumacher GmbH	Cleanisept solution (7.5%) contains as active ingredients: • Didecydemethylammoniumchlo-rid 0.25% • Alkylbenzyldimethylammonium-chlorid 0.25% • Alkylethylbenzyldiemthylammoni-umchlorid 0.25%	Quaternary ammonium
Clinell Universal Sanitizing Wipes	GAMA Healthcare	• Benzalkonium chloride < 0.5% • Didecyl dimethyl ammonium chloride < 0.5% • Polyhexamethylene biguanide (PHMB) < 0.10%	Quaternary ammonium and bisbiguanide
Clinell Sporicidal Wipes	GAMA Healthcare	• Sodium Percarbonate 40 to 50% • Citric acid 5 to 10% • Tetra acetyl ethylene diamine 10 to 35%	Hydrogen peroxide and peracetic acid
Clorox Hydrogen Peroxide Wipes*	Clorox Professional	• Hydrogen Peroxide 1.4% • Benzyl alcohol 1 to 5%	Hydrogen peroxide
Mikrozid Sensitive Wipes	Schülke & Mayr GmbH	• Didecyldimethylammonium chloride 0.26% • Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides 0.26% • Quaternary ammonium compounds, C12-14-alkyl [(ethylphenyl)methyl] dimethyl, chlorides 0.26%	Quaternary ammonium

Disinfectant	Manufacturer	Ingredients	Type of disinfectant
PDI Sani-Cloth AF3 Germicidal Disposable Wipes*	Professional Disposables Inc.	• n-Alkyl (68% C12, 32% C14) dimethyl ethylbenzyl ammonium chlorides 0.14% • n-Alkyl (60% C14, 30% C16, 5% C12, 5% C18) dimethyl benzyl ammonium chlorides 0.14% Total of Quats: 0.28%	Quaternary ammonium
PDI Sani-Cloth Bleach Germicidal Disposable Wipes*	Professional Disposables Inc.	• Sodium Hypochlorite 0.63%	Chlorine
PDI Sani-Cloth HB Germicidal Disposable Wipes*	Professional Disposables Inc.	• Benzyl-C12-18-alkyldimethyl ammonium chlorides 0.07% • Quaternary ammonium compounds, C12-14-alkyl [(ethylphenyl)methyl]dimethyl, chlorides 0.07%	Quaternary ammonium
PDI Sani-Cloth Plus*	Professional Disposables Inc.	• n-Alkyl (68% C12, 32% C14) dimethyl ethylbenzyl ammonium chlorides 0.125% • n-Alkyl (60% C14, 30% C16, 5% C12, 5% C18) dimethyl benzyl ammonium chlorides 0.125% • Isopropanol 14.85%	Quaternary ammonium (contains alcohol)
PDI Super Sani-Cloth Germicidal Disposable Wipes*	Professional Disposables Inc.	• n-Alkyl (68% C12, 32% C14) dimethyl ethylbenzyl ammonium chlorides 0.25% • n-Alkyl (60% C14, 30% C16, 5% C12, 5% C18) dimethyl benzyl ammonium chlorides 0.25% • Isopropanol 55.00%	Quaternary ammonium and alcohol
PDI Easy Screen Cleaning Wipes*	Professional Disposables Inc.	• Isopropyl alcohol 70%	Alcohol
Oxivir TB Wipes*	Sealed Air	• Hydrogen peroxide 0.1 to 1.5% • Benzyl alcohol 1 to 5%	Accelerated hydrogen peroxide
Ethanol 70 to 96%	Generic	• Ethanol	Alcohol
Isopropyl alcohol max. 60% by weight	Generic	• Isopropyl alcohol	Alcohol
Bleach [dilute to max. of 0.65%]	Generic	• Sodium hypochlorite	Chlorine
* Available in the United States.			

Disinfection and sterilization of accessories

For details about disinfecting and sterilizing the accessories, see the instructions for use in the accessory package.

Care

Care safety precautions

Care warnings

WARNING Regular preventive maintenance should be carried out every 24 months. Failure to implement the recommended maintenance schedule may cause equipment failure and possible health hazards.

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

WARNING If liquid has accidentally entered the system or its parts, disconnect the power cord from the power supply, remove the battery, and have the equipment serviced by qualified service personnel.

WARNING Cleanup and disposal of broken displays must be in compliance with the safety and waste control guidelines regulating this product.

WARNING Since calibration gas contains anesthetic agents, always ensure sufficient ventilation of the room during calibration.

Disposal warnings

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

Disposal cautions

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.

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

Care schedules

See the service manual for more comprehensive checks.

Daily checks

- Check that the accessories, cables, cable connectors, monitor, modules, and display parts are clean and intact.
- Check the charge of the battery.

Once a year checks

- Check the calibration of temperature, NIBP and invasive blood pressure.

NOTE The invasive blood pressure transducers should be calibrated whenever a transducer error occurs.

Regular calibration checks

The following parameters require calibration checks at regular intervals, in addition to the calibration performed while monitoring patients.

- Temperature, NIBP, and invasive pressures
  - A calibration check of temperature, NIBP, and invasive blood pressures should be performed at least once a year to ensure that the measurement accuracy remains within specifications. For calibration instructions, see the service manual.

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Messages

Messages related to ECG measurement

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
• ***A Fib***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***Accel. Ventric.***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***Arrh off***	• param.	The arrhythmia detection level is set to ***Off***.	• If arrhythmia detection is needed, set the detection level to ***Full*** or ***Lethal***.
• ***Arrhythmia paused*** • ***Arrh paused***	• al. area • wavef.	ECG channels have not been available for analysis for the last 20 seconds due to excessive artifact, or the internal HR calculation has not been updated for the last 30 seconds, or in single lead analysis when arrhythmia detection is set to ***Full*** or ***Lethal***, the ECG 1 lead has not been active for the last 5 seconds.	• Check the patient status. • Check electrode placement. • Prepare the patient's skin at electrode sites. • Change or move electrodes.

Message	Location	Possible causes	Suggested actions
• ***Artifact***	• wavef.	Muscle artifact, high or low frequency noise, or pacemaker artifact.	• Check electrode contact. • Check lead placement. • Perform skin preparation. • Reposition/replace electrodes. • Request the patient to remain still. • Check if any electrical devices are too close to the patient.
• ***Asystole***	• al. area, param., wavef.	Physiological alarm.	• Check the patient status.
• ***Bigeminy***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***Brady*** • ***HR LOW*** • ***HR(ECG) low***	• al. area	Physiological alarm. Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Check device*** • ***ECG malfunction***	• wavef. • al. area	Hardware or software fault in CARESCAPE ECG: • Cable fault • No updated data • Data sample drift • Configuration failure	• Reconnect the CARESCAPE ECG. • Replace the CARESCAPE ECG. • If the problem persists, contact qualified service personnel.
• ***Couplet***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***Device overheating*** • ***Move ECG device to a cooler location***	• wavef. • al. area	CARESCAPE ECG surface temperature is too high.	• Check the CARESCAPE ECG placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE ECG.
• ***ECG device failure: Call service***	• al. area	• CARESCAPE ECG startup or initialization failure.	• Reconnect the CARESCAPE ECG. • Replace the CARESCAPE ECG. • If the problem persists, contact qualified service personnel.
• ***ECG device overheated. Shutting down***	• al. area	• CARESCAPE ONE turns off the CARESCAPE ECG because its surface temperature is too high.	• Check the CARESCAPE ECG placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE ECG.

Message	Location	Possible causes	Suggested actions
• *ECG measurements removed*	• al. area	CARESCAPE ECG has been removed.	• Check all connections and reconnect as required.
• *Frequent PVCs*	• al. area	Physiological alarm.	• Check the patient status.
• *Frequent SVCs*	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• *Tachy* • *HR high* • *HR(ECG) high*	• al. area	Measurement values are equal to or outside the alarm limits. Physiological alarm.	• Check the patient status. • Adjust alarm limits if necessary.
• *Identical ECG device*	• al. area	There are two CARESCAPE ECGs.	• Remove one CARESCAPE ECG.
• *Irregular*	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• *Lead off* • *LA/L lead off* • *LL/F lead off* • *RA/R lead off* • *RL/N lead off* • *V2/C2 lead off* • *V3/C3 lead off* • *V4/C4 lead off* • *V5/C5 lead off* • *V6/C6 lead off* • *V/C lead off* • *Va/Ca lead off* • *Vb/Cb lead off*	• al. area, wavef.	One or more leadwires or electrodes disconnected. Other ECG leads are available for arrhythmia detection.	• Check the leadwire and electrode connections.
• *Lead changed*	• wavef.	The monitor automatically switches the ECG1 waveform selection to a measurable ECG Lead (I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5 or V6) if the current ECG1 waveform is not measurable. This message also appears when the user changes the ECG1 lead selection.	• Note that the ECG waveform will be from the lead selected for the ECG1 lead. Check the lead.
• *Leads off*	• al. area, wavef.	One or more of the connected leadwires is disconnected and arrhythmia detection is not possible.	• Check the connections.
• *Learning*	• wavef.	ECG algorithm is in learning phase, message shown e.g. when ECG measurement is started.	• No action required.
• *Missing Beat*	• al. area, wavef.	Physiological alarm.	• Check the patient status.

Message	Location	Possible causes	Suggested actions
• ***Multifocal PVCs***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***Noisy ECG*** • ***Noise***	• al. area • wavef.	Arrhythmia alarm category has been set to ***Off*** through ***Alarms Setup*** > ***Arrhythmia*** > ***Setup***, and the ECG channels have not been available for analysis for the last 20 seconds due to excessive noise; the internal HR calculation has not been updated for the last 30 seconds, which compromises the accuracy of detecting events; or in single lead analysis when arrhythmia detection is set to ***Off***, the ECG 1 lead has not been active for the last 5 seconds.	• Check and remove the source of excessive noise if possible.
• ***Pause***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***R on T***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***ST XXX high*** / ***ST XXX low*** where XXX = ECG lead label	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***SV Tachy***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***Trigeminy***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***V Brady***	• al. area, wavef.	Physiological alarm.	• Check the patient status.
• ***V Fib / V Tach***	• al. area, param., wavef.	Physiological alarm.	• Check the patient status.
• ***V Tach***	• al. area, param., wavef.	Physiological alarm.	• Check the patient status.
• ***VT > 2***	• al. area, wavef.	Physiological alarm.	• Check the patient status.

Messages related to impedance respiration measurement with CARESCAPE ONE

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
• ***Apnea (Imped.)*** • ***APN*** • ***Apnea***	• al. area • param. • wavef.	No breathing detected.	• Check the patient status. • Check the ventilator and breathing status.
• ***Apnea deactivated***	• param.	The case has just been started/patient admitted on the monitor, or the measurement has just been started.	• Wait. The message disappears after the respiration rate is ≥ 3/min.
• ***Artifact*** • ***Cardiac Artifact***	• param., wavef. • al. area	Cardiac artifact has been detected.	• Check the patient status. • Select alternate leads to monitor. • Increase sensitivity setting. • Select alternate lead placement. • Relearn respiration.
• ***Check device*** • ***Imped. malfunction***	• param., wavef. • al. area	Hardware or software fault in CARESCAPE ECG: • Cable fault • Configuration failure • No updated data • Data sample drift	• Reconnect the CARESCAPE ECG. • Replace the CARESCAPE ECG. • If the problem persists, contact qualified service personnel.
• ***Lead I failed***	• param., wavef.	Lead I has been selected for measurement, but the RA or LA electrode is off or is not adhered to the patient well enough to get a sufficient signal for respiration monitoring.	• Check the electrodes and their connections. • You may need to prep the skin and replace the electrode.
• ***Lead II failed***	• param., wavef.	Lead II has been selected for measurement, but the RA or LL electrode is off or is not adhered to the patient well enough to get a sufficient signal for respiration monitoring.	• Check the electrodes and their connections. • You may need to prep the skin and replace the electrode.

Message	Location	Possible causes	Suggested actions
• ***Lead RL-LL failed***	• param., wavef.	Lead RL-LL has been selected for measurement, but the RL or LL electrode is off or is not adhered to the patient well enough to get a sufficient signal for respiration monitoring.	• Check the electrodes and their connections. • You may need to prep the skin and replace the electrode.
• ***Measurement off*** • ***OFF***	• wavef. • param.	ECG leads not connected to the patient. Measurement has been turned off from the setup menu.	• Connect the ECG leads to the patient to start the impedance respiration measurement. • Turn on the measurement from the setup menu.
• ***Relearning***	• param., wavef.	The patient's breathing pattern is being relearned because the measurement has just been turned on, the user has activated relearning, a lead has been changed, or a lead has been reconnected after a lead fail situation.	• Wait until the message disappears.
• ***Resp (Imped.) measurement paused*** • ***Measurement paused***	• al. area • wavef.	This alarm is triggered when apnea alarm is enabled and respiration rate has been invalid for the last 18 seconds in the NICU software package or for the last 50 seconds in other software packages due to: • A lead fail. • Ongoing automatic relearning. • Impedance respiration malfunction.	• Check the patient status. • Check the electrodes and their connections. • Acknowledge the alarm.
• ***RR (Imped.) high / RR (Imped.) low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.

Messages related to SpO_2 measurement with CARESCAPE ONE

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
• ***Artifact***	• param.	Artifact detected.	• Check sensor contact. • Reposition or replace sensor. • Request the patient to remain still.
• ***Check device*** • ***SpO2 malfunction***	• param. • al. area	CARESCAPE SpO_2 device malfunction. No SpO_2 data detected.	• Check the CARESCAPE SpO_2 device. • Replace if needed.
• ***Check probe*** • ***Check SpO2 probe***	• param. • al. area	There is no detectable SpO_2 signal, the sensor is faulty or is detached from the patient. With CARESCAPE SpO_2 – Nellcor this message also appears when the saturation updates exceed 30 seconds, the pulse rate is lost, or the pulse timeout condition occurs.	• Check the sensor and connections. • Check the patient status.
• ***Demo mode*** • ***SpO2 Demo mode***	• param. • al. area	CARESCAPE SpO_2 – Masimo is in demo mode.	• Exit ***Demo mode***. See the supplemental information provided.
• ***Expiring cable***	• param.	CARESCAPE SpO_2 – Masimo has detected that the interconnect cable is near its expiration date.	• Replace the interconnect cable.
• ***Expiring probe***	• param.	CARESCAPE SpO_2 – Masimo has detected that the sensor or adhesive sensor is near its expiration date.	• Replace the sensor or adhesive sensor.
• ***Faulty cable*** • ***SpO2 faulty cable***	• param. • al. area	CARESCAPE SpO_2 – Masimo has detected a defective interconnect cable.	• Replace the interconnect cable.
• ***Faulty probe*** • ***SpO2 faulty probe*** • ***Faulty adhesive SpO2 probe***	• param. • al. area	The sensor has failed. The adhesive sensor has failed.	• Replace the sensor. • Replace the adhesive sensor.
• ***Identical SpO2 device***	• al. area	You can only have one CARESCAPE SpO_2, CARESCAPE SpO_2 – Masimo, or CARESCAPE SpO_2 – Nellcor in the system.	• Remove all but one CARESCAPE SpO_2 device.
• ***Incompatible cable*** • ***Incompatible SpO2 cable***	• param. • al. area	CARESCAPE SpO_2 – Masimo has detected that an incompatible or unrecognized interconnect cable has been connected.	• Connect a Masimo compatible interconnect cable.

Message	Location	Possible causes	Suggested actions
• ***Incompatible probe*** • ***Incompatible SpO2 probe*** • ***Incompatible adhesive SpO2 probe***	• param. • al. area	The sensor is not compatible or it is not recognized. Adhesive sensor is not compatible or it is not recognized.	• Replace the sensor with a compatible one. See the supplemental information provided. • If the problem persists, contact qualified service personnel.
• ***Incompatible SpO2 device***	• al.area	CARESCAPE SpO_2 device startup or initialization failure. CARESCAPE SpO_2 device hardware fault.	• Reconnect the CARESCAPE SpO_2 device. • Replace the CARESCAPE SpO_2 device. • If the problem persists, contact qualified service personnel.
• ***Insufficient power for SpO2 device***	• al. area	There is not enough power for the CARESCAPE SpO_2 device.	• Connect the acquisition platform to a host or use mains power. • Charge the CARESCAPE ONE battery.
• ***Low perfusion***	• param.	Low perfusion at the measurement point.	• Check the sensor and sensor positioning. • Relocate the sensor to a better measurement site, if possible. • Make sure the patient is not shivering.
• ***Low signal***	• param.	The quality of the signal is questionable.	• Check the sensor placement and the patient status.
• ***Low signal quality***	• param.	The quality of the signal is questionable.	• Check the sensor and sensor positioning. • Relocate the sensor to a better measurement site, if possible. • Make sure the patient is not shivering.
• ***Motion detected***	• param.	Patient movement detected.	• Reposition sensor.
• ***Move SpO2 device to a cooler location***	• al. area	CARESCAPE SpO_2 device surface temperature is too high.	• Check the CARESCAPE SpO_2 device placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE SpO_2 device.
• ***No cable*** • ***No SpO2 cable***	• param. • al. area	Interconnect cable is not connected to the CARESCAPE SpO_2 – Masimo.	• Check the connection between the interconnect cable and CARESCAPE SpO_2 device.

Message	Location	Possible causes	Suggested actions
• ***No probe*** • ***No SpO2 probe*** • ***No adhesive SpO2 probe***	• param. • al. area	Sensor is not connected to the CARESCAPE SpO_2 device. Adhesive sensor is not connected to the CARESCAPE SpO_2 device.	• Check the connection between the sensor and the CARESCAPE SpO_2 device.
• ***PR(SpO2) high / PR(SpO2) low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Probe initializing***	• param.	CARESCAPE SpO_2 – Masimo has detected that the sensor is initializing.	• SpO_2 monitoring will begin after initialization is complete.
• ***Probe off*** • ***SpO2 Probe Off***	• param. • al. area	The sensor may be defective or it is not connected to the patient.	• Check the patient status. • Reposition the SpO_2 sensor. • Replace the SpO_2 sensor.
• ***Pulse search***	• param.	The measurement is starting normally. Defective or damaged sensor or cable. Sensor is off of the patient. Detection of a repeatable pulse has stopped. Pulse is not recognized by the algorithm due to a low amplitude signal.	• Wait for waveforms and parameter values to display. • Check the sensor and cable. • Reposition or replace sensor.
• ***Replace cable*** • ***Replace SpO2 cable***	• param. • al. area	CARESCAPE SpO_2 – Masimo has detected that the interconnect cable has expired.	• Replace the interconnect cable.
• ***Replace probe*** • ***Replace SpO2 probe*** • ***Replace adhesive SpO2 probe***	• param. • al. area	CARESCAPE SpO_2 – Masimo has detected that the sensor has expired. CARESCAPE SpO_2 – Masimo has detected that the adhesive sensor has expired.	• Replace the sensor.
• ***SpO2 device failure: Call service***	• al. area	CARESCAPE SpO_2 device startup or initialization failure.	• Reconnect the CARESCAPE SpO_2. • Replace the CARESCAPE SpO_2. • If the problem persists, contact qualified service personnel.
• ***SpO2 device overheated Shutting down***	• al. area	The surface temperature of the CARESCAPE SpO_2 is too high and the CARESCAPE ONE turns the CARESCAPE SpO_2 off.	• Check the CARESCAPE SpO_2 device placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE SpO_2 device.

Message	Location	Possible causes	Suggested actions
• ***SpO2 high / SpO2 low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***SpO2 measurement removed***	• al. area	CARESCAPE SpO_2 device is disconnected.	• Connect a CARESCAPE SpO_2. device

Messages related to NIBP measurement

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
- report = report view
- wavef. = waveform area

Message	Location	Possible causes	Suggested actions
• ***Calibrated***	• param.	Channel calibrated successfully.	• Wait until the message disappears before starting a measurement.
• ***Calibrating***	• param.	Calibration of a channel is in progress.	• No action required.
• ***Calibration error***	• param.	Calibration has failed.	• Recalibrate. • If the problem persists, contact qualified service personnel.
• ***Call service***	• param.	Technical fault.	• Contact qualified service personnel.
• ***Check NIBP***	• al. area	Systolic and/or diastolic results missing.	• Check the patient status. • Check NIBP cuff and hoses. • Repeat the measurement.
• ***Control measurement***	• param.	Pressure alarm limit exceeded.	• Allow measurement to complete. • Check the patient status.
• ***Cuff occlusion***	• param.	Occlusion during measurement or overpressured cuff.	• Check the cuff.
• ***Cuff loose***	• param.	Loose cuff or cuff hose.	• Check the cuff and cuff hose.
• ***Cuff overpressure***	• param.	NIBP cuff is squeezed during measurement and exceeded the pressure safety limits.	• Check NIBP cuff and hoses. • Repeat the measurement.

Message	Location	Possible causes	Suggested actions
• ***Long meas. time***	• param.	The measurement time is long. The triggering values vary according to the cuff type in use: • >2 min for adult/ child, 85 s for infant	• Check the patient status. • Check the cuff and hose connections. • If the problem persists, contact qualified service personnel.
• ***NIBP alarm limits changed***	• al. area	The alarm limits have changed due to cuff size or profile change.	• Check that the cuff size is correct. • Check that the new alarm limits are correct. • Silence the alarm.
• ***NIBP cuff occlusion***	• al. area	Occlusion during measurement or overpressured cuff.	• Check the cuff.
• ***NIBP cuff loose***	• al. area	Loose cuff or cuff hose.	• Check the cuff and cuff hose.
• ***NIBP Dia high*** / ***NIBP Dia low*** • ***NIBP Mean high*** / ***NIBP Mean low*** • ***NIBP Sys high*** / ***NIBP Sys low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***NIBP auto stopped***	• al. area	***NIBP Auto*** mode is stopped because of a loose cuff or cuff hose.	• Check the cuff and cuff hose. • Restart the ***NIBP Auto*** mode.
• ***NIBP over range*** • ***NIBP under range***	• al. area	At least one measurement value (systolic, diastolic, or mean) is outside the NIBP display range.	• Start a new measurement. • Check the patient status.
• ***NIBP STAT stopped***	• al. area	***STAT*** mode is stopped because of a loose cuff or cuff hose.	• Check the cuff and cuff hose. • Restart the ***STAT*** mode.
• ***Select cuff size***	• param.	Cuff size has not been selected.	• Select a cuff size from the NIBP setup menu.
• ***Zeroing***	• param.	Zeroing is in progress.	• Wait until the zeroing is completed.
• ***Zero OK***	• param.	Zeroing was successful.	• No action required.

Messages related to invasive pressures measurement

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
• ***Art 1 disconnect*** to ***Art 2 disconnect*** • ***Disconnected***	• al. area • param.	No arterial invasive pressure is detected.	• Check the patient status. • Check connections. • If pressure drops because of zeroing, perform the zeroing process.
• ***Art 1 sys high*** / ***Art 1 sys low*** to ***Art 2 sys high*** / ***Art 2 sys low*** • ***Art 1 mean high*** / ***Art 1 mean low*** to ***Art 2 mean high*** / ***Art 2 mean low*** • ***Art 1 dia high*** / ***Art 1 dia low*** to ***Art 2 dia high*** / ***Art 2 dia low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Artifact***	• param.	If Smart BP is enabled, this is normal behavior when zeroing, flushing, or sampling is performed. If Smart BP is not enabled, this message indicates that the measurement is disturbed by artifact. Systolic and diastolic numerics are also invalidated if an artifact event is detected while Smart BP is enabled.	• Check the patient status. • Check cable contact. • Minimize tubing length. • Rezero the transducer.
• ***Check device*** • ***Art X pressure malfunction*** • ***CPP X pressure malfunction*** • ***CVP X pressure malfunction*** • ***Fem X pressure malfunction*** • ***FemV X pressure malfunction*** • ***ICP X pressure malfunction*** • ***LAP X pressure malfunction*** • ***PX pressure malfunction***	• param. • al. area	The CARESCAPE Pressure has malfunctioned.	• Check the patient status. • Check connections. • If the problem persists, contact qualified service personnel.

Message	Location	Possible causes	Suggested actions
• ***PA X pressure malfunction*** • ***RAP X pressure malfunction*** • ***RVP X pressure malfunction*** • ***UAC X pressure malfunction*** • ***UVC X pressure malfunction*** where X = channel number (1 or 2)			
• ***CPP 1 high*** / ***CPP 1 low*** to ***CPP 2 high*** / ***CPP 2 low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***CVP 1 mean high*** / ***CVP 1 mean low*** to ***CVP 2 mean high*** / ***CVP 2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Device overheating*** • ***Move pressure device to a cooler location***	• param. • al. area	The CARESCAPE Pressure surface temperature is too high.	• Check the CARESCAPE Pressure placement and ensure that it is not covered by anything that might lead to overheating. • If the problem persists, replace the CARESCAPE Pressure.
• ***Fem 1 disconnect*** to ***Fem 2 disconnect*** • ***Disconnected***	• al. area • param.	No arterial invasive pressure is detected.	• Check the patient status. • Check connections. • If pressure drops because of zeroing, perform the zeroing process.
• ***Fem 1 sys high*** / ***Fem 1 sys low*** to ***Fem 2 sys high*** / ***Fem 2 sys low*** • ***Fem 1 mean high*** / ***Fem 1 mean low*** to ***Fem 2 mean high*** / ***Fem 2 mean low*** • ***Fem 1 dia high*** / ***Fem 1 dia low*** to ***Fem 2 dia high*** / ***Fem 2 dia low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***FemV 1 mean high*** / ***FemV 1 mean low*** to ***FemV 2 mean high*** / ***FemV 2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.

Message	Location	Possible causes	Suggested actions
• ***ICP 1 mean high*** / ***ICP 1 mean low*** to ***ICP 2 mean high*** / ***ICP 2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Identical pressure devices***	• al. area	There are two or more CARESCAPE Pressures connected.	• Remove all but one CARESCAPE Pressure.
• [Invasive pressure channel label] ***X sensor disconnected***, where [Invasive pressure channel label] = ***Art***, ***CPP***, ***CVP***, ***Fem***, ***FemV***, ***ICP***, ***LAP***, ***P***, ***PA***, ***RAP***, ***RVP***, ***UAC***, or ***UVC***, and X = invasive pressure channel number 1 to 2. • ***Sensor***	• al. area • param.	The transducer detected a disconnection.	• Check the patient status. • Check connections. • Acknowledge the alarm if you are intentionally disconnecting the invasive pressure line.
• [Invasive pressure channel label] ***X sensor failed***, where [Invasive pressure channel label] = ***Art***, ***CPP***, ***CVP***, ***Fem***, ***FemV***, ***ICP***, ***LAP***, ***P***, ***PA***, ***RAP***, ***RVP***, ***UAC***, or ***UVC***, and X = invasive pressure channel number 1 to 2. • ***Sensor***	• al. area • param.	Faulty sensor or transducer.	• Check cable and transducer connections. • Replace the transducer.
• ***PX not zeroed*** where X = channel number (1 or 2)	• al. area	There is at least one invasive pressure channel that has not been zeroed.	• Perform zeroing for all channels.
• ***LAP 1 mean high*** / ***LAP 1 mean low*** to ***LAP 2 mean high*** / ***LAP 2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***P1 standby*** to ***P2 standby***	• param.	The IP channel has been set to standby.	• Reactivate the channel by selecting ***Activate P1*** to ***Activate P2***. • Channels are reactivated if pressures have remained between 10 and 250 mmHg for 10 seconds or longer.
• ***P1 mean high*** / ***P1 mean low*** to ***P2 mean high*** / ***P2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.

Message	Location	Possible causes	Suggested actions
• ***P1 zeroing failed*** to ***P2 zeroing failed***	• param.	The channel has not been zeroed successfully.	• Repeat the zeroing.
• ***PA 1 sys high*** / ***PA 1 sys low*** to ***PA 2 sys high*** / ***PA 2 sys low*** • ***PA 1 mean high*** / ***PA 1 mean low*** to ***PA 2 mean high*** / ***PA 2 mean low*** • ***PA 1 dia high*** / ***PA 1 dia low*** to ***PA 2 dia high*** / ***PA 2 dia low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***PR (Art 1) high*** to ***PR (Art 2) high*** / ***PR (Art 1) low*** to ***PR (Art 2) low*** • ***PR (Fem 1) high*** to ***PR (Fem 2) high*** / ***PR (Fem 1) low*** to ***PR (Fem 2) low*** • ***PR (UAC 1) high*** to ***PR (UAC 2) high*** / ***PR (UAC 1) low*** to ***PR (UAC 2) low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Pressure device failure: Call service***	• al. area	Faulty CARESCAPE Pressure.	• Contact qualified service personnel.
• ***Pressure device initializing***	• al. area	New software is being downloaded to the CARESCAPE Pressure.	• Wait. The message will clear when the download is complete.
• ***Pressure device overheated. Shutting it down.***	• al. area	CARESCAPE ONE turns off the CARESCAPE Pressure because its surface temperature is too high.	• Check the CARESCAPE Pressure placement and ensure that it is not covered by anything that might lead to overheating. • If the problem persists, replace the CARESCAPE Pressure.
• ***Pressure measurement removed***	• al. area	CARESCAPE Pressure has been removed or active pressure channel becomes inactive.	• Check all connections and reconnect as required.
• ***Pressure Sensed***	• param.	Pressure has been sensed during zeroing.	• Open the venting stopcock to air. • Re-zero.
• ***RAP 1 mean high*** / ***RAP 1 mean low*** to ***RAP 2 mean high*** / ***RAP 2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.

Message	Location	Possible causes	Suggested actions
• ***RVP 1 mean high*** / ***RVP 1 mean low*** to ***RVP 2 mean high*** / ***RVP 2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***UAC 1 disconnect*** to ***UAC 2 disconnect*** • ***Disconnected***	• al. area • param.	No arterial invasive pressure is detected.	• Check the patient status. • Check connections. • If pressure drops because of zeroing, perform the zeroing process.
• ***UAC 1 sys high*** / ***UAC 1 sys low*** to ***UAC 2 sys high*** / ***UAC 2 sys low*** • ***UAC 1 mean high*** / ***UAC 1 mean low*** to ***UAC 2 mean high*** / ***UAC 2 mean low*** • ***UAC 1 dia high*** / ***UAC 1 dia low*** to ***UAC 2 dia high*** / ***UAC 2 dia low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***UVC 1 mean high*** to ***UVC 2 mean high*** / ***UVC 1 mean low*** to ***UVC 2 mean low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Zeroed***	• param.	Zeroing was successful.	• No action required. Message is automatically removed after 10 seconds.
• ***Zeroing***	• param.	IP channel is currently being zeroed.	• No action required. Message is automatically removed and replaced with the zeroing results after completion.
• ***Zeroing failed***	• al. area	Pulsating waveform detected. Defective transducer Offset is >150 mmHg.	• Open the transducer to room air and zero the channel. • Replace the transducer, open it to room air, and zero the channel.
• ***Zero ICP separately***	• al. area	The ICP channel must be zeroed separately from all other invasive pressures.	• Zero the channel using the ***Zero*** option found under the ICP channel setup menu.

Messages related to temperature measurement

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
• ***Calibration fail*** • ***T1 Calibration fail / T2 Calibration fail***	• param. • al. area	Calibration of a channel failed.	• Check connections. • If the problem persists, contact qualified service personnel.
• ***Check device*** • ***Temperature malfunction***	• param. • al. area	Hardware or software fault in CARESCAPE Temperature: • Cable fault • Data out of expected range	• Reconnect the CARESCAPE Temperature. • Replace the CARESCAPE Temperature. • If the problem persists, contact qualified service personnel.
• ***Device overheating*** • ***Move temp device to a cooler location***	• param. • al. area	CARESCAPE Temperature surface temperature is too high.	• Check the CARESCAPE Temperature placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE Temperature.
• ***Identical Temp device***	• al. area	There are two CARESCAPE Temperatures.	• Remove one CARESCAPE Temperature.
• ***No sensor detected***	• param.	No probe detected, or the probe is not compatible. Also when the temperature probe check fails.	• Check the probe and connections. • Ensure that you are using a compatible probe.
• ***T1 high / T1 low*** • ***T2 high / T2 low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***T2–T1 high***	• al. area	Measured delta value is equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Temp measurement removed***	• al. area	CARESCAPE Temperature has been removed or active temperature channel becomes inactive.	• Check all connections and reconnect as required.

Message	Location	Possible causes	Suggested actions
• ***Temp device failure: Call service***	• al. area	CARESCAPE Temperature startup or initialization failure.	• Reconnect the CARESCAPE Temperature. • Replace the CARESCAPE Temperature. • If the problem persists, contact qualified service personnel.
• ***Temp device overheated. Shutting down.***	• al. area	CARESCAPE ONE turns off the CARESCAPE Temperature because its surface temperature is too high.	• Check the CARESCAPE Temperature placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE Temperature.

Messages related to CO_2 measurement

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
• ***Apnea (CO2)*** • ***APN*** • ***Apnea***	• al. area • param. • wavef.	No breathing detected.	• Check the patient status. • Wait. The message disappears after a breath is detected.
• ***Apnea deactivated***	• param.	A new case has just been started/a new patient admitted, or the measurement has just been started and the apnea alarm is not active yet, or the user has deactivated the apnea alarm.	• Wait. The message disappears after 3 breaths are detected within one minute.

Message	Location	Possible causes	Suggested actions
• ***Check CO2 adapter*** • ***Check Adapter***	• al. area • param.	There is an obstruction in the LoFlo receptacle sample cell, or the LoFlo receptacle sample cell is not within the optimal operating range for CO_2 measurement.	• Ensure that the sampling line connector is correctly and fully inserted. • Check that the sample cell windows and receptacle windows do not have any foreign material on them. • Perform zeroing procedure to optimize the operation. • If the problem persists, replace the adapter.
• ***Check sample line***	• al. area • param.	Sample flow rate is lower or higher than the nominal flow due to an obstruction in the sample line or exhaust port, or a cut or split in the sample line. The filter in the sample line is completely saturated. If the situation persists for more than 2 minutes, the pump will turn off.	• Check the sample line and exhaust port for obstructions. • Check the sample line for cuts or splits and replace if necessary. • Remove the sample line and dispose of it following hospital protocol. • If the pump has shut off, disconnect then reconnect the accessory to restart the pump
• ***CO2 device failure: Call service***	• al. area	CARESCAPE CO_2 startup or initialization failure.	• Reconnect the CARESCAPE CO_2. • Replace the CARESCAPE CO_2. • Contact qualified service personnel.
• ***CO2 device initializing***	• al. area	The CARESCAPE CO_2 is in the software download mode.	• Wait and see if the message disappears. • Replace the CARESCAPE CO_2. • Contact qualified service personnel.
• ***CO2 device malfunction*** • ***Check device***	• al. area • param.	CARESCAPE CO_2 startup or runtime failure.	• Reconnect the CARESCAPE CO_2. • Replace the CARESCAPE CO_2. • Contact qualified service personnel.
• ***CO2 device overheated Shutting down***	• al. area	The CARESCAPE CO_2 surface temperature is too high and the CARESCAPE ONE turns the measurement off.	• Check the CARESCAPE CO_2 placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE CO_2. • Contact qualified service personnel.

Message	Location	Possible causes	Suggested actions
• ***CO2 measurement removed***	• al. area	The CARESCAPE CO_2 has been disconnected from the CARESCAPE ONE.	• Connect the CARESCAPE CO_2 and LoFlo Sidestream Module if you want to restart the measurement.
• ***CO2 sensor removed*** • ***Sensor removed***	• al. area • param.	The LoFlo Sidestream Module has been disconnected from the CARESCAPE CO_2.	• Connect the LoFlo Sidestream Module to the CARESCAPE CO_2 if you want to restart the measurement.
• ***CO2 zero required*** • ***Zero required***	• al. area • param.	The CARESCAPE CO_2 needs zeroing.	• Disconnect the patient and perform zeroing from the CO_2 menu: ***Zeroing*** > ***Zero to room air***. • If the problem persists, replace the sampling line and zero again.
• ***EtCO2 high*** • ***EtCO2 low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Check the ventilator and fresh gas flow settings. • Check arterial blood gas values. • Adjust alarm limits if necessary.
• ***FiCO2 high*** • ***FiCO2 low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Check the ventilator or absorber, breathing circuit, and fresh gas flow settings. • Adjust alarm limits if necessary.
• ***Identical CO2 device***	• al. area	There is more than one CARESCAPE CO_2 device in the system.	• Remove all but one CARESCAPE CO_2.
• ***Move CO2 device to a cooler location*** • ***Device overheating***	• al. area • param.	The CARESCAPE CO_2 surface temperature is too high.	• Check the CARESCAPE CO_2 placement and ensure that it is not covered by anything that might lead to overheating. • Replace the CARESCAPE CO_2. • Contact qualified service personnel.

Message	Location	Possible causes	Suggested actions
• ***Move CO2 sensor to a cooler location*** • ***Sensor overheating***	• al. area • param.	The LoFlo Sidestream Module temperature is too high.	• Check the LoFlo Sidestream Module placement and ensure that it is not covered by anything that might lead to overheating. • Replace the LoFlo Sidestream Module. • Contact qualified service personnel.
• ***Over range***	• param.	The CO_2 value is outside the measurable range and cannot be measured	• Zero CO_2. • Replace the CARESCAPE CO_2. • Contact qualified service personnel.
• ***Over scale***	• wavef.	The CO_2 signal exceeds the waveform area.	• Check the patient status. • Select a larger scale for the waveform.
• ***RR (CO2) high*** • ***RR (CO2) low***	• al. area	Measurement values are equal to or outside the alarm limits.	• Check the patient status. • Adjust alarm limits if necessary.
• ***Sample line disconnected*** • ***Line disconnected***	• al. area • param.	The sample line is disconnected.	• Check the sample line connection and reconnect as needed, then perform zeroing.
• ***Service CO2 sensor*** • ***Check sensor***	• al. area • param.	There is a problem with the LoFlo Sidestream Module.	• Replace the LoFlo Sidestream Module. • Contact qualified service personnel.
• ***Warming up***	• param.	The LoFlo Sidestream Module is warming up.	• Wait until the warm-up is completed and the message disappears.
• ***Zeroing***	• wavef. • param.	Zeroing is in progress.	• Wait until the zeroing is completed and the message disappears.

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, and similar issues.

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
Analog output malfunction	• al. area	CARESCAPE ONE analog output voltage failure.	• Contact qualified service personnel.
• ***Battery empty!***	• al. area	The CARESCAPE ONE is being used on battery power, and there is less than 5 minutes of charge left.	• Charge the battery by connecting the CARESCAPE ONE to a powered CARESCAPE Dock F0.
• ***Battery failure***	• al. area	The battery is faulty.	• Replace the battery.
• ***Battery low***	• al. area	The CARESCAPE ONE is being used on battery power, and there is less than 20 minutes of charge left.	• Charge the battery by connecting the CARESCAPE ONE to a powered CARESCAPE Dock F0.
• ***Battery temp high***	• al. area	Battery temperature is too high.	• Replace the battery. • If the problem persists, contact qualified service personnel.
• ***Call Service: Text(s) missing***	• al. area	The software text is missing in this language; the text file may be corrupted.	• Contact qualified service personnel.
• ***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.
• ***Condition battery***	• al. area	The battery needs to be conditioned.	• Replace the battery, and condition the battery that was removed.
• ***Configuration error(s)***	• al. area	One or more errors have been detected in the configuration.	• Contact qualified service personnel.
• ***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*** > ***Defaults & Service*** > ***Exit DEMO*** > ***Confirm***.
• ***Entering standby***	• al.area	Activate standby has been selected.	• Continue disconnecting the patient to enter standby mode.

Message	Location	Possible causes	Suggested actions
• ***No battery backup***	• al. area	There is no battery in the CARESCAPE ONE.	• Install a battery in the CARESCAPE ONE battery compartment.
• ***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.
• ***Powering down!***	• al. area	The CARESCAPE ONE is being used on battery power and there is less than 1 minute of charge left.	• Charge the battery by connecting the CARESCAPE ONE to a powered CARESCAPE Dock F0.
• ***Replace battery***	• al. area	The battery is not working properly.	• Replace the battery.
• ***Service CS ONE*** and specific error indication	• al. area	Technical fault in the monitor.	• Contact qualified service personnel.

19 Abbreviations

List of abbreviations

The abbreviations that appear in the monitor software are indicated with bold and italic typeface. Other abbreviations listed in this table appear in the monitor manuals. Some abbreviations listed have multiple meanings but are differentiated by the context in which they appear.

/min	beats per minute, breaths per minute
°C	Celsius degree
°F	Fahrenheit degree
µ	micro
12RL	twelve reduced leads
a	arterial
A	auricular
A Fib	atrial fibrillation
A	alveolar
AAMI	Association for the Advancement of Medical Instrumentation
AC	alternating current
Accel. Ventric.	accelerated ventricular rhythm
AHA	American Heart Association
Amp	amplitude
ANATEL	Agência Nacional de Telecomunicações
ANSI	American National Standards Institute
Ant.	anterior
APN	apnea
Arrh	arrhythmia
Art	arterial pressure
ASY	asystole
Auto	continuous NIBP measurement mode
aVF	left foot augmented lead
aVL	left arm augmented lead

aVR	right arm augmented lead
Axil	axillary temperature
Blad	bladder temperature
bpm	beats per minute
Brady	bradycardia
BSA	body surface area
B-to-B	beat-to-beat
C	central
C (C1 - C6)	chest
C1 to C6	ECG lead C1 to ECG lead C6
cc	cubic centimeter
CCU	cardiac (coronary) care unit
CISPR	International Special Committee on Radio Interference
CMRR	common mode rejection ratio
CO2	carbon dioxide
Core	core temperature
CPP	cerebral perfusion pressure
CPU	central processing unit
CSA	Canadian Standards Association
CT	computed tomography
CVP	central venous pressure
d	day
dB	decibel
DC	direct current
DEMO	demonstration (mode)
DEMO PATIENT	patient name in the demonstration mode
Dia; ***DIA***	diastolic pressure
e	estimated
ECG	electrocardiogram
ED	emergency department
EMC	electromagnetic compatibility
EMI	electromagnetic interference
ESD	electrostatic discharge electrostatic sensitive devices
Eso	esophageal temperature
ESU	electrosurgical unit
ET; ***Et***	end-tidal concentration

EtCO2	end-tidal carbon dioxide
Exp; ***exp***	expiratory expiration
F	foot (describing location) frontal
Fem	femoral
FemV	femoral venous
Fib	fibrillation
FiCO2	fraction of inspired carbon dioxide
FiO2	fraction of inspired oxygen
Fr	French (unit of measure for a Catheter diameter scale)
ft	feet foot
g	gram
GND	ground
h	hour
Hb	hemoglobin
Hemo	hemodynamic
hPa	hectopascal
HR	heart rate
HRdif	heart rate difference
Hz	hertz
I	lead I
IABP	intra-aortic balloon pump
ICASA	Independent Communications Authority of South Africa
ICP	intracranial pressure
ICU	intensive care unit
ID	identification
IEC	International Electrotechnical Commission
II	lead II
III	lead III
Imped.	impedance impedance respiration
in	inch
Insp; ***insp***	inspiratory inspiration
IntelliRate	automatic heart rate source selection

IP	internet protocol
IP	invasive blood pressure
Iso	isoelectric
ISO	International Standards Organization
IV	intravenous
J	joule
KCC	Korea Communications Commission
kg	kilogram
kPa	kilopascal
l	liter
LA	left arm (describing location)
Lab	laboratory
LAN	local area network
LAP	left atrial pressure
lb	pound
LCD	liquid crystal display
LED	light emitting diode
LL	left leg (describing location)
Man	manual
MAP	mean arterial pressure
Max.	maximum
mbar	millibar
ME	medical equipment
Mean; ***M***	mean blood pressure
MetHb	methemoglobin
mg	milligram
min	minute
ml	milliliter
mm	millimeter
mmHg	millimeters of mercury
MRI	magnetic resonance imaging
MRN	medical record number
ms	millisecond
Myo	myocardiac temperature
N	neutral
N/A	not applicable
N_2	nitrogen

N2O	nitrous oxide
Naso	nasopharyngeal temperature
Neo	neonate
Neuro	neurological
NIBP	non-invasive blood pressure
NICU	neonatal intensive care unit
O2	oxygen
ONE	CARESCAPE ONE
OR	operating room
P	pressure
PA	pulmonary arterial pressure
Paced	paced beats
PACU	post anesthesia care unit
pcs	pieces
PCWP	pulmonary capillary wedge pressure
PDF	portable document format
Pedi	pediatric
Pleth	plethysmographic pulse waveform
Pmean	mean pressure
PN	part number
PR	pulse rate
PVC	polyvinyl chloride
PVC	premature ventricular contraction
QRS	QRS complex
R	right (describing location)
R on T	early PVC, close to the T wave of the preceding normal beat
RA	right arm (describing location)
RAP	right atrial pressure
Rect	rectal temperature
Resp Rate	respiration rate (total) (measured)
Resp	respiration
RF	radio frequency
RL	reduced leadset right leg
Room	room temperature
RR	respiration rate
s	second

SaO2	arterial oxygen saturation
Skin	skin temperature
SL	simultaneous leads
SN	serial number
SpO2	oxygen saturation
ST	ST segment
STAT	five minute continuous NIBP measurement mode
Surf	surface temperature
SV	supraventricular
SW; sw	software
SVC	supra ventricular contraction
SV Tachy	supra ventricular tachycardia
Sys; ***SYS***	systolic pressure
T	temperature
Tab	tabular
Tachy	tachycardia
Temp	temperature
Tx-Ty	temperature difference
Tymp	tympanic temperature
UAC	umbilical arterial catheter
UI	user interface
UVC	umbilical venous catheter
V	ventricular
V (***V1-V6***)	chest
V Brady	ventricular bradycardia
V Fib	ventricular fibrillation
V Tach	ventricular tachycardia
v	venous
(***V1*** to (***V1-V6***)	ECG lead ***V1*** to ECG lead (***V1-V6***)
WLAN	wireless local area network
Vol; V	volume
VT > 2	ventricular tachycardia with more than two consecutive ventricular beats
yrs	years

A

Skills checklist

System introduction

To familiarize yourself with these functions and features, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
SYSTEM SAFETY PRECAUTIONS • System warnings (28)		
• System cautions (32)		
CARESCAPE ONE SYSTEM COMPONENTS • CARESCAPE ONE system components (39)		
MONITOR BATTERY • Monitor battery (42)		
DOCKS • Docks (45)		
ALARM LIGHT • Alarm light (62)		
EQUIPMENT SYMBOLS • Equipment symbols (48)		
USER INTERFACE INDICATORS • User interface indicators (59)		

Starting and ending

To familiarize yourself with these functions and features, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
CASE START / PATIENT ADMISSION • Starting monitoring (67)		
USING STANDBY • Starting standby (70)		

Recommended reading	Completed	Not applicable
• Ending standby (71)		
CONTINUING MONITORING • Continuing monitoring (69)		
CASE RESET / PATIENT DISCHARGE • Resetting a case/discharging a patient (69)		

Monitoring basics

To familiarize yourself with these functions and features, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
MAIN KEYS • Main keys (56)		
MAIN SCREEN LAYOUT • Main screen layout (55)		
OPERATION SAFETY PRECAUTIONS • Operation warnings (37)		
MONITOR INSTALLATION POINTS TO NOTE • Installation points to note (37)		
TURNING ON THE MONITOR • Turing on the monitor (67)		
SCREEN SETUP MODIFICATIONS • Screen setup modifications (62)		
PRE-MONITORING CHECKLIST • Pre-monitoring checklist (68)		

Alarms

To familiarize yourself with these functions and features, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
SAFETY PRECAUTIONS • Alarm warnings (73)		
OVERVIEW • Alarm types (74)		
• Alarm conditions (75)		
• Alarm priority levels (81)		

Recommended reading	Completed	Not applicable
• Selecting parameter alarm priority levels (81)		
• Alarm priority escalation (81)		
CHECKING THE FUNCTION • Checking alarm function (75)		
ALARM INDICATIONS • Alarm icons on the screen (76)		
• Setting the alarm light brightness (77)		
• Adjusting the alarm volume (78)		
• Audible alarm signals (78)		
ALARM DEACTIVATION • Technical alarms' deactivation with the pause audio key (85)		
• Apnea alarms' deactivation with the pause audio key		
• Turning audible alarms on/off (83)		
• Pausing alarms for 5 minutes (84)		
BREAKTHROUGH AND LATCHED ALARMS • Breakthrough alarms (85)		
• Latched alarms (85)		

Transport

To familiarize yourself with these functions and features, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
TRANSPORT MONITORING • Preparing to transport a patient (88)		
• Returning a patient from transport (88)		
TRANSPORT SETTINGS • Transport settings (89)		

ECG

To familiarize yourself with this parameter and its use, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
GENERAL MEASUREMENT OVERVIEW • ECG warnings (97)		
• ECG cautions (99)		

Recommended reading	Completed	Not applicable
• ECG measurement limitations (99)		
• ECG points to note (99)		
• ECG equipment to patient connection with CARESCAPE ONE (99)		
• Checking the ECG measurement (104)		
PREPARING THE PATIENT • Preparing the patient's electrode sites (100)		
• Applying the electrodes to the patient (100)		
• 3- lead or 5-lead ECG electrode placement (101)		
• 6-lead ECG electrode placement (101)		
• 10-lead ECG electrode placement for cardiac monitoring (102)		
• Standard resting 10-lead ECG electrode placement (103)		
SELECTING LEADS • The first three displayed ECG leads (104)		
• Selecting the first displayed ECG lead (104)		
• Selecting the second displayed ECG lead (104)		
• Selecting the third displayed ECG lead (105)		
USING THE MEASUREMENT • Selecting the beat source (106)		
• Selecting the beep tone during bradycardia alarms (106)		
• Selecting the ECG waveform size (106)		
• Selecting the ECG waveform filter (106)		
• Selecting the leads for ECG analysis (107)		
• Relearning the patient's QRS pattern (108)		
ECG ALARM LIMITS • ECG alarm limits (110)		
12 LEAD ANALYSIS • About the 12RL feature (112)		
PACEMAKER DETECTION • Pacemaker detection warnings (113)		
• Selecting the pacemaker detection (114)		
ARRHYTHMIA DETECTION • Arrhythmia monitoring warnings (115)		
• Arrhythmia measurement limitations (116)		
• Setting the arrhythmia category to alarm (117)		
• Setting arrhythmia alarms (117)		
• Arrhythmia alarm messages (118)		

Recommended reading	Completed	Not applicable
ST DETECTION • ST detection measurement limitations (122)		
• Starting the ST detection (122)		

Impedance respiration

To familiarize yourself with this parameter and its use, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
GENERAL MEASUREMENT OVERVIEW • Respiration warnings (123)		
• Respiration cautions (124)		
• Respiration measurement limitations (124)		
• Respiration points to note (124)		
• Respiration measurement checks (127)		
• Respiration equipment to patient connection with CARESCAPE ONE (125)		
RESPIRATION LEADS • Respiration lead and breath detection (125)		
• Respiration lead I electrode placement (126)		
• Respiration lead II electrode placement (126)		
• Respiration lead RL-LL electrode placement (127)		
USING THE MEASUREMENT • Selecting the waveform sensitivity (128)		
• Setting the respiration alarm limits (129)		
• Turning on or off the respiration rate alarm (129)		
• Setting the apnea alarm delay (130)		
• Enabling the respiration cardiac artifact alarm (130)		
• Respiration alarm priorities (130)		

Pulse oximetry (SpO_2)

To familiarize yourself with this parameter and its use, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
GENERAL MEASUREMENT OVERVIEW • SpO_2 warnings (133)		
• SpO_2 cautions (136)		

Recommended reading	Completed	Not applicable
• SpO_2 measurement limitations (137)		
• SpO_2 points to note (137)		
• Checking the SpO_2 measurement (143)		
• SpO_2 equipment to patient connection with CARESCAPE ONE (143)		
• Preparing the SpO_2 connection (143)		
MEASUREMENT GUIDELINES • Masimo SET technology and sensor measurement guidelines (141)		
• Nellcor OxiMax technology and sensor measurement guidelines (142)		
• GE TruSignal technology and sensor measurement guidelines (141)		
USING THE MEASUREMENT • Selecting the SpO_2 as the primary heart rate source (144)		
• Adjusting the SpO_2 pulse beep volume (145)		
• Masimo SET data averaging and updating (145)		
• Nellcor OxiMax data averaging and updating (146)		
• Setting the SpO_2 alarms and alarm limits (148)		
• Deactivating the SpO_2 probe off alarm (148)		

Non-invasive blood pressure

To familiarize yourself with this parameter and its use, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
GENERAL MEASUREMENT OVERVIEW • NIBP warnings (153)		
• NIBP cautions (154)		
• NIBP measurement limitations (155)		
• NIBP points to note (155)		
• Checking the NIBP measurement (156)		
• NIBP equipment to patient connection with CARESCAPE ONE (156)		
CUFF APPLICATION • Preparing the NIBP patient connection (156)		
• NIBP cuff selection and placement (159)		

Recommended reading	Completed	Not applicable
SINGLE NIBP MEASUREMENT • Starting or stopping a single NIBP measurement from the main menu (157)		
• Starting or stopping a single NIBP measurement from the NIBP setup menu (157)		
AUTOMATIC NIBP MEASUREMENTS • Starting or stopping the NIBP Auto from the main menu (157)		
• Starting or stopping the NIBP Auto from the NIBP Setup menu (157)		
STAT MODE • Starting or stopping a Stat NIBP measurement (159)		

Invasive pressures

To familiarize yourself with this parameter and its use, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
GENERAL MEASUREMENT OVERVIEW • Invasive pressure warnings (165)		
• Invasive pressure points to note (166)		
• Checking the invasive pressure measurement (166)		
• Invasive pressure equipment to patient connection with CARESCAPE ONE (166)		
ZEROING • Zeroing the invasive pressure transducers (168)		
USING THE MEASUREMENT • Selecting an invasive pressure channel label (168)		
• Selecting the size of the invasive pressure waveform (168)		
• Optimizing the invasive pressure waveform scale (168)		

Temperature

To familiarize yourself with this parameter and its use, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
GENERAL MEASUREMENT OVERVIEW • Temperature warnings (179)		
• Temperature cautions (179)		
• Temperature points to note (180)		

Recommended reading	Completed	Not applicable
• Checking the temperature measurement (181)		
• Temperature equipment to patient connection with CARESCAPE ONE (180)		
TEMPERATURE MEASUREMENT START • Starting the temperature measurement (181)		
TEMPERATURE SITE NAME CHANGES • Changing the temperature site label (181)		

CO_2

To familiarize yourself with this parameter and its use, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
GENERAL MEASUREMENT OVERVIEW • CO_2 warnings (185)		
• CO_2 cautions (186)		
• CO_2 points to note (186)		
• Equipment connection with CARESCAPE CO_2 (187)		
• Preparing the setup for CARESCAPE CO_2 (187)		
USING THE MEASUREMENT • Selecting the CO_2 scale (188)		
• Setting CO_2 limit alarms (189)		
ZEROING • Zeroing the LoFlo Sidestream Module (190)		
SCAVENGING • Connecting to scavenging systems (191)		

Trends

To familiarize yourself with these functions and features, study the topics listed as recommended reading. The numbers in brackets refer to the page numbers in the manual. As you proceed, mark your completed tasks in the table.

Recommended reading	Completed	Not applicable
NUMERIC TRENDS • Viewing numeric trends (197)		

B

Compatibility

Compatibility

Devices and versions not specifically stated have not been verified and validated to comprise a conforming system with the CARESCAPE ONE.

In the following sections, compatible devices refer to devices that have been verified to be compliant with the standard 60601–1:2012, 3.1 edition.

Measurement device compatibility

Identical measurement devices

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

The following measurement devices are considered identical and should not be used simultaneously in the same CARESCAPE ONE monitoring system.

Measurement device	Simultaneous use
CARESCAPE ECG	Only one per system.
CARESCAPE Pressure	Only one per system.
CARESCAPE SpO_2 CARESCAPE SpO_2 – Masimo CARESCAPE SpO_2 – Nellcor	Only one per system.
CARESCAPE Temperature	Only one per system.
CARESCAPE CO_2	Only one per system.

Measurement device compatibility

CARESCAPE ONE is compatible with the following measurement devices:

- CARESCAPE ECG
- CARESCAPE Pressure
- CARESCAPE SpO_2
- CARESCAPE SpO_2 — Nellcor
- CARESCAPE SpO_2 — Masimo
- CARESCAPE Temperature
- CARESCAPE CO_2

Host monitor compatibility

CARESCAPE ONE is compatible with the following devices:

- CARESCAPE Monitor B850 with v3 software

Dock compatibility

CARESCAPE ONE is compatible with the following docks:

- CARESCAPE Dock F0
- Mini Dock
- Parameter Dock 1
- Parameter Dock 5

C

Compliance

Standards compliance

The system complies with the following standards.

- IEC 60601-1:2012
- IEC 60601-1-2:2007
- IEC 60601-1-6:2013
- IEC 60601-1-8:2012
- IEC 60601-2-27:2011
- IEC 60601-2-34:2011
- IEC 60601-2-49:2011
- IEC 62304:2015
- IEC 62366:2014
- IEC 80601-2-30:2013
- ISO 80601-2-55:2011
- ISO 80601-2-56:2009
- ISO 80601-2-61:2011

Compliance to parameter and function specific standards is disclosed in the applicable sections.

IEC 60601-1

- Type of protection against electrical shock: Class II.
- 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 equipment in the presence of flammable anesthetics, vapors or liquids.

- Degree of enclosure protection against solid objects and water ingress ratings are specified in the Design, environmental, and physical specifications appendix.
- Mode of operation: Continuous.

D

Design, environmental, and physical specifications

CARESCAPE ONE specifications

WARNING Operation of CARESCAPE ONE outside the specified performance range may cause inaccurate results.

CARESCAPE ONE	
Size (H x W x D), width excludes pull tab	15.5 cm x 27.0 cm x 6.5 cm (6.1 in x 10.6 in x 2.6 in)
Weight	less than 1.85 kg (4.08 lbs) with battery
Operating temperature range	0°C to 40°C (32°F to 104°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP41
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1
Shock	Withstand shock in accordance with IEC 60068-2-27: 2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstand broad-band random vibration in accordance with IEC 60068-2-64: 2008 using conditions set in IEC 60721-4-7:2001, class 7M3
Power source	Battery or DC input from CARESCAPE F0 Dock
Cooling	Natural convection
Display size	7 inch diagonal
Display type	Active matrix color TFT LCD
Display resolution	800 x 480

CARESCAPE ONE	
Number of waveform fields	Up to 4 simultaneously
Number of parameter windows	Up to 7 simultaneously
Display layout and colors	User-configurable
Touchscreen technology	Projected Capacitive Touch screen with direct function keys, selections and adjustments in menus Compatible with latex gloves, nitrile gloves and stylus as small as 8 mm
Display rotation	Display image rotates when CARESCAPE ONE is rotated 180 degrees
CARESCAPE Parameter connectors	Eight USB 2.0 full speed parameter connections
Analog out / Defibrillator synchronization connector	Invasive pressure and ECG analog outputs Defibrillator synchronization input and output signals

Battery	
Battery type	One removable Lithium-Ion battery
Battery voltage	10.8 Volt (nominal)
Size (L x W x D)	15.2 cm x 5.9 cm x 2.2 cm (6.0 in x 2.3 in x 0.9 in)
Weight	0.35 kg (0.77 lbs)
Operating temperature range	0°C to 40°C (32°F to 104°F)
Storage temperature range	-20°C to 60°C (-4°F to 140°F)
Operating humidity range	5% to 95% RH (non-condensing)
Storage humidity range	10% to 90% RH (non-condensing)
Operating altitude range	-500 m (1075 hPa) to 4000 m (616 hPa)
Non-operating altitude range	-500 m (1075 hPa) to 5573 m (500 hPa)
Battery capacity	3.8 Amp hour minimum (new)
Battery charge time	4 hours typical in CARESCAPE ONE Battery charge time may increase in ambient temperatures above 35°C when in CARESCAPE ONE
Battery run time	5 hours minimum (new, fully charged) **NOTE** System includes dual invasive pressure, dual temperature, 12 lead ECG, CARESCAPE SpO2 or CARESCAPE SpO2 - Nellcor, 100% display brightness, 15 minute NBP Cycles, and high priority alarms with maximum volume and alarm light brightness at 100%.
Battery life	300 deep discharge cycles to 60% of design capacity
Battery fuel status	LED indicators on the battery

External AC-DC power supply	
Size (H x W x D)	7.5 cm x 15.0 cm x 4.0 cm (2.9 in x 5.9 in x 1.5 in)
Weight	less than 0.46 kg (1.0 lb)
Operating temperature range	0°C to 40°C (32°F to 104°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP42
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1.
Output voltage	15 VDC nominal
Rated output power	60 W maximum
Input voltage and frequency	100 - 240 VAC, 50 - 60 Hz
Rated Input current	1.5 A - 0.75 A
AC input In-rush current	less than < 50 A peak with a 2 ms width at 264 VAC

CARESCAPE Dock F0 specifications

Size (H x W x D)	9.0 cm x 21.0 cm x 7.5 cm (3.5 in x 8.3 in x 3.0 in)
Weight	Less than 0.5 kg (1.0 lb)
Operating temperature range	0°C to 40°C (32°F to 104°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP42
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1.
Shock	Withstands shock in accordance with IEC 60068-27:2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstands broad-band random vibration in accordance with IEC 60068-2-64:2008 using conditions set in IEC 60721-4-7:2001, class 7M3

System power consumption	• Worst case configuration includes external supply efficiency • CARESCAPE F0 Dock powered by External AC-DC supply or ePort host connection. No Charging: 17.6 W maximum Battery Charging: 32.4 W maximum
ePort interface connector	Interface with a host monitor (DB-9 connector) • Power from host (8.5V to 17.3V) • Ethernet communication
Ethernet port connector	Interface with a service PC for ethernet communication (RJ45 connector)
Power receptacle	Interface with the AC mains to DC power supply (15 VDC)

Mini Dock, Parameter Dock 1, and Parameter Dock 5 specifications

Mini Dock size (H x W x D)	8.5 cm x 19.0 cm x 3.0 cm (3.5 in x 8.3 in x 3.0 in)
Parameter Dock 1 size (H x W x D)	8.3 cm x 16.1 cm x 5.0 cm (3.3 in x 6.3 in x 2.0 in)
Parameter Dock 5 size (H x W x D)	8.3 cm x 28.8 cm x 5.5 cm (3.3 in x 11.3 in x 2.2 in)
Mini Dock weight	Less than 0.15 kg (0.33 lb)
Parameter Dock 1 weight	Less than 0.20 kg (0.44 lb)
Parameter Dock 5 weight	Less than 0.35 kg (0.77 lb)
Operating temperature range	0°C to 40°C (32°F to 104°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m (1075 hPa) to 4000 m (616 hPa)
Non-operating altitude range	-500 m (1075 hPa) to 5573 m (500 hPa)
Mini Dock	Secures CARESCAPE ONE from either end of the dock
Parameter 5 Dock	Secures up to 5 CARESCAPE Parameters (excluding CARESCAPE ECG and CARESCAPE SpO2 - Masimo SET)
Parameter 1 Dock	Secures CARESCAPE ECG or CARESCAPE SpO2 - Masimo SET
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1

CARESCAPE ECG specifications

Length	3.7 m or 1.9 m (12.1 ft or 6.2 ft)
Weight	Less than 0.57 kg (1.26 lb), includes long 10 leadwire set
Operating temperature range	0°C to 35°C (32°F to 95°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP47
Power consumption	625 mW maximum
Power requirement - input voltage	5 VDC ± 0.25 VDC
Power requirement - input current	125 mA maximum
1 m drop	Drop from 1m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1
Shock	Withstands shock in accordance with IEC 60068-27:2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstands broad-band random vibration in accordance with IEC 60068-2-64:2008 using conditions set in IEC 60721-4-7:2001, class 7M3

CARESCAPE SpO_2 specifications

CARESCAPE SpO_2 (TruSignal)	
Length	3.0 m or 1.8 m (9.8 ft or 5.9 ft)
Weight	less than 0.17 kg (0.38 lb)
Operating temperature range	0°C to 40°C (32°F to 104°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP47
Power consumption	375 mW maximum

CARESCAPE SpO_2 (TruSignal)	
Power requirement - input voltage	5 VDC ± 0.25 VDC
Power requirement - input current	75 mA maximum
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1.
Shock	Withstands shock in accordance with IEC 60068-27:2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstands broad-band random vibration in accordance with IEC 60068-2-64:2008 using conditions set in IEC 60721-4-7:2001, class 7M3

CARESCAPE SpO_2 – Masimo	
Length	1.9 m or 1.0 m (6.2 or 3.3 ft)
Weight	less than 0.33 kg (0.82 lb)
Operating temperature range	0°C to 35°C (32°F to 95°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP47
Power consumption	2.15 W maximum
Power requirement - input voltage	5 VDC ± 0.25 VDC
Power requirement - input current	430 mA maximum
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1
Shock	Withstand shock in accordance with IEC 60068-2-27: 2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstand broad-band random vibration in accordance with IEC 60068-2-64: 2008 using conditions set in IEC 60721-4-7:2001, class 7M3

CARESCAPE SpO_2 – Nellcor	
Length	3.6 m or 1.2 m (11.8 ft or 3.9 ft)
Weight	Less than 0.20 kg (0.44 lb)
Operating temperature range	0°C to 35°C (41°F to 95°F)
Non-operating temperature range	-40°C to 70°C (-40°F to 158°F)

CARESCAPE SpO_2 – Nellcor	
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5572 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP47
Power consumption	350 mW maximum
Power requirement - input voltage	5 VDC ±0.25 VDC
Power requirement - input current	70 mA maximum
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1
Shock	Withstand shock in accordance with IEC 60068-2-27: 2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstand broad-band random vibration in accordance with IEC 60068-2-64: 2008 using conditions set in IEC 60721-4-7:2001, class 7M3

CARESCAPE Pressure specifications

Length	3.6 m or 1.8 m (11.8 ft or 5.9 ft)
Weight	less than 0.26 kg (0.57 lb)
Operating temperature range	0°C to 40°C (32°F to 104°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP47
Power consumption	425 mW maximum
Power requirement - input voltage	5 VDC ± 0.25 VDC
Power requirement - input current	85 mA maximum
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1

Shock	Withstands shock in accordance with IEC 60068-27:2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstands broad-band random vibration in accordance with IEC 60068-2-64:2008 using conditions set in IEC 60721-4-7:2001, class 7M3

CARESCAPE Temperature specifications

Length	With reusable sensor interface cable: 1.5 m (4.9 ft) With disposable sensor interface cable: 3.0 m or 1.5 m (9.8 ft or 4.9 ft)
Weight	less than 0.22 kg (0.49 lb)
Operating temperature range	0°C to 40°C (32°F to 104°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 95% RH (non-condensing)
Non-operating humidity range	5% to 95% RH (non-condensing)
Operating altitude range	-500 m to 4000 m (1075 hPa to 616 hPa)
Non-operating altitude range	-500 m to 5573 m (1075 hPa to 500 hPa)
Power consumption	325 mW maximum
Power requirement - input voltage	5 VDC ± 0.25 VDC
Power requirement - input current	65 mA maximum
Degree of enclosure protection against solid objects and water	IP47
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1
Shock	Withstands shock in accordance with IEC 60068-27:2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstands broad-band random vibration in accordance with IEC 60068-2-64:2008 using conditions set in IEC 60721-4-7:2001, class 7M3

CARESCAPE CO_2 specifications

Length	3.0 m (9.8 ft)
Weight	Less than 0.37 kg (0.81 lb)
Operating temperature range	0°C to 35°C (32°F to 95°F)
Non-operating temperature range	-30°C to 70°C (-22°F to 158°F)
Operating humidity range	5% to 90% RH (non-condensing)
Non-operating humidity range	5% to 90% RH (non-condensing)

Operating altitude range	-350 m to 4000 m (1056 hPa to 616 hPa)
Non-operating altitude range	-350 m to 5572 m (1056 hPa to 500 hPa)
Degree of enclosure protection against solid objects and water	IP47 (CARESCAPE CO_2 enclosure) IP24 (CARESCAPE CO_2 LoFlo Module Assembly enclosure)
Power consumption	3.75 W maximum
Power requirement - input voltage	5 VDC ± 0.25 VDC
Power requirement - input current	750 mA maximum
1 m drop	Drop from 1 m in multiple orientations onto a hard surface per the test in IEC 60601-1 clause 15.3.4.1
Shock	Withstand shock in accordance with IEC 60068-2-27: 2008 using conditions set in IEC 60721-4-7:2001 class 7M3
Broad-band random vibration	Withstand broad-band random vibration in accordance with IEC 60068-2-64: 2008 using conditions set in IEC 60721-4-7:2001, class 7M3

E

Alarm specifications

Alarm standards compliance

The system complies with IEC 60601-1-8:2012–11.

NOTE Legacy alarm tones do not meet the audio requirements defined in IEC 60601-1-8 Clause 6.3.3.1.

Auditory alarm volume, IEC tones

Tested in accordance with IEC 60601-1-8 subclause 6.3.3.2 with alarm volume control set to maximum.

CARESCAPE ONE

Alarm volume setting	Maximum sound pressure level
6 Level 6 corresponds to the factory default minimum allowed setting for volume level.	High priority alarm: 53 dBA Medium priority alarm: 50 dBA Low priority alarm: 49 dBA
10	High priority alarm: 76 dBA Medium priority alarm: 75 dBA Low priority alarm: 73 dBA

Auditory alarm volume, legacy tones

Tested in accordance with IEC 60601-1-8 subclause 6.3.3.2 with alarm volume control set to maximum.

CARESCAPE ONE

Alarm volume setting	Maximum sound pressure level
6 Level 6 corresponds to the factory default minimum allowed setting for volume level.	High priority alarm: 50 dBA Medium priority alarm: 44 dBA Low priority alarm: 41 dBA
10	High priority alarm: 71 dBA Medium priority alarm: 66 dBA Low priority alarm: 65 dBA

Audio alarm sound tolerances

Tolerances for sounds (total pulse duration with rise and fall times) are:

- Time < 1000 ms: ±5%
- Time ≥ 1000 ms: ±250 ms
- Frequencies: ±5 Hz

IEC alarm tone sound patterns

Priority	Corresponding sound pattern
High	• Beep “C” (523 Hz/100 ms) Silence (100 ms) • Beep “F” (698 Hz/100 ms) Silence (100 ms) • Beep “G” (784 Hz/100 ms) Silence (300 ms) • Beep “A” (880 Hz/100 ms) Silence (100 ms) • Beep “B” (988 Hz/100 ms) Silence (1 s) • Beep “C” (523 Hz/100 ms) Silence (100 ms) • Beep “F” (698 Hz/100 ms) Silence (100 ms) • Beep “G” (784 Hz/100 ms) Silence (300 ms) • Beep “A” (880 Hz/100 ms) Silence (100 ms) • Beep “B” (988 Hz/100 ms) Silence (5 s)
Medium	• Beep “C” (523 Hz/200 ms; Silence (200 ms) • Beep “G” (784 Hz/200 ms; Silence (200 ms) • Beep “B” (988 Hz/200 ms) Silence (19 s)
Low	Beep “C” (523 Hz/200 ms) Silence is 24.8 s if ***Low Priority Alarm Tone*** is set to ***Repeat***.

Legacy alarm tone sound patterns

Priority	Corresponding sound pattern
High	• Beep (500 & 510 Hz/100 ms) Silence (100 ms) • Beep (500 & 510 Hz /100 ms) Silence (100 ms) • Beep (500 & 510 Hz/100 ms) Silence (500 ms)
Medium	• Beep (397 & 441 Hz/100 ms) Silence (100 ms) • Beep (397 & 441 Hz/100 ms) Silence (2.4 s)
Low	Beep (397 Hz/500 ms) Silence is 5 s if ***Low Priority Alarm Tone*** is set to ***Repeat***.

Auditory information signal characteristics

Measurement and start-up related information signals		
Signal	**Frequency (Hz)**	**Duration (ms)**
Start-up sound	523	1000
QRS/Pulse beep	815	10 when ***Beat Tone Sound*** is set to ***Sharp***. 40 when ***Beat Tone Sound*** is set to ***Soft***.
SpO_2 oxygen saturation level indicator (pitch)	920 at 100% SpO_2 900 at 98% SpO_2 - - - 240 at 32% SpO_2 220 at 30% SpO_2	100
NIBP ready prompt	250	500
UI touch tone	660	100
Reminder tone	523	125

Visual information signals

For information regarding visual information signals, see the Alarms chapter.

Alarm delay specifications

The disclosed alarm system delays are measured by simulator or respective methods, which represent optimal signals. Possible interferences and poor quality signals in a clinical environment may extend the disclosed alarm system delays.

The alarm generation consists of two components: the algorithm delay of each parameter and the fixed delay of the monitor software. Both of these components are included in each alarm system delay.

The determination of an alarm condition has nominal factors: signal quality, movement artifact, heart rate for ECG related alarms, and respiration rate for impedance respiration and CO_2 related alarms.

The following disclosures list the alarm system delays as an average and include the delay of the first activated priority alarm.

Alarms with alarm delays of more than 10 s are specified with the average, minimum, and maximum values obtained from five trial measurements.

NOTE Any alarm delays that are less than 5 s are given as <5 s.

Time to alarm for tachycardia

When tested in accordance to IEC 60601-2-27 Clause 201.7.9.2.9.101 b) 6), according to Figure 201.101, the times to alarm for tachycardia are as follows:

CARESCAPE ONE
Ventricular tachycardia (206 bpm); halved amplitude: 6.3 s (average) (5.9 to 6.8 s range)
Ventricular tachycardia (206 bpm); normal amplitude: 8.6 s (average) (6.7 to 9.5 s range)
Ventricular tachycardia (206 bpm); doubled amplitude: 5.7 s (average) (4.5 to 6.4 s range)
Ventricular tachycardia (195 bpm); halved amplitude: 7.7 s (average) (7.1 to 8.0 s range)
Ventricular tachycardia (195 bpm); normal amplitude: 6.6 s (average) (5.9 to 7.5 s range)
Ventricular tachycardia (195 bpm); doubled amplitude: 5.3 s (average) (4.9 to 5.8 s range)

Physiological alarm delay specifications

Alarm delay specifications for ECG alarms

The following table lists the alarm delays for physiological alarms related to the ECG measurement. Any alarm delays that are less than 5 s are given as <5 s.

Alarm	Limit range	Limit increment	Alarm delay
A Fib			46 s (average) (29 to 87s range). ***A Fib*** detection delay is usually 30 - 60 seconds.
Accel. Ventric.			10 s
Asystole			7 s
Bigeminy			8 s
Brady	20 to 300 bpm The Brady limit matches the low heart rate limit. If the low heart rate limit is changed, the Brady limit changes.	1 bpm	8 s
Couplet			6 s
Frequent PVCs	1 to 100 per minute	1 per minute	8 PVCs: 49 s (average) (47 to 51 s range)
Frequent SVCs	1 to 100 per minute	1 per minute	6 SVCs: 21 s (average) (18 to 23 s range)
Irregular			12 s (average) (9 to 17 s range)

Alarm	Limit range	Limit increment	Alarm delay
Missing Beat			<5 s
Multifocal PVCs			8 s
Pause			6 s
R on T			5 s (average) (5 to 6 s range)
ST XXX high where XXX = ECG lead label	-12.0 to +12.0 mm	0.1 mm	86 s (average) (82 to 90 s range)
ST XXX low where XXX = ECG lead label	-12.0 to +12.0 mm	0.1 mm	86 s (average) (85 to 89 s range)
SV Tachy			5 s
Tachy	20 to 300 bpm The Tachy limit matches the high heart rate limit. If the high heart rate limit is changed, the Tachy limit changes.	1 bpm	9 s
Trigeminy			10 s
V Brady			11 s
V Fib / V Tach			9 s
V Tach			7 s
VT > 2			10 s

Alarm delay specifications for impedance respiration alarms

The following table lists the alarm delays for physiological alarms related to the impedance respiration measurement. Any alarm delays that are less than 5 s are given as <5 s.

Alarm	Limit range	Limit increment	Alarm delay
Apnea			3 to 30 s, configurable
Cardiac Artifact			30 breaths. The delay time is dependent on the respiration rate value, for example, with a respiration rate of 60 breaths per minute, the delay is 30 s.
RR (Imped.) high	4 to 120 breaths per minute	1 breath per minute	< 5 s
RR (Imped.) low	4 to 120 breaths per minute	1 breath per minute	< 5 s

Alarm delay specifications for SpO_2 alarms

The following table lists the alarm delays for physiological alarms related to the SpO_2 measurement. Any alarm delays that are less than 5 s are given as <5 s.

Alarm	Limit range	Limit increment	Alarm delay
PR(SpO2) high	30 to 240 bpm	1 bpm	• GE TruSignal: 14 s (average) (12 to 16 s range) • Masimo: 9 s • Nellcor: 9 s
PR(SpO2) low	30 to 240 bpm	1 bpm	• GE TruSignal: 17 s (average) (10 to 20 s range) • Masimo: 15 s (average) (14 to 17 s range) • Nellcor: 14 s (average) (9 to 17 s range)
SpO2 high	30 to 100%	1%	• GE TruSignal: 10 s • Masimo: 15 s (average) (9 to 17 s range) • Nellcor: 12 s (average) (11 to 13 s range)
SpO2 low	30 to 100%	1%	• GE TruSignal: 10 s • Masimo: 17 s (average) (9 to 20 s range) • Nellcor: 13 s (average) (12 to 15 s range)

Pulse oximetry saturation and pulse rate averaging time

GE TruSignal	The TruSignal algorithm provides averaging time options of 5 and 12 seconds. The overall alarm generation delay of SpO_2 is typically less than 28 seconds from the actual SpO_2 value in the patient. This delay is due to the SpO_2 averaging, signal processing, and data transmission delays. The delay consists of the alarm condition and alarm generation delay, being typically < 10 seconds and < 18 seconds respectively. For pulse rate the alamr generation delay is typically less than 11 seconds, in which the alarm signal delay is less than a second. The SpO_2 and pulse rate data is updated every second.
Masimo	The Masimo algorithm provides averaging time options of 2, 4, 8, 10, 12, 14, and 16 seconds. When using the default averaging time, the overall alarm generation delay of SpO_2 is typically less than 28 seconds from the actual SpO_2 value in the patient. This delay is due to the SpO_2 averaging, signal processing, and data transmission delays. The delay consists of the alarm condition and alarm generation delay, being typically < 10 seconds and < 18 seconds respectively. For pulse rate, the alarm generation delay is typically less than 11 seconds, in which the alarm signal delay is less than a second. The SpO_2 and pulse rate data is updated every second.
Nellcor	The Nellcor OxiMax algorithm automatically extends the amount of data required for measuring SpO_2 and pulse rate depending on the measurement conditions. There are various matrices within the saturation pulse rate detection algorithm. Some of these are used to assess the severity of conditions presented to the measuring of SpO_2 and pulse rate on a patient. These individual matrices or combinations of these matrices are used to determine the quality of the received SpO_2 signal. The advanced signal processing in the algorithms automatically extends the amount of data required for measuring SpO_2 and pulse rate depending on the measuring conditions. During normal measurement conditions, the averaging time is approximately 3 seconds. The overall alarm generation delay of SpO_2 is typically less than 28 seconds from the actual SpO_2 value in the patient. This delay is due to the SpO_2 averaging, signal processing, and data transmission delays. The delay consists of the alarm condition and alarm generation delay, being typically < 10 seconds and < 18 seconds respectively. For pulse rate, the alarm generation delay is typically less than 11 seconds, in which the alarm signal delay is less than a second. The SpO_2 and pulse rate data is updated every second.

Alarm delay specifications for NIBP alarms

The following table lists the alarm delays for physiological alarms related to the non-invasive blood pressure measurement. Any alarm delays that are less than 5 s are given as <5 s.

Alarm	Limit range	Limit increment	Alarm delay
• ***NIBP Sys high*** / ***NIBP Sys low*** • ***NIBP Mean high*** / ***NIBP Mean low*** • ***NIBP Dia high*** / ***NIBP Dia low***	• Adult: 25 to 260 mmHg • Child: 25 to 190 mmHg • Infant: 15 to 140 mmHg	Adult: 5 mmHg Child: 5 mmHg Infant: 1 mmHg	<5 s

Alarm delay specifications for invasive pressures alarms

The following table lists the alarm delays for physiological alarms related to the invasive pressures measurement. Any alarm delays that are less than 5 s are given as <5 s.

NOTE When an invasive pressure label is followed by an "X", the "X" represents invasive pressure channel numbers 1 and 2.

Alarm	Limit range	Limit increment	Alarm delay
• ***Art X sys high*** / ***Art X dia high*** / ***Art X mean high*** • ***CVP X mean high*** • ***Fem X sys high*** / ***Fem X dia high*** / ***Fem X mean high*** • ***FemV X mean high*** • ***ICP X mean high*** • ***LAP X mean high*** • ***P1 mean high*** to ***P2 mean high*** • ***RAP X mean high*** • ***RVP X mean high*** • ***UAC X sys high*** / ***UAC X dia high*** / ***UAC X mean high*** • ***UVC X mean high***	-25 to 320 mmHg (-3.3 to 42.7 kPa)	1 mmHg (0.1 kPa)	• Systolic: 13 s (average) (12 to 14 s range) • Diastolic: 13 s (average) (12 to 15 s range) • Mean: 14 s (average) (13 to 15 s range)
• ***Art X sys low*** / ***Art X dia low*** / ***Art X mean low*** • ***CVP X mean low*** • ***Fem X sys low*** / ***Fem X dia low*** / ***Fem X mean low***	-25 to 320 mmHg (-3.3 to 42.7 kPa)	1 mmHg (0.1 kPa)	• Systolic: 14 s (average) (14 to 16 s range) • Diastolic: 15 s (average) (14 to 15 s range) • Mean: 15 s (average) (14 to 15 s range)

Alarm	Limit range	Limit increment	Alarm delay
• *FemV* X *mean low* • *ICP* X *mean low* • *LAP* X *mean low* • *P1 mean low* to *P2 mean low* • *RAP* X *mean low* • *RVP* X *mean low* • *UAC* X *sys low* / *UAC* X *dia low* / *UAC* X *mean low* • *UVC* X *mean low*			
CPP X *high*	-25 to 320 mmHg (-3.3 to 42.7 kPa)	1 mmHg (0.1 kPa)	16 s (average) (14 to 17 s range)
CPP X *low*	-25 to 320 mmHg (-3.3 to 42.7 kPa)	1 mmHg (0.1 kPa)	18 s (average) (16 to 20 s range)
• *PR(Art)* X *high* • *PR(Fem)* X *high* • *PR(UAC)* X *high*	20 to 300 bpm	1 bpm	7 s
• *PR(Art)* X *low* • *PR(Fem)* X *low* • *PR(UAC)* X *low*	20 to 300 bpm	1 bpm	7 s

Alarm delay specifications for temperature alarms

The following table lists the alarm delays for physiological alarms related to the temperature measurement. Any alarm delays that are less than 5 s are given as <5 s.

Alarm	Limit range	Limit increment	Alarm delay
T1 high *T2 high* *T1 low* *T2 low*	10 to 45°C (50 to 113°F)	0.1°C (0.18°F)	61 s (average) (60 to 61 s range)

Alarm delay specifications for CO_2 alarms

The following table lists the alarm delays for physiological alarms related to the CO_2 measurement. Any alarm delays that are less than 5 s are given as <5 s.

Alarm	Limit range	Limit increment	Alarm delay
Apnea (CO2)			20 s (average) (20 s range)
EtCO2 high / *EtCO2 low*	0 to 13%	0.1%	21 s (average) (20 to 23 s range)
FiCO2 high / *FiCO2 low*	0.0% to 3%	0.1%	21 s (average) (20 to 23 s range)

Alarm	Limit range	Limit increment	Alarm delay
RR (CO2) high	4 to 60 breaths per minute NICU sw package: 4 to 100 breaths per minute	1 breath per minute	21 s (average) (20 to 22 s range)
RR (CO2) low	4 to 60 breaths per minute NICU sw package: 4 to 100 breaths per minute	1 breath per minute	21 s (average) (20 to 22 s range)

Technical alarm delay specifications

The following table lists the alarm delays for technical alarms. Any alarm delays that are less than 5 s are given as <5 s.

Alarm	Parameter	Alarm delay
Analog output malfunction		<5 s
Arrhythmia paused	ECG	21 s (average) (20 to 22 s range)
Art X disconnect ***Fem X disconnect*** ***UAC X disconnect*** ***Disconnected***	Invasive pressures	8 s
Artifact	ECG	<5 s
Calibration fail ***T1 Calibration fail*** ***T2 Calibration fail***	Temperature	<5 s
Call service	NIBP	22 s (average) (22 s range)
Check CO2 adapter	CO_2	42 s (average) (41 to 42 s range)
Check device ***CO2 device malfunction***	CO_2	<5 s
Check device ***ECG malfunction***	ECG	<5 s
Check device ***Imped. malfunction***	Impedance respiration	<5 s

Alarm	Parameter	Alarm delay
Check device ***Art X pressure malfunction*** ***CPP X pressure malfunction*** ***CVP X pressure malfunction*** ***Fem X pressure malfunction*** ***FemV X pressure malfunction*** ***ICP X pressure malfunction*** ***LAP X pressure malfunction*** ***PAX pressure malfunction*** ***RAP X pressure malfunction*** ***RVP X pressure malfunction*** ***UAC X pressure malfunction*** ***UVC X pressure malfunction*** where X = channel number (1 or 2)	Invasive pressures	<5 s
Check device ***SpO2 malfunction***	SpO_2	<5 s
Check device ***Temperature malfunction***	Temperature	8 s
Check NIBP	NIBP	<5 s
Check sample line	CO_2	40 s (average) (39 to 40 s range)
Check sensor ***Service CO2 sensor***	CO_2	<5 s
Check SpO2 probe ***Check probe***	SpO_2	<5 s
CO2 device failure: Call service	CO_2	7 s
CO2 device overheated Shutting down	CO_2	10 s
CO2 sensor removed ***Sensor removed***	CO_2	<5 s
CO2 zero required ***Zero required***	CO_2	42 s (average) (41 to 42 s range)
Device overheating ***Move CO2 device to a cooler location***	CO_2	6 s
Device overheating ***Move ECG device to a cooler location***	ECG	6 s
Device overheating ***Move pressure device to a cooler location***	Invasive pressures	7 s

Alarm	Parameter	Alarm delay
Device overheating ***Move Temp device to a cooler location***	Temperature	7 s
ECG device failure: Call service	ECG	7 s
ECG device overheated. Shutting down	ECG	10 s
ECG measurements removed	ECG	<5 s
Identical ECG device	ECG	<5 s
Identical pressure devices	Invasive pressures	<5 s
Identical SpO2 device	SpO_2	<5 s
Identical Temp device	Temperature	<5 s
Incompatible probe ***Incompatible SpO2 probe*** ***Incompatible adhesive SpO2 probe***	SpO_2	7 s
Incompatible SpO2 device	SpO_2	8 s
[Invasive pressure channel label] X ***sensor disconnected***, where [Invasive pressure channel label] = ***Art***, ***CPP***, ***CVP***, ***Fem***, ***FemV***, ***ICP***, ***LAP***, ***P***, ***PA***, ***RAP***, ***RVP***, ***UAC***, or ***UVC***, and X = invasive pressure channel number 1 to 2. ***Sensor***	Invasive pressures	6 s
[Invasive pressure channel label] X ***sensor failed***, where [Invasive pressure channel label] = ***Art***, ***CPP***, ***CVP***, ***Fem***, ***FemV***, ***ICP***, ***LAP***, ***P***, ***PA***, ***RAP***, ***RVP***, ***UAC***, or ***UVC***, and X = invasive pressure channel number 1 to 2. ***Sensor***	Invasive pressures	8 s
IP's not zeroed	Invasive pressures	301 s (average) (300 to 301 s range)
LA/L lead off ***LL/F lead off*** ***RA/R lead off*** ***RL/N lead off***	ECG	***LA/L lead off***, ***LL/F lead off***: 10 s ***RA/R lead off***: 11 s (average) (10 to 11 s range) ***RL/N lead off***: 16 s (average) (15 to 17 s range)
Leads off	ECG	7 s
• ***Move CO2 sensor to a cooler location*** • ***Sensor overheating***	CO_2	<5 s

Alarm	Parameter	Alarm delay
Move SpO2 device to a cooler location	SpO_2	6 s
NIBP cuff loose	NIBP	22 s (average) (22 s range)
NIBP cuff occlusion *Cuff occlusion*	NIBP	<5 s
NIBP auto stopped *NIBP STAT stopped*	NIBP	<5 s
NIBP over range *NIBP under range*	NIBP	<5 s
Noise *Noisy ECG*	ECG	27 s (average) (25 to 27 s range)
Pressure device failure: Call service	Invasive pressures	7 s
Pressure device initializing	Invasive pressures	6 s
Pressure device overheated. Shutting it down	Invasive pressures	10 s
Pressure measurement removed	Invasive pressures	<5 s
Resp (Imped.) measurement paused *Measurement paused*	Impedance respiration	50 s (average) (49 to 51 s range) for all software packages except NICU. NICU software package: 18 s (average) (17 to 20 s range)
Sample line disconnected *Line disconnected*	CO_2	42 s (average) (41 to 42 s range)
SpO2 device failure: Call service	SpO_2	6 s
SpO2 device overheated Shutting down	SpO_2	11 s (average) (9 to 12 s range)
SpO2 faulty probe *Faulty adhesive SpO2 probe*	SpO_2	7 s
SpO2 measurement removed	SpO_2	<5 s
Temp device failure: Call service	Temperature	8 s
Temp device overheated. Shutting down	Temperature	8 s
Temp measurement removed	Temperature	<5 s

Alarm priorities and escalation times

Alarm priorities and escalation times for ECG

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
A Fib		alarm, wavef.		0s, according to priority setting: high, medium, low, off, info		
Accel. Ventric.		alarm, wavef.		0s, according to priority setting: high, medium, low, off, info		
Arrh off		param.	0 s			
• ***Arrhythmia paused***		• alarm	0 s if no patient case/no admitted patient	0 s, according to priority setting: high, medium, low		
• ***Arrh paused***		• wavef.	0 s			
• ***Arrhythmia paused*** • ***Arrh paused***	Alarm priority = ***Escalating***	• alarm • wavef.	0 s if no vital signs		0 s	40 s
Artifact		wavef.	0 s			
Asystole		alarm, param., wavef.				0 s
Bigeminy		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			
Brady	Unit setting ***HR Alarms*** = ***Single***; Primary HR source AUTO, IntelliRate, or ECG.	alarm		0 s, according to priority setting: high, medium, low		
Brady	Unit setting ***HR Alarms*** = ***Single***; Alarm priority = ***Escalating***; Primary HR source AUTO, IntelliRate, or ECG.	alarm			0 s	69 s

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Brady	Unit setting ***HR Alarms*** = ***Single***; Alarm priority = ***Escalating***; HR <0.75 x low limit; Primary HR source AUTO, IntelliRate, or ECG.	alarm				0 s
Brady	Unit setting ***HR Alarms*** = ***Single***; non-ECG source and Primary HR source AUTO, IntelliRate.	alarm		High, medium, or low according to the priority setting. The alarm delay is equivalent to the set PR alarm delay, which is configurable from 0 to 20 s in increments of 5 s.		
Brady	Unit setting ***HR Alarms*** = ***Single***; Alarm priority = ***Escalating***; non-ECG source and Primary HR source AUTO, IntelliRate.	alarm			According to the set PR alarm delay, which is configurable from 0 to 20 s in increments of 5 s.	Alarm delay + 64 s
Brady	Unit setting ***HR Alarms*** = ***Single***; Alarm priority = ***Escalating***; HR <0.75 x low limit; non-ECG source and Primary HR source AUTO, IntelliRate.	alarm				According to the set PR alarm delay, which is configurable from 0 to 20 s in increments of 5 s.
Check device		wavef.	0 s			
Couplet		alarm, wavef.	0 s , according to priority setting: high, medium, low, off, info			
Device overheating		wavef.	0 s			
ECG device failure: Call service		alarm			0 s	
ECG device overheated. Shutting down		alarm			0 s	
ECG malfunction		alarm			0 s	

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
ECG measurements removed		alarm	0 s if no patient case/no admitted patient		0 s if active patient case/ admitted patient	
Frequent PVCs	Alarm priority = ***Escalating***	alarm		0 s	13 s	
Frequent PVCs		alarm	0 s, according to priority setting: high, medium, low, info			
Frequent SVCs	Alarm priority = ***Escalating***	alarm, wavef.	0 s	0 s	13 s	
Frequent SVCs		alarm, wavef.	0 s, according to priority setting: high, medium, low, info			
HR(ECG) high	Unit setting ***HR Alarms*** = ***Multiple***	alarm		0 s, according to priority setting: high, medium, low		
HR(ECG) high	Unit setting ***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***	alarm			0 s	69 s
HR(ECG) high	Unit setting ***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***; HR >1.25 x high limit	alarm				0 s
HR(ECG) low	Unit setting ***HR Alarms*** = ***Multiple***	alarm		0 s, according to priority setting: high, medium, low		
HR(ECG) low	Unit setting ***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***	alarm			0 s	69 s
HR(ECG) low	Unit setting***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***; HR < 0.75 x low limit	alarm				0 s
Identical ECG device		alarm			0 s	
Irregular	NICU software package only.	alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
• ***LA/L lead off*** • ***LL/F lead off*** • ***RA/R lead off*** • ***RL/N lead off*** • ***V/C lead off*** • ***Va/Ca lead off*** • ***Vb/Cb lead off*** • ***V2/C2 lead off*** • ***V3/C3 lead off*** • ***V4/C4 lead off*** • ***V5/C5 lead off*** • ***V6/C6 lead off***		wavef.	0 s	0 s		
Lead changed		wavef.				
Lead off		alarm	7 s	7 s		
Leads off	Alarm priority = ***Escalating***	alarm, wavef.		3 s	12 s (30 s in OR software package)	60 s
Leads off		alarm, wavef.		0s, according to priority setting: high, medium, low		
Learning		wavef.	0 s			
Missing Beat		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			
Move ECG device to a cooler location		alarm		0 s		
Multifocal PVCs		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			
• ***Noisy ECG*** • ***Noise***		• alarm • wavef.		0 s, according to priority setting: high, medium, low		
• ***Noisy ECG*** • ***Noise***	Alarm priority = ***Escalating***	• alarm • wavef.		5 s	12 s	
Pause		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			
R on T		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			
ST XXX high / ST XXX low where XXX = ECG lead label		alarm	60s, according to priority setting: high, medium, low, info			

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
SV Tachy		alarm, wavef.	0 s, according to priority setting: high, medium, low, info			
Tachy	Unit setting ***HR Alarms*** = ***Single***. Primary HR source AUTO, IntelliRate or ECG).	alarm		0 s, according to priority setting: high, medium, low		
Tachy	Unit setting ***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***; Primary HR source AUTO, IntelliRate or ECG.	alarm			0 s	69 s
Tachy	Unit setting ***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***; Primary HR source AUTO, IntelliRate or ECG. HR>1.25 x high limit	alarm				0 s
Tachy	Unit setting ***HR Alarms*** = ***Single***; non-ECG source and Primary HR source AUTO, IntelliRate.	alarm		High, medium, or low according to the priority setting. The alarm delay is equivalent to the set PR alarm delay, which is configurable from 0 to 20 s in increments of 5 s.		
Tachy	Unit setting ***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***; non-ECG source and Primary HR source not AUTO, IntelliRate.	alarm			According to the set PR alarm delay, which is configurable from 0 to 20 s in increments of 5 s.	Alarm delay + 64 s
Tachy	Unit setting ***HR Alarms*** = ***Multiple***; Alarm priority = ***Escalating***; HR >1.25 x high limit; non-ECG source and Primary HR source AUTO, IntelliRate.	alarm				According to the set PR alarm delay, which is configurable from 0 to 20 s in increments of 5 s.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Trigeminy		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			
V Brady		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			
V Fib/V Tach		alarm, param., wavef.				0 s
V Tach		alarm, param., wavef.	0s, according to priority setting: high, medium, low, info The alarm priority is always high if the duration is over 30 s, the set HR high limit is exceeded, and the HR is over 180 in NICU sw package or over 150 in all other sw packages.			
VT>2		alarm, wavef.	0s, according to priority setting: high, medium, low, off, info			

Alarm priorities and escalation times for impedance respiration

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Apnea (Imped.)	OR sw package, adjustable limit seconds	alarm, wavef.		X seconds (X = adjustable limit)	X + 40 s	X +102 s
Apnea (Imped.)	PACU, ED, ICU, NICU sw packages, adjustable limit seconds	alarm, wavef.		X seconds (X = adjustable limit)	X + 20 s	X + 40 s
Apnea (Imped.)	Alarm priority set to info, low, medium or high	alarm	X s, according to priority setting: high, medium, low, info (X = adjustable limit)			
Apnea deactivated		param.	0 s			
Artifact		param., wavef.	0 s			
Cardiac artifact		alarm		0 s		

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
• *Lead I failed* • *Lead II failed* • *Lead RL-LL failed*		param., wavef.	0 s			
Measurement off *OFF*		• param. • wavef.	0 s			
Measurement paused *Resp (Imped.) measurement paused*		• wavef. • alarm		X seconds (X = adjustable limit)	X + 20 s	X + 40 s
Relearning		param., wavef.	0 s			
RR (Imped.) high / RR (Imped.) low	Alarm priority set to ***Escalating***	alarm		X seconds (X = adjustable limit)	X + 20 s	X + 40 s
RR (Imped.) high / RR (Imped.) low	Alarm priority set to info, low, medium or high	alarm	High, medium, low, or info according to priority setting. The alarm delay is equivalent to the set respiration rate alarm delay, which is configurable from 0 to 20 s in increments of 5 s.			

Alarm priorities and escalation times for SpO_2

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Artifact	GE TruSignal, Masimo	param.	0 s			
Check device		param.	0 s			
Check probe		param.	0 s			
Check SpO2 probe		alarm		5 s	30 s	
Expiring cable	Masimo	param.	0 s			
Expiring probe	Masimo	param.	0 s			
Faulty probe		param.	0 s			
Identical SpO2 device		alarm			0 s	

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Incompatible cable ***Incompatible SpO2 cable***	Masimo	param., alarm	0 s			
Incompatible probe ***Incompatible adhesive SpO2 probe***	Masimo	param., alarm	0 s	5 s	30 s	
Incompatible probe ***Incompatible SpO2 probe***		param., alarm	0 s	5 s	30 s	
Incompatible SpO2 device		alarm			0 s	
Low perfusion	GE TruSignal, Masimo	param.	0 s			
Low signal	Masimo	param.	0 s			
Low signal quality	Nellcor, Masimo	param.	0 s			
Motion detected	Nellcor	param.	0 s			
Move SpO2 device to a cooler location		alarm		0 s		
No probe		param.	0 s			
No SpO2 probe	All profiles except ***Perfusion***	alarm		5 s	30 s	
PR(SpO2) high	Unit setting ***HR Alarms*** = ***Multiple***	alarm		PR alarm delay setting, according to priority setting: high, medium, low		
PR(SpO2) high	Unit setting ***HR Alarms*** = ***Multiple***; ***Alarm Priority*** = ***Escalating***	alarm			PR alarm delay setting	PR alarm delay setting + 64 s
PR(SpO2) high	Unit setting ***HR Alarms*** = ***Multiple***; ***Alarm Priority*** = ***Escalating***; HR > 1.25 x high limit	alarm				PR alarm delay setting
PR(SpO2) low	Unit setting ***HR Alarms*** = ***Multiple***	alarm		PR alarm delay setting, according to priority setting: high, medium, low		

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
PR(SpO2) low	Unit setting ***HR Alarms*** = ***Multiple***; ***Alarm Priority*** = ***Escalating***	alarm			PR alarm delay setting	PR alarm delay setting + 64 s
PR(SpO2) low	Unit setting ***HR Alarms*** = ***Multiple***; ***Alarm Priority*** = ***Escalating***; HR < 0.75 x low limit	alarm				PR alarm delay setting
Probe initializing	Masimo	param.	0 s			
Probe off		param.	0 s			
Pulse search		param.	0 s			
Replace cable ***Replace SpO2 cable***	Masimo	param., alarm	0 s	0 s		
Replace probe ***Replace SpO2 probe***	Masimo	param., alarm	0 s	0 s		
SpO2 device failure: Call service		alarm			0 s	
SpO2 device overheated Shutting down		alarm			0 s	
SpO2 faulty probe		alarm		5 s	30 s	
SpO2 high / ***SpO2 low***	OR software package, escalating alarm priority	alarm			SpO_2 high or low alarm delay setting	SpO_2 high or low alarm delay setting + 60 s
SpO2 high / ***SpO2 low***	ICU, NICU, PACU, ED software package, escalating alarm priority	alarm			SpO_2 high or low alarm delay setting	SpO_2 high or low alarm delay setting + 30 s
SpO2 high / ***SpO2 low***	OR software package and saturation seconds on, escalating alarm priority	alarm			0 s	60 s

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
SpO2 high / SpO2 low	ICU, NICU, PACU, ED software package and saturation seconds on, escalating alarm priority	alarm			0 s	30 s
SpO2 high / SpO2 low	Alarm priority set to low	alarm		SpO_2 high or low alarm delay setting		
SpO2 high / SpO2 low	Alarm priority set to medium	alarm			SpO_2 high or low alarm delay setting	
SpO2 high / SpO2 low	Alarm priority set to high	alarm				SpO_2 high or low alarm delay setting
SpO2 high / SpO2 low	Alarm priority set to low and saturation seconds on	alarm		0 s		
SpO2 high / SpO2 low	Alarm priority set to medium and saturation seconds on	alarm			0 s	
SpO2 high / SpO2 low	Alarm priority set to high and saturation seconds on	alarm				0 s
SpO2 malfunction		alarm			0 s	
SpO2 measurement removed		alarm	0 s if no patient case/no admitted patient		0 s if active patient case/ admitted patient	
SpO2 probe off	Escalating alarm priority, all profiles except ***Perfusion***	alarm		5 s	30 s	
SpO2 probe off	Alarm priority set to high, medium, or low; all profiles except ***Perfusion***	alarm		5 s, according to priority setting: high, medium, low		

Alarm priorities and escalation times for NIBP

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Calibrated	Displays for 10 s	param.	0 s			
Calibrating		param.	0 s			
Call service		param.	0 s			
Check NIBP		alarm			0 s	
Control measurement	Displays for 10 s	param.	0 s			
Cuff loose		param.			0 s	
Cuff occlusion		param.	0 s			
Cuff overpressure	Displays for 10 s	param.	0 s			
Long meas. time	Displays for 10 s	param.	0 s			
NIBP alarm limits changed		alarm	0 s			
NIBP cuff loose		alarm			0 s	
NIBP cuff occlusion		alarm		0 s	40 s	
NIBP auto stopped *NIBP STAT stopped*		alarm			0 s	
NIBP malfunction		alarm			0 s	
NIBP over range		alarm			0 s	
NIBP under range		alarm			0 s	
• *NIBP Sys high* / *NIBP Sys low* • *NIBP Mean high* / *NIBP Mean low* • *NIBP Dia high* / *NIBP Dia low*		alarm		0 s	0 s, after control measurement	0 s if Primary HR high/ low alarm also active

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
• *NIBP Sys high* / *NIBP Sys low* • *NIBP Mean high* / *NIBP Mean low* • *NIBP Dia high* / *NIBP Dia low*	Alarm priority set to low, medium or high	alarm		0 s, according to priority setting: high, medium, low		
Select cuff size		param.	0 s			
Zero OK	Displays for 10 s	param.	0 s			
Zeroing		param.	0 s			

Alarm priorities and escalation times for invasive pressures

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

NOTE When an invasive pressure label is followed by an "X", the "X" represents invasive pressure channel numbers 1 and 2.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
• *Art X disconnect* • *Fem X disconnect* • *UAC X disconnect*		alarm				5 s
• *Art X sensor disconnected* • *CVP X sensor disconnected* • *Fem X sensor disconnected* • *FemV X sensor disconnected* • *ICP X sensor disconnected* • *LAP X sensor disconnected* • *PX sensor disconnected*		alarm			0 s	

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
• *PA X sensor disconnected* • *RAP X sensor disconnected* • *RVP X sensor disconnected* • *UAC X sensor disconnected* • *UVC X sensor disconnected*						
• *Art X sensor failed* • *CVP X sensor failed* • *Fem X sensor failed* • *FemV X sensor failed* • *ICP X sensor failed* • *LAP X sensor failed* • *PX sensor failed* • *PA X sensor failed* • *RAP X sensor failed* • *RVP X sensor failed* • *UAC X sensor failed* • *UVC X sensor failed*		alarm			0 s	
• *Art X sys high* / *Art X sys low* • *Art X mean high* / *Art X mean low* • *Art X dia high* / *Art X dia low*	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/low alarm also present

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
• ***Art X sys high / Art X sys low*** • ***Art X mean high / Art X mean low*** • ***Art X dia high / Art X dia low***	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
Artifact		param.	0 s			
Check device		param.	0 s			
CPP X high / CPP X low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/low alarm also present
CPP X high / CPP X low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
CVP X mean high / CVP X mean low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/low alarm also present
CVP X mean high / CVP X mean low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
Disconnected		param.				5 s
Device overheating		param.	0 s			
• ***Fem X sys high / Fem X sys low*** • ***Fem X mean high / Fem X mean low*** • ***Fem X dia high / Fem X dia low***	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
• ***Fem X sys high / Fem X sys low*** • ***Fem X mean high / Fem X mean low*** • ***Fem X dia high / Fem X dia low***	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
FemV X mean high / FemV X mean low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
FemV X mean high / FemV X mean low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
ICP X mean high / ICP X mean low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
ICP X mean high / ICP X mean low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
Identical pressure devices		alarm			0 s	
IP's not zeroed		alarm	0 s	300 s		
LAP X mean high / LAP X mean low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
LAP X mean high / LAP X mean low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
Move pressure device to a cooler location		alarm		0 s		
P1 not zeroed to ***P2 not zeroed***		param.	0 s			

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
P1 mean high / ***P1 mean low*** to ***P2 mean high*** / ***P2 mean low***	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
P1 mean high / ***P1 mean low*** to ***P2 mean high*** / ***P2 mean low***	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
• ***P1 pressure malfunction*** • ***P2 pressure malfunction***		alarm			0 s	
P1 standby to ***P2 standby***		param.	0 s			
P1 zeroing failed to ***P2 zeroing failed***		param.	0 s			
• ***PA X sys high*** / ***PA X sys low*** • ***PA X mean high*** / ***PA X mean low*** • ***PA X dia high*** / ***PA X dia low***	Alarm priority set to ***Escalating***	alarm		0 s	15 s	0 s if Brady/ Tachy or HR high/ low alarm also present
• ***PA X sys high*** / ***PA X sys low*** • ***PA X mean high*** / ***PA X mean low*** • ***PA X dia high*** / ***PA X dia low***	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
• ***PR(Art 1) high*** / ***PR(Art 1) low*** to ***PR(Art 2) high*** / ***PR(Art 2) low*** • ***PR(Fem 1) high*** / ***PR(Fem 1) low*** to ***PR(Fem 2) high*** / ***PR(Fem 2) low*** • ***PR(UAC 1) high*** / ***PR(UAC 1) low*** to ***PR(UAC 2)***	Unit setting ***HR Alarms*** = ***Multiple***	alarm		High, medium or low according to priority setting. The alarm delay is equivalent to the set PR alarm delay, which is configurable from 0 to 20 s in increments of 5 s.		

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
high / PR(UAC 2) low						
• ***PR(Art 1) high / PR(Art 1) low*** to ***PR(Art 2) high / PR(Art 2) low*** • ***PR(Fem 1) high / PR(Fem 1) low*** to ***PR(Fem 2) high / PR(Fem 2) low*** • ***PR(UAC 1) high / PR(UAC 1) low*** to ***PR(UAC 2) high / PR(UAC 2) low***	Unit setting ***HR Alarms*** = ***Multiple***; ***Alarm Priority*** = ***Escalating***	alarm			According to the set alarm delay, which is configurable from 0 to 20 s in increments of 5 s.	Alarm delay + 64 s
• ***PR(Art 1) high / PR(Art 1) low*** to ***PR(Art 2) high / PR(Art 2) low*** • ***PR(Fem 1) high / PR(Fem 1) low*** to ***PR(Fem 2) high / PR(Fem 2) low*** • ***PR(UAC 1) high / PR(UAC 1) low*** to ***PR(UAC 2) high / PR(UAC 2) low***	Unit setting ***HR Alarms*** = ***Multiple***; ***Alarm Priority*** = ***Escalating***; HR > 1.25 x high limit or < 0.75 x low limit	alarm				According to the set alarm delay, which is configurable from 0 to 20 s in increments of 5 s.
Pressure device failure: Call service		alarm			0 s	
Pressure device initializing		alarm			0 s	
Pressure device overheated. Shutting it down		alarm			0 s	
Pressure measurement removed		alarm	0 s if no patient case/ no admitted patient		0 s if active patient case/ admitted patient	
Pressure Sensed		param.	0 s			

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
RAP X mean high / RAP X mean low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
RAP X mean high / RAP X mean low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
RVP X mean high / RVP X mean low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
RVP X mean high / RVP X mean low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
Sensor		param.	0 s		0 s	
• ***UAC X sys high / UAC X sys low*** • ***UAC X mean high / UAC X mean low*** • ***UAC X dia high / UAC X dia low***	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
• ***UAC X sys high / UAC X sys low*** • ***UAC X mean high / UAC X mean low*** • ***UAC X dia high / UAC X dia low***	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
UVC X mean high / UVC X mean low	Alarm priority set to ***Escalating***	alarm		10 s	30 s	10 s if Brady/ Tachy or HR high/ low alarm also present
UVC X mean high / UVC X mean low	Alarm priority set to low, medium, or high	alarm		10 s, according to priority setting: high, medium, low		
Zero ICP separately		alarm	0 s			

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Zeroed		param.	0 s			
Zeroing		param.	0 s			

Alarm priorities and escalation times for temperature

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Calibration fail		param.	0 s			
Check device		param.	0 s			
Device overheating		param.	0 s			
Identical Temp device		alarm			0 s	
Move Temp device to a cooler location		alarm		0 s		
No sensor detected		param.	0 s			
T1 calibration fail / T2 calibration fail		alarm			0 s	
T1 high / T1 low *T2 high / T2 low*		alarm	60 s	60 s	60 s	
T1 high / T1 low *T2 high / T2 low*	Alarm priority set to ***Escalating***.	alarm		60 s	120 s	
T2-T1 high		alarm	60 s	60 s	60 s	
T2-T1 high	Alarm priority set to ***Escalating***.	alarm		60 s	120 s	
Temp device failure: Call service		alarm			0 s	
Temp measurement removed		alarm	0 s if no patient case/ no admitted patient		0 s if active patient case/ admitted patient	

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Temperature malfunction		alarm			0 s	
Temp device overheated. Shutting down		alarm			0 s	

Alarm priorities and escalation times for CO_2

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Apnea (CO2)	OR sw package, adjustable limit seconds	alarm, wavef., param.	0 s	X seconds (X = adjustable limit)	X + 40 s	X +102 s
Apnea (CO2)	PACU, ED, ICU, NICU sw packages, adjustable limit seconds	alarm, wavef., param.	0 s	X seconds (X = adjustable limit)	X + 20 s	X + 40 s
Apnea (CO2)	With alarm priority set to medium or high	alarm			X seconds (X = adjustable limit), according to priority setting: high, medium	
Apnea deactivated		param.	0 s			
Check Adapter		param.	0 s			
Check CO2 adapter		alarm		40 s	60 s	
Check device		param.	0 s			
Check sample line		alarm, param.	0 s	40 s	60 s	
Check sensor		param.	0 s			
CO2 device failure: Call service		alarm			0 s	
CO2 device initializing		alarm			0 s	
CO2 device malfunction		alarm			0 s	
CO2 device overheated Shutting down		alarm			0 s	

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
CO2 measurement removed		alarm	0 s if no patient case/ no admitted patient		0 s if active patient case/ admitted patient	
CO2 sensor removed		alarm	0 s if no patient case/ no admitted patient		0 s if active patient case/ admitted patient	
CO2 zero required		alarm			40 s	
Device overheating		param.	0 s			
EtCO2 high / *EtCO2 low*	Alarm priority set to ***Escalating***	alarm		20 s	60 s	
EtCO2 high / *EtCO2 low*	Alarm priority set to medium or high	alarm			20 s, according to priority setting: high, medium	
FiCO2 high / *FiCO2 low*	Alarm priority set to ***Escalating***	alarm		20 s	60 s	
FiCO2 high / *FiCO2 low*	Alarm priority set to medium or high	alarm			20 s, according to priority setting: high, medium	
Identical CO2 device		alarm			0 s	
Line disconnected		param.	0 s			
Move CO2 device to a cooler location		alarm		0 s		
Move CO2 sensor to a cooler location		alarm		0 s	120 s	
Over range		param.	0 s			
Over scale		wavef.	0 s			
RR (CO2) high / *RR (CO2) low*	Alarm priority set to ***Escalating***	alarm		20 s	60 s	
RR (CO2) high / *RR (CO2) low*	Alarm priority set to medium or high	alarm			20 s, according to priority setting: high, medium	
Sample line disconnected		alarm			40 s	
Sensor overheating		param.	0 s			

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Sensor removed		param.	0 s			
Service CO2 sensor		alarm			0 s	
Warming up		param.	0 s			
Zero required		param.	0 s			
Zeroing		param., wavef.	0 s			

Alarm priorities and escalation times for various situations

The following table shows the messages with their priorities and escalation times. In the table, the message location is indicated by the following: alarm = alarm area; param. = parameter window; and wavef. = waveform area. In the following table, 0 s = no intended delay. For more information on alarm messages, refer to the user information provided.

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Analog output malfunction		alarm			0 s	
Battery empty!		alarm			0 s	
Battery failure		alarm		0 s		
Battery low		alarm		0 s		
Battery temp high		alarm		0 s		
Call Service: Text(s) missing		alarm	0 s			
Case ended		alarm	0 s			
Case started		alarm	0 s			
Condition battery		alarm		0 s		
Configuration changes. Restart required.		alarm	0 s			
Configuration error(s)		alarm	0 s			
DEMO MODE Not for clinical use!	Not for patient monitoring use!	alarm		0 s		
Entering standby		alarm	0 s			
Measurement error		alarm	0 s			
Monitor warm start		alarm	0 s			

MESSAGE	NOTES	LOCATION	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
No battery backup		alarm		0 s		
Patient admitted		alarm	0 s			
Patient discharged		alarm	0 s			
Powering down!		alarm			0 s	
Replace battery		alarm		0 s		
Service CS ONE and specific error code		alarm			0 s	

F

Parameter specifications

Parameter specifications

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.

ECG standards compliance

The system with CARESCAPE ECG complies with IEC 60601-2-27:2011-03.

NOTE Moderate and maximum reduced bandwidths do not comply with all requirements of the IEC 60601-2-27 standard.

The CARESCAPE ECG enclosure and interface cable are treated as TYPE CF DEFIBRILLATION-PROOF APPLIED PARTs per IEC 60601-2-27 Clause 201.6.2. Compatible leadwires are TYPE CF DEFIBRILLATION-PROOF APPLIED PARTs.

ECG performance specifications

ECG heart rate range	20 to 300 bpm **NOTE** Values in the range of 301 to 360 bpm are displayed as 300 bpm.
ECG heart rate accuracy	±1% or ±1 bpm, whichever is greater
ECG heart rate resolution	1 bpm
ECG heart rate sensitivity	≥ 0.5 mV peak
ECG heart rate response time	Indicates a new heart rate for a step increase of 80 to 120 bpm and a step decrease of 80 to 40 bpm in < 10 s
Heart rate accuracy and response to irregular rhythm	Heart rate calculation operates with irregular rhythms of IEC 60601-2-27 Clause 201.7.9.2.9.101 b) 4), according to Figure 201.101, as follows: Ventricular bigeminy: 80 bpm Slow alternating ventricular bigeminy: 59 bpm Rapid alternating ventricular bigeminy: 126 bpm Bidirectional systoles: 110 bpm

ECG heart rate averaging	• 12-second median HR values • 12-second HR median calculation extended to a maximum of 32 seconds based on signal noise when software package is ICU, ED, OR, or PACU
ECG heart rate display update interval	< 2 seconds
ECG QRS detection range	±0.5 to ±5 mV
ECG QRS detection width	40 to 120 ms (Q to S)
PVC rate range	0 to 300 PVCs per minute
PVC rate resolution	1 PVC per minute
ST numeric range	-20.0 to 20.0 mm
ST numeric resolution	0.1 mm
ST numeric accuracy	Per EC57 (ESC database): • ST Mean Absolute Difference < 100 µV • ST Mean Difference (Mean error) < 50 µV • Correlation coefficient > 0.90 • ST tolerance ± 0.4 mm or 20%, whichever is greater
QRS numeric accuracy	Per EC57 (AHA and MIT-BIH databases): • QRS sensitivity >97.5% • QRS positive predictivity: >97.5%
VEB numeric accuracy	Per EC57 (AHA and MIT-BIH databases): • VEB sensitivity >90% • VEB positive predictivity: >90%
VF numeric accuracy	Per EC57 (AHA and MIT-BIH databases): • VF episode sensitivity >95% • VF episode positive predictivity: >95%
ECG gain selections	0.5x = 5 mm/mV 1x = 10 mm/mV 2x = 20 mm/mV 4x = 40 mm/mV
ECG signal gain accuracy	±5%
Sampling rate	500 samples/second

ECG display bandwidth (based on ECG waveform filter setting)
Diagnostic and Monitoring (at 60 Hz powerline frequency) bandwidths tested from 0.67 to 40 Hz as per IEC 60601-2-27 Clause 201.12.1.101.8
Moderate and maximum bandwidths not tested from 0.67 to 40 Hz as per IEC 60601-2-27 Clause 201.12.1.101.8
	• Diagnostic: 0.05 to 150 Hz
	• Monitoring:
	  ▪ 50 Hz powerline frequency: 0.05 to 32 Hz
	  ▪ 60 Hz powerline frequency: 0.05 to 40 Hz
	• Moderate: 0.05 to 23 Hz
	• Maximum: 4.5 to 27 Hz

ECG differential offset voltage (allowable offset)	±0.4V
ECG input impedance	Differential: > 2.5 MΩ from 0.67 Hz to 40 Hz
ECG system noise	< 30 µV (referred to input)
Common mode rejection	90 dB minimum at 50/60 Hz
Maximum tall T-wave rejection capability (with a 1 mV QRS test signal)	< 4.5 mV
ECG sweep speed options	6.25, 12.5, 25, and 50 mm/s
ECG leads available	I, II, III, V1 to V6, aVR, aVL, aVF
ECG lead sets supported	3-, 5-, 6-, and 10-leadwire
Pacemaker pulse display capability	• Sensitive pacemaker detection: voltage range of ±1.2 mV to ±700 mV with pulse widths of 0.1 ms to 2 ms • Normal pacemaker detection: voltage range of ±2.4 mV to ±700 mV with pulse widths of 0.1 ms to 2 ms Pacemaker pulse indication visible on the display with an amplitude no less than 0.2 mV referred to the input Normal not tested to down to ±2 mV per IEC 60601-2-27 clause 201.12.1.101.12
Pacemaker pulse rejection capability	Voltage range: ±2 to ±700 mV Pulse width: 0.1 to 2 ms Overshoot measured using Method A IEC 60601-2-27 Clause 201.12.1.101.13 with amplitude maximum 2 mV Time constant: 4 ms to 8 ms **NOTE** According to IEC 60601-2-27 Clause 201.12.1.101.13 an atrial pace pulse with identical amplitude and duration precedes ventricular pace pulse by 150 ms to 250 ms.
ECG lead fail sensing direct current for leads-off detection	• Active patient electrode: 12.8 nA typical (each) • Reference electrode: < 150 nA maximum
ECG lead fail	Identifies failed electrodes and switches to those intact.
Defibrillation protection	5000 V, 360 J
Replaceable interface cable	Tool removable USB interface cable
ECG analog output signal gain	1 V/1 mV ±10%
ECG analog output bandwidth (based on ECG waveform filter setting)	• Diagnostic: 0.05 to 125 Hz • Monitoring: 0.05 to 40 Hz • Moderate: 0.05 to 25 Hz • Maximum: 0.05 to 25 Hz
ECG analog output delay	< 35 ms
Pacemaker marker	5 V, 2 ms pulse summed with the ECG analog output
Defibrillator sync output signal	Square pulse, low level 0 V to 0.8 V, high level 9 V to 10.5 V, duration 10 ms (±10%); output load impedance < 10kΩ

Defibrillator sync input signal	Signal amplitude of -2.0 V to -25.0 V or +2.0 V to +25.0 V for a duration of 2.5 ms and greater is detected as a synchronization pulse
Defibrillator sync output delay	< 35 ms

Impedance respiration standards compliance

The CARESCAPE ECG enclosure and interface cable are treated as TYPE CF DEFIBRILLATION-PROOF APPLIED PARTs per IEC 60601-2-27 Clause 201.6.2. Compatible lead wires are TYPE CF DEFIBRILLATION-PROOF APPLIED PARTs.

Impedance respiration performance specifications

Impedance respiration rate measurement range	0 to 200 breaths/minute
Impedance respiration measurement accuracy	• 0 to 120 breaths per minute: ±1 breath per minute • 121 to 200 breaths per minute: ±3 breaths per minute
Impedance respiration rate resolution	1 breath per minute
Impedance respiration input impedance range	• Dynamic: 0.4 to 10 Ω • Static: 100 to 1500 Ω @ 52.3 kHz
Impedance respiration normalized respiration sensing current	< 100 μA_{RMS}
Impedance respiration carrier frequency	52.3 kHz ±5 Hz
Impedance respiration leads available	I, II, RL-LL
Impedance respiration waveform sweep speed options	0.625 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s

SpO_2 standards compliance

The system with CARESCAPE SpO_2 complies with ISO 80601-2-61:2011-04.

The CARESCAPE SpO_2 sensor interface cable, excluding the module strain relief, and compatible sensors are type BF DEFIBRILLATION-PROOF APPLIED PARTS per ISO 80601-2-61 Clause 201.6.

The CARESCAPE SpO_2 – Masimo enclosure and interface cable, excluding the connector and strain relief on the host end of the cable, is treated as a type BF DEFIBRILLATION-PROOF APPLIED PART. Compatible sensor interface cables and SpO_2 sensors are type BF DEFIBRILLATION-PROOF APPLIED PARTS per ISO 80601-2-61 Clause 201.6.

The CARESCAPE SpO_2 – Nellcor OxiCOR Module enclosure and cable from the OxiCOR module to the strain relief on the Isolation Module are treated as type BF DEFIBRILLATION-PROOF APPLIED PARTS. Compatible SpO_2 sensors are type BF DEFIBRILLATION-PROOF APPLIED PARTS per ISO 80601-2-61 Clause 201.6.

SpO_2 displayed saturation values

GE TruSignal, Masimo SET and Nellcor OxiMax pulse oximetry are calibrated to display functional saturation.

NOTE You can verify the functionality of pulse oximeter sensor and monitor with a functional SpO_2 tester but you cannot evaluate their accuracy with such a device. For more information, refer to the standard ISO 80601-2-61:2011-04 Annex FF (Simulators, calibrators and functional testers for pulse oximeter equipment).

SpO_2 summary of clinical studies used to establish accuracy claims

Accuracy of Nellcor™ sensors with Oximax™ technology

Accuracy specifications were validated using measurements of healthy non-smoking adult volunteers during controlled hypoxia studies spanning the specified saturation ranges. Subjects were recruited from the local population and comprised both men and women ranging in age from 18-50 years old, and spanned a range of skin pigmentations. Pulse oximeter SpO_2 readings were compared to SaO_2 values of drawn blood samples measured by hemoximetry. All accuracies are expressed as ±1 SD. Because pulse oximeter equipment measurements are statistically distributed, about two-thirds of the measurements can be expected to fall in this accuracy (A_{RMS}) range.

Adult specifications are shown for OxiMax MAXA and MAXN sensors with the pulse oximeter.

Neonate specifications are shown for OxiMax MAXN sensors with the pulse oximeter.

Clinical functionality has been demonstrated on a population of hospitalized neonate patients. The observed SpO_2 accuracy was 2.5% in a study of 42 patients with ages of 1 to 23 days, weight from 750 to 4,100 grams, and 61 observations made spanning a range of 77% to 98% SaO_2.

Accuracy of Masimo SET technology with Masimo SET sensors

The Masimo SET Technology with Masimo sensors has been validated for no motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced hypoxia studies in the range of 70-100% SpO2 against a laboratory co-oximeter and ECG monitor. This variation equals ±1 standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

For detailed information, refer to the supplemental analysis graphs in the appendix (Bland and Altman. Agreement between methods of measurement with multiple observations per individual. Journal of Biopharmaceutical Statistics (2007) vol. 17 pp. 571-582).

Accuracy of GE TruSignal technology with TruSignal sensors

The GE TruSignal technology with TruSignal sensors has been validated for no motion accuracy in controlled hypoxia studies with healthy non-smoking adult volunteers over the specified saturation SpO_2 range(s). Pulse oximeter SpO_2 readings were compared to SaO_2 values of drawn blood samples measured by a laboratory co-oximeter. Subjects comprised both healthy adult men and women and spanned a range of ages and skin pigmentations.

For more detailed information, refer to the supplemental analysis graphs in the appendix (Bland and Altman. Agreement between methods of measurement with multiple observations per individual. Journal of Biopharmaceutical Statistics (2007) vol. 17 pp. 571-582).

SpO_2 test methods used to establish accuracy claims during motion

Nellcor™ sensors accuracy specifications were validated using measurements of healthy non-smoking adult volunteers during controlled hypoxia studies spanning the specified saturation ranges. Subjects were recruited from the local population and comprised both men and women ranging in age from 18-50 years old, and spanned a range of skin pigmentations. Pulse oximeter SpO_2 readings were compared to SaO_2 values of drawn blood samples measured by hemoximetry. All accuracies are expressed as ±1 SD. Because pulse oximeter equipment measurements are statistically distributed, about two-thirds of the measurements can be expected to fall in this accuracy (A_{RMS}) range.

Nellcor™ sensors motion performance was validated during a controlled hypoxia blood study over an SaO_2 span of 70% to 98.9% and a convenience-sample heart range of 41-105 bpm. Subjects performed rubbing and tapping movements 1-2 cm in amplitude with aperiodic intervals (randomly changing) with a random variation in frequency between 1-4 Hz. The average percent range was validated using synthetic signals from a patient simulator that comprised representative cardiac and signal artifact components. Applicability: OxiMax MAXA, MAXAL, MAXP, MAXI, and MAXN sensors.

The Masimo SET Technology with Masimo sensors has been validated for motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced hypoxia studies while performing rubbing and tapping motions, at 2 to 4 Hz at an amplitude of 1 to 2 cm and non-repetitive motion between 1 to 5 Hz at an amplitude of 2 to 3 cm in the range of 70% to 100% SpO_2 against a laboratory CO-oximeter and ECG monitor. This variation equals ±1 standard deviation, which encompasses 68% of the population.

NOTE Accuracy during motion has not been specified for Masimo SET sensors TC-I, TF-I, DBI, Blue, and E-1.

Measurement modules using GE Ohmeda Technology with TS-AF and TS-AP sensors have been validated for motion accuracy in controlled hypoxia studies with healthy non-smoking adult volunteers over the specified saturation SpO_2 range(s). The following motion types were used: mechanically induced 3 Hz tapping motion at an amplitude of 1-2 cm, patient induced non-repetitive rubbing motion, and patient induced non-repetitive hand motion in supine position. Pulse oximeter SpO_2 readings were compared to SaO_2 values of drawn blood samples measured by CO-oximetry.

Subjects comprised both adult men and women and spanned a range of skin pigmentations.

SpO_2 test methods used to establish accuracy claims during low perfusion

Low perfusion accuracy of Nellcor Oximax technology with Oximax sensors

Specification applies to monitoring cable performance. Reading accuracy in the presence of low perfusion (detected IR pulse modulation amplitude 0.03% - 1.5%) was validated using signals supplied by a patient simulator. SpO_2 and pulse rate values were varied across the monitoring range over a range of weak signal conditions and compared to the known true saturation and pulse rate of the input signals.

Low perfusion accuracy of Masimo SET technology

The Masimo SET technology has been validated for low perfusion accuracy in bench top testing against Biotek Index 2™ simulator and Masimo's simulator with signal strengths of greater than 0.02% and transmission of greater than 5% for saturations ranging from 70 to 100%. This variation equals ±1 standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

Low perfusion accuracy of GE TruSignal technology with TruSignal sensors

GE TruSignal technology with TruSignal sensors have been validated for low perfusion accuracy in a simulator test for saturation ranging from 70% to 100%. The test was conducted using a Fluke ProSim 8 simulator using 0.03% pulse amplitude and Thin Finger transmission setting.

SpO_2 test methods used to establish pulse rate accuracy

Pulse rate accuracy of Nellcor Oximax technology with Oximax sensors

Accuracy specifications were validated using measurements of healthy non-smoking adult volunteers during controlled hypoxia studies spanning the specified saturation ranges. Subjects were recruited from the local population and comprised both men and women ranging in age from 18-50 years old, and spanned a range of skin pigmentations. Pulse oximeter SpO_2 readings were compared to SaO_2 values of drawn blood samples measured by hemoximetry. All accuracies are expressed as ±1 SD. Because pulse oximeter equipment measurements are statistically distributed, about two-thirds of the measurements can be expected to fall in this accuracy (A_{RMS}) range.

Adult specifications are shown for OxiMax MAXA and MAXN sensors with the pulse oximeter.

Neonate specifications are shown for OxiMax MAXN sensors with the pulse oximeter.

Clinical functionality has been demonstrated on a population of hospitalized neonate patients. The observed SpO_2 accuracy was 2.5% in a study of 42 patients with ages of 1 to 23 days, weight from 750 to 4,100 grams, and 61 observations made spanning a range of 77% to 98% SaO_2.

Specification applies to monitoring cable performance. Reading accuracy in the presence of low perfusion (detected IR pulse modulation amplitude 0.03% - 1.5%) was validated using signals supplied by a patient simulator. SpO_2 and pulse rate values were varied across the monitoring range over a range of weak signal conditions and compared to the known true saturation and pulse rate of the input signals.

Nellcor™ sensors motion performance was validated during a controlled hypoxia blood study over an SaO_2 span of 70% to 98.9% and a convenience-sample heart range of 41-105 bpm. Subjects performed rubbing and tapping movements 1-2 cm in amplitude with aperiodic intervals (randomly changing) with a random variation in frequency between 1-4 Hz. The average percent range was validated using synthetic signals from a patient simulator that comprised representative cardiac and signal artifact components. Applicability: OxiMax MAXA, MAXAL, MAXP, MAXI, and MAXN sensors.

Pulse rate accuracy of Masimo SET technology with Masimo sensors

Masimo SET Technology with Masimo sensors has been validated for pulse rate accuracy for the range of 25-240 bpm in bench top testing against a Biotek Index 2 simulator. The variation equals plus or minus one standard deviation, which encompasses 68% of the population.

Pulse rate accuracy of GE TruSignal technology with TruSignal sensors

GE TruSignal technology with TruSignal sensors has been validated for pulse rate accuracy over the specified range in bench top testing against a patient simulator.

SpO_2 performance specifications

NOTE Technical specifications given for CARESCAPE SpO_2 – Masimo are based on Masimo Corporation owned Masimo SET technology and sensors. For more detailed information, refer to the sensor instructions for use.

NOTE Technical specifications given for CARESCAPE SpO_2 – Nellcor are based on Covidien AG owned technology and sensors. For more detailed information, refer to the sensor instructions for use.

The following specifications apply to all CARESCAPE SpO_2 technologies unless otherwise indicated.

Pulse oximetry saturation display resolution	1 digit (% of SpO_2)
Pulse oximetry peripheral pulse rate display resolution	1 bpm

Pulse oximetry display data update period	< 30 s
Pulse oximetry sweep speed options	6.25, 12.5, 25, and 50 mm/s
Pulse oximetry waveform scale options	TruSignal technology: AUTO, 50, 20, 10, 5, 2 Masimo and Nellcor technologies: 1x, 2x, 4x, and 8x
Wavelength information for SpO_2 probe LEDs	This information can be especially useful to clinicians such as those performing photodynamic therapy. GE TruSignal pulse oximetry sensor LED peak wavelengths are within 600 to 1000 nm and the maximum optical output power for each LED is less than 15 mW. Nellcor OxiMax pulse oximetry sensors contain LEDs that emit red light at a wavelength of approximately 660 nm and infrared light at a wavelength of approximately 900 nm. The total optical output power of the sensor LEDs is less than 15 mW. Masimo SET pulse oximetry sensors contain LEDs that emit red light at a wavelength of approximately 660 nm and infrared light at a wavelength of approximately 905 nm for LNOP and LNCS, approximately 663 nm and 880 nm for LNOP and LNCS tip clips, and approximately 660 nm and 880 nm for LNOP and LNCS transflectance forehead sensors. The total optical output power of the LEDs is less than 15 nW.
Pulse oximetry parameters monitored	Arterial oxygen saturation (SpO_2) and pulse rate
Pulse oximetry saturation measurement value and display range	GE TruSignal: 0 to 100% Masimo: 0 to 100% Nellcor: 1 to 100%
Pulse oximetry peripheral pulse rate range	GE TruSignal: 30 to 300 bpm Masimo: 25 to 240 bpm Nellcor: 20 to 300 bpm
Pulse oximetry saturation measurement value accuracy	The specified accuracy for each technology is the root-mean-square (RMS) difference between the measured values and the reference values. Because pulse oximetry equipment measurements are statistically distributed, only about two-thirds of the pulse oximetry equipment measurements can be expected to fall within the ±1 A_{rms} of the value measured by a CO-oximeter. Actual accuracy depends on sensor. Please refer to the sensor instructions for use for more detailed information. GE TruSignal accuracy: • Without motion: ▪ SpO_2 (70 to 100%): ±2 Adult, ±2 Pediatric, ±3 Neonatal ▪ SpO_2 (<70%): Unspecified • With motion: ▪ SpO_2 (70 to 100%): ±3 Adult, ±3 Pediatric, ±3 Neonatal ▪ SpO_2 (<70%): Unspecified • Low perfusion: ▪ SpO_2 (70 to 100%): ±2 Adult, ±2 Pediatric, ±3 Neonatal ▪ SpO_2 (<70%): Unspecified

	Masimo accuracy: The following accuracy specifications represent only the device's portion of the integrated Masimo rainbow SET technology performance. The actual measurement performance and accuracy depends on the accessory used and can be limited by the accessory as specified in the sensor's instructions for use. • Without motion: ▪ SpO_2 (70 to 100%): ±2% Adult, ±3% Neonate ▪ SpO_2 (<70%): Unspecified • With motion: ▪ SpO_2 (70 to 100%): ±3% Adult, ±3% Neonate ▪ SpO_2 (<70%): Unspecified • Low perfusion: ▪ SpO_2 (70 to 100%): ±2% Adult, ±3% Neonate ▪ SpO_2 (<70%): Unspecified Nellcor accuracy: Saturation accuracy varies by sensor type. Contact Medtronic for sensor accuracy information. Adult specifications are shown for OxiMax MAXA and MAXN sensors with the pulse oximeter. Neonate specifications are shown for OxiMax MAXN sensors with the pulse oximeter. • With or without motion: ▪ SpO_2 (70 to 100%): ±2 Adult, ±2 Neonatal ▪ SpO_2 (60 to 80%): ±3 Adult, ±3 Neonatal ▪ SpO_2 (< 60%): Unspecified • Low perfusion: ▪ SpO_2 (70 to 100%): ±2 Adult, ±2 Neonatal ▪ SpO_2 (< 70%): Unspecified
Pulse oximetry peripheral pulse rate accuracy	The specified accuracy for each technology is the root-mean-square (RMS) difference between the measured values and the reference values. Actual accuracy depends on sensor. Please refer to the sensor instructions for use for more detailed information. GE TruSignal accuracy: • Without motion (30 to 250 bpm): ±2 Adult, ±2 Pediatric, ±2 Neonatal • With motion (30 to 250 bpm): ±5 Adult, ±5 Pediatric, ±5 Neonatal • Low perfusion (30 to 250 bpm): ±3 Adult, ±3 Pediatric, ±3 Neonatal Masimo accuracy: • Without motion (25 to 240 bpm): ±3 bpm Adult, Pediatric, Infant, Neonate • With motion (25 to 240 bpm): ±5 bpm Adult, Pediatric, Infant, Neonate

	• Low perfusion (25 to 240 bpm): ±3 bpm Adult, Pediatric, Infant, Neonate Nellcor accuracy: Saturation accuracy varies by sensor type. Contact Medtronic for sensor accuracy information. Adult specifications are shown for OxiMax MAXA and MAXN sensors with the pulse oximeter. Neonate specifications are shown for OxiMax MAXN sensors with the pulse oximeter. • Without motion (20 to 250 bpm): ±3 bpm Adult, ±3 bpm Neonatal • Low perfusion (20 to 250 bpm): ±3 bpm Adult, ±3 bpm Neonatal • With motion (20 to 250 bpm): ±5 bpm Adult, ±5 bpm Neonatal
Pulse oximetry low perfusion range	GE TruSignal: 0.03 to 20% Masimo: 0.02 to 20% Nellcor: 0.03 to 20%
Signal strength indication	Signal strength is indicated through the display of asterisks (No asterisk, *, **, or ***). Three asterisks indicate good signal quality and no asterisks indicate poor signal quality. All waveforms are normalized to fit the allocated display area. The GE TruSignal pleth waveform is not normalized. The Masimo pleth waveform is not normalized. The Nellcor pleth waveform is not normalized.

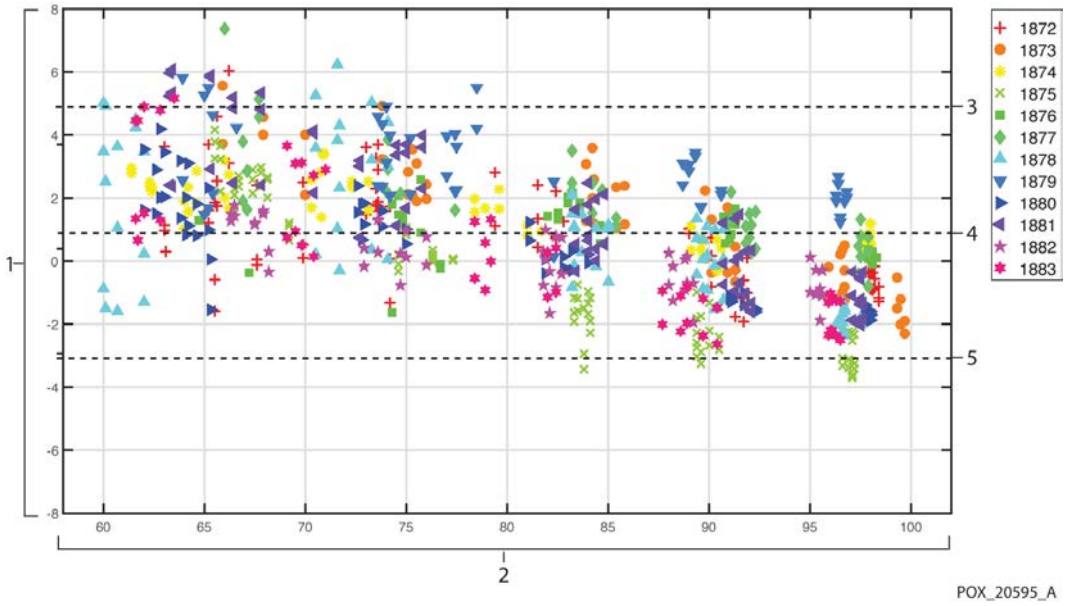
SpO_2 supplemental analysis graphs

Additional accuracy information for Nellcor™ sensors

The table information provides supplemental data analysis for Nellcor sensors' measurement accuracy. The tables are provided by Covidien.

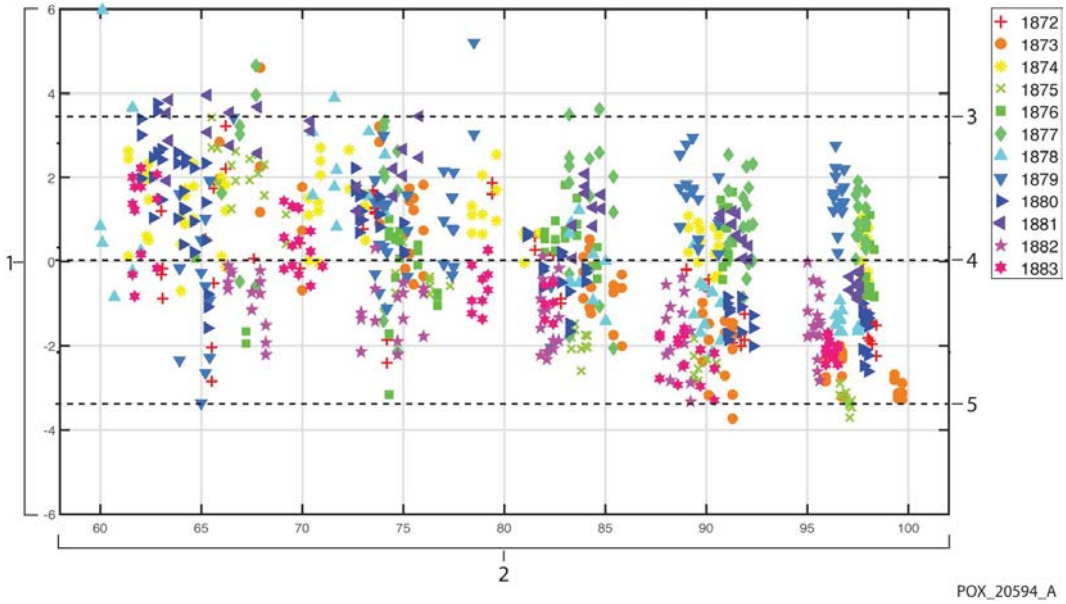
The following modified Bland-Altman plots show SpO_2 data by sensor type. Each individual subject is represented by a unique marker on the plots. Subject identification numbers are indicated in the legend with each plot.

Modified Bland-Altman for SpO_2 - MAXA Sensor: SaO_2 vs. (SpO_2 - SaO_2)



1. SpO_2 - SaO_2 (%)
2. SaO_2 (%)
3. Upper 95%
4. Mean Bias
5. Lower 95%

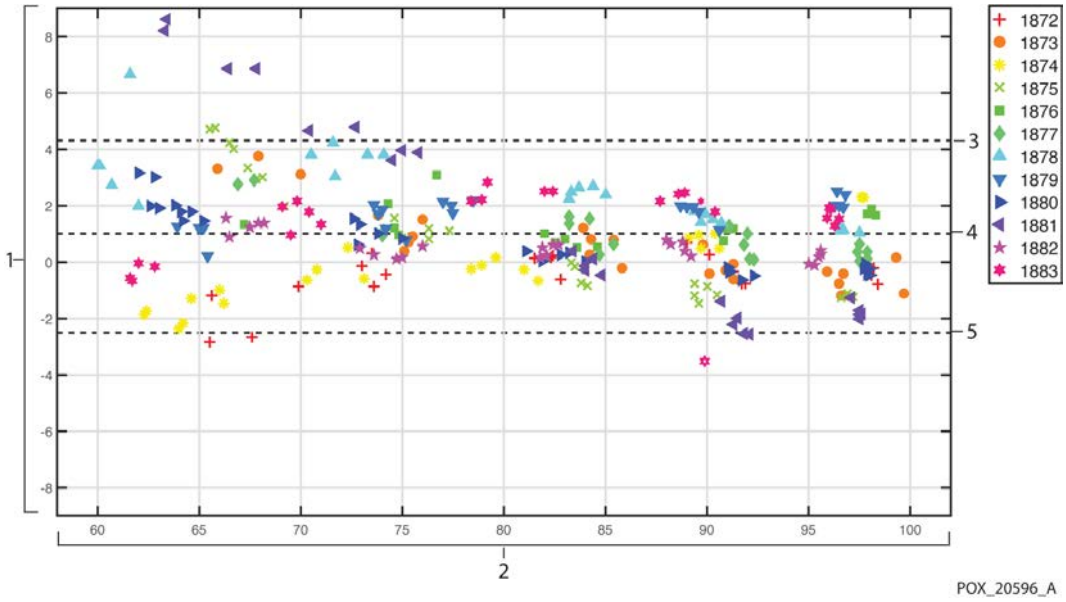
Modified Bland-Altman for SpO_2 - MAXN Sensor: SaO_2 vs. (SpO_2 - SaO_2)



1. SpO_2 - SaO_2 (%)
2. SaO_2 (%)
3. Upper 95%
4. Mean Bias

5. Lower 95%

Modified Bland-Altman for SpO_2 - MAXFAST Sensor: SaO_2 vs. (SpO_2 - SaO_2)



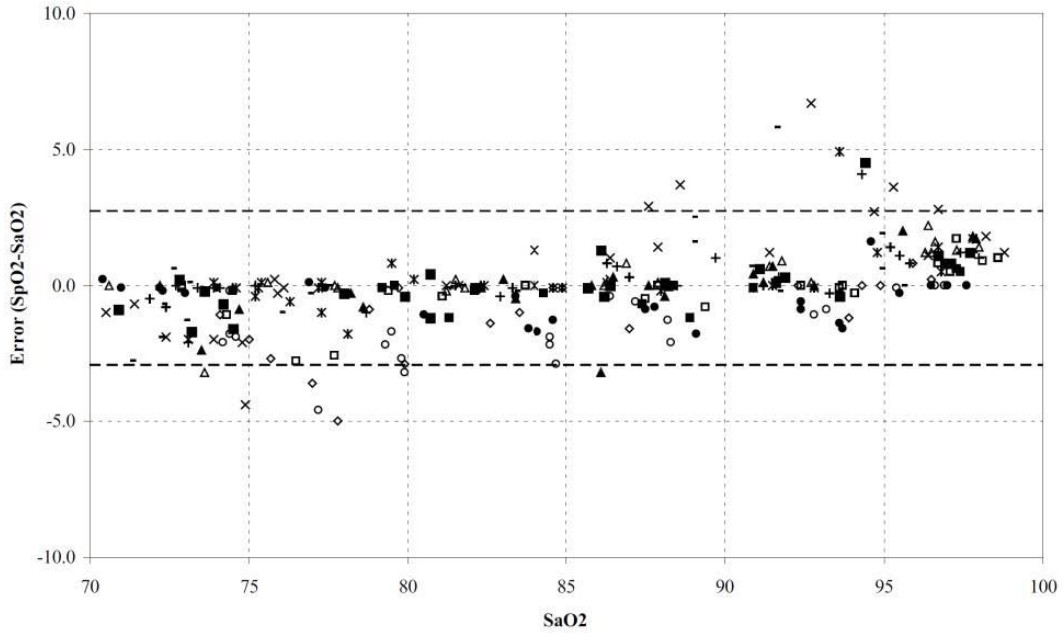
1. SpO_2 - SaO_2 (%)
2. SaO_2 (%)
3. Upper 95%
4. Mean Bias
5. Lower 95%

Additional accuracy information for Masimo sensors

The table information provides supplemental data analysis for Masimo sensors' measurement accuracy. The tables are provided by Masimo.

The table information for the plots below show A_{RMS} values measured with Masimo SET Oximetry Technology in a clinical study.

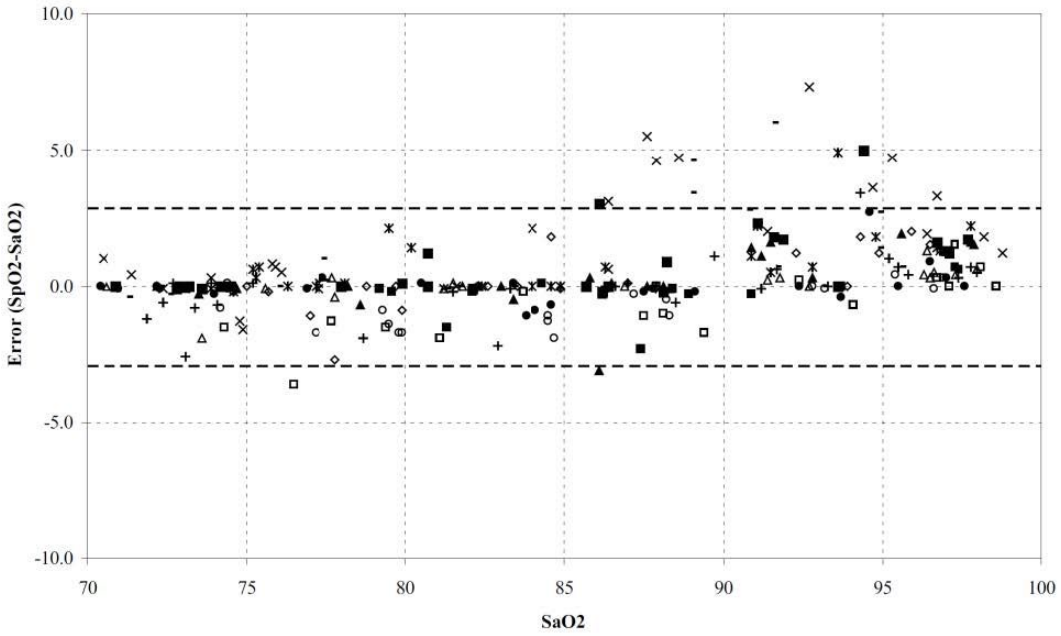
Adtx/Pdtx



Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.64%
80-90%	1.07%
70-80%	1.55%

Overall claimed accuracy value	
Range	**A_{RMS}**
70-100%	± 2%

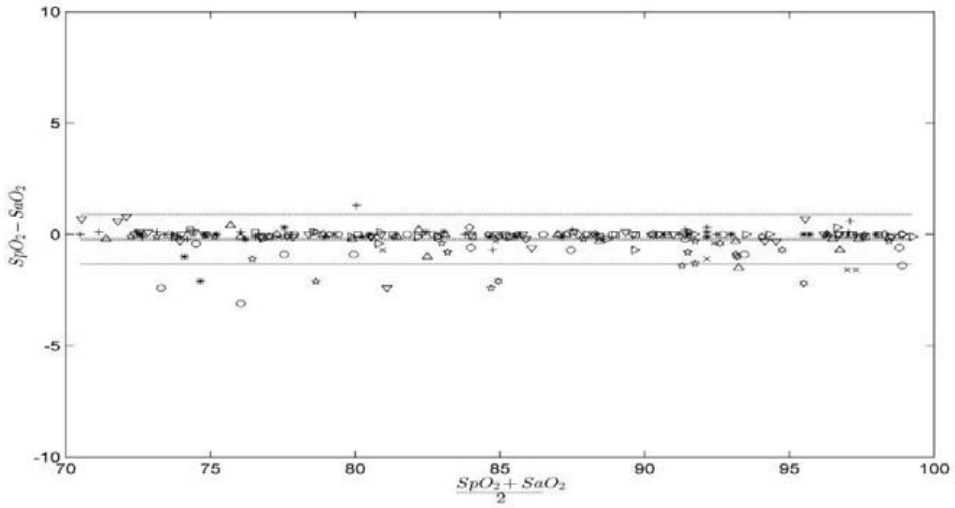
Inf/Neo/NeoPt



Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.85%
80-90%	1.44%
70-80%	0.89%

Overall claimed accuracy value			
Range	**A_{RMS}**		
70-100%	**Inf**	**Neo***	**Neo Pt***
	± 2%	± 2% Adult ± 3% Neonatal	± 3%
* The saturation accuracy of the Neonate and Preterm sensors were validated on adult volunteers and 1% was added to account for the properties of fetal hemoglobin.			

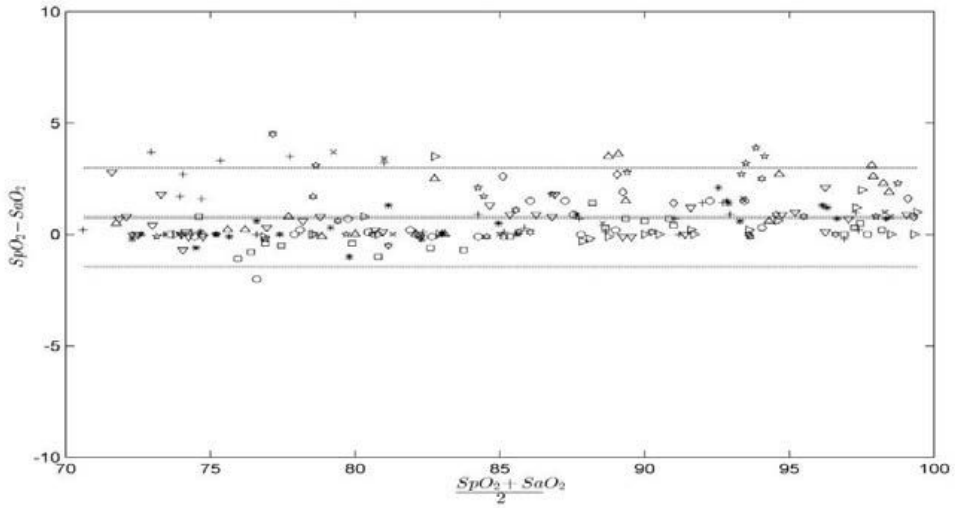
DCI/DCIP



Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	0.60%
80-90%	0.54%
70-80%	0.67%

Overall claimed accuracy value	
Range	**A_{RMS}**
70-100%	2%

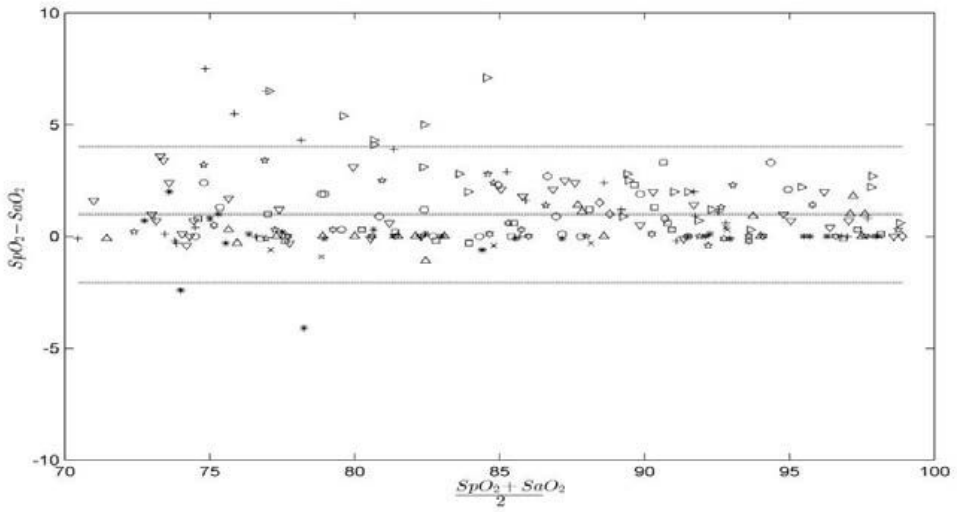
TFI



Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.45%
80-90%	1.22%
70-80%	1.41%

Overall claimed accuracy value	
Range	**A_{RMS}**
70-100%	2%

TCI



Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.05%
80-90%	1.67%
70-80%	2.43%

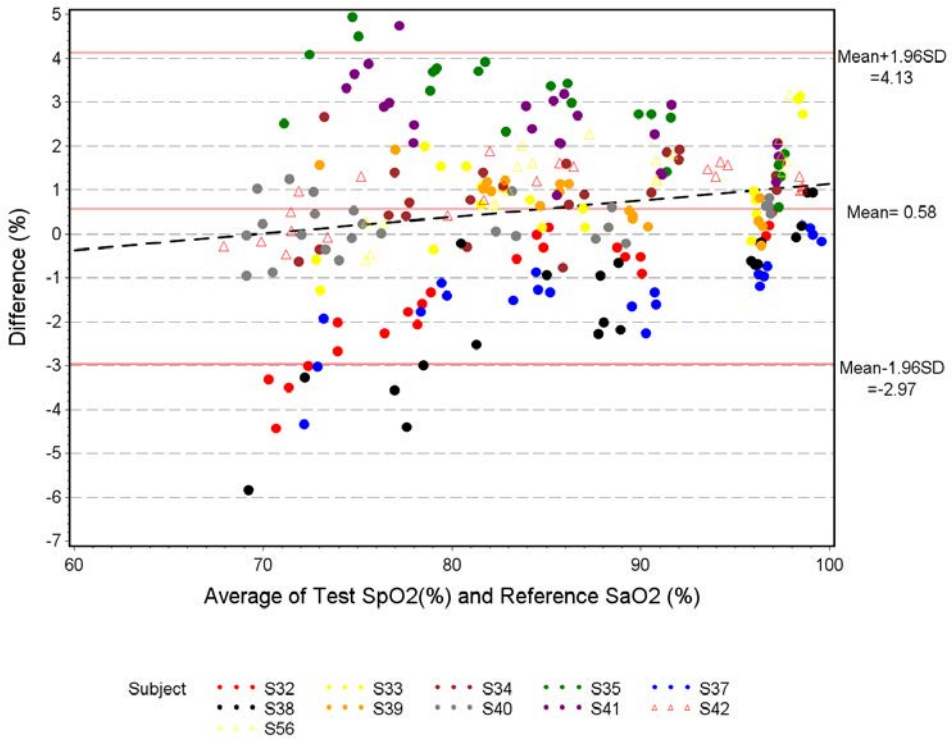
Overall claimed accuracy value	
Range	**A_{RMS}**
70-100%	3.5%

Additional accuracy information for GE TruSignal sensors

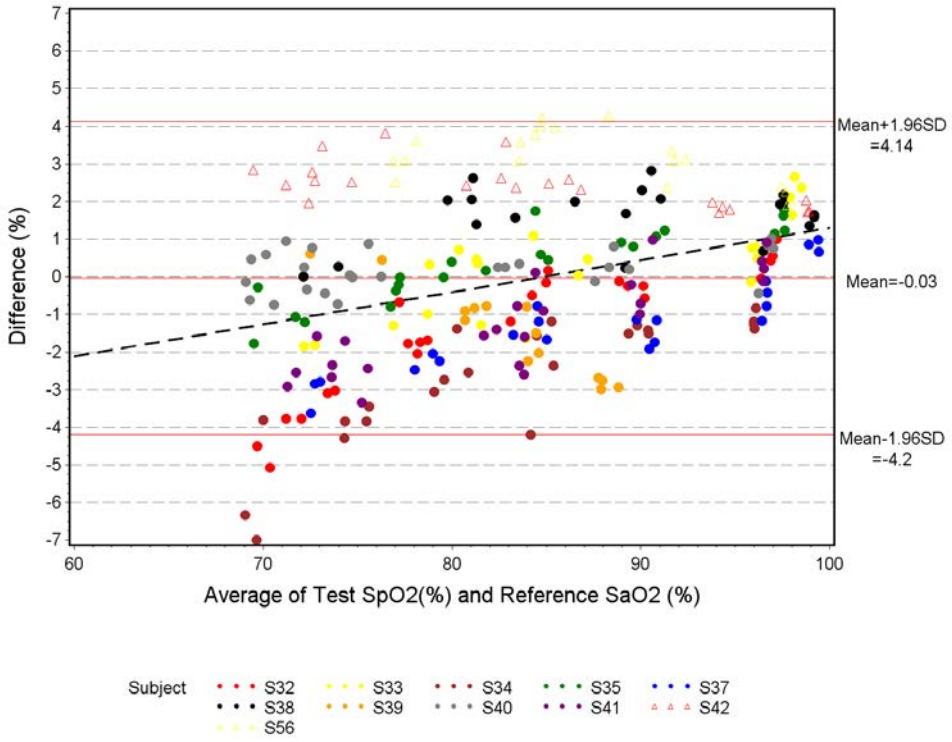
The table information provides supplemental data analysis for GE TruSignal sensors' measurement accuracy.

The following modified Bland-Altman plots show SpO_2 data by sensor type.

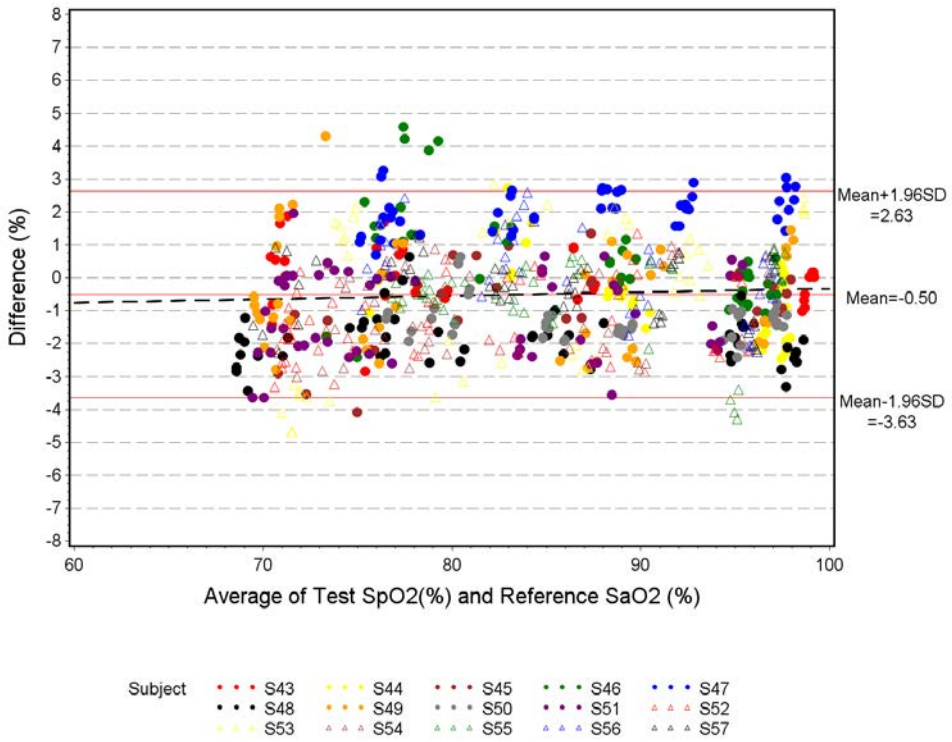
Bland-Altman plot for SpO_2 - TS-W-D sensor



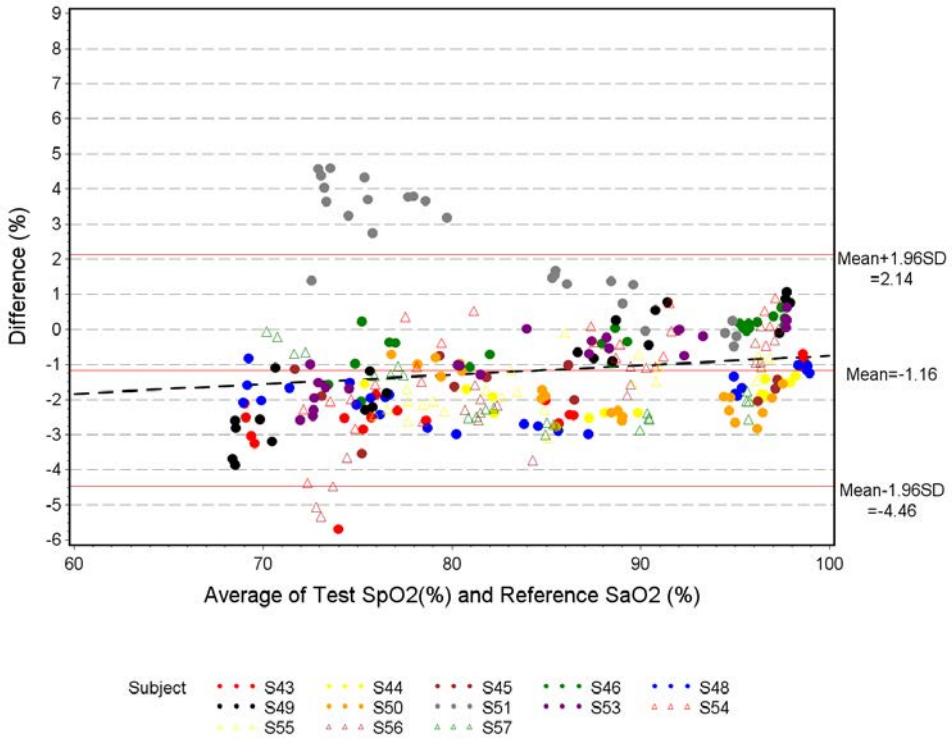
Bland-Altman plot for SpO_2 - TS-SE-D sensor



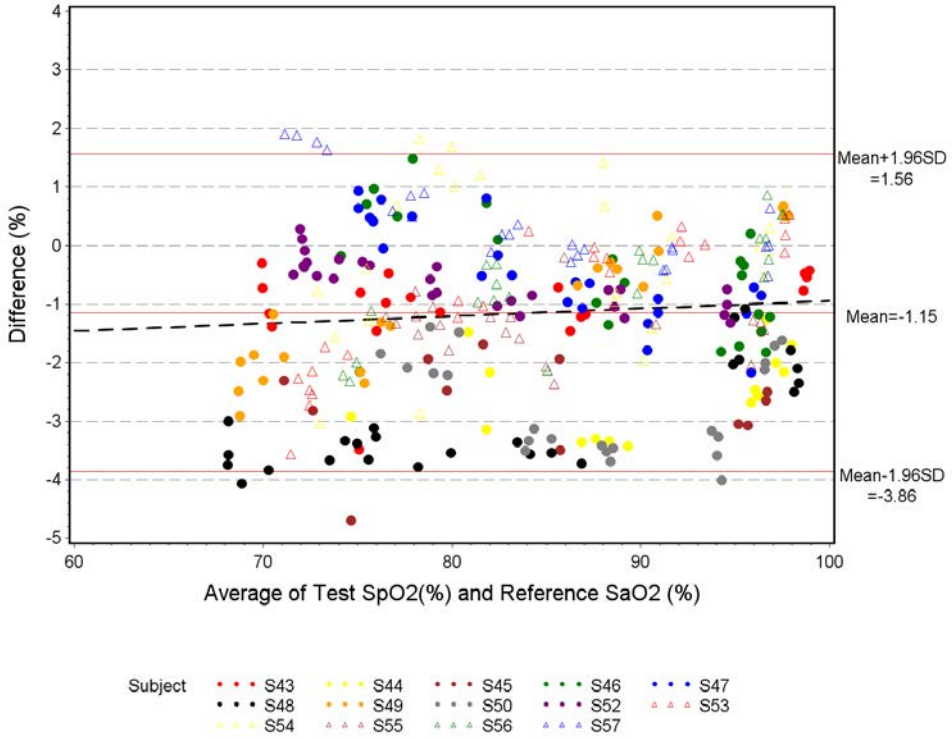
Bland-Altman plot for SpO_2 - TS-E-D sensor



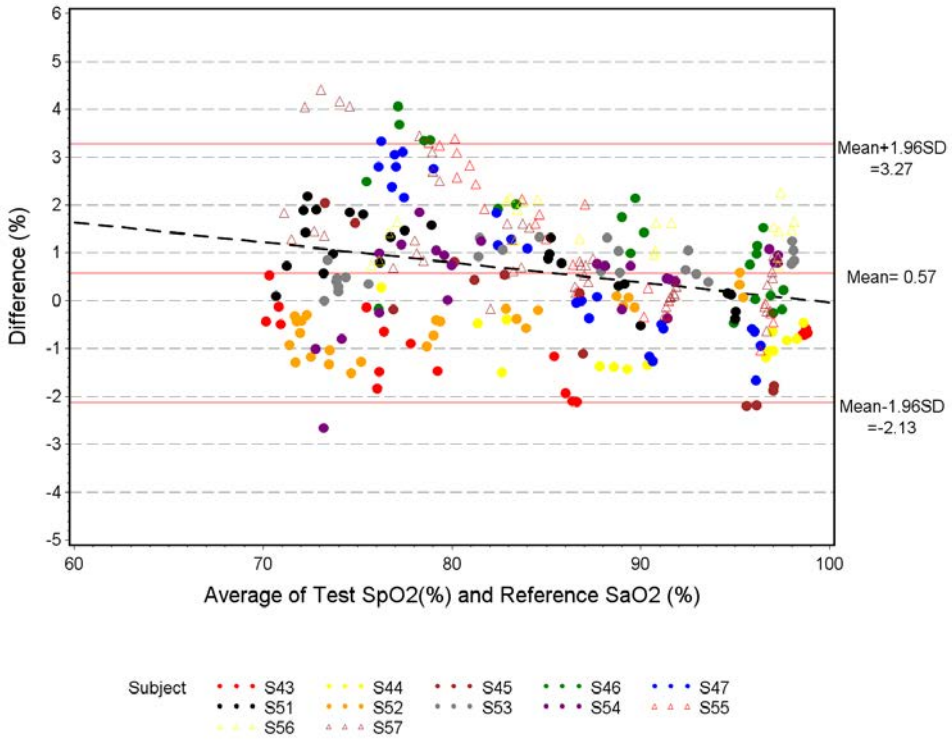
Bland-Altman plot for SpO_2 - TS-F-D sensor



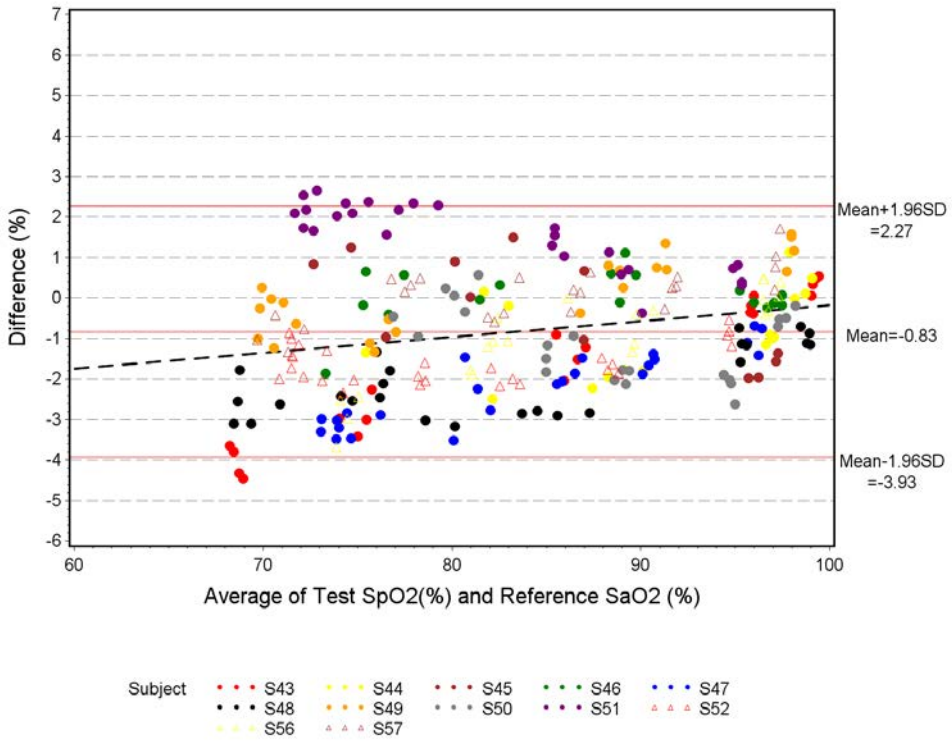
Bland-Altman plot for SpO_2 - TS-SA-D sensor



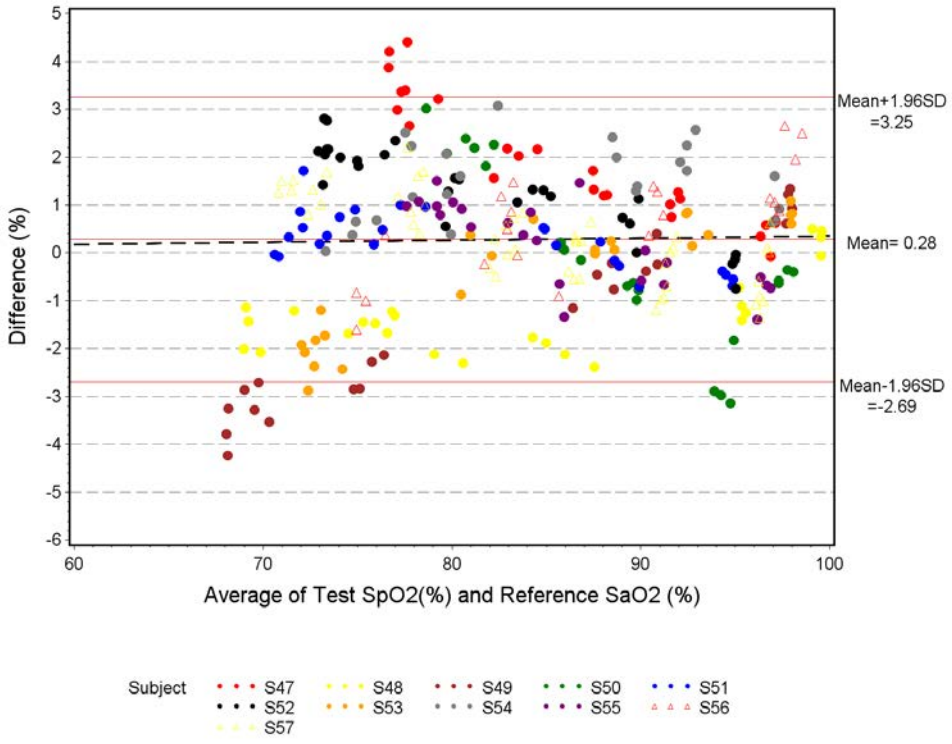
Bland-Altman plot for SpO_2 - TS-AF sensor



Bland-Altman plot for SpO_2 - TS-AP sensor



Bland-Altman plot for SpO_2 - TS-AAW sensor



NIBP standards compliance

The system complies with IEC 80601-2-30:2013-07.

The system was clinically tested according to ISO 81060-2:2013. The measurement has been validated with patient populations requiring clinical investigations according to ISO 81060-2:2013 apart from pregnant and pre-eclamptic women.

The non-invasive blood pressure APPLIED PART is classified as a DEFIBRILLATION PROOF TYPE BF per IEC 80601-2-30:2013 Clause 201.6 and 201.8.5.5.101.

NIBP performance specifications

NIBP measurement technique	Oscillometric
NIBP displayed parameters	Systolic, diastolic, and mean pressures, time of last measurement, cuff pressure
NIBP measurement supported modes	Manual, Auto, and STAT
NIBP measurement range	• Adult: 15 to 300 mmHg (2.0 to 40.0 kPa) • Child: 15 to 260 mmHg (2.0 to 34.7 kPa) • Infant: 15 to 155 mmHg (2.0 to 20.7 kPa)
NIBP measurement range accuracy	±5 mmHg (0.7 kPa) average error, 8 mmHg (1.1 kPa) standard deviation
NIBP measurement display resolution	1 mmHg
NIBP measurement default initial inflation pressure	• Adult: 135 mmHg (18.0 kPa) • Child: 125 mmHg (16.7 kPa) • Infant: 100 mmHg (13.3 kPa) **NOTE** In the NICU software package, infant ranges are equal to neonatal ranges.
Supported cuff sizes	• Disposable: Large adult, adult, small adult, pediatric, child, and neonatal • Reusable: Adult thigh, large adult, adult, small adult, small adult/child, child, and infant
Cuff pressure range	0 to 315 mmHg (0.0 to 42.0 kPa)
NIBP cuff pressure display resolution	1 mmHg
Cuff maximum inflation pressure	• Adult: 290 ±6 mmHg (38.7 ±0.8 kPa) • Child: 250 ±5 mmHg (33.3 ±0.7 kPa) • Infant: 145 ±5 mmHg (19.3 ±0.7 kPa)
NIBP measurement available automatic cycle times	1 min, 2 min, 2.5 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 h, 2 h, and 4 h
Auto zero	Auto zero pressure reference

NIBP total cycle time	20 to 40 seconds typical (depending on heart rate, pressure, and motion artifact)
Automatic cuff deflation conditions	• Power off • Adult and child cuff cycle time exceeding 125 seconds • Infant cuff cycle time exceeding 90 seconds • Adult and child cuff pressure exceeding 300 mmHg (40.0 kPa) • Infant cuff pressure exceeding 150 mmHg (20.0 kPa)

Invasive pressure standards compliance

The system with CARESCAPE Pressure complies with IEC 60601-2-34:2011-05.

The CARESCAPE Pressure sensor interface cable and compatible transducers are TYPE CF DEFIBRILLATION-PROOF APPLIED PARTs per IEC 60601-2-34 Clause 201.6.

Invasive pressure performance specifications

Number of invasive pressure channels	2
Invasive pressure measurement range	-98 to 349 mmHg (-13.1 to 46.5 kPa)
Invasive pressure measurement accuracy	± 0.5 % ± 1.50 mmHg (excluding transducer) ± 4 % or ± 4 mmHg, which ever is greater (including transducer)
Invasive pressure display resolution	1 mmHg
Invasive pressure units of measure	mmHg or kPa
Invasive pressure zero balance range	±150 mmHg (±20.0 kPa)
Invasive pressure zero balance accuracy	±1 mmHg (±0.1 kPa)
Invasive pressure pulse rate range	0 to 360 bpm
Invasive pressure pulse rate accuracy	±2% or ±2 bpm, whichever is greater
Invasive pressure pulse rate display resolution	1 bpm
Invasive pressure transducer sites, site name, and displayed values	• Arterial (***Art***): Systolic, diastolic, mean, rate • Femoral (***Fem***): Systolic, diastolic, mean, rate • Femoral vein (***FemV***): Mean • Pulmonary artery (***PA***): Systolic, diastolic, mean • Central venous pressure (***CVP***): Mean • Intra-cranial pressure (***ICP***): Mean • Left atrial (***LAP***): Mean • Pressure channel (***P1***, ***P2***): Mean • Right atrial (***RAP***): Mean • Right vein (***RVP***): Mean • Umbilical artery (***UAC***): Systolic, diastolic, mean, rate • Umbilical vein (***UVC***): Mean

Invasive pressure frequency response (waveform filter)	0 to 12 Hz or 0 to 40 Hz (-3dB), user-selectable
Invasive pressure sweep speed options	6.25, 12.5, 25, and 50 mm/s
Invasive pressure waveform display scale	User and automatic
Invasive pressure waveform display scale selections	0-10 to 0-300 mmHg, with a step size of 10 mmHg (0.0-2.0 to 0.0-40.0 kPa, with a step size of 2.0 kPa); or automatic scale based on valid waveform values from last 4 seconds with a lower limit of -100 mmHg (-14 kPa) and an upper limit of 350 mmHg (48 kPa) and a step size of 10 mmHg (2.0 kPa)
Invasive pressure transducer interfaces supported	Argon Medical, ICU Medical, Edwards Lifesciences, Utah Medical
Invasive pressure transducer excitation voltage	+2.5 VDC ±1.0 %
Invasive pressure transducer sensitivity	5 µV/V/mmHg
Replaceable sensor interface cable	Tool removable sensor interface cable
Invasive pressure analog output signal accuracy (gain and offset)	1V/100 mmHg ± 0.5% ± 2 mmHg, pressure < 100 mmHg (excludes transducer) 1V/100 mmHg ± 1.5% ± 1 mmHg, pressure 100 mmHg or greater (excludes transducer)
Invasive pressure analog output bandwidth	0 to 40Hz
Invasive pressure analog output delay	< 35 ms

Temperature standards compliance

The system with CARESCAPE Temperature complies with ISO 80601-2-56:2009-10.

The CARESCAPE Temperature sensor interface cable and compatible probe accessories are TYPE CF DEFIBRILLATION-PROOF APPLIED PARTs per ISO 80601-2-56 Clause 201.6.

Temperature performance specifications

Number of channels	2
Temperature parameters displayed	T1, T2
Temperature range	0°C to 45°C (32°F to 113°F), delta values -45°C to 45°C (-49°F to 113°F)
Temperature system measurement accuracy	CARESCAPE ONE system excluding temperature probes: • 18°C to 45°C (64°F to 113°F): ±0.1°C (±0.2°F), rated output range • 0°C to less than 18°C (32°F to 64°F): ±0.2°C (±0.4°F), extended output range Temperature probe instructions for use specify the probe accuracy.
Temperature display resolution	0.1°C (0.1°F)
Temperature measurement units	°C or °F

Temperature probe types supported	Series 400
Temperature test measurement cycle	Every minute
Reusable and disposable temperature probe support	Sensor interface cables provide reusable or disposable temperature probe interfaces.
Replaceable sensor interface cable	Tool removable sensor interface cable

CO_2 standards compliance

The system with CARESCAPE CO_2 complies with ISO 80601-2-55:2011-12.

The CARESCAPE CO_2 accessories that are intended to be connected with the breathing system are TYPE BF DEFIBRILLATION-PROOF APPLIED PARTs per ISO 80601-2-55 Clause 201.4.6.

CO_2 performance specifications

CO_2 range	0-19.7%
CO_2 accuracy	After two minutes warm-up: • For values between 0 and 40 mmHg (0 and 5.3 kPa): ±2.0 mmHg (±0.29 kPa) • For values from 41–70 mmHg (5.4–9.3 kPa): ±5% of reading • For values from 71–100 mmHg (9.4–13.3 kPa) ±8% of reading • For values from 101–150 mmHg (13.4–20 kPa): ±10% of reading At respiration rates above 80 rpm, all ranges are ±12% of reading. The specifications are valid for gas mixtures of CO_2, balance N_2, dry gas at 760 mmHg (101.3 kPa) within specified operating temperature range.
Resolution	• Numeric: 1.0 mmHg (0.1 kPa) • Wave: 0.1 mmHg (0.01 kPa)
Stability	• Short-term drift: ±0.8 mmHg (0.13 kPa) over six hours • Long-term drift: Accuracy specification is maintained over a 120-hour period
awRR (airway respiratory rate) range	2-150 rpm
awRR (airway respiratory rate) accuracy	± 1 rpm
Warm-up time	2 minutes with CO_2 sensor attached for full accuracy specification
Sample flow rate	50 ±10 ml/minute
Total system response time	3 seconds for on-airway adapter kits (Additional 30 ms for sidestream sampling cannulas) (Additional 2 seconds for extension line and dehumidification tubing)
Total system rise time	200 ms for on-airway adapter kits (Additional 30 ms for sidestream sampling cannulas) (Additional 80 ms for extension line and dehumidification tubing)
CO_2 sweep speed options	0.625, 6.25, 12.5, 25, and 50 mm/s

The effects of interfering gases and vapors shall be as follows: ISO 806061-2-55 Table 201.105 Test gas levels of interfering gases and vapors in nominal atmospheric pressure, i.e., 760 mmHg:	
Effects of interfering gases and vapors	Effect of Helium (50% vol): decreases CO_2 readings <0.5 vol%
	Effect of N_2O (30% vol): increases CO_2 readings <0.3 vol%
	Effect of O_2 (40% to 95%): • If compensation is not activated: decreases CO_2 readings <0.4 vol% • If compensation is activated: CO_2 error <0.15 vol%
	Effect of N_2O (30% to 80%): • If compensation is not activated: CO_2 error <0.8 vol% • If compensation is activated: CO_2 error <0.3 vol%
Effects of non-interfering gases and vapors	A gas is non-interfering if its effect to the measured CO_2 is as follows: 0-40 mmHg: ±1 mmHg additional error 41-70 mmHg: ±2.5% additional error 71-100 mmHg: ±4% additional error 101-150 mmHg: ±5% additional error The following gases are non-interfering when tested per ISO 80601-2-55: • ethanol, • acetone, • isopropanol, • methane, • nitrogen, • and water vapor

G

Default settings

Understanding your monitor configuration

The monitor's configuration is dependent on the equipment used, the software enabled, and the settings that define how the software application behaves.

Software packages

The monitor can have up to five software packages, but only one can be enabled at a time. Software packages pre-configure the monitor's behavior and appearance for a specific clinical environment. There are five software packages:

- ED: Emergency Department (also called Emergency Care)
- ICU: Intensive Care Unit (also called Critical Care)
- OR: Operating Room (also called Anesthesia Care)
- PACU: Post Anesthesia Care Unit
- NICU: Neonatal Intensive Care Unit (also called Neonatal Care)

ICU is the factory default software package. Software packages cannot be customized, but the profile and care unit settings for a software package can be customized.

Licensed software options

The following table lists the software options available for purchase. These options are enabled with licenses during installation/configuration. For more information, refer to the appropriate service manual.

Option	OR	PACU	ICU	ED	NICU
Software package license	Standard				
Multi-lead ST analysis	Standard				
12RL 12-lead ECG	Standard				Not available
Full arrhythmia	Standard				
Touch user interface	Standard				

Software profiles

Each software package supports up to eight active profiles. A profile is a group of unique settings suited to a particular care unit or patient demographic within the broader software package (e.g., alarm limits, screen layouts, trends and snapshot settings). Profile settings can be customized. The following table lists the factory default profiles for each software package. The default profile is listed first.

ED	ICU	NICU	OR	PACU
Medical	***Medical***	***Premature***	***General***	***General***
Trauma	***Surgical***	***Cardiac***	***Perfusion***	***Invasive***
Cardiac	***Cardiac***	***Full-term***	***Invasive***	***Regional***
Neuro	***Neuro***	***Infant***	***Regional***	***Neuro***
Respiratory	***Trauma***	There are four pre-defined profiles for NICU and four undefined profiles (***Profile 5*** to ***Profile 8***) that can be customized as needed.	***Neuro***	***PreRegional***
Adolescent	***Adolescent***		***Adolescent***	***Adolescent***
Pediatric	***Pediatric***		***Pediatric***	***Pediatric***
Infant	***Infant***		***Infant***	***Infant***

Software settings

NOTE The enabled software profile and CARESCAPE Parameters used determine which configurable settings display on the CARESCAPE ONE. Some settings may not appear in all configurations.

NOTE Some settings vary by configuration. These settings are indicated where applicable.

If the monitor resets while monitoring a patient, care should be taken to confirm the settings are appropriate for the current patient, making changes where necessary.

When the supply mains to the equipment is interrupted for more than 30 seconds while the monitor is on, the monitor shuts down. When restarted within 2 hours, it will continue monitoring with the previously selected user settings.

Care unit settings

Care unit settings are password protected. Care unit settings are established during installation/configuration of the monitor. Instructions to access the care unit settings are provided in this document. The care unit settings factory default values are also provided.

Care unit settings apply to the software package and all associated profiles. Care unit settings have two values:

- Current values: Values displayed on the monitor, saved during configuration/installation of the monitor to meet the needs of a particular clinical environment.

- Factory default values: Permanent values used in case of failure that allow the software application to recover from failure by reverting to these values for system operation.

The care unit settings reset varies by setting. There are three types of reset:

- Case reset/discharge: Case is reset/patient is discharged from the monitor.
- Cold start: Start-up of the software application after the monitor is shut down for 2 hours or more.
- Warm start: Start-up of the software application after the monitor is shut down for less than 2 hours.

DEMO MODE

Entering the ***DEMO MODE*** is password protected. The ***DEMO MODE*** can only be activated (confirmed) if there is no active patient monitoring occurring.

When you exit the ***DEMO MODE***, the monitor restarts with the same settings that were used in the actual monitoring mode before entering the ***DEMO MODE***. In other words, any changes made to the settings in the ***DEMO MODE*** do not affect the actual monitoring mode.

NOTE The ***DEMO MODE*** is *not* meant for actual patient monitoring, it is for demonstration purposes only.

Exiting the *DEMO MODE*

To avoid the risk of missed alarms and loss of monitoring, always exit the ***DEMO MODE*** when simulated monitoring is no longer needed. Restart the monitor, or:

1. Select ***Monitor Setup*** > ***Defaults & Service***.
2. Select ***Exit DEMO*** > ***Confirm***.

   The monitor will shut down and restart in the normal monitoring mode utilizing the defined start up profile.

Profile settings

Profile settings are password protected. Profile settings are established during installation/configuration of the monitor. Instructions to access the profile settings are provided in this document. The profile setting factory default values are also provided.

Profile settings only apply to a specific profile. Profile settings have the following values:

- Saved values: Values selected and saved during configuration/installation of the monitor to meet the needs of a particular clinical environment.
- Factory default values: Permanent values used in case of failure that allow the software application to recover from failure by reverting to these values for system operation.

Profile settings generally share the same reset behavior. There are three types of reset:

- Case reset/discharge: Case is reset/patient is discharged from the monitor. Generally, the saved value is retained and used after the reset.
- Cold start: Start-up of the software application after the monitor is shut down for 2 hours or more. Generally, the saved value is retained and used after the reset.
- Warm start: Start-up of the software application after the monitor is shut down for less than 2 hours. Generally, the current value is retained and used after the reset.

Current patient settings

Current patient settings are non-password protected settings that are adjusted to meet the needs of the current patient. The current patient settings are not saved to the monitor's permanent memory, but most current patient settings are configured to persist over a warm start (CARESCAPE ONE is shut down for less than 2 hours).

Configuring care unit settings

To access and customize the care unit settings:

1. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup***.
2. Enter the ***Username***: **clinical**.
3. Enter the ***Password***: **Change Me**.

   This default password should be changed.
4. Select ***Care Unit Settings***.
5. Change the settings as needed in ***Alarms***, ***Parameter Alarms***, ***Admit/Discharge***, ***Units***, and ***Parameters***. All changes are automatically saved and applied.
   - To revert to the factory default care unit settings, end the case/discharge the patient and select ***Factory Default*** > ***Yes***.

Alarm settings

Select ***Care Unit Settings*** > ***Alarms*** to define the alarm settings for the care unit. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Show Alarm Limits	Enable the current alarm limits to display in parameter window.	Enabled				
Latching Alarms	Select the level of alarm priority to sound until the event is acknowledged.	***High***			None	
Alarm Light	Enable the alarm light to be turned off (***0% (Off) Allowed***).	Disabled			Enabled	Disabled
Audio Pause Time (min)	Select the number of minutes to pause audible alarms.	***2***				

Setting	Description	ED	ICU	NICU	OR	PACU
All Audio Pause 5 min	Select to allow all audio alarms including breakthrough alarms to be paused for 5 minutes.	Disabled				
Reminder Volume	Select the audible reminder volume.	***5***				
Audio Alarm	Enable audible alarms to be turned off (***Off Allowed***).	Disabled				
Alarm Tones	Select the audible alarm tone sounds.	***IEC***				
Low Priority Alarm Tone	Selects the audible alarm tone sound for low priority alarms.	***Single***				
Alarm Volume	Select whether the alarm volume adjusts all priority alarms (***Common for All***) or a separate volume for low priority alarms (***Separate for Low***).	***Common for All***				
Minimum Alarm Volume for: High&Med Priority	Select the minimum audible alarm volume for high and medium priority alarms.	***6***				
Minimum Alarm Volume for: Low Priority	Select the minimum audible alarm volume for low priority alarms.	***6***				

Parameter alarms settings

Select ***Care Unit Settings*** > ***Parameter Alarms*** to define the parameter alarms settings for the care unit. The following tables list the factory default settings.

Allowed Priorities ECG default settings

Setting	Description	ED	ICU	NICU	OR	PACU
Care Unit Settings > ***Parameter Alarms*** > ***Allowed Priorities ECG***> ***Page 1*** or ***Page 2***						
Tachy/Brady PR High/Low	Select if the low priority alarm setting is allowed.	Disabled				

Setting	Description	ED	ICU	NICU	OR	PACU
Arrhythmia Alarms ***Informational Allowed***	Select if informational level alarm setting is allowed for non-lethal arrhythmia alarms.	Enabled				
ST Alarms ***Informational Allowed***	Select if the informational level alarm setting is allowed.	Disabled				
V Tach	Select the allowed alarm priorities levels	***High***				
Noisy ECG, Arrh. Paused	Select the allowed alarm priorities levels for ***Noisy ECG*** and ***Arrhythmia paused***.	***Escalating, High***				
ECG Leads Off	Select the allowed alarm priorities levels.	***Escalating, High***				
ECG Lead Off	Select the allowed alarm priority levels.	***Low***				

***Allowed Priorities SpO2 & Pressures* default settings**

Setting	Description	ED	ICU	NICU	OR	PACU
Care Unit Settings > ***Parameter Alarms*** > ***Allowed Priorities SpO2 & Pressures*** > ***SpO2*** or ***Pressures***						
SpO2 Low ***Low Priority Allowed***	Select if the low priority alarm setting is allowed.	Disabled				
SpO2 Probe Off	Select the allowed alarm priorities levels.	***Escalating, High***				
IP High/Low	Select the allowed alarm priority levels.	***High, Medium***				
NIBP High/Low	Select the allowed alarm priority levels.	***Escalating, High***				

Allowed Priorities Other Parameters default settings

Setting	Description	ED	ICU	NICU	OR	PACU
Care Unit Settings > *Parameter Alarms* > *Allowed Priorities Other Parameters* > *Page 1* or *Page 2*						
Apnea (Imped.)	Select the allowed alarm priorities for impedance apnea alarms.	*Escalating, High*				
CO2 High/Low Escalating Allowed	Select if the escalating alarm priority is allowed.	Disabled				
RR (Imped.) High/Low	Select the allowed alarm priorities for impedance respiration rate high/low alarms.	*Escalating, High*				
Temperature Alarms Informational Allowed	Select if the informational level alarm setting is allowed.	Disabled				
Resp (Imped.) Meas. Paused	Select the allowed alarm priorities for impedance respiration measurement paused alarms.	*Escalating, High*				

Alarm Deactivation default settings

Setting	Description	ED	ICU	NICU	OR	PACU
Care Unit Settings > *Parameter Alarms* > *Alarm Deactivation* > *Page 1* or *Page 2*						
Allow alarm deactivation from the parameter menu for: SpO2 Probe Off	Select if the ***Deactivate SpO2 Probe Off*** option is enabled in the ***SpO2*** menu.	Disabled				
Allow alarm deactivation from the parameter menu for: Apnea (CO2)	Select if the ***Deactivate Apnea Alarm*** option is enabled in the CO_2 menu.	Disabled				
Allow alarm deactivation with the Audio Pause key for: ECG Leads Off	Select if the ***Leads off*** alarm can be deactivated with the **Audio Pause** button.	Disabled				
Allow alarm deactivation with the Audio Pause key for: Arterial Disconnect	Select if Art, Fem, and UAC disconnect alarms can be deactivated with the **Audio Pause** button.	Disabled				

Setting	Description	ED	ICU	NICU	OR	PACU
Allow alarm deactivation with the Audio Pause key for: SpO2 Probe Off	Select if the ***SpO2 probe off*** alarm can be deactivated with the **Audio Pause** button.	Disabled				
Allow alarm deactivation with the Audio Pause key for: Apnea (CO2/Imped.)	Select if apnea alarms can be deactivated with the **Audio Pause** button.	Disabled				

Admit/discharge settings

Select ***Care Unit Settings*** > ***Admit/Discharge*** or ***Start / Reset Case*** to define the discharge settings for the care unit. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Auto Discharge Time	Select the automatic discharge time.	***24 hours***			***15 min***	

Unit of measure settings

Select ***Care Unit Settings*** > ***Units*** to define the units of measure settings for the care unit. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Blood Pressure	Select the unit of measure for non-invasive and invasive pressure measurements.	***mmHg***				
CO2	Select the unit of measure for CO_2 measurement.	***%***(US only ***mmHg***)				
Temperature	Select the unit of measure for temperature measurement.	***°C***				
Height	Select the unit of measure for patient height.	***cm***				
Weight	Select the unit of measure for patient weight.	***kg***		***g***	***kg***	

Parameter settings

Select ***Care Unit Settings*** > ***Parameters*** to define the parameter settings for the care unit. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
HR Alarms	Select if HR alarms display and alarm from one HR source or more than one HR/PR source.	***Multiple***				
Allowed Arrh. Levels	Select the level of arrhythmias detected.	***Full, Lethal***				
NIBP Display Timeout	Select the time to gray out and clear NIBP measurements from the parameter window.	***60min/4h***			***5min***	***30min/1h***
NIBP Cycle Time Display	Select how the NIBP cycle time is displayed.	***Graphical***				
Beat Tone Sound	Select the volume of the beat tone sound.	***Soft***			***Sharp***	
Art Disconnect / ***Fem Disconnect*** / ***UAC Disconnect***	Select whether turning alarms off is allowed for each of these invasive pressures.	***Alarm Off Allowed***				

Configuring profile settings

To access and customize the profile settings:

1. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup***.
2. Enter the ***Username*** **clinical**.
3. Enter the ***Password*** **Change Me**.
4. Change the settings as needed in ***Alarm Delays*** and ***Invasive Pressures***.
5. Select ***Previous Menu*** until you return to the ***Default Setup*** page.
6. Select ***Save Profiles***.
   - To revert to the factory default profile settings, select ***Factory Default*** > ***Yes***.
   - To rename a factory default profile, first select the profile name in the ***Profile*** list, then select ***Rename*** and enter the new name.
   - To restrict the profiles that clinicians can select for the current patient, select the profile name in the ***Profile*** list, then deselect the ***Enable Profile*** check box.
   - To define a default startup profile, select a profile from the ***Startup Profile*** list.
   - To save current patient settings to a selected profile, first select the profile name in the ***Profile*** list, then select ***Save Settings to Profile***.
     If prompted to confirm patient settings, review the selected settings and confirm if applicable to the profile.

NOTE Some settings do not display in all software packages. These settings are indicated where appropriate as Not applicable.

Alarm delay settings

Select ***Alarm Delays*** to define the alarm delay settings. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
PR (SpO2/IP) high/low	5 s				
SpO2 high	5 s				
SpO2 low	5 s				
RR (Imped.) high	15 s (***Pediatric*** and ***Infant*** profiles: 10 s)		10 s	15 s (***Pediatric*** and ***Infant*** profiles: 10 s)	
RR (Imped.) low	15 s (***Pediatric*** and ***Infant*** profiles: 10 s)		10 s	15 s (***Pediatric*** and ***Infant*** profiles: 10 s)	

Invasive pressures alarms settings

Select ***Profile Settings*** > ***Invasive Pressures*** > ***Alarms*** to define the invasive pressures alarms settings.

Select ***Arterial*** tab to adjust the invasive pressures arterial alarms profile settings. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
Art Sys High Limit/Low Limit	180/80 (***Neuro*** profile: 160/90; ***Adolescent*** profile: 150/80; ***Pediatric*** profile: 130/70; ***Infant*** profile: 120/50) (US only ***Infant*** profile: 100/50)		90/40 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 100/40)	180/80 (***Neuro*** profile: 160/90; ***Perfusion*** profile: 120/40; ***Adolescent*** profile: 150/80; ***Pediatric*** profile: 130/70; ***Infant*** profile: 120/50) (US only ***Infant*** profile: 100/50)	180/80 (***Neuro*** profile: 160/90; ***Adolescent*** profile: 150/80; ***Pediatric*** profile: 130/70; ***Infant*** profile: 120/50) (US only ***Infant*** profile: 100/50)
Art Sys Alarm On	Enabled				

Setting	ED	ICU	NICU	OR	PACU
Art Mean High Limit/Low Limit	140/60 (***Adolescent*** profile: 110/50; ***Pediatric*** profile: 100/50; ***Infant*** profile: 80/40)		60/30 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 70/40) (US only: 70/30; ***Cardiac*** and ***Full-term*** profiles: 70/40; ***Infant*** profile: 80/40)	140/60 (***Adolescent*** profile: 110/50; ***Pediatric*** profile: 100/50; ***Infant*** profile: 80/40)	
Art Mean Alarm On	Disabled (***Adolescent***, ***Pediatric***, and ***Infant*** profiles: Enabled) (US only: Enabled)		Enabled	Disabled (***Adolescent***, ***Pediatric***, and ***Infant*** profiles: Enabled) (US only: Enabled)	
Art Dia High Limit/Low Limit	100/40 (***Adolescent*** and ***Pediatric*** profiles: 80/40; ***Infant*** profile: 70/30)		50/20 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 60/20) (US only: ***Infant*** profile: 70/20)	100/40 (***Adolescent*** and ***Pediatric*** profiles: 80/40; ***Infant*** profile: 70/30)	
Art Dia Alarm On	Disabled (US only: Enabled)				
PR(Art) High Limit/Low Limit	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)		200/90 (***Infant*** profile: 180/80)	160/40 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Adolescent*** profile: 150/50; ***Infant*** profile: 180/80)	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)
PR(Art) Alarm On	Enabled (***Perfusion*** profile: Disabled)				

Setting	ED	ICU	NICU	OR	PACU
Fem Sys High Limit/Low Limit	180/80 (***Neuro*** profile: 160/90; ***Adolescent*** profile: 150/80; ***Pediatric*** profile: 130/70; ***Infant*** profile: 120/50) (US only: ***Infant*** profile: 100/50)		90/40 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 100/40) (US only: ***Cardiac*** and ***Full-term*** profiles: 100/40; ***Infant*** profile: 100/50)	180/80 (***Neuro*** profile: 160/90; ***Adolescent*** profile: 150/80; ***Pediatric*** profile: 130/70; ***Infant*** profile: 120/50) (US only: ***Infant*** profile: 100/50)	
Fem Sys Alarm On	Enabled				
Fem Mean High Limit/Low Limit	140/60 (***Adolescent*** profile: 110/50; ***Pediatric*** profile: 100/50; ***Infant*** profile: 80/40)		60/30 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 70/40) (US only: ***Infant*** profile: 80/40)	140/60 (***Adolescent*** profile: 110/50; ***Pediatric*** profile: 100/50; ***Infant*** profile: 80/40)	
Fem Mean Alarm On	Disabled (***Adolescent***, ***Pediatric***, and ***Infant*** profiles: Enabled) (US only: Enabled)		Enabled	Disabled (***Adolescent***, ***Pediatric***, and ***Infant*** profiles: Enabled) (US only: Enabled)	
Fem Dia High Limit/Low Limit	100/40 (***Adolescent*** and ***Pediatric*** profiles: 80/40; ***Infant*** profile: 70/30)		50/20 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 60/20) (US only: ***Infant*** profile: 70/20)	100/40 (***Adolescent*** and ***Pediatric*** profiles: 80/40; ***Infant*** profile: 70/30)	
Fem Dia Alarm On	Disabled (US only: Enabled)				
PR(Fem) High Limit/Low Limit	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)		200/90 (***Infant*** profile: 180/80)	160/40 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Adolescent*** profile: 150/50; ***Infant*** profile: 180/80)	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)

Setting	ED	ICU	NICU	OR	PACU
PR(Fem) Alarm On	Enabled (US only: Disabled)			Enabled (***Perfusion*** profile: Disabled)	Enabled (US only: Disabled)
UAC Sys High Limit/Low Limit	90/40		90/40 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 100/40) (US only: ***Infant*** profile: 100/50)	90/40	
UAC Sys Alarm On	Disabled (US only: NICU software package Enabled)				
UAC Mean High Limit/Low Limit	70/30		60/30 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 70/40) (US only: 70/30; ***Infant*** profile: 80/40)	70/30	
UAC Mean Alarm On	Enabled				
UAC Dia High Limit/Low Limit	50/20		50/20 (***Cardiac***, ***Full-term***, and ***Infant*** profiles: 60/20) (US only: ***Infant*** profile: 70/20)	50/20	
UAC Dia Alarm On	Disabled				
PR(UAC) High Limit/Low Limit	150/50		200/90 (***Infant*** profile: 180/80)	150/50	
PR(UAC) Alarm On	Enabled (***Perfusion*** profile: Disabled)				

Select ***Venous*** tab to adjust the invasive pressures venous alarm profile settings. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
CVP Mean High Limit/Low Limit	15/0 (***Infant*** profile: 10/0)		5/0	15/0 (***Infant*** profile: 10/0; ***Perfusion*** profile: 15/-5)	
CVP Mean Alarm On	Enabled	Enabled (***Trauma*** and ***Neuro*** profiles: Disabled)	Enabled		
UVC Mean High Limit/Low Limit	15/0				
UVC Mean Alarm On	Disabled				
FemV Mean High Limit/Low Limit	15/0 (***Infant*** profiles: 10/0)		5/0	15/0 (***Infant*** profiles: 10/0)	
FemV Mean Alarm On	Enabled				

Select ***PA, ICP & P1-P2*** tab to adjust the invasive pressures alarm profile settings. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
PA Sys High Limit/Low Limit	40/10				
PA Sys Alarm On	Disabled (US only: Enabled)				
PA Mean High Limit/Low Limit	30/5				
PA Mean Alarm On	Enabled				
PA Dia High Limit/Low Limit	20/5				
PA Dia Alarm On	Enabled (***Trauma*** and ***Neuro*** profiles: Disabled)	Enabled			
ICP Mean High Limit/Low Limit	15/0 (***Infant*** profile: 9/0)		9/0	15/0 (***Infant*** profile: 9/0)	
ICP Mean Alarm On	Enabled				
CPP High Limit/Low Limit	100/60 (***Infant*** profile: 90/50)		100/40	100/60 (***Infant*** profile: 90/50)	
CPP Alarm On	Enabled				

Setting	ED	ICU	NICU	OR	PACU
P1-P2 Mean High Limit/Low Limit	15/0 (***Infant*** profile: 10/0)		5/0	15/0 (***Infant*** profile: 10/0; ***Perfusion*** profile: 15/-5)	
P1-P2 Mean Alarm On	Enabled	Enabled (***Neuro*** and ***Trauma*** profiles: Disabled)	Enabled		

Select ***Ventricular & Atrial*** tab to adjust the invasive pressures ventricular and atrial alarm profile settings. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
RAP Mean High Limit/Low Limit	15/0 (***Pediatric*** and ***Infant*** profiles: 10/0) (US only: 15/-5) (US only: ICU software package ***Pediatric*** and ***Infant*** profiles: 15/0)		5/0	15/0 (***Pediatric*** and ***Infant*** profiles: 10/0)	15/0 (US only: 15/-5) (***Pediatric*** and ***Infant*** profiles: 10/0)
RAP Mean Alarm On	Enabled				
RVP Mean High Limit/Low Limit	35/5 (***Pediatric*** and ***Infant*** profiles: 25/5)		25/5	35/5 (***Pediatric*** and ***Infant*** profiles: 25/5)	
RVP Mean Alarm On	Enabled				
LAP Mean High Limit/Low Limit	20/5 (***Pediatric*** and ***Infant*** profiles: 15/5)		10/2	20/5 (***Pediatric*** and ***Infant*** profiles: 15/5)	
LAP Mean Alarm On	Enabled				

Invasive pressures settings for labels

Selecting a new channel label for a channel will apply the following label default settings to the current patient. Once a new label is selected, the channel's default settings can be changed for the current patient and also saved as the channel's profile setting defaults.

- When any channel label other than the default channel label is selected:
  - ***Filter Hz***: 12
- When ***Art*** is selected as the channel label:
  - ***Catheter Disconnect***: Enabled
  - ***Display Format***: ***Sys/Dia (Mean)***
  - ***Show Pulse Rate***: Disabled
  - ***Primary Arterial Source***: ***AUTO***
  - ***Smart BP***: Enabled
  - ***Scale mmHg*** (waveform):

- ED, ICU, OR, and PACU software packages: 0-200
- NICU software package: 0-100

- When ***Fem*** is selected as the channel label:
  - ***Catheter Disconnect***: Enabled
  - ***Display Format***: ***Sys/Dia (Mean)***
  - ***Show Pulse Rate***: Disabled
  - ***Primary Arterial Source***: ***AUTO***
  - ***Smart BP***: Enabled
  - ***Scale mmHg*** (waveform):
    - ED, ICU, OR, and PACU software packages: 0-200
    - NICU software package: 0-100
- When ***UAC*** is selected as the channel label:
  - ***Catheter Disconnect***: Enabled
  - ***Display Format***: ***Sys/Dia (Mean)***
  - ***Show Pulse Rate***: Disabled
  - ***Primary Arterial Source***: ***AUTO***
  - ***Scale mmHg*** (waveform):
    - ED, ICU, OR, and PACU software packages: 0-120
    - NICU software package: 0-100
- When ***CVP***, ***FemV***, ***RAP***, ***UVC***, ***P1***, or ***P2*** are selected as the channel label:
  - ***Scale mmHg*** (waveform):
    - ED, ICU, OR, and PACU software packages: 0-20
    - NICU software package: 0-10
- When ***ICP*** is selected as the channel label:
  - ***Scale mmHg*** (waveform):
    - ED, ICU, OR, and PACU software packages: 0-30
    - NICU software package: 0-20
- When ***LAP*** is selected as the channel label:
  - ***Scale mmHg*** (waveform) for all software packages: 0-20
- When ***PA*** or ***RVP*** is selected as the channel label:
  - ***Scale mmHg*** (waveform):
    - ED, ICU, OR, and PACU software packages: 0-60
    - NICU software package: 0-40

Select ***Profile Settings*** > ***Invasive Pressures*** > ***Colors*** > ***Page 1*** or ***Page 2*** to define the invasive pressures colors settings for labels. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
Art	Red				
Fem	Red				

Setting	ED	ICU	NICU	OR	PACU
UAC	Red				
CVP	Cyan				
FemV	Cyan				
UVC	White				
PA	Yellow				
RAP	White (US only Cyan)				
RVP	White				
LAP	White				
ICP	White				
P1-P2	White				

Configuring locking settings

Some profile and care unit settings can be locked. Clinicians cannot adjust locked settings for the current patient.

Select ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup*** > ***Locking Settings***.

Parameter locking settings

Select ***Locking Settings***> ***Parameters*** to define the parameter locking settings. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
ECG: ST Analysis	Unlocked				
ECG: QRS Width	Unlocked (***Pediatric*** and ***Infant*** profiles: Locked)		Locked	Unlocked (***Pediatric*** and ***Infant*** profiles: Locked)	
ECG: Pause Interval	Unlocked				

Alarm locking settings

Select ***Locking Settings*** > ***Alarms*** to define the alarm locking settings. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
HR Alarm - Single: Tachy/Brady Alarm	Unlocked				
HR Alarm - Multiple: Tachy/Brady Alarm	Unlocked				
PR(SpO2) Alarm	Unlocked				
PR(UAC) Alarm	Unlocked				
PR(Art) Alarm	Unlocked				

Setting	ED	ICU	NICU	OR	PACU
PR(Fem) Alarm	Unlocked				
ST(I) Alarm	Unlocked				
ST(II) Alarm	Unlocked				
ST(III) Alarm	Unlocked				
ST(aVR) Alarm	Unlocked				
ST(aVL) Alarm	Unlocked				
ST(aVF) Alarm	Unlocked				
ST(V1) Alarm	Unlocked				
ST(V2/dV2) Alarm	Unlocked				
ST(V3/dV3) Alarm	Unlocked				
ST(V4/dV4) Alarm	Unlocked				
ST(V5) Alarm	Unlocked				
ST(V6/dV6) Alarm	Unlocked				
Frequent PVCs Alarm	Unlocked				
Frequent SVCs Alarm	Unlocked				
SpO2 Alarm	Unlocked				
NIBP(Sys) Alarm	Unlocked				
NIBP(Mean) Alarm	Unlocked				
NIBP(Dia) Alarm	Unlocked				
UAC(Sys) Alarm	Unlocked				
UAC(Mean) Alarm	Unlocked				
UAC(Dia) Alarm	Unlocked				
Art(Sys) Alarm	Unlocked				
Art(Mean) Alarm	Unlocked				
Art(Dia) Alarm	Unlocked				
Fem(Sys) Alarm	Unlocked				
Fem(Mean) Alarm	Unlocked				
Fem(Dia) Alarm	Unlocked				
UVC(Mean) Alarm	Unlocked				
CVP(Mean) Alarm	Unlocked				
FemV(Mean) Alarm	Unlocked				
PA(Sys) Alarm	Unlocked				
PA(Mean) Alarm	Unlocked				
PA(Dia) Alarm	Unlocked				
RAP(Mean) Alarm	Unlocked				
RVP(Mean) Alarm	Unlocked				

Setting	ED	ICU	NICU	OR	PACU
LAP(Mean) Alarm	Unlocked				
ICP(Mean) Alarm	Unlocked				
CPP Alarm	Unlocked				
P1(Mean) Alarm	Unlocked				
P2(Mean) Alarm	Unlocked				
RR (Imped.) Alarm	Unlocked				
Cardiac Artifact Alarm	Unlocked				
FiCO2 Alarm	Unlocked				
T1 Alarm	Unlocked				
T2 Alarm	Unlocked				
T2-T1 Alarm	Unlocked				

Configuring Time & Date settings

Time & Date can be changed during an active case/admitted patient.

CAUTION MISINTERPRETATION OF HISTORICAL DATA. To avoid possible misinterpretation of historical data when viewing it, special attention should always be paid to the time and date information.

1. Select ***Monitor Setup*** > ***Defaults & Service*** > ***Default Setup***.
2. Enter the ***Username***: **clinical**.
3. Enter the ***Password***: **Change Me**.
4. Select ***Time & Date***.
5. Change the settings as needed for ***Day***, ***Month***, ***Year***, ***Hour***, ***Min***, and ***Time Format***.
6. Select ***Confirm***.

Time Format settings

Select ***Time & Date*** > ***Time Format*** to define the time format. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
Time Format	*24 h*				

Configuring current patient settings

Current patient settings are non-password protected settings that are adjusted to meet the needs of the current patient. They are saved to the monitor's permanent memory, but only until the case is reset/patient is discharged. For more information, refer to the user information provided.

NOTE Some settings do not display in all software packages. These settings are indicated where appropriate as not applicable.

Alarm limits settings

Select ***Alarms Setup*** > ***Alarm Limits*** to adjust the parameter alarm high/low settings for the current patient.

Alarm priority settings

Select ***Alarms Setup*** > ***Alarm Priorities*** to adjust the alarm priority settings for the current patient. For more information, refer to the user information provided. The following table lists the factory default settings.

Select the ***ECG*** tab to adjust the ECG alarm priority settings for the current patient. For more information, refer to the user information provided. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
Tachy/Brady PR high/low	*Escalating*		*High*	*Escalating*	
ST Segment high/low	*Medium*		*Low*	*Medium*	
Frequent PVCs	*Low*			*Escalating*	*Low*
Frequent SVCs	*Low*				
ECG lead off	*Low*				
ECG leads off	*Escalating*				
Noisy ECG	*Escalating*				
Arrhythmia paused	*Escalating*				

Select the ***Invasive Pressures*** tab to adjust the invasive pressure alarm priority settings for the current patient. For more information, refer to the user information provided. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
UAC high/low	*Medium*				
Art high/low	*Medium*				
Fem high/low	*Medium*				
UVC high/low	*Medium*				
CVP high/low	*Medium*				
FemV high/low	*Medium*				
PA high/low	*Medium*				
RAP high/low	*Medium*				
RVP high/low	*Medium*				
LAP high/low	*Medium*				
ICP high/low	*Medium*				
CPP high/low	*Medium*				
P1 high/low	*Medium*				
P2 high/low	*Medium*				

Select the ***Other Parameters*** tab to adjust other parameter alarm priority settings for the current patient. For more information, refer to the user information provided. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
SpO2 high	*Escalating*				
SpO2 low	*Escalating*				
SpO2 probe off	*Escalating*				
NIBP high/low	*Medium*				
RR (Imped.) high/low	*Escalating*				
Apnea (Imped.)	*Escalating*				
Resp (Imped.) measurement paused	*Escalating*				
RR (CO2) high/low	*Escalating*				
Apnea (CO2)	*Escalating*				
CO2 high/low	*Medium*				
Temp high/low	*Escalating*				

Arrhythmia alarm settings

Lethal alarm settings

Select ***Alarms Setup*** > ***Arrhythmia*** > ***Lethal Alarms*** to adjust the lethal arrhythmia alarm settings for the current patient.

Select ***Asy V Fib*** and ***V Tach*** for all available settings.

The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Asystole > ***Alarm Priority***	Define the alarm priority.	***High***				
Asystole > ***Create Snapshot***	Enable automatic snapshot on alarm.	Enabled				
V Fib / V Tach > ***Alarm Priority***	Define the alarm priority.	***High***				
V Fib / V Tach > ***Create Snapshot***	Enable automatic snapshot on alarm.	Enabled				
V Tach > ***Alarm Priority***	Define the alarm priority.	***High***				
V Tach > ***Create Snapshot***	Enable automatic snapshot on alarm.	Enabled				
V Tach Criteria: HR for V Tach/min	Define the criteria for V Tach detection.	100		160	100	

Ventricular alarm settings

Select ***Alarms Setup*** > ***Arrhythmia*** > ***Ventricular Alarms*** to adjust the ventricular arrhythmia alarm settings for the current patient.

The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
VT > 2 > ***Alarm Priority***	Define the alarm priority.	***Medium***				
VT > 2 > ***Create Snapshot***	Enable automatic snapshot on alarm.	Enabled				
R on T > ***Alarm Priority***	Define the alarm priority.	***Medium***				
R on T > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled				
V Brady > ***Alarm Priority***	Define the alarm priority.	***Medium***			***High***	***Medium***
V Brady > ***Create Snapshot***	Enable automatic snapshot on alarm.	Enabled				
Couplet > ***Alarm Priority***	Define the alarm priority.	***Low***				
Couplet > ***Create Snapshot***	Enable automatic snapshot on alarm.	Enabled				
Bigeminy > ***Alarm Priority***	Define the alarm priority.	***Low***				
Bigeminy > ***Create Snapshot***	Enable automatic snapshot on alarm.	Enabled				
Accelerated Ventricular > ***Alarm Priority***	Define the alarm priority.	***Low***				
Accelerated Ventricular > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled		Enabled	Disabled	
Trigeminy > ***Alarm Priority***	Define the alarm priority.	***Low***				
Trigeminy > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled		Enabled		Disabled
Multifocal PVCs > ***Alarm Priority***	Define the alarm priority.	***Off***				
Multifocal PVCs > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled				

Atrial alarm settings

Select ***Alarms Setup*** > ***Arrhythmia*** > ***Atrial Alarms*** to adjust the atrial arrhythmia alarm settings for the current patient.

Select ***A Fib***, ***SV Tachy***, and ***Pause*** for all available settings.

The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Pause > ***Alarm Priority***	Define the alarm priority.	***Low***				
Pause > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled			Enabled	Disabled
Pause Criteria: Pause Interval	Select the time interval between two adjacent beats before ***Pause*** alarm sounds.	***3 s***		***5 s***	***3 s***	
A Fib > ***Alarm Priority***	Define the alarm priority.	***Off***		Not applicable	***Low***	***Off***
A Fib > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled		Not applicable	Disabled	
Irregular > ***Alarm Priority***	Define the alarm priority. NICU package only.	Not applicable		***Low***	Not applicable	
Irregular > ***Create Snapshot***	Enable automatic snapshot on alarm. NICU package only.	Not applicable		Enabled	Not applicable	
Missing Beat > ***Alarm Priority***	Define the alarm priority.	***Off***		Not applicable	***Low***	***Off***
Missing Beat > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled		Not applicable	Disabled	
SV Tachy > ***Alarm Priority***	Define the alarm priority.	***Off***				
SV Tachy > ***Create Snapshot***	Enable automatic snapshot on alarm.	Disabled				
SV Tachy Criteria: SVT Length	Define the number of beats before the ***SV Tachy*** alarm sounds.	***6 Beats***				
HR for SVT/min	Define the beats per minute before the ***SV Tachy*** alarm sounds.	***120***		***180***	***120***	

Arrhythmia alarm setup settings

Select ***Alarms Setup*** > ***Arrhythmia*** > ***Setup*** to adjust the arrhythmia detection level setting for the current patient.

The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Arrhythmia Level	Define the arrhythmia detection level.	***Full***			***Lethal*** (***Perfusion*** profile: ***Off***)	***Full***

Audible and visual alarm settings

Select ***Alarms Setup*** > ***Audible & Visual*** to adjust the audible and visual alarm settings for the current patient.

Select the ***Audio Pause*** and ***Volume & Light*** tabs for all available settings.

The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Set audible alarms permanently Off	Select an option to silence audible alarms.	***None*** (OR software package ***Perfusion*** profile: ***Apnea & ECG Audio Off***)				
Alarm Light %	Select alarm light percent.	***100***				
Alarm Volume	Select the audible alarm tone volume. This setting appears when the ***Alarm Volume Control*** setting is set to ***Common for All***.	***7***			***6***	***7***
Alarm Volume for: High & Medium Priority	Select the audible alarm tone volume. This setting appears when the ***Alarm Volume Control*** setting is set to ***Separate for Low***.	***7***			***6***	***7***
Alarm Volume for: Low Priority	Select the audible alarm tone volume. This setting appears when the ***Alarm Volume Control*** setting is set to ***Separate for Low***.	***7***			***6***	***7***

Monitor screen settings

Select ***Monitor Setup*** > ***Screen Setup*** to adjust the screen settings for the current patient.

Invasive pressures color settings for channels

Select ***Monitor Setup*** > ***Colors*** > ***Invasive Pressures*** to adjust the channel color settings for the current patient. The following table lists the factory default settings.

NOTE Only the factory default site labels for invasive pressure channels 1 and 2 are shown in the table.

Setting	ED	ICU	NICU	OR	PACU
Art 1 (***UAC 1*** in NICU software package)	Red				
CVP 2 (***UVC 2*** in NICU software package)	Cyan		White	Cyan	

Other parameters color settings

Select ***Monitor Setup*** > ***Colors*** > ***Other Parameters*** to adjust the color settings for the current patient. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
ECG	Green				
SpO2	Yellow				
NIBP	Red				
Resp	White				
Temp	White				
CO2	White				

Monitor sound settings

Select ***Monitor Setup*** > ***Sound Volumes*** to adjust the volume settings for the current patient. The following table lists the factory default settings.

Setting	ED	ICU	NICU	OR	PACU
Alarm Volume This setting appears when the ***Alarm Volume Control*** setting is set to ***Common for All***.	***7***			***6***	***7***
Alarm Volume for: High & Medium Priority This setting appears when the ***Alarm Volume Control*** setting is set to ***Separate for Low***.	***7***			***6***	***7***

Setting	ED	ICU	NICU	OR	PACU
Alarm Volume for: Low Priority This setting appears when the ***Alarm Volume Control*** setting is set to ***Separate for Low***.		*7*		*6*	*7*
Beat Volume		*0*		*5*	*0*
Touch Volume			*2*		
Completed NIBP Volume			*3*		

Monitor parameter settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** to adjust the parameter settings for the current patient.

For more information, refer to the user information provided.

Admit/discharge or start/end case settings

Select ***Pt. Data & Trends*** > ***Admit/Discharge*** or ***Start / Reset Case*** > ***Patient*** to adjust the admit/discharge or start/end case settings for the current patient/case. Some settings remain blank (empty) until a value is selected for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
MRN: ***Second ID***	Select to enter the patient's medical record number and second ID.			Blank		
Name:	Select to enter the patient's name.			Blank		
Profile	Select the monitor profile.		*Medical*	*Premature*	*General*	

Select ***Pt. Data & Trends*** > ***Admit/Discharge*** or ***Start / Reset Case*** > ***Patient***, then select the ***Date of Birth: Age:*** field to open the ***Edit Demographics*** window ***Page 1*** tab, or select the ***Height: Weight: BSA: Gender: Ethnicity:*** field to open the ***Edit Demographics*** window ***Page 2*** tab. Some settings remain blank (empty) until a value is selected for the current patient. The following table lists the factory default settings for the settings in the ***Edit Demographics*** window.

Setting	Description	ED	ICU	NICU	OR	PACU
Date of Birth	Select the patient's birth day.	***15*** (***Infant*** profile: Current day)		Current day	***15*** (***Infant*** profile: Current day)	
	Select the patient's birth month.	***June*** (***Infant*** profile: Current month)		Current month	***June*** (***Infant*** profile: Current month)	
	Select the patient's birth year. (Subtract number of years from today's year).	***-40*** (***Adolescent*** profile: ***-13***; ***Pediatric*** profile: ***-5***; ***Infant*** profile: ***0***)		***0***	***-40*** (***Adolescent*** profile: ***-13***; ***Pediatric*** profile: ***-5***; ***Infant*** profile: ***0***)	
Age	Select the patient's age.	***40*** (***Adolescent*** profile: ***13***; ***Pediatric*** profile: ***5***; ***Infant*** profile: ***0***)		***0***	***40*** (***Adolescent*** profile: ***13***; ***Pediatric*** profile: ***5***; ***Infant*** profile: ***0***)	
	Select the unit of measure for the patient's age.	***Years*** (***Infant*** profile: ***Days***)		***Days***	***Years*** (***Infant*** profile: ***Days***)	
Height cm	Select the patient's height.	***170*** (***Adolescent*** profile: ***150***; ***Pediatric*** profile: ***115***; ***Infant*** profile: ***65***)		***40***	***170*** (***Adolescent*** profile: ***150***; ***Pediatric*** profile: ***115***; ***Infant*** profile: ***65***)	
Weight kg or ***Weight g***	Select the patient's weight. The unit of measure for all software packages is kg, except NICU, which is g.	***80*** (***Adolescent*** profile: ***40***; ***Pediatric*** profile: ***20***; ***Infant*** profile: ***8***)		***1500***	***80*** (***Adolescent*** profile: ***40***;***Pediatric*** profile: ***20***; ***Infant*** profile: ***8***)	
BSA m2	Select the patient's BSA.	***1*** (If ***Height:*** and ***Weight:*** are entered for the current patient, the BSA value is automatically calculated. The calculated BSA value will replace the factory default value.)				
Gender	Select the patient's gender.	***Not Selected***				
Ethnicity	Select the patient's ethnicity.	***Caucasian***				

Trend settings

Select ***Pt. Data & Trends*** > ***Trends Time Interval*** to adjust the numeric trends view settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Trends Time Interval	Select the time interval for numeric trends.	***5 min*** (***Trauma***, ***Cardiac***, ***Neuro***, ***Respiratory***, ***Pediatric***, ***Infant*** profiles: ***1 min***)	***15 min***		***5 min***	

Parameter default settings

NOTE Some settings do not display in all software packages. These settings are indicated where appropriate as not applicable.

NOTE High and low alarm limit values are fixed and no algorithms are used, and auto limits are off by default.

ECG default settings

Following are the ECG factory default settings.

ECG setup default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***ECG*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
ECG 1 Lead	Select the ECG 1 lead for 3-, 5, 6-, 10-lead and 12RL modes.	***II***				
ECG 2 Lead	Select the ECG 2 lead for 3-, 5-, 6-, 10-lead and 12RL modes.	***V1*** (3-lead mode: ***Cascade***; 5- and 6-lead mode: Va lead selection)			***V5*** (3-lead mode: ***Cascade***; 5-lead mode: Va lead selection; 6-lead mode: Vb lead selection)	***V1*** (3-lead mode: ***Cascade***; 5- and 6-lead mode: Va lead selection)
ECG 3 Lead	Select the ECG 3 lead for 3-, 5-, 6-, 10-lead and 12RL modes.	***aVL*** (3-lead mode: ***Cascade***)				

Setting	Description	ED	ICU	NICU	OR	PACU
Va Lead Position	Select the only V-lead label for 5-lead or the first V-lead label for 6-lead.	***V1***				
Vb Lead Position	Select the second V-lead label for 6-lead.	***V5***				
Beat Source	Select what is used as the beat source.	***Primary HR***				
Beat Volume	Select the audible QRS beep tone volume.	***0***			***5***	***0***
Beat Tone on Brady Only	Enable the audible QRS beep tone during bradycardia.	N/A		Disabled	N/A	
Size	Select the waveform size.	***1x***				
Hemo Sweep Speed	Select the hemodynamic waveform speed.	***25 mm/s***				
Primary HR Source	Select the parameter to calculate HR.	***AUTO***				

ECG advanced default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***ECG*** > ***Advanced*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Pacemaker Detection	Enable the pacemaker detection program.	***Sensitive***				
Waveform Filter	Select the filter for waveform display and printed strips.	***Monitoring***				
QRS Width	Adjust the monitor to detect certain types of QRS complexes.	***Normal*** (***Pediatric*** and ***Infant*** profiles: ***Narrow***)		***Narrow***	***Normal*** (***Pediatric*** and ***Infant*** profiles: ***Narrow***)	

Setting	Description	ED	ICU	NICU	OR	PACU
Lead Analysis	Select the lead(s) for ECG analysis when a 5-, 6-, 10-lead cable is connected.	***Multi lead*** (3-lead cable connected: ***Single lead***)				
Show with HR	Select the highest deviation ST value, PVC value, a second HR, or nothing to display in the ECG parameter window.	***Off***				
ECG Grid	Display a grid on waveforms.	Disabled				

ECG HR alarms default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***ECG*** > ***HR Alarms Arrhythmia*** > ***HR/PR*** to adjust these settings for the current patient when the ***HR Alarms*** care unit setting is ***Multiple***. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
HR alarm limits	Select the high/low alarm limits.	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)		200/90 (***Infant*** profile: 180/80)	160/40 (***Neuro*** profile: 120/50; ***Adolescent*** profile: 150/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)
HR alarm on	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled)				

Setting	Description	ED	ICU	NICU	OR	PACU
PR(SpO_2) alarm limits	Select the high/low alarm limits.	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)		200/90 (***Infant*** profile: 180/80)	160/40 (***Neuro*** profile: 120/50; ***Adolescent*** profile: 150/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)
PR(SpO_2) alarm on	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled)				
PR(UAC) alarm limits	Select the high/low alarm limits.	150/50		200/90 (***Infant*** profile: 180/80)	150/50	
PR(UAC) alarm on	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled)				
PR(Art) alarm limits	Select the high/low alarm limits.	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)		200/90 (***Infant*** profile: 180/80)	160/40 (***Neuro*** profile: 120/50; ***Adolescent*** profile: 150/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)
PR(Art) alarm on	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled)				
PR(Fem) alarm limits	Select the high/low alarm limits.	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)		200/90 (***Infant*** profile: 180/80)	160/40 (***Neuro*** profile: 120/50; ***Adolescent*** profile: 150/50; ***Pediatric*** profile: 170/70; ***Infant***	150/50 (***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80)

Setting	Description	ED	ICU	NICU	OR	PACU
					profile: 180/80)	
PR(Fem) alarm on	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled.				

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***ECG*** > ***HR Alarms*** ***Arrhythmia*** > ***PVC/SVC Arrhythmia*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
PVC alarm limit	Select the high alarm limit.	10			6	10
PVC alarm on	Enable alarm when limits are violated.	Enabled		Disabled		Enabled
SVC alarm limit	Select the high alarm limit.	10				
SVC alarm on	Enable alarm when limits are violated.	Disabled				

ECG arrhythmia alarm default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***Arrhythmia Priorities*** to adjust these settings for the current patient.

ST default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***ECG*** > ***ST*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
ST Analysis	Enable ST analysis.	***On*** (***Adolescent***, ***Pediatric*** and ***Infant*** profiles: ***Off***)		***Off***	***On*** (***Adolescent***, ***Pediatric*** and ***Infant*** profiles: ***Off***; ***Perfusion*** profile: ***Off***)	***On*** (***Adolescent***, ***Pediatric*** and ***Infant*** profiles: ***Off***)

ST alarms default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***ECG*** > ***ST*** > ***ST Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings. The settings for the individual ST leads ***I***, ***II***, ***III***, ***aVR***, ***aVL***, ***aVF***, and ***V1*** to ***V6*** can be adjusted.

Setting	Description	ED	ICU	NICU	OR	PACU
Alarm limits	Select the high/low alarm limits for each individual ST lead.			***2.0/-2.0***		
Alarms on/off	Enable alarm when limits are violated for each individual ST lead.			Enabled		

Impedance respiration default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***Impedance Respiration*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Resp Measurement	Enable respiration measurement.			***Off***		
Resp Lead	Select the lead to measure respiration.			***II***		
Sensitivity	Select the threshold breath detection value.			***40%***		
Size	Select the waveform display size.			***20%***		
Sweep Speed	Select the waveform display sweep speed.			***6.25 mm/s***		
Insp./Exp. Markers	Display inspiration and expiration markers on the respiration waveform.			Enabled		
Imped. Resp Smoothing	Enable respiration waveform smoothing.	Disabled (***Pediatric*** and ***Infant*** profiles: Enabled)		Enabled	Disabled (***Pediatric*** and ***Infant*** profiles: Enabled)	

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***Impedance Respiration*** > ***Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Resp Rate (Imped.) alarm limits	Select the high/low alarm limits.	40/4		75/20	40/***OFF*** (***Perfusion*** profile: ***OFF***/***OFF***)	40/4
Apnea Limit Seconds	Select medium elapsed time limit.	20				
Cardiac Artifact	Enable the ***Cardiac Artifact*** alarm.	***Alarm On***				

SpO_2 default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***SpO2*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Scale	Select the waveform display scale. GE TruSignal technology only.	***AUTO***				
Size	Select the waveform display size. Nellcor and Masimo SET technologies only.	***1x***				
Hemo Sweep Speed	Select the waveform display sweep speed.	***25 mm/s***				
Averaging	Select the averaging time. GE TruSignal and Masimo SET technologies only.	GE TruSignal technology: ***12 s*** (***Perfusion*** profile: ***5 s***) Masimo SET technology: ***8 s***				
Primary HR Source	Select the parameter to calculate HR.	***AUTO***				
Show Pulse Rate	Enable the pulse rate display.	Disabled				
Beat Volume	Select the volume of the pulse rate beat tone.	***0***			***5***	***0***
Beat Source	Select what is used as the beat source.	***Primary HR***				
Variable Beat Tone Source	Select what is used as the variable beat tone source.	***Off***				
Show Sat. Seconds	Enable SatSeconds display. Nellcor technology only.	Disabled				

Setting	Description	ED	ICU	NICU	OR	PACU
Saturation Seconds	Select the saturation seconds measurement option. Nellcor technology only.	***10***				
Response	Select the averaging time. Nellcor technology only.	***Normal***				
Sensitivity	Select the sensitivity. Masimo SET technology only.	***Normal***				

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***SpO2*** > ***Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
SpO2 alarm limits	Select the high/low alarm limits.	***OFF***/90 ***Neuro*** and ***Infant*** profiles: ***OFF***/94	***OFF***/90 ***Trauma*** profile: 100/90 ***Neuro*** profile: ***OFF***/94 ***Adoles-cent***, ***Pe-diatric***, and ***Infant*** profiles: ***OFF***/92	100/88 ***Infant*** profile: 100/92	***OFF***/90 ***Neuro*** and ***Infant*** profiles: ***OFF***/94	
SpO2 alarms on	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled)				
PR(SpO2) alarm limits	Select the high/low alarm limits.	150/50 ***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80		200/90 ***Infant*** profile: 180/80	160/40 ***Neuro*** profile: 120/50; ***Adolescent*** profile: 150/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80	150/50 ***Neuro*** profile: 120/50; ***Pediatric*** profile: 170/70; ***Infant*** profile: 180/80
PR(SpO2) alarms on	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled.)				

NIBP default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***NIBP*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
NIBP Auto	Enable automatic measurements.	Disabled				
Cycle Time	Select the amount of time between automatic measurements.	***5 min***	***15 min***	***10 min***	***5 min***	
Completed NIBP Volume	Select the tone volume that sounds when an NIBP measurement is complete.	***3***				
Display Format	Display the values display format.	***Sys/Dia (Mean)***				
Auto Initial Inflate	Enable automatic selection of initial cuff inflation pressure.	Enabled				
Init. Pressure mmHg	Select the adult cuff initial inflation pressure.	***135***				
	Select the child cuff initial inflation pressure.	***125***				
	Select the infant cuff initial inflation pressure.	***100***				
Cuff Size	Select the cuff size.	***(Not Selected)*** (***Adolescent*** profile: ***Adult***; ***Pediatric*** profile: ***Child***; ***Infant*** profile: ***Infant***)		***Infant***	***(Not Selected)*** (***Adolescent*** profile: ***Adult***; ***Pediatric*** profile: ***Child***; ***Infant*** profile: ***Infant***)	

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***NIBP*** > ***Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Systolic alarm limits	Select the high/low adult alarm limits.	180/80 (***Adolescent*** profile: 150/80. OR ***Neuro*** profile: 160/80.)				
	Select the high/low child alarm limits.	130/70		120/70	130/70	
	Select the high/low infant alarm limits.	120/50		90/40 (***Cardiac***, ***Full-term*** and ***Infant*** profiles: 100/40.)	120/50	
Systolic alarm on	Enable alarm when limits are violated.	Enabled				
Mean alarm limits	Select the high/low adult alarm limits.	140/60 (***Adolescent*** profile: 110/50)		140/60	140/60 (***Adolescent*** profile: 110/50)	
	Select the high/low child alarm limits.	100/50		90/50	100/50	
	Select the high/low infant alarm limits.	80/40		60/30 (***Cardiac***, ***Full-term*** and ***Infant*** profiles: 70/40.)	80/40	
Mean alarm on	Enable alarm when limits are violated.	Disabled (***Infant*** profile: Enabled)	Disabled (***Adolescent*** profile: Enabled	Enabled	Disabled (***Infant*** profile: Enabled)	
Diastolic alarm limits	Select the high/low adult alarm limits.	100/40 (***Adolescent*** profile: 80/40; OR software package ***Neuro*** profile: 90/40.)				
	Select the high/low child alarm limits.	80/40		60/40	80/40	
	Select the high/low infant alarm limits.	70/30		50/20 (***Cardiac***, ***Full-term*** and ***Infant*** profiles: 60/20.)	70/30	
Diastolic alarm on	Enable alarm when limits are violated.	Disabled				

Invasive pressures default settings

Invasive pressure channel labels and channel numbers both have default settings. If you change a pressure channel label, the channel's default settings will change to the selected label's default settings. Once a new label is selected, the channel's default

settings can be changed for the current patient and also saved as the channel's profile setting defaults. For example, if the channel 1 label ***Art 1*** is changed to ***RAP 1***, the ***RAP 1*** label default settings are applied to channel 1 for the current patient. The current patient settings can be changed and also saved the channel 1 profile settings defaults. If no label is selected for a channel, then the channel's default settings are used.

Invasive pressure channel 1 defaults to the channel label ***Art*** in the ED, ICU, OR, and PACU software packages. It defaults to the channel label ***UAC*** in the NICU software package. Invasive pressure channel 2 defaults to the channel label ***CVP*** in the ED, ICU, OR, and PACU software packages. It defaults to the channel label ***UVC*** in the NICU software package.

Art 1 pressure site default settings

The default ***P1*** pressure site for the ED, ICU, OR, and PACU software package is ***Art***. Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***Art 1*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	OR	PACU
Label	Select the pressure site label.	***Art***			
Scale mmHg	Select the waveform scale.	***0-200*** (***Adolescent*** profile: 0-170; ***Pediatric*** profile: 0-140; ***Infant*** profile: 0-120)		***0-200*** (***Perfusion*** profile: 0-120; ***Adolescent*** profile: 0-170; ***Pediatric*** profile: 0-140; ***Infant*** profile: 0-120	***0-200*** (***Adolescent*** profile: 0-170; ***Pediatric*** profile: 0-140; ***Infant*** profile: 0-120)
Hemo Sweep Speed	Select the waveform display sweep speed.	***25 mm/s***			
Display Format	Select the pressure values display format.	***Sys/Dia (Mean)***			
Primary HR Source	Select the parameter to calculate HR.	***AUTO*** (US only: ***ECG***)			
Show Pulse Rate	Enable the pulse rate display.	Disabled			

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***Art 1*** > ***Advanced*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	OR	PACU
Filter Hz	Select the waveform filter.	***12***			
Catheter Disconnect	Enable the disconnect alarm.	Enabled			

Setting	Description	ED	ICU	OR	PACU
Smart BP	Enable the Smart BP algorithm.	Enabled			
IABP On	Enable the IABP program.	Disabled			
Primary Arterial Source	Select the primary arterial source.	***AUTO***			

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***Art 1*** > ***Alarms*** > ***Art 1 Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	OR	PACU
Systolic alarm limits	Select the high/low alarm limits.	180/80 (***Adolescent*** profile: 150/80; ***Pediatric*** profile: 130/70; ***Infant*** profile: 120/50)			
Systolic alarms on	Enable alarm when limits are violated.	Enabled			
Mean alarm limits	Select the high/low alarm limits.	140/60 (***Adolescent*** profile: 110/50; ***Pediatric*** profile: 100/50; ***Infant*** profile: 80/40)			
Mean alarms on	Enable alarm when limits are violated.	Disabled			
Diastolic alarm limits	Select the high/low alarm limits.	100/40 (***Adolescent*** and ***Pediatric*** profiles: 80/40; ***Infant*** profile: 70/30)			
Diastolic alarms on	Enable alarm when limits are violated.	Disabled (***Adolescent***, ***Pediatric***, and ***Infant*** profiles: Enabled)			

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***Art 1*** > ***Alarms*** > ***PR***(***Art 1***) ***Alarms*** to adjust the heart rate alarm default settings for the current patient.

UAC 1 pressure site default settings

The default ***P1*** pressure site for the NICU software package is ***UAC***. Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***UAC 1*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	NICU
Label	Select the pressure site label.	***UAC***
Scale mmHg	Select the waveform scale.	***0-100*** (***Infant*** profile: 0-120)
Hemo Sweep Speed	Select the waveform display sweep speed.	***25 mm/s***
Display Format	Select the pressure values display format.	***Sys/Dia (Mean)***

Setting	Description	NICU
Primary HR Source	Select the parameter to calculate HR.	***AUTO*** (US only: ***ECG***)
Show Pulse Rate	Enable the pulse rate display.	Disabled

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***UAC 1*** > ***Advanced*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	NICU
Filter Hz	Select the waveform filter.	***12***
Catheter Disconnect	Enable the disconnect alarm.	Enabled
Primary Arterial Source	Select the primary arterial source.	***AUTO***

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***UAC 1*** > ***Alarms*** > ***UAC 1*** > ***Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	NICU
Systolic alarm limits	Select the high/low alarm limits.	90/40 (***Cardiac*** and ***Full-term*** profiles: 100/40; ***Infant*** profile: 100/50.)
Systolic alarms on/off	Enable alarm when limits are violated.	Enabled
Mean alarm limits	Select the high/low alarm limits.	60/30 (***Cardiac***, ***Full-term*** and ***Infant*** profiles: 70/40.)
Mean alarms on/off	Enable alarm when limits are violated.	Enabled
Diastolic alarm limits	Select the high/low alarm limits.	50/20 (***Cardiac*** and ***Full-term*** profiles: 60/20; ***Infant*** profile: 60/30.)
Diastolic alarms on/off	Enable alarm when limits are violated.	Disabled (***Infant*** profile: Enabled)

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***UAC 1*** > ***Alarms*** > ***UAC 1*** > ***Alarms*** > ***PR***(***UAC 1***) ***Alarms*** to adjust the heart rate alarm default settings for the current patient.

CVP 2 pressure site default settings

The default ***P2*** pressure site for the ED, ICU, OR, and PACU software package is ***CVP***. Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***CVP 2*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	OR	PACU
Label	Select the pressure site label.	***CVP***			
Scale mmHg	Select the waveform scale.	***0-20*** (***Infant*** profile: 0-10)			
Hemo Sweep Speed	Select the waveform display sweep speed.	***25 mm/s***			
Display Format	Select the pressure values display format.	***Mean only***			

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***CVP 2*** > ***Advanced*** to adjust the ***Filter Hz*** setting for the current patient. The factory default setting is ***12***.

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***CVP 2*** > ***Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	OR	PACU
Mean alarm limits	Select the high/low alarm limits.	15/0 (***Infant*** profile: 10/0)			
Mean alarms on/off	Enable alarm when limits are violated.	Enabled			

UVC 2 pressure site default settings

The default ***P2*** pressure site for the NICU software package is ***UVC***. Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***UVC 2*** > ***Setup*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	NICU
Label	Select the pressure site label.	***UVC***
Scale mmHg	Select the waveform scale.	***0-10***
Hemo Sweep Speed	Select the waveform display sweep speed.	***25 mm/s***
Display Format	Select the pressure values display format.	***Mean only***

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***UVC 2*** > ***Advanced*** to adjust the ***Filter Hz*** setting for the current patient. The factory default setting is ***12***.

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***UVC 2*** > ***Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	NICU
Mean alarm limits	Select the high/low alarm limits.	5/0 (***Infant*** profile: 10/0)
Mean alarms on/off	Enable alarm when limits are violated.	Enabled

CO_2 default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***CO2*** > ***Setup*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
Scale %	Select the CO_2 scale.	***0-6***				
CO2 Sweep Speed	Select the CO_2 sweep speed.	***6.25 mm/s***				
CO2 Average	Select the time window that is used to select the displayed CO_2 value.	***10 s***				
FiO2 level %	Select the level of FiO_2 used to make compensation to measured CO_2 values.	***21-40***				
N2O level %	Select the level of N_2O used to make compensation to measured CO_2 values.	***0-40***				

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 1*** > ***CO2*** > ***Alarms*** > ***Page 1*** or ***Page 2*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
$EtCO_2$ alarm limits	Select the high/low alarm limits (%).	8/3 (***Neuro*** and ***Trauma*** profiles: 6.0/2.7.)		8/3	8/3 (***Neuro*** profile: 6.0/2.7; ***Perfusion*** profile: 8/0)	8/3 (***Neuro*** profile: 6/2.7)
$FiCO_2$ alarm limits	Select the high/low alarm limits (%).	3/***OFF***				
$FiCO_2$ alarms on/off	Enable alarm when limits are violated.	Enabled (OR software package ***Perfusion*** profile: Disabled)				

Setting	Description	ED	ICU	NICU	OR	PACU
Respiration Rate alarm limits	Select the high/low alarm limits.	60/***OFF***	60/***OFF*** (***Infant*** profile: 60/15.)	75/20	60/***OFF*** (***Perfusion*** profile: ***OFF/OFF***.)	60/***OFF***
Apnea limit seconds	Select the time delay before an apnea alarm is generated.	***20 s***				

Temperature default settings

T1, T2 default settings

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 2*** > ***Temperatures*** > ***Setup*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
T1 Measurement	Select the temperature site to display.	Enabled				
T1 Label	Select the temperature site label.	***T1***				
T2 Measurement	Select the temperature site to display.	Enabled				
T2 Label	Select the temperature site label.	***T2***				

Select ***Monitor Setup*** > ***Main Setup*** > ***Parameter Setup*** > ***Page 2*** > ***Temperatures*** > ***T1, T2 Alarms*** to adjust these settings for the current patient. The following table lists the factory default settings.

Setting	Description	ED	ICU	NICU	OR	PACU
T1 alarm limits	Select the high/low alarm limits.	38.5/34 (***Pediatric*** and ***Infant*** profiles: 38/35.5)		37.5/36	38.5/34 (***Pediatric*** and ***Infant*** profiles: 38/35.5)	
T2 alarm limits	Select the high/low alarm limits.	38.5/34 (***Pediatric*** and ***Infant*** profiles: 38/35.5)		37.5/36	38.5/34 (***Pediatric*** and ***Infant*** profiles: 38/35.5)	
T2 - T1 alarm limit	Select the high alarm limit.	4				
T1 alarms on/off	Enable alarm when limits are violated.	Disabled			Enabled (***Perfusion*** profile: Disabled)	Disabled

Setting	Description	ED	ICU	NICU	OR	PACU
T2 alarms on/off	Enable alarm when limits are violated.	Disabled			Enabled (***Perfusion*** profile: Disabled)	Disabled
T2 - T1 alarms on/off	Enable alarm when limits are violated.	Disabled				

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Supplies and accessories

About this list

This list indicates the supplies and accessories that are approved, specified and available for use with the CARESCAPE ONE.

To ensure patient safety, use only supplies and accessories listed in this document or recommended by GE.

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

WARNING DEFIBRILLATOR PRECAUTIONS. Patient signal inputs labeled with the CF and BF symbols with paddles are protected against damage resulting from defibrillation voltages. To ensure proper defibrillator protection, use only the recommended cables and leadwires. Using other cables or leadwires may result in damage to the equipment and compromise patient and user safety.

WARNING Use only approved accessories, including mounts, and defibrillator-proof cables and invasive pressure transducers. Other cables, transducers and accessories may cause a safety hazard, damage the equipment or system, result in increased emissions or decreased immunity of the equipment or system, or interfere with the measurement.

NOTE Some of the recommended accessories may have to be ordered from the OEM manufacturer.

Refer to the user manual for complete safety information.

Please note that some products are not available worldwide. You can check the availability with your local GE representative.

For technical documentation purposes this list refers to the OEM manufacturers as follows:

- CareFusion Finland 320 Oy: CareFusion
- Covidien LLC: Covidien
- GCX Corporation: GCX
- Masimo Corporation: Masimo
- Philips Respironics and Respironics Novametrix, LLC: Respironics

Ordering information

Contact your local GE representative to order supplies or accessories. Accessories without a GE part number must be ordered from the OEM manufacturer, and vice versa.

Parameter accessories

ECG accessories

GE Medical Systems *Information Technologies*, Inc. is the legal manufacturer of the following accessories:

Electrodes

Part number	Accessory description
2066468-001	4 Leadwire Expansion Cable, snap, AHA, 75 cm/29 in.
2066468-002	4 Leadwire Expansion Cable, snap, IEC, 75 cm/29 in.
2066468-003	4 Leadwire Expansion Cable, grabber, AHA, 75 cm/29 in.
2066468-004	4 Leadwire Expansion Cable, grabber, IEC, 75 cm/29 in.
2066468-005	4 Leadwire Expansion Cable, snap, AHA, 130 cm/51 in.
2066468-006	4 Leadwire Expansion Cable, snap, IEC, 130 cm/51 in.
2066468-007	4 Leadwire Expansion Cable, grabber, AHA, 130 cm/51 in.
2066468-008	4 Leadwire Expansion Cable, grabber, IEC, 130 cm/51 in.

For the following accessories, see the individual accessory product labeling for specific legal manufacturer and regulatory information (e.g., CE marking).

CareFusion leadwires

GE part number	Manufacturer part number	Accessory description
403751-007	403751-007	SET LDWR RTRAN GRAB, DIN 1.2 m/48 in, 5-ld, AHA
403751-009	403751-009	SET LDWR RTRAN GRAB, DIN 1.5 m/60 in, 5-ld, AHA
403751-019	403751-019	SET LDWR RTRAN GRAB 1.2 m/48 in, 5-ld, AHA
403751-023	403751-023	SET LDWR RTRAN GRAB 1.5 m/60 in, 5-ld, AHA
403751-025	403751-025	SET LDWR RTRAN GRAB 1.5 m/60 in, 5-ld, IEC
411202-001	411202-001	Multi-Link Leadwire Set, 5-Lead, Snap, AHA, 74 cm/29 in.
411202-002	411202-002	Multi-Link Leadwire Set, 5-Lead, Snap, AHA, 130 cm/51 in.
411202-003	411202-003	Multi-Link Leadwire Set, 5-Lead, Snap, IEC, 74 cm/29 in.
411202-004	411202-004	Multi-Link Leadwire Set, 5-Lead, Snap, IEC, 130 cm/51 in.
411203-001	411203-001	Multi-Link Leadwire Set, 3-Lead, Snap, AHA, 74 cm/29 in.
411203-002	411203-002	Multi-Link Leadwire Set, 3-Lead, Snap, AHA, 130 cm/51 in.
411203-003	411203-003	Multi-Link Leadwire Set, 3-Lead, Snap, IEC, 74 cm/29 in.

GE part number	Manufacturer part number	Accessory description
411203-004	411203-004	Multi-Link Leadwire Set, 3-Lead, Snap, IEC, 130 cm/51 in.
412681-001	412681-001	Multi-Link Leadwire Set, 5-lead, grabber, AHA, 74 cm/29 in.
412681-002	412681-002	Multi-Link Leadwire Set, 5-lead, grabber, AHA, 130 cm/51 in.
412681-003	412681-003	Multi-Link Leadwire Set, 5-lead, grabber, IEC, 74 cm/29 in.
412681-004	412681-004	Multi-Link Leadwire Set, 5-lead, grabber, IEC, 130 cm/51 in.
412682-001	412682-001	Multi-Link Leadwire Set, 3-lead, grabber, AHA, 74 cm/29 in.
412682-002	412682-002	Multi-Link Leadwire Set, 3-lead, grabber, AHA, 130 cm/51 in.
412682-003	412682-003	Multi-Link Leadwire Set, 3-lead, grabber, IEC, 74 cm/29 in.
412682-004	412682-004	Multi-Link Leadwire Set, 3-lead, grabber, IEC, 130 cm/51 in.
421930-001	421930-001	Multi-Link Leadwire Set, 6-lead, snap, AHA, 74 cm/29 in.
421930-002	421930-002	Multi-Link Leadwire Set, 6-lead, snap, AHA, 130 cm/51 in.
421931-001	421931-001	Multi-Link Leadwire Set, 6-lead, snap, IEC, 74 cm/29 in.
421931-002	421931-002	Multi-Link Leadwire Set, 6-lead, snap, IEC, 130 cm/51 in.
421932-001	421932-001	Multi-Link Leadwire Set, 6-lead, grabber, AHA, 74 cm/29 in.
421932-002	421932-002	Multi-Link Leadwire Set, 6-lead, grabber, AHA, 130 cm/51 in.
421933-001	421933-001	Multi-Link Leadwire Set, 6-lead, grabber, IEC, 74 cm/29 in.
421933-002	421933-002	Multi-Link Leadwire Set, 6-lead, grabber, IEC, 130 cm/51 in.
2052104-001	2052104-001	3-LEAD, SNAP, IEC, 100 cm/39 in.
2052104-002	2052104-002	5-LEAD, SNAP, IEC, 100 cm/39 in.
2052104-003	2052104-003	5-LEAD, SNAP, IEC, 75 cm/29 in.
2052104-005	2052104-005	3-LEAD, SNAP, AHA, 100 cm/39 in.
2052104-006	2052104-006	5-LEAD, SNAP, AHA, 100 cm/39 in.
2052104-007	2052104-007	5-LEAD, SNAP, AHA, 75 cm/29 in.
2052133-001	2052133-001	3-LEAD, GRABBER, IEC, 100 cm/39 in.
2052133-002	2052133-002	5-LEAD, GRABBER, IEC,, 100 cm/39 in.
2052133-003	2052133-003	5-LEAD, GRABBER, IEC, 75 cm/29 in.
2052133-005	2052133-005	3-LEAD, GRABBER, AHA, 100 cm/39 in.
2052133-006	2052133-006	5-LEAD, GRABBER, AHA, 100 cm/39 in.
2052133-007	2052133-007	5-LEAD, GRABBER, AHA, 75 cm/29 in.

CareFusion cables and leadwire accessories

GE part number	Manufacturer part number	Accessory description
414370-001	414370-001	Multi-Link 5-Lead DIN Converter
414371-001	414371-001	Multi-Link 3-Lead DIN Converter

GE part number	Manufacturer part number	Accessory description
414763-002	414763-002	Multi-Link Leadwire Separator, 3/5-Lead
416212-001	416212-001	Multi-Link Bedsheet Clip
2009101-403	2009101-403	Radiolucent Neonatal Cloth Monitoring Snap Electrodes, T832C
2009101-404	2009101-404	Radiolucent Neonatal Cloth Monitoring Electrodes w/Preattached Ldwrs, SR15-3 (B,W,R)
2009101-406	2009101-406	Radiolucent Neonatal Cloth Monitoring Electrodes w/Preattached Ldwrs, SR15-3 (Y,G,R)
2009109-003	2009109-003	Clear Tape Round, Solid Gel, T915-3
2009109-005	2009109-005	Clear Tape Round, Solid Gel, T915-5
2009109-050	2009109-050	Clear Tape Round, Solid Gel, T915-50
2009110-003	2009110-003	Foam Round Solid Gel, T715-3
2009110-005	2009110-005	Foam Round Solid Gel, T715-5
2009110-050	2009110-050	Foam Round Solid Gel, T715-50
2009110-050R	2009110-050R	Foam Round, Radiolucent, Solid Gel, T717C-50
2009110-050W	2009110-050W	Foam Round WetGel, T715W-50
2009110-150	2009110-150	Foam Round Solid Gel, T717-50
2009111-050	2009111-050	Cloth Round Solid Gel, T815-5
2009111-150	2009111-150	Cloth Round Solid Gel, T816-50
2014768-001	58542	Electrodes, ECG, SilverTRACE, MULTI P20MO, Ad, Foam Oval, Tab, 300/bx
2014775-001	58533	Electrodes, ECG, SilverTRACE, FIRST P28MO, Ad, Foam Rect, 300/bx
2014776-001	58544	Electrodes, ECG, SilverTRACE, FIRST P28MO, Ad, Foam Rect, 10/pouch, 1600/bx
2014777-001	58534	Electrodes, ECG, SilverTRACE, SOFT P55MO, Ad, Foam Rnd, 30/pch, 300/bx
2014780-001	58539	Electrodes, ECG, SilverTRACE, SOFT STRESS PS50MO, Ad, Foam Rnd, 300/cs
2014782-001	58540	KIT ELECTRODE SOLID GEL P40CL 300 PK
2014783-001	58541	Electrodes, ECG, SilverTRACE, WINDOW P50TR Vinyl Tape Rnd, 30/pch 300/cs
2014785-001	58549	Electrodes, ECG, SilverTRACE WINDOW P50TR Vinyl Tape Rnd, 7/pch, 350/cs

SpO_2 accessories

Nellcor OxiMax accessories

For the following accessories, see the individual accessory product labeling for specific legal manufacturer and regulatory information (e.g., CE marking).

Covidien sensors

GE part number	Manufacturer part number	Accessory description
2106258-004	P	Nellcor Pediatric OxiCliq single use, two-piece adhesive sensor
2106258-002	N	Nellcor Neonatal/Adult OxiCliq single use, two-piece adhesive sensor
2106258-003	I	Nellcor Infant OxiCliq single use, two-piece adhesive sensor
2106258-001	A	Nellcor Adult OxiCliq single use, two-piece adhesive sensor
2106258-006	MAX-R	Nellcor Adult OxiMax nasal single use sensor
414248-001	OXI-P/I	Toe Oxiband Sensor, Pediatric/Infant, OXI-P/I, 3-40 kg (6.6-88 lbs)
2016130-001	ADH-A/N	Nellcor Tape, ADH-A/N, for use with OXI-A/N 70124035
2016131-001	ADH-P/I	Nellcor Tape, ADH-P/I for use with OXI-P/I Sensors (#414248-001)
2028117-001	MAXAL	Nellcor OxiMax Adhesive Sensor, Adult Long
2069116-001	MAXFAST	MaxFast OxiMax forehead sensor, MAXFAST, >10 kg
2072896-001	SC-PR	Preemie SoftCare non-adhesive sensor, SC-PR, <1.5 kg
2072897-001	SC-NEO	Neonate SoftCare non-adhesive sensor, SC-NEO, 1.5-5 kg
2072898-001	SC-A	Adult SoftCare non-adhesive sensor, >40 kg
2072900-001	D-YSPD	Pediatric clip, D-YSPD, 3-40 kg, for use with 70124033
70124021	DS100A	Finger Sensor, Adult, DS100A, >40 kg (>88 lbs)
70124022	MAXP	Finger Sensor, Pediatric, MAX-P, 3-50 kg (6.6-110 lbs)
70124026	MAXI	Toe Sensor, Infant, MAX-I, 3-20 kg (6.6-44 lbs)
70124027	MAXA	Finger Sensor, Adult, MAX-A, >30 kg (>66 lbs)
70124032	MAXN	Toe/Foot Sensor, Neonatal/Adult, MAX-N, <3 kg or >40 kg (<6.6 or >88 lbs)
70124033	D-YS	Multisite Sensor, Neonatal/Pediatric/Adult, D-YS, >1 kg (>2.2 lbs)
70124034	D-YSE	Ear-Clip, Pediatric/Adult, D-YSE, >30 kg (>66 lbs) for use with 70124033
70124035	OXI-A/N	Reusable sensor, Neonatal/Adult,<3 kg or >40 kg

Masimo SpO_2 accessories

For the following accessories, see the individual accessory product labeling for specific legal manufacturer and regulatory information (e.g., CE marking).

Masimo LNCS sensors

GE part number	Manufacturer part number	Accessory description
2027253-001	1859	Finger Sensor, Adult, LNCS-Adtx, >30kg (>66lbs)
2027254-001	1860	Finger Sensor, Pediatric, LNCS-Pdtx 10-50kg (22-110lbs)
2027258-001	1863	Finger Sensor, Adult, LNCS DC-I, >30kg (>66lbs)
2027259-001	1864	Finger Sensor, Pediatric, LNCS DC-IP, 10-50kg (22-110lbs)

GE part number	Manufacturer part number	Accessory description
2027261-001	1895	Ear Sensor, Adult, LNCS TC-I, >30kg (>66lbs)
2051068-001	2328	Masimo LNCS Adhesive sensor, LNCS Inf, Infant (20/box)
2051069-001	2329	Masimo LNCS Adhesive sensor, LNCS Neo, Neonatal (20/box)
2051070-001	2330	Masimo LNCS Adhesive sensor, LNCS-Neo-Pt, Neonatal (20/box)
2066333-001	2317	Adult adhesive sensor, LNCS Adtx-3, 3 ft
2066334-001	2318	Pediatric adhesive sensor, LNCS Pdtx-3, 3 ft
2066335-001	2319	Infant adhesive sensor, LNCS Inf-3, 3 ft
2066336-001	2320	Neonate adhesive sensor, LNCS Neo-3, 3 ft
2066338-001	2653	Adult reusable finger sensor, LNCS DBI
2066339-001	2258	Reusable multisite sensor, LNCS YI

Masimo M-LNCS sensors

GE part number	Manufacturer part number	Accessory description
2068423-048	2508	M-LNCS Adtx, Adult adhesive sensor, 18 in.
2068423-050	2511	M-LNCS Pdtx-3, Pediatric adhesive sensor, 3 ft
2068423-051	2512	M-LNCS Inf, Infant adhesive sensor, 18 in.
2068423-053	2514	M-LNCS Neo, Neonate adhesive sensor, 18 in.
2068423-055	2516	M-LNCS NeoPt, Sensitive skin neonate adhesive sensor, 18 in.
2068423-057	2518	M-LNCS NeoPt-500, Neonate non-adhesive sensor, 18 in.
2068423-058	2521	M-LNCS Trauma, Adult adhesive sensor
2068423-059	2519	M-LNCS Newborn Neonatal, Newborn neonatal adhesive sensor
2068423-060	2520	M-LNCS Newborn Infant/Pediatric, Newborn Infant adhesive sensor
2068423-062	2502	M-LNCS DCIP, Pediatric Reusable finger sensor
2068423-064	2503	M-LNCS TC-I, Reusable ear sensor
2068423-065	2505	M-LNCS, YI, Multisite Reusable Sensor, 3 ft.
2068423-066	2504	M-LNCS TF-I, Reusable forehead sensor

TruSignal SpO_2 accessories

GE Healthcare Finland Oy is the legal manufacturer of the following accessories:

Part number	Accessory description
OXY-HB	Replacement headband
OXY-RT	Replacement adhesive tape (blue)
OXY-RTB	Replacement adhesive tape (bears)
OXY-RTW	Wide adhesive replacement tape
OXY-RWL	Foam wrap replacement, large

Part number	Accessory description
OXY-RWM	Foam wrap replacement, medium
OXY-RWS	Foam wrap replacement, small
OXY-SND	Infant foam sandal, 2-7.7 kg (4.4-17 lbs)
TS-AAW-10	TruSignal Adult Adhesive Wrap Sensor, ≥20 kg (≥44 lbs)
TS-AAW-25	TruSignal Adult Adhesive Wrap Sensor, ≥20 kg (≥44 lbs)
TS-AF-10	TruSignal AllFit sensor, adult-pediatric-infant-neonate, 0.5 m/1.6 ft
TS-AF-25	TruSignal AllFit sensor, adult-pediatric-infant-neonate, 0.5 m/1.6 ft
TS-AP-10	TruSignal adult/pediatric sensors, 0.3 m/1 ft, 20 to 50 kg (44 to 110 lb) or ≥50 kg (≥110 lb)
TS-AP-25	TruSignal adult/pediatric sensors, 0.3 m/1 ft, 20 to 50 kg (44 to 110 lb) or ≥50 kg (≥110 lb)
TS-E-D	TruSignal Ear Sensor, adult-pediatric, 1 m/3.3 ft, ≥10 kg (≥22 lbs)
TS-F-D	TruSignal Finger sensor, adult-pediatric, 1 m/3.3 ft, ≥20 kg (≥44 lbs)
TS-PAW-10	TruSignal Pediatric Adhesive Wrap Sensor, 3 to 20 kg (6.6 to 44 lbs)
TS-PAW-25	TruSignal Pediatric Adhesive Wrap Sensor, 3 to 20 kg (6.6 to 44 lbs)
TS-SA-D	TruSignal FingerTip sensor, 1 m/3.3 ft, >30 kg (>66 lbs)
TS-SE-3	TruSignal Sensitive Skin sensor, adult-pediatric-infant-neonate, 1 m/3.3 ft
TS-SP-D	TruSignal PediTip sensor with GE connector, 1 m/3.3 ft, 15 to 30 kg (33 to 66 lbs)
TS-W-D	TruSignal Wrap sensor, adult-pediatric, 1 m/3.3 ft, ≥3 kg (≥6lbs)

Non-invasive blood pressure accessories

GE Medical Systems *Information Technologies*, Inc. is the legal manufacturer of the following accessories:

CLASSIC-CUF, limited reuse

Part number	Accessory description
CLA-P1-2A	Infant, Orange, 2-Tube, DINACLICK Connector, 8-13 cm
CLA-P2-2A	Child, Green, 2-Tube, DINACLICK Connector, 12-19 cm
CLA-A1-2A	Small Adult, Light Blue, 2-Tube, DINACLICK Connector, 17-25 cm
CLA-A2-2A	Adult, Navy, 2-Tube. DINACLICK Connector, 23-33 cm
CLA-A2-2A-L	Adult Long, Navy, 2-Tube, DINACLICK Connector, 23-33 cm
CLA-A3-2A	Large Adult, Rose, 2-Tube, DINACLICK Connector, 31-40 cm
CLA-A3-2A-L	Large Adult Long, Rose, 2-Tube, DINACLICK Connector, 31-40 cm
CLA-T1-2A	Thigh, Brown, 2-Tube, DINACLICK Connector, 38-50 cm

Cuff assortment packs

Part number	Accessory description
2059300-001	SENSA-CUF, Assortment Pack, Adult, 2-Tube, DINACLICK Connector, 3/Pkg
2059301-001	DURA-CUF, Assortment Pack, Adult, 2-Tube, DINACLICK Connector, 3/Pkg
2059301-002	DURA-CUF, Assortment Pack, Pediatric, 2-Tube, DINACLICK Connector, 6/Pkg
2059301-003	DURA-CUF, Assortment Pack, Adult, 2-Tube, DINACLICK Connector, 6/Pkg
2059301-004	DURA-CUF, Assortment Pack, Various, 2-Tube, DINACLICK Connector, 6/Pkg
2059303-001	SOFT-CUF, Assortment Pack, Adult, 2-Tube, DINACLICK Connector, 20/Pkg
2059303-002	SOFT-CUF, Assortment Pack, Pediatric, 2-Tube, DINACLICK Connector, 20/Pkg
2059303-003	SOFT-CUF, Assortment Pack, Adult/Radial, 2-Tube, DINACLICK Connector, 20/Pkg
2059303-004	SOFT-CUF, Assortment Pack, Various, 2-Tube, DINACLICK Connector, 20/Pkg
2059303-006	SOFT-CUF, Assortment Pack, Small Adult, Medium Adult, Large Adult, Radial, 2-Tube, DINACLICK Connector
2059304-001	CLASSIC-CUF, Assortment Pack, Adult, 2-Tube, DINACLICK Connector, 20/Pkg
2059304-002	CLASSIC-CUF, Assortment Pack, Small Adult, Medium Adult, Large Adult, 2-Tube, DINACLICK Connector
2059305-002	SOFT-CUF, Assortment Pack, Neonatal, 2-Tube, Neo-Snap Connector
2059306-002	CLASSIC-CUF, Assortment Pack, Neonatal, 2-Tube, Neo-Snap Connector, 20/Pkg
2059306-003	CLASSIC-CUF, Assortment Pack, Neonatal, 2-Tube, Neo-Snap Connector

DURA-CUF

Part number	Accessory description
DUR-A1-2A	Small Adult, DINACLICK Connector, 17 - 25 cm, 5/Box
DUR-A1-2A-L	Small Adult Long, DINACLICK Connector, 17 - 25 cm, 5/Box
DUR-A2-2A	Adult, DINACLICK Connector, 23 - 33 cm, 5/Box
DUR-A2-2A-L	Adult Long, DINACLICK Connector, 23 - 33 cm, 5/Box
DUR-A3-2A	Large Adult, DINACLICK Connector, 31 - 40 cm, 5/Box
DUR-A3-2A-L	Large Adult Long, DINACLICK Connector, 31 - 40 cm, 5/Box
DUR-P1-2A	Infant, DINACLICK Connector, 08 - 13 cm, 5/Box
DUR-P2-2A	Child, DINACLICK Connector, 12 - 19 cm, 5/ Box
DUR-P2-2A-L	Child Long, DINACLICK Connector, 12 - 19 cm, 5/Box
DUR-T1-2A	Thigh, DINACLICK Connector, 38 - 50 cm, 5/Box

Gray CLINI-CUF, reusable

Part number	Accessory description
CLN-A1-2A	Small Adult, 2-Tube, DINACLICK Connector, 17-25 cm, 5/Box
CLN-A2-2A	Adult, 2-Tube, DINACLICK Connector, 3-33 cm, 5/Box
CLN-A3-2A	Large Adult, 2-Tube, DINACLICK Connector, 31-40 cm, 5/Box

Part number	Accessory description
CLN-A2-2A-L	Adult Long, 2-Tube, DINACLICK Connector, 23-33 cm, 5/Box
CLN-P2-2A	Child, 2-Tube, DINACLICK Connector, 12-19 cm, 5/Box

MY-CUF

Part number	Accessory description
MY-A1-2A	Small Adult, 2-Tube, DINACLICK Connector, 17-25 cm, 20/Box
MY-A2-2A	Adult, 2-Tube, DINACLICK Connector, 23-33 cm, 20/Box
MY-A3-2A	Large Adult, 2-Tube, DINACLICK Connector, 31-40 cm, 20/Box
MY-A2-2A-L	Adult Long, 2-Tube, DINACLICK Connector, 23-33 cm, 20/Box
MY-P1-2A	Infant, 2-Tube, DINACLICK Connector, 8-13 cm, 20/Box
MY-P2-2A	Child, 2-Tube, DINACLICK Connector, 12-19 cm, 20/Box
MY-T1-2A	Thigh, 2-Tube, DINACLICK Connector, 38-50 cm, 20/Box

NEONATAL CUFFS, limited reuse

Part number	Accessory description
SFT-N1-2B	SOFT-CUF, 2-Tube, Neo-Snap Connector, Size 1, Orange, 3-6 cm
SFT-N2-2B	SOFT-CUF, 2-Tube, Neo-Snap Connector, Size 2, Light Blue, 4-8 cm
SFT-N3-2B	SOFT-CUF, 2-Tube, Neo-Snap Connector, Size 3, Green, 6-11 cm
SFT-N4-2B	SOFT-CUF, 2-Tube, Neo-Snap Connector, Size 4, Navy, 7-13 cm
SFT-N5-2B	SOFT-CUF, 2-Tube, Neo-Snap Connector, Size 5, Rose, 8-15 cm
CLA-N4-1B	CLASSIC-CUF, 1-Tube, Neo-Snap Connector, Size 4, Navy, 7-13 cm
CLA-N1-2B	CLASSIC-CUF, 2-Tube, Neo-Snap Connector, Size 1, Orange, 3-6 cm
CLA-N2-2B	CLASSIC-CUF, 2-Tube, Neo-Snap Connector, Size 2, Light Blue, 4-8 cm
CLA-N3-2B	CLASSIC-CUF, 2-Tube, Neo-Snap Connector, Size 3, Green, 6-11 cm
CLA-N4-2B	CLASSIC-CUF, 2-Tube, Neo-Snap Connector, Size 4, Navy, 7-13 cm
CLA-N5-2B	CLASSIC-CUF, 2-Tube, Neo-Snap Connector, Size 5, Rose, 8-15 cm

RADIAL-CUF, purple, for the adult forearm. Forearm circumference 26-36 cm.

Part number	Accessory description
SFT-F1-2A	2-Tube, DINACLICK Connector

SENSA-CUF

Part number	Accessory description
SEN-P1-2A	Infant, Rust, 2-Tube, DINACLICK Connector, 8-13 cm
SEN-P2-2A	Child, Green, 2-Tube, DINACLICK Connector, 12-19 cm
SEN-A1-2A	Small Adult, Royal Blue, 2-Tube, DINACLICK Connector, 17-25 cm
SEN-A1-2A-L	Small Adult Long, Royal Blue, 2-Tube, DINACLICK Connector, 17-25 cm
SEN-A2-2A	Adult, Navy, 2-Tube, DINACLICK Connector, 23-33 cm

Part number	Accessory description
SEN-A2-2A-L	Adult Long, Navy, 2-Tube, DINACLICK Connector, 23-33 cm
SEN-A3-2A	Large Adult, Wine, 2-Tube, DINACLICK Connector, 31-40 cm
SEN-A3-2A-L	Large Adult Long, Wine, 2-Tube, DINACLICK Connector, 31-40 cm
SEN-T1-2A	Thigh, Brown, 2-Tube, DINACLICK Connector, 38-50 cm

SOFT-CUF, limited reuse

Part number	Accessory description
SFT-P1-2A	Infant, Orange, 2-Tube, DINACLICK Connector, 8-13 cm
SFT-P2-2A	Child, Green, 2-Tube, DINACLICK Connector, 12-19 cm
SFT-P2-2A-INT	Child, Green, 2-Tube, DINACLICK Connector, 12-19 cm
SFT-P2-2A-L	Child Long, Green, 2-Tube, DINACLICK Connector, 12-19 cm
SFT-A1-2A	Small Adult, Light Blue, 2-Tube, DINACLICK Connector, 17-25 cm
SFT-A1-2A-INT	Small Adult, Light Blue, 2-Tube, DINACLICK Connector, 17-25 cm
SFT-A1-2A-L	Small Adult Long, Light Blue, 2-Tube, DINACLICK Connector, 17-25 cm
SFT-A2-2A	Adult, Navy, 2-Tube, DINACLICK Connector, 23-33 cm
SFT-A2-2A-INT	Adult, Navy, 2-Tube, DINACLICK Connector, 23-33 cm
SFT-A2-2A-L	Adult Long, Navy, 2-Tube, DINACLICK Connector, 23-33 cm
SFT-A2-2A-L-INT	Adult Long, Navy, 2-Tube, DINACLICK Connector, 23-33 cm
SFT-A3-2A	Large Adult, Rose, 2-Tube, DINACLICK Connector, 31-40 cm
SFT-A3-2A-INT	Large Adult, Rose, 2-Tube, DINACLICK Connector, 31-40 cm
SFT-A3-2A-L	Large Adult Long, Rose, 2-Tube, DINACLICK Connector, 31-40 cm
SFT-T1-2A	Thigh, Brown, 2-Tube, DINACLICK Connector, 38-50 cm

Yellow CLASSIC-CUF, yellow/blue, single-patient use

Part number	Accessory description
CLA-P1-2A-X	Infant, 2-Tube, DINACLICK Connector, 8-13 cm
CLA-P2-2A-X	Child, 2-Tube, DINACLICK Connector, 12-19 cm
CLA-A1-2A-X	Small Adult, 2-Tube, DINACLICK Connector, 17-25 cm
CLA-A1-2A-L	Small Adult Long, 2-Tube, DINACLICK Connector, 17-25 cm
CLA-A2-2A-X	Adult, 2-Tube, DINACLICK Connector, 23-33 cm
CLA-A3-2A-X	Large Adult, 2-Tube, DINACLICK Connector, 31-40 cm
CLA-T1-2A-X	Thigh, 2-Tube, DINACLICK Connector, 38-50 cm

Temperature accessories

For the following accessories, see the individual accessory product labeling for specific legal manufacturer and regulatory information (e.g., CE marking).

CareFusion accessories

GE part number	Manufacturer part number	Accessory description
165640	165640	400 Series Temperature Interconnect Cable, 1.3 m/4.3 ft. extension cable for disposable temperature probes.
165641	165641	400 Series Temperature Interconnect Cable, 2.8 m/9 ft. extension cable for disposable temperature probes.
2070720-001	2070720-001	Nasal temperature probe, 9F, disposable
M1024205	M1024205	Esophageal Stethoscope with Temp Probe 9F
M1024212	M1024212	Esophageal Stethoscope with Temp Probe 12F
M1024215	M1024215	Esophageal Stethoscope with Temp Probe 18F
M1024218	M1024218	Esophageal Stethoscope with Temp Probe 24F
M1024222	M1024222	Skin Temperature Probe
M1024229	M1024229	General Purpose Temperature Probe 9F
M1024231	M1024231	General Purpose Temperature Probe 12F
M1024233	M1024233	Tympanic Temp Probe, with foam
M1024237	M1024237	Tympanic Temp Probe, without foam
M1024239	M1024239	Foley Catheter with Temperature Probe 14F
M1024242	M1024242	Foley Catheter with Temperature Probe 16F
M1024244	M1024244	Foley Catheter with Temperature Probe 18F
M1024247	M1024247	General Purpose Probe, 400 Series, adult. Application: esophagus, rectum, cable length: 3 m/10 ft.
M1024251	M1024251	General Purpose Probe, 400 Series, pediatric. Application: esophagus, rectum, cable length: 3 m/10 ft.
M1024254	M1024254	Skin Temperature Probe, 400 Series, adult/pediatric. Application: finger, toe, axillary (armpit) using tape or posey wrap, cable length: 3 m/10 ft.

CO_2 accessories

For the following accessories, see the individual accessory product labeling for specific legal manufacturer and regulatory information (e.g., CE marking).

CareFusion accessories

GE part number	Manufacturer part number	Accessory description
2013066-001	2013066-001	Kit LoFlo CO2 Nasal Cannula - Adult
2013066-002	2013066-002	Kit LoFlo CO2 Nasal Cannula - Pediatric
2013066-003	2013066-003	Kit LoFlo CO2 Nasal Cannula - Infant
2013066-004	2013066-004	Kit LoFlo CO2 Nasal Cannula w/ O2 - Adult
2013066-005	2013066-005	Kit LoFlo CO2 Nasal Cannula w/ O2 - Pediatric
2013066-007	2013066-007	Kit LoFlo CO2 Nasal Cannula w/ O2 - Infant

GE part number	Manufacturer part number	Accessory description
2013067-001	2013067-001	Kit LoFlo CO2 Oral/ Nasal Cannula - Adult
2013067-002	2013067-002	Kit LoFlo CO2 Oral/ Nasal Cannula - Pediatric
2013067-003	2013067-003	Kit LoFlo CO2 Oral/ Nasal Cannula w/O2 - Adult
2013067-004	2013067-004	Kit LoFlo CO2 Oral/Nasal Cannula w/O2 - Pediatric
2013068-001	2013068-001	Kit LoFlo Airway Adapter - Pediatric/Adult
2013068-002	2013068-002	Kit LoFlo Airway Adapter - Pediatric/Infant
2013068-003	2013068-003	Kit LoFlo Airway Adapter w/Nafion - Pediatric/Adult
2013068-004	2013068-004	Kit LoFlo Airway Adapter w/Nafion - Pediatric/Infant
2013069-001	2013069-001	Kit LoFlo Sample Line w/ Male Luer
2013069-002	2013069-002	Kit LoFlo Sample Line w/ Male Luer w/Nafion
2067767-001	2067767-001	LoFlo CO2 Nasal Cannula w/nafion, Adult
2067767-002	2067767-002	LoFlo CO2 Nasal Cannula w/nafion, Pediatric
2067767-003	2067767-003	LoFlo CO2 Nasal Cannula w/nafion, Infant
2067767-004	2067767-004	LoFlo CO2 Nasal Cannula w/O2 w/nafion, Adult
2067767-005	2067767-005	LoFlo CO2 Nasal Cannula w/O2 w/nafion, Pediatric
2067767-006	2067767-006	LoFlo CO2 Nasal Cannula w/O2 w/nafion, Infant
2067767-007	2067767-007	LoFlo CO2 Oral/Nasal Cannula w/nafion, Adult
2067767-008	2067767-008	LoFlo CO2 Oral/Nasal Cannula w/nafion Pediatric
2067767-009	2067767-009	LoFlo CO2 Oral/Nasal Cannula w/O2 w/nafion, Adult
2067767-010	2067767-010	LoFlo CO2 Oral/Nasal Cannula w/O2 w/nafion Pediatric

Respironics accessories

GE part number	Manufacturer part number	Accessory description
2092610-001	1027730	LoFlo Sidestream Module mounting bracket

Other accessories

Cables, adapters, and other accessories

GE Medical Systems *Information Technologies*, Inc. is the legal manufacturer of the following accessories:

Part number	Accessory description
2017842-001	DS1 Sync to Unterminated 15 ft
2023807-002	DS1 to Physio Control Cable 3 m
2023808-002	DS1 to Datascope Balloon Pump Cable 9.2 m

Part number	Accessory description
2024565-002	DS1 3-way Splitter Cable
2024696-001	DS1 Field Termination Kit
2025370-002	DS1 to Arrow/Kontron Cable 9.2 m
2087389-001	2-Tube, DINACLICK Connector NIBP Hose Adult/Pediatric, 1.2 m
2087389-002	2-Tube, DINACLICK Connector NIBP Hose Adult/Pediatric, 3.6 m
2087389-003	2-Tube, DINACLICK Connector NIBP Hose Adult/Pediatric, 7.2 m
2089791-002	2-Tube, Neo-Snap Connector NIBP Hose Neonatal, 2.4 m
2089791-003	2-Tube, Neo-Snap Connector NIBP Hose Neonatal, 3.6 m
2096245-001	Cable Holder for 5 devices
2096245-002	Cable Holder for ECG and Masimo SpO_2 devices
2097648-001	SpO_2 TruSignal Active Cable 1.8 m
2097648-002	SpO_2 TruSignal Active Cable 3.6 m

For the following accessories, see the individual accessory product labeling for specific legal manufacturer and regulatory information (e.g., CE marking).

Covidien accessories

Part number	Accessory description
2082747-001	SpO_2 Nellcor Active Cable 1.8 m
2082747-002	SpO_2 Nellcor Active Cable 3.6 m
2106258-005	Nellcor OxiCliq Sensor Cable 3 ft

Masimo accessories

GE part number	Manufacturer part number	Accessory description
2106257-001	2056	Masimo 25-pin LNC-10 LNCS cable, 10 ft
2106257-002	2055	Masimo 25-pin LNC-4 LNCS cable, 4 ft
2106257-003	2356	Masimo 25-pin LNC-1 LNCS cable, 1 ft
2106257-006	2404	Masimo 25-pin RC-12 M-LNCS cable, 12 ft
2106257-008	2406	Masimo 25-pin RC-4 M-LNCS cable, 4 ft
2106257-010	2405	Masimo 25-pin RC-1 M-LNCS cable, 1 ft

Respironics accessories

Part number	Accessory description
2099061-001	CO_2 LoFlo Active Cable 2.3 m

Mounting accessories

GE Medical Systems *Information Technologies*, Inc. is the legal manufacturer of the following accessories:

For more information, see the mount-specific installation instructions.

Part number	Manufacturer part number	Accessory description
2098982-001	GE2098982-001	Mini Dock kit

For the following accessories, see the individual accessory product labeling for specific legal manufacturer and regulatory information (e.g., CE marking).

For more information, see the mount-specific installation instructions.

GCX accessories

Part number	Manufacturer part number	Accessory description
2090387-001	GEM-0027-60	Roll stand
2090387-002	GEM-0027-16	CARESCAPE Dock F0 VESA mounting adapter
2090387-005	GEM-0027-83	Bed rail mount kit
2090387-006	GEM-0027-84	Pole/rail mount kit
2090387-007	GEM-0027-85	CARESCAPE Dock F0 power supply wall, channel, or pole mount
2099973-001	GEM-0027-86	Molded offset slide adapter

Supplies

There are no supplies required for CARESCAPE ONE.

Maintenance

Planned maintenance

Service personnel shall perform the following checkout procedures every 24 months after installation. Refer to the service manual for planned maintenance procedures.

- Visual inspection
- Electrical safety tests
- Functional check
- Battery maintenance

Recommended regular checks

Daily checks

- Check that the accessories, cables, cable connectors, CARESCAPE Parameters, CARESCAPE ONE, and display parts are clean and intact.
- Check the charge of the battery.

Once a year checks

- Check the calibration of temperature and NIBP.

CARESCAPE SpO_2 — Nellcor maintenance

There are no user-serviceable parts inside the CARESCAPE SpO_2 — Nellcor. Users may not modify any components. The CARESCAPE SpO_2 — Nellcor requires no calibration.

For technical information and assistance if unable to correct a problem, or to order parts contact your GE representative or a local Medtronic representative.

www.medtronic.com

When contacting a local Medtronic representative, have the CARESCAPE SpO_2 — Nellcor serial number available.

Maintaining the battery

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/minimum 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 Battery quality status indicates ***Conditioning required*** (***Monitor Setup*** > ***Battery Status*** > ***Advanced*** > ***Page 1***).

   Battery conditioning re-calibrates the electronic fuel gauge. GE recommends using an approved GE external battery charger to condition the battery.

   See the supplemental information provided for details about a compatible external battery charger.

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 CARESCAPE ONE

The battery is charged whenever the CARESCAPE ONE is connected to a CARESCAPE Dock F0 and the dock is connected to an AC power source. The battery charges both when the CARESCAPE ONE is turned on and when it is in standby mode.

There are some special conditions when the CARESCAPE ONE battery charging is temporarily denied, for example, when the battery temperature is too high.

Charging a battery using an external battery charger

See the supplemental information provided for details about a compatible external battery charger.

1. Follow the external battery charger instructions for use to charge the battery.

Conditioning the battery

Battery conditioning re-calibrates the electronic fuel gauge. GE recommends using an external battery charger to condition the battery. See the supplemental information provided for details about an approved GE external external battery charger.

Condition the battery when the Battery quality status indicates ***Conditioning required***.

1. Select ***Monitor Setup*** > ***Battery Status*** > ***Advanced*** > ***Page 1***.
2. Under ***Battery quality***, check for a ***Conditioning required*** status.

   A ***Conditioning required*** status means that the battery requires conditioning.
3. Follow the external battery charger instructions for use to condition the battery.

Replacing the CARESCAPE ONE battery

CAUTION LOSS OF MONITORING. To prevent loss of monitoring, only change the CARESCAPE ONE battery when CARESCAPE ONE is connected to a powered CARESCAPE Dock F0.

1. Open the battery door by gently peeling down the corner of the battery door pull tab.

2. Pull on the battery cord to remove the battery from the battery slot.

3. Position the battery with the connector end facing up and insert the battery all the way into the battery slot.

4. Close the battery door. Ensure that the battery door tightly seals the battery into the battery slot.

   WARNING PHYSICAL INJURY. Do not install the device 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.

5. Press the Power/Standby button on the CARESCAPE ONE.
6. Check that the Power LED illuminates amber while the CARESCAPE ONE powers up, then illuminates green.
7. Check that the battery status icon displays on screen without battery error messages.

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.

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Electromagnetic compatibility

IEC 60601-1-2

The system complies with IEC 60601-1-2:2007-03.

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

Essential performance in EMC

Parameter	Essential performance
General	• No loss of display or user settings. • No loss of patient data, mode of operation, or stored data during loss of AC mains or battery power > 10 s. • No invalid or erroneous alarms. • Ability to generate a technical alarm during abnormal operation.
ECG	• No false beat detection that produces an incorrect heart rate measurement greater than ± 10% or ± 5 bpm, whichever is greater. • No waveform amplitude error > 20%.
Impedance respiration	• No error in respiration rate greater than ± 1 breath per minute.
Invasive blood pressure	• No invasive pressure error greater than ± 4% of reading or ± 0.5 kPa (± 4 mmHg), whichever is greater.
Temperature	• No errors in temperature readings > 0.3° C.
CO_2 (RGM)	• No error in CO_2 greater than ±(volume fraction of +8% of Gas Level) with the gas level set between 71-100 mmHg.. • No change in respiration greater than ± 1 breath per minute. • CO_2 flow rate < 60 ml/min.
SpO_2: GE TruSignal, Nellcor, Masimo	• No errors in pulse rate greater than ± 2 bpm for GE TruSignal SpO_2 or greater than ± 3 bpm for Nellcor and Masimo SpO_2. • No error in saturation greater than ± 4%.
Non-invasive blood pressure	• No error for the measurement of the cuff pressure greater than ± 2 mmHg (± 0.3 kPa).
Defibrillator sync marker output	• Time delay from peak of ECG R-wave to synchronization pulse ≤ 35 ms.

Parameter	Essential performance
ECG analog output	• No errors in ECG waveform amplitude greater than ± 10%.
Invasive blood pressure analog output	• No errors in invasive blood pressure analog output greater than 1 V/100 mmHg ± 1.5% ± 1.0 mmHg or ± 0.5% ± 2 mmHg, whichever is greater.

Electromagnetic compatibility safety precautions

Electromagnetic compatibility warnings

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

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

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

Electromagnetic compatibility cautions

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

CAUTION Changes or modifications to this device/system not expressly approved by GE may cause EMC issues with this or other equipment.

Electromagnetic emissions

The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	CARESCAPE ONE uses RF energy only for its internal function. Therefore, RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The equipment 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.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Electromagnetic immunity

This device is intended for use in the electromagnetic environment specified below. It is the responsibility of the hospital to assure that the device is used in such an environment.

U_t is the AC mains voltage prior to application of the test level.

Guidance and manufacturer's declaration — electromagnetic immunity			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment — guidance**
Electrostatic Discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air		Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical Fast Transient/ Burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines		Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode		
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycles 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 s		Mains power quality should be that of a typical commercial or hospital environment. If the user of the equipment requires continued operation during power mains interruptions, it is recommended that the equipment be powered from an uninterruptible power supply or a battery.
Power Frequency (50/60 Hz) Magnetic Field IEC 61000-4-8	3 A/m		Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Guidance and manufacturer's declaration — electromagnetic immunity			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment — guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 KHz to 80 MHz	3 V rms	Portable and mobile RF communications equipment should not be used closer to any part of the equipment, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	

Recommended separation distance:

$d = 1.2 \sqrt{P}$

$d = 1.2 \sqrt{P}$ 80 MHz to 800 MHz. At 80 MHz and 800 MHz, the higher frequency range applies.

$d = 2.3 \sqrt{P}$ 800 MHz to 2.5 GHz

where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, and d is the recommended separation distance in meters (m).

Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.

Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radio, AM and FM radio broadcast, and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the equipment is used exceeds the applicable RF compliance level above, the equipment should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the equipment.

Interference may occur in the vicinity of equipment marked with the following symbol:

These guidelines may not apply in all situations. Electromagnetic propagation is affected by reflection from structures, objects, and people.

Recommended separation distances

The following table provides the recommended separation distances (in meters) between portable and mobile RF communications equipment and the device.

This device is intended for use in the electromagnetic environment on which radiated RF disturbances are controlled. The customer or the user of the device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the

device as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter in watts (W)	Separation distance in meters (m) according to frequency of transmitter		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
	d = 1.2 √P	d = 1.2 √P	d = 2.3 √P
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance [d] in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

These guidelines may not apply in all instances. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Compliant cables and accessories

WARNING Use only approved accessories, including mounts, and defibrillator-proof cables and invasive pressure transducers. For a list of approved accessories, see the supplemental information provided. Other cables, transducers, and accessories may cause a safety hazard, damage the equipment or system, result in increased emissions or decreased immunity of the equipment or system, or interfere with the measurement.

Minimizing electromagnetic interference

Electromagnetic interference (EMI) can cause erratic readings, cessation of operation, or other incorrect functioning. If this occurs, survey the site of use to determine the source of this disruption, and take the listed actions to eliminate the source:

- Turn equipment in the vicinity off and on to isolate the interfering equipment.
- Reorient or relocate the interfering equipment.
- Increase the separation between the interfering equipment and the CARESCAPE ONE and CARESCAPE Parameters.

The CARESCAPE ONE and CARESCAPE Parameters can radiate radio frequency energy and, if not installed and used in accordance with these instructions, may themselves cause harmful interference with other susceptible devices in the vicinity.

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