Patient Monitor B155M-OR/B125M-OR/B105M-OR

Supplemental Information Manual

Software Version 4.0

CE 0197

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Revision 1
English

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Notice

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.

Revision history

Revision	Date	Reason for change
1	2024-05-08	Initial release.

Contents

About this manual

Intended use of this manual

This manual must be used in conjunction with the user's manual for important safety information and detailed instructions for clinical use of these products. Devices and versions not specifically stated are not supported and should not be used.

As the monitor configuration may vary, some menus, displays and functions described may not be available in the monitor you are using.

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

Intended audience of this manual

This manual is intended for clinical professionals. Clinical professionals are expected to have a working knowledge of medical procedures, practices and terminology required to provide patient care. Using the device should never replace nor impede the human intervention and required patient care provided by clinical professionals. This manual is also intended for service representatives and technical personnel who install, maintain, troubleshoot, or repair this device.

Manual conventions

This manual uses the following styles to emphasize text or indicate action.

Item	Description
`Courier`	Indicates hardware terms.
bold	Indicates software terms.
italic	Indicates terms for emphasis.
select	The word select means choosing and confirming.
supplemental information	Indicates information that appears in the Supplemental Information Manual or supplements provided.
NOTE	Note statements provide application tips or other useful information.

Acquisition module naming conventions

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

- E-miniC: Single-width airway module
- E-sCO, E-sCAiO: CARESCAPE respiratory modules
- N-CAiO: Airway Gas Option
- E-modules: All modules with the prefix E-

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

- B155M-OR/B125M-OR/B105M-OR Patient Monitor User's Manual
- B155M-OR/B125M-OR/B105M-OR Patient Monitor Technical Manual
- Supplies and accessories
- Service manuals for acquisition modules
- Patient Monitoring Network Configuration Guide
- CARESCAPE Central Station User's Manual
- HL7 Reference Manual
- Privacy and Security Manual

Ordering manuals

Paper copies of the medical device IFU will be provided within 7 days of receiving the request, at no additional cost. Contact your local GE representative and request the part number on the first page of the eIFU.

Accessing manuals online

To access manuals online,

1. Go to https://www.gehealthcare.com/documentationlibrary.
2. Enter **Customer Documentation Portal** site.
3. Select **Modaility** to **Monitoring Solutions (MS)** and **Products** to related products you want to search. Launch the search.
4. Identify and download the IFUs.

The IFUs are in PDF format, make sure the device has software to open the PDF files (e.g. Adobe® Acrobat® Reader).

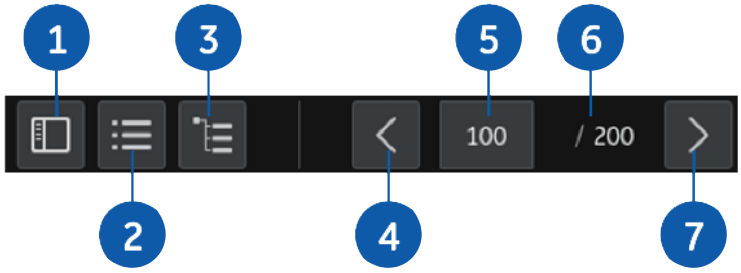
Accessing manuals on monitor

To access manuals on monitor:

1. Press the `On/Off` button (more than 3 seconds) to turn on the monitor.
2. Select > **E-Manual**.
3. Select related manuals.

Using E-manuals on monitor

The E-manual's navigation are on the top of the menu.



1.	Show/Hide bookmark view softkey	5.	Current page area
2.	Collapse bookmark view softkey	6.	Total page
3.	Expand bookmark view softkey	7.	Next page softkey
4.	Previous page softkey		

1. Swipe down and up to scroll the page.
2. Select < or > to turn pages.
3. Enter a page number to current page area can jump to this page.
4. Select to display or hide the bookmark volume on the left.
5. Select to collapse bookmark.
6. Select to expand bookmark.

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HL7 is a registered trademark of Health Level Seven (HL7), Inc.

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Manufacturer responsibility

GE HealthCare 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.

Product availability

NOTE
Due to continual product innovation and design, 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 about availability.

Compatible devices

Compatibility

Devices and versions not specifically stated have not been verified and validated as comprising a conforming system with the monitor.

In the following sections, compatible devices refer to devices that have been verified to be compliant with the standard IEC 60601-1. Supported devices refer to devices that are compatible with the system, but have not been verified to meet the recent standard requirements.

Devices and versions listed as supported only: refer to their original user and technical documentation.

For the list of monitor-compatible supplies and accessories, refer to the Supplies and Accessories.

E-module compatibility

The monitor is compatible with the following module:

- E-COP-01
- E-sCAiO-00
- E-sCO-00
- N-CAiO-00
- E-miniC-00
- E-ENTROPY-01
- E-NMT-01
- E-BIS-01

Frame compatibility

The monitor is compatible with the B1X5-F2 Frame.

Input-output device compatibility

Printing device

The monitor is compatible with the following devices:

- B1X5-REC recorder in local
- Laser printer:
  - HP LaserJet Enterprise M507dn
  - HP M405dn

NOTE
You also can from CARESCAPE Central Station to do print, refer to CARESCAPE Central Station User's Manual for compatible devices.

Display device

The monitor is compatible with the external display with following resolutions:

- 1280*800
- 1366*768

Data collection device

The monitor supports the following device:

- iCollect V5

  NOTE
  The system supports two simultaneous Datax-Ohmeda S/5 Collect connections.

- USB storage device

Input device

The monitor is compatible with the following device:

- 5813075 USB barcode reader

Peripheral device

The monitor is compatible with the following devices:

- The anesthesia machine devices that support Datex-Ohmeda Com 1.2 serial protocol

Network compatibility

The monitor has been verified to be compatible with in CARESCAPE* Network environment.

The monitor is capable of EMR connectivity. The monitor HL7 (Health Level Seven) message is compliant with the IHE PCD-01 OBR/OBX format. There are two ways to acquire trended vital sign data from the monitor:

- HL7 directly from the monitor
- HL7 from the CARESCAPE Gateway

On the CARESCAPE network,

- The monitor is compatible with the following devices:
  - CARESCAPE Central Station v2.1, and v3.0
  - CARESCAPE Gateway v2
  - Mobile Care Server v6.3
  - CARESCAPE Bridge v2
- The monitor can communicate with the following bedside monitors:

- B155M/B125M/B125P/B105M/B105P VSP3.0 and 4.0

- The monitor supports maximum 2048 devices in MC network.
- The monitor can simultaneously respond with:
  - 10 views on the wireless network
  - 16 views on the wired network

NOTE
When the monitor **Radio Enable** in the service menu is set to **Disabled**, the monitor won't automatically allow 16 views. To switch to 16 views support, the WLAN license needs to be inactive.

Design, environmental and physical specifications

Design, environmental, and physical specifications

Operating/non-operating altitude: The system will meet specifications when subjected to altitudes corresponding to pressure readings from 700 hPa to 1060 hPa.

NOTE
An average pressure reading of 700 hPa corresponds to an altitude of 3000 m (10,000 ft) and 1060 hPa corresponds to an altitude of –400 m (–1000 ft).

NOTE
Operation of the monitor outside the environmental specifications may cause inaccurate results.

Monitor specifications

Size (H x W x D) Without module and recorder	B155M-OR: 305 mm x 405 mm x 175 mm B125M-OR: 280 mm x 312 mm x 175 mm B105M-OR: 275 mm x 265 mm x 175 mm
Weight With battery, without module and recorder	B155M-OR: ≤ 5.5 kg B125M-OR: ≤ 4.2 kg B105M-OR: ≤ 3.8 kg For device with VSP 4.0 Upgrade Software: B155M-OR: ≤ 5.2 kg
Monitor operating temperature range	5 to 40°C (41 to 104°F)
Battery charging temperature range	5 to 35°C (41 to 95°F)
Non-operating temperature range	-20 to 60°C (-4 to 140°F)
Operating humidity range	15 to 90% RH non-condensing
Non-operating humidity range	10 to 90% RH non-condensing
Operating altitude range	700 to 1060 hPa (525 to 795 mmHg)
Non-operating altitude range	700 to 1060 hPa (525 to 795 mmHg)
Degree of protection against harmful ingress of water	IP22
Power supply	Internal battery or AC power
Power requirements line voltage	100-240 VAC ±10%, 50/60 Hz
Power consumption	≤ 150 VA
Power cord type	IEC/EN 60320-1/C13 For USA, difference type of plugs should be used for connection to the alternate voltage 10 A 125 V.
Touchscreen	Capacitive
Alarm light	Illuminates red, yellow and cyan

Display size	B155M-OR: 15.6 in B125M-OR: 12.1 in B105M-OR: 10.1 in
Resolution	B155M-OR: 1366*768 B125M-OR/B105M-OR: 1280*800
Video connector	One HDMI connector for slave display
Ethernet port connector	One Ethernet interface (RJ45)
USB 2.0 port connector	Universal Serial Bus (USB type A connectors) compatible with the USB 2.0 standard 3 USB connectors. For device with VSP 4.0 Upgrade Software: 1 connector.
Recorder connector	One external thermal recorder interface
Nurse call connector	One nurse call connector
Serial port connector	One standard RS232 connector
Defibrillation synchronization connector	One defib marker out connector.
Sync pulse width	10 ms (±20%)
Sync output impedance	110 Ω ± 20 % @10 mA
Sync amplitude	CMOS compatible 3.5 V min. at 1 mA sourcing 0.5 V max. at 5 mA sinking
Sync delay	< 35 ms
Service life	10 years

B1X5-F2 frame specifications

Size (H x W x D)	160 mm x 266 mm x 132 mm
Weight	1.5 kg (3.3 lb)
Operating temperature range	5 to 40°C (41 to 104°F)
Non-operating temperature range	-20 to 60°C (-4 to 140°F)
Operating humidity range	20 to 90% RH non-condensing
Non-operating humidity range	10 to 90% RH non-condensing
Operating altitude range	700 to 1060 hPa (525 to 795 mmHg)
Non-operating altitude range	700 to 1060 hPa (525 to 795 mmHg)
Degree of protection against harmful ingress of water	IP21
Power requirements line voltage	100-240 VAC ±10%, 50/60 Hz
Power consumption	≤50 VA
Service life	10 years

B1X5-REC recorder specifications

Recorder type	Thermal printer
Operating temperature range	5 to 40°C (41 to 104°F)
Non-operating temperature range	-20 to 60°C (-4 to 140°F)
Operating humidity range	20 to 90% RH non-condensing
Non-operating humidity range	10 to 90% RH non-condensing
Operating and non-operating altitude range	700 to 1060 hPa (525 to 795 mmHg)
Resolution	Horizontal: 24 dots/mm (600 dots/in) minimum in waveform mode Vertical: 8 dots/mm (200 dots/in) in non-waveform mode
Paper width	50 mm (2 in)
Power consumption	Printing: <=10 w
Service life	10 years

E-COP module specifications

Size (H x W x D)	112 x 37 x 187 mm (4.4 x 1.5 x 7.4 in)
Weight	0.35 kg (0.77 lb)
Power consumption	approximately <1.5 W
Operating temperature range	10 to 40°C (50 to 104°F)
Non-operating temperature range	-25 to 60°C (-13 to 140°F)
Operating humidity range	10 to 90% RH non-condensing
Non-operating humidity range	10 to 90% RH non-condensing

E-sCAiO, E-sCO, and N-CAiO module specifications

Size (H x W x D)	112 x 37 x 205 mm (4.4 x 1.5 x 8.1 in)
Weight	0.7 kg (1.5 lb)
Cooling	Forced air
Power consumption	3.9 W, 5.8 W momentary
Operating temperature range	10 to 40°C (50 to 104°F)
Non-operating temperature range	-25 to 60°C (-13 to 140°F)
Operating humidity range	10 to 98% RH non-condensing
Non-operating humidity range	10 to 90% RH non-condensing
Operating altitude range	660 to 1060 mbar

E-miniC module specifications

Size (H x W x D)	112 x 37 x 209 mm (4.4 x 1.5 x 8.2 in)

Weight	0.4 kg (0.88 lb)
Operating temperature range	10 to 40°C (50 to 104°F)
Non-operating temperature range	-25 to 70°C (-13 to 158°F)
Operating humidity range	10 to 95% RH non-condensing
Non-operating humidity range	10 to 95% RH non-condensing
Operating altitude range	666 to 1060 mbar

E-ENTROPY module specifications

Size (H x W x D)	112 x 37 x 180 mm (4.4 x 1.5 x 7.1 in)
Weight	0.35 kg (0.77 lb)
Power consumption	1.5 W
Operating temperature range	10 to 40°C (50 to 104°F)
Non-operating temperature range	-20 to 60°C (-4 to 140°F)
Operating humidity range	10 to 90% RH non-condensing
Non-operating humidity range	10 to 90% RH non-condensing

E-NMT module specifications

Size (H x W x D)	112 x 37 x 186 mm (4.4 x 1.5 x 7.3 in)
Weight	0.35 kg (0.77 lb)
Power consumption	3.3 W
Operating temperature range	10 to 40°C (50 to 104°F)
Non-operating temperature range	-20 to 60°C (-4 to 140°F)
Operating humidity range	10 to 90% RH non-condensing
Non-operating humidity range	10 to 90% RH non-condensing
Operating altitude range	700 to 1060 mbar

E-BIS module specifications

Size (H x W x D)	112 x 37 x 189 mm (4.4 x 1.5 x 7.4 in)
Weight	0.3 kg (0.66 lb)
Power consumption	2.2 W
Operating temperature range	10 to 40°C (50 to 104°F)
Non-operating temperature range	-25 to 70°C (-13 to 158°F)
Operating humidity range	10 to 95% RH non-condensing
Non-operating humidity range	10 to 95% RH non-condensing
Operating altitude range	700 to 1060 mbar

Battery specifications

	High capacity battery	Basic battery
Battery type	lithium-ion	
Battery model	FLEX-3S2P	03-57490-001
Battery voltage	10.8V±10%	10.95V±10%
Operation time	Under certain conditions* B105M-OR: 4.5 hours B155M-OR/B125M-OR: 4 hours	Under certain conditions* B105M-OR: 2.5 hours B155M-OR/B125M-OR: 2 hours
Charging time	< 4 hours to 90% capacity, under certain conditions*	
*Conditions: The new battery has been fully charged and discharged for three cycles. Typical monitor configuration: ECG, SPO_2, and 15 minutes interval NIBP measurement. Screen brightness is set to 70%.		

WLAN specifications

Type	B1x5–01
Bands	2.4 GHz: Note the available channels for 802.11 b/g operation in the US are Channels 1 to 11. The range of channels is limited by firmware. 5.0 GHZ: The use in the UNII (Unlicensed National Information Infrastructure) band 1 5150-5250 MHz band is restricted to indoor use only to reduce potential for harmful interference to co-channel mobile satellite systems. Any other use will make the operation of this device illegal.
Protocols	Radio support 802.11 abgn
RF output power	**2.4 GHz EIRP**: up to +18.83dBm **5 GHz EIRP**: up to +16.42dBm NOTE: May be further restricted on some channels according to regulatory domain.
Data speed	Up to MCS15 (144 Mbps)
Radio RF standards	• USA: FCC Part 15.247, 15.401-15.407 • European Union: EN300328, EN301893 • Australia: AS/NZS 4268
Minimum RSSI value and data rate, which must be maintained in the coverage area to support application performance	RSSI Value: -65dBm Data rate: 54 Mbps
Maximum packet delay value before degradation of application quality	250 ms
Maximum packet loss value before degradation of application quality	5 drops per 1 million packets

On average, a given monitor uses 150-300 kbps of network bandwidth (i.e. usage) with a maximum of 500 kbps (i.e. 50 kbps times 10 patient views) limited in software by the 10-patient view requirement plus an additional 720 bps for on-demand HL7 traffic. GE recommends the wireless network to be

designed in such – that the Access Point utilization does not exceed 50% of full capacity for all wireless clients.

The monitor can reliably deliver patient data and alarms to the central station through WLAN Network under maximum data latency: 250 ms, this latency specification is based on the worst-case configuration as follow:

Configuration	Maximum
Number of Monitors in the system	1024
Number of Beds in each Care Unit	300
Number of real time patient views	10
Number of Monitors with active alarm conditions	205
CARESCAPE Gateway trend data requests interval	1 min

Alarm specifications

Alarm standards compliance

The system complies with IEC 60601-1-8/YY0709.

Auditory alarm volume

Tested in accordance with IEC 60601-1-8 subclause 6.3.3.2 with alarm volume control set to maximum.

Alarm volume can be adjusted from 45 to 85 dB.

Alarm volume setting	Sound pressure level
10	High priority: 72.0 dB average Medium priority: 64.9 dB average Low priority: 54.5 dB average
1	High priority: 57.9 dB average Medium priority: 51.6 dB average Low priority: 40.6 dB average

Audio alarm sound tolerances

General alarm tone sound patterns

Priority	Corresponding sound pattern
High	• Beep (500 ms) Silence (500 ms) Frequency: 815 Hz
Medium	• Beep (500 ms) Silence (500 ms) • Beep (500 ms) Silence (5 s) Frequency: 815 Hz
Low	• Beep (500 ms) Silence (30 s) Frequency: 815 Hz

IEC alarm tone sound patterns

Priority	Corresponding sound pattern
High	• Beep “C” (373 Hz/80 ms) Silence (120 ms) • Beep “F” (498 Hz/80 ms) Silence (120 ms) • Beep “G” (560 Hz/80 ms) Silence (320 ms) • Beep “A” (628 Hz/80 ms) Silence (120 ms) • Beep “B” (705 Hz/80 ms) Silence (1020 ms) • Beep “C” (373 Hz/80 ms) Silence (120 ms) • Beep “F” (498 Hz/80 ms) Silence (120 ms) • Beep “G” (560 Hz/80 ms) Silence (320 ms) • Beep “A” (628 Hz/80 ms) Silence (120 ms) • Beep “B” (705 Hz/80 ms) Silence (5 s)
Medium	• Beep “C” (373 Hz/150 ms) Silence (250 ms) • Beep “G” (560 Hz/150 ms) Silence (250 ms) • Beep “B” (705 Hz/150 ms) Silence (19 s)
Low	• Beep “C” (373 Hz/150 ms) Silence (30 s)

ISO alarm tone sound patterns

Priority	Corresponding sound pattern
High	• Beep (100 ms) Silence (100 ms) • Beep (100 ms) Silence (100 ms) • Beep (100 ms) Silence (200 ms) • Beep (100 ms) Silence (100 ms) • Beep (100 ms) Silence (1 s) • Beep (100 ms) Silence (100 ms) • Beep (100 ms) Silence (100 ms) • Beep (100 ms) Silence (200 ms) • Beep (100 ms) Silence (100 ms) • Beep (100 ms) Silence (5 s) Frequency: 815 Hz
Medium	• Beep (200 ms) Silence (200 ms) • Beep (200 ms) Silence (200 ms) • Beep (200 ms) Silence (19 s) Frequency: 815 Hz
Low	• Beep (500 ms) Silence (30 s) Frequency: 815 Hz

ISO2 alarm tone sound patterns

Priority	Corresponding sound pattern
High	• Beep “C” (523 Hz/80 ms) Silence (120 ms) • Beep “F” (698 Hz/80 ms) Silence (120 ms) • Beep “G” (784 Hz/80 ms) Silence (220 ms) • Beep “A” (880 Hz/80 ms) Silence (120 ms) • Beep “B” (988 Hz/80 ms) Silence (1020 ms) • Beep “C” (523 Hz/80 ms) Silence (120 ms) • Beep “F” (698 Hz/80 ms) Silence (120 ms) • Beep “G” (784 Hz/80 ms) Silence (220 ms) • Beep “A” (880 Hz/80 ms) Silence (120 ms) • Beep “B” (988 Hz/80 ms) Silence (5 s)
Medium	• Beep “C” (523 Hz/115 ms) Silence (185 ms) • Beep “G” (784 Hz/115 ms) Silence (185 ms) • Beep “B” 988 Hz/115 ms) Silence (19.5 s)
Low	• Beep “C” (523 Hz/380 ms) Silence (30 s)

Auditory information signal characteristics

Measurement and start-up related information signals		
Signal	**Frequency (Hz)**	**Duration (ms)**
Start-up sound	523	1000
HR beat beep	815	10
Completed NIBP volume	250	500
Reminder tone	523	125

Visual information signals

For information regarding visual information signals, see the user’s manual.

Alarm broadcast mapping

Feature	Message on the bedside monitor	Message displayed on the central station/remote monitor
ECG	**Tachy**	**TACHY**
ECG	**Brady**	**BRADY**
ECG	**ST Ant high**	**ST ANT HIGH**
ECG	**ST Ant low**	**ST ANT LOW**
ECG	**ST Inf high**	**ST INF HIGH**
ECG	**ST Inf low**	**ST INF LOW**
ECG	**ST Lat high**	**ST LAT HIGH**

Feature	Message on the bedside monitor	Message displayed on the central station/remote monitor
ECG	**ST Lat low**	**ST LAT LOW**
ECG	**Frequent PVCs**	**FREQUENT PVCS**
ECG	**Frequent SVCs**	**FREQUENT SVCS**
ECG	**Asystole**	**ASYSTOLE**
ECG	**V Fib / V Tach**	**V FIB/V TACH**
ECG	**V Tach**	**V TACH**
ECG	**ECG measurements removed**	**ECG REMOVED**
ECG	**Arrh Paused**	**ARRH PAUSED**
ECG	**Leads off**	**LEADS OFF**
ECG	**Lead off**	**LEAD OFF**
ECG	**ECG module error**	**ECG MOD ERROR**
RESP	**RR (Imped.) high**	**RR IMP. HIGH**
RESP	**RR (Imped.) low**	**RR IMP. LOW**
RESP	**Apnea (Imped.)**	**APNEA IMP.**
RESP	**Lead I failed**	**LD I FAIL**
RESP	**Lead II failed**	**LD II FAIL**
RESP	**Lead RL-LL failed**	**RL-LL FAIL**
NIBP	**NIBP DIA high** **NIBP SYS high** **NIBP MAP high**	**NIBP HIGH**
NIBP	**NIBP DIA low** **NIBP SYS low** **NIBP MAP low**	**NIBP LOW**
NIBP	**NIBP measurement removed**	**NIBP REMOVED**
NIBP	**Check NIBP**	**CHECK NIBP**
NIBP	**NIBP cuff occlusion**	**OCCLUSION**
NIBP	**NIBP cuff loose**	**CUFF LOOSE**
IBP	**Art Sys high** **Art Dia high** **Art Mean high**	**ART HIGH**
IBP	**ABP Sys high** **ABP Dia high** **ABP Mean high**	**ABP HIGH**
IBP	**CVP Sys high** **CVP Dia high** **CVP Mean high**	**CVP HIGH**
IBP	**IBP1 Sys high** **IBP1 Dia high** **IBP1 Mean high**	**P1 HIGH**

Feature	Message on the bedside monitor	Message displayed on the central station/remote monitor
IBP	**IBP2 Sys high** **IBP2 Dia high** **IBP2 Mean high**	**P2 HIGH**
IBP	**IBP8 Sys high** **IBP8 Dia high** **IBP8 Mean high**	**P8 HIGH**
IBP	**ICP Sys high** **ICP Dia high** **ICP Mean high**	**ICP HIGH**
IBP	**LAP Sys high** **LAP Dia high** **LAP Mean high**	**LAP HIGH**
IBP	**PA Sys high** **PA Dia high** **PA Mean high**	**PA HIGH**
IBP	**RAP Sys high** **RAP Dia high** **RAP Mean high**	**RAP HIGH**
IBP	**RVP Sys high** **RVP Dia high** **RVP Mean high**	**RVP HIGH**
IBP	**UAC Sys high** **UAC Dia high** **UAC Mean high**	**UAC HIGH**
IBP	**UVC Sys high** **UVC Dia high** **UVC Mean high**	**UVC HIGH**
IBP	**Art Sys low** **Art Dia low** **Art Mean low**	**ART LOW**
IBP	**ABP Sys low** **ABP Dia low** **ABP Mean low**	**ABP LOW**
IBP	**CVP Sys low** **CVP Dia low** **CVP Mean low**	**CVP LOW**
IBP	**IBP1 Sys low** **IBP1 Dia low** **IBP1 Mean low**	**P1 LOW**

Feature	Message on the bedside monitor	Message displayed on the central station/remote monitor
IBP	**IBP2 Sys low** **IBP2 Dia low** **IBP2 Mean low**	**P2 LOW**
IBP	**IBP8 Sys low** **IBP8 Dia low** **IBP8 Mean low**	**P8 LOW**
IBP	**ICP Sys low** **ICP Dia low** **ICP Mean low**	**ICP LOW**
IBP	**LAP Sys low** **LAP Dia low** **LAP Mean low**	**LAP LOW**
IBP	**PA Sys low** **PA Dia low** **PA Mean low**	**PA LOW**
IBP	**RAP Sys low** **RAP Dia low** **RAP Mean low**	**RAP LOW**
IBP	**RVP Sys low** **RVP Dia low** **RVP Mean low**	**RVP LOW**
IBP	**UAC Sys low** **UAC Dia low** **UAC Mean low**	**UAC LOW**
IBP	**UVC Sys low** **UVC Dia low** **UVC Mean low**	**UVC LOW**
IBP	**No Px transducer**	**NO PX TRANSD**
IBP	**InvBP's not zeroed**	**IP NOT ZEROED**
IBP	**P1 over range**	**P1 OVER RNG**
IBP	**P2 over range**	**P2 OVER RNG**
IBP	**P8 over range**	**P8 OVER RNG**
IBP	**P1 under range**	**P1 UNDER RG**
IBP	**P2 under range**	**P2 UNDER RG**
IBP	**P8 under range**	**P8 UNDER RG**
IBP, Temperature	**STP measurements removed**	**STP REMOVED**
IBP	**Art disconnect**	**ART DISCONN**
IBP	**ABP disconnect**	**ABP DISCONN**
IBP	**UAC disconnect**	**UAC DISCONN**
SpO_2	**SpO2 high**	**SPO2 HIGH**

Feature	Message on the bedside monitor	Message displayed on the central station/remote monitor
SpO_2	**SpO2 low**	**SPO2 LOW**
SpO_2	**No SpO2 pulse**	**NO SPO2 PULSE**
SpO_2	**SpO2 probe off**	**SPO2 PROBE**
SpO_2	**No SpO2 probe**	**NO SPO2 PROBE**
SpO_2	**Check SpO2 probe** **SpO2 faulty probe**	**SPO2 FAULTY**
SpO_2	**Incompatible SpO2 Probe**	**SPO2 INCOMPAT**
SpO_2	**Identical SpO2 modules**	**SPO2 IDENT**
SpO_2	**SpO2 measurement removed**	**SPO2 REMOVED**
Temperature	**T1 high**	**T1 HIGH**
Temperature	**T2 high**	**T2 HIGH**
Temperature	**T1 low**	**T1 LOW**
Temperature	**T2 low**	**T2 LOW**
Temperature	**Tblood high**	**TBLOOD HIGH**
Temperature	**Tblood low**	**TBLOOD LOW**
Temperature	**T1 temperature error** **T2 temperature error**	**TEMP ERROR**
C.O.	**C.O. measurement removed**	**CO REMOVED**
C.O.	**Identical C.O. modules**	**IDENTICAL CO**
Gases	**RR (CO2) high**	**RR CO2 HIGH**
Gases	**RR (CO2) low**	**RR CO2 LOW**
Gases	**Apnea (CO2)**	**APNEA CO2**
Gases	**Apnea (Anes CO2)**	**VENT CO2 APN**
Gases	**EtCO2 high**	**ETCO2 HIGH**
Gases	**EtCO2 low**	**ETCO2 LOW**
Gases	**FiCO2 high**	**FICO2 HIGH**
Gases	**FiCO2 low**	**FICO2 LOW**
Gases	**EtO2 high**	**ETO2 HIGH**
Gases	**EtO2 low**	**ETO2 LOW**
Gases	**FiO2 high**	**FIO2 HIGH**
Gases	**FiO2 low**	**FIO2 LOW**
Gases	**Etxxx high**(**xxx**: **Hal**, **Enf**, **Iso**, **Sev**, **Des**)	**ETAA HIGH**
Gases	**Etxxx low**	**ETAA LOW**
Gases	**Fixxxhigh**	**FIAA HIGH**
Gases	**Fixxxlow**	**FIAA LOW**
Gases	**FiN2O high**	**FIN2O HIGH**
Gases	**Agent Mixture**	**AGENT MIXTURE**

Feature	Message on the bedside monitor	Message displayed on the central station/remote monitor
Gases	**Identical gas modules**	**MODULE ERROR**
Gases	**Failure in Agent ID**	**CHECK GAS**
Gases	**Service gas module**	**SERVICE GAS**
Gases	**Multiple agents present**	**MULTI AGENTS**
Gases	**Sample line blocked**	**BLOCKED LINE**
Gases	**Check sample gas out**	**SAMPLE GAS**
Gases	**Check water trap**	**WATER TRAP?**
Gases	**Gas measurements removed**	**GAS REMOVED**
Entropy	**Entropy RE high**	**RE HIGH**
Entropy	**Entropy RE low**	**RE LOW**
Entropy	**Entropy SE high**	**SE HIGH**
Entropy	**Entropy SE low**	**SE LOW**
Entropy	**Identical Entropy modules**	**ENTROPY IDENT**
Entropy	**Entropy measurement removed**	**ENTROPY REMOV**
NMT	**NMT measurement removed**	**NMT REMOVED**
NMT	**Identical NMT modules**	**NMT IDENT**
Monitor battery	**Battery empty**	**BATT EMPTY**
BIS	**BIS high**	**BIS HIGH**
BIS	**BIS low**	**BIS LOW**
BIS	**BIS measurement removed**	**BIS REMOVED**
BIS	**Identical BIS modules**	**BIS IDENT**
BIS	**BIS module error**	**BIS MOD ERR**
Monitor sound	**Audio fail**	**AUDIO FAIL**
Monitor speaker	**Speaker failure**	**SPEAKER FAIL**
Spirometry	**TVexp low**	**TVEXP LOW**
Spirometry	**TVexp high**	**TVEXP HIGH**
Spirometry	**Ppeak low**	**PPEAK LOW**
Spirometry	**Ppeak high**	**PPEAK HIGH**
Spirometry	**MVexp low**	**MVEXP LOW**
Spirometry	**MVexp high**	**MVEXP HIGH**
Spirometry	**Anes: Apnea**	**VENT APNEA**
ECG full arrhythmia	**VT > 2**	**VT > 2**
ECG full arrhythmia	**R on T**	**R ON T**
ECG full arrhythmia	**V Brady**	**V BRADY**
ECG full arrhythmia	**Couplet**	**COUPLET**
ECG full arrhythmia	**Bigeminy**	**BIGEMINY**

ECG full arrhythmia	**Accel. Ventric.**	**ACC VENT**
ECG full arrhythmia	**Trigeminy**	**TRIGEMINY**
ECG full arrhythmia	**Multifocal PVCs**	**MULTIFOC PVCS**
ECG full arrhythmia	**A Fib**	**ATRIAL FIB**
ECG full arrhythmia	**Missing Beat**	**MISSING BEAT**
ECG full arrhythmia	**Pause**	**PAUSE**
ECG full arrhythmia	**SV Tachy**	**SV TACHY**
ECG full arrhythmia	**Irregular**	**IRREGULAR**

Physiological alarm limits specifications

Alarm limits specifications for ECG alarms

The following table lists the alarm limits for physiological alarms related to the ECG measurement.

Alarm	Limit range	Limit increment
Asystole	NA	NA
Brady	20 to 295 bpm The Brady limit matches the low heart rate limit. If the low heart rate limit is changed, the Brady limit changes.	5 bpm
ST Ant high **ST Inf high** **ST Lat high**	-6.0 to +6.0 mm	0.1 mm
ST Ant low **ST Inf low** **ST Lat low**	-6.0 to +6.0 mm	0.1 mm
Tachy	25 to 300 bpm The Tachy limit matches the high heart rate limit. If the high heart rate limit is changed, the Tachy limit changes.	5 bpm
V Fib / V Tach	NA	NA
V Tach	NA	NA
A Fib	NA	NA
Accel. Ventric.	NA	NA
Bigeminy	NA	NA
Couplet	NA	NA
Frequent PVCs	1 to 100 per minute	1 per minute
Frequent SVCs	1 to 100 per minute	1 per minute

Irregular	NA	NA
Missing Beat	NA	NA
Multifocal PVCs	NA	NA
Pause	NA	NA
R on T	NA	NA
SV Tachy	4 to 10 beats	2 beats
Trigeminy	NA	NA
V Brady	NA	NA
VT > 2	NA	NA

Alarm limits specifications for impedance respiration alarms

The following table lists the alarm limits for physiological alarms related to the impedance respiration measurement.

Alarm	Limit range	Limit increment
Apnea **Apnea (Imped.)** **APN**	NA	NA
RR (Imped.) high	4 to 120 breaths per minute	1 breath per minute
RR (Imped.) low	4 to 120 breaths per minute	1 breath per minute

Alarm limits specifications for SpO_2 alarms

The following table lists the alarm limits for physiological alarms related to the SpO_2 measurement.

Alarm	Limit range	Limit increment
No pulse **No SpO2 pulse**	NA	NA
SpO2 high	51 to 100%	1%
SpO2 low	50 to 100%	1%

Alarm limits specifications for NIBP alarms

The following table lists the alarm limits for physiological alarms related to the non-invasive blood pressure measurement.

Alarm	Limit range	Limit increment
NIBP SYS high **NIBP SYS low**	A/P: 30 to 290 mmHg NEO: 30 to 140 mmHg	5 mmHg
NIBP DIA high **NIBP DIA low**	A/P: 10 to 220 mmHg NEO: 10 to 110 mmHg	5 mmHg
NIBP MAP high **NIBP MAP low**	A/P: 20 to 260 mmHg NEO: 20 to 125 mmHg	5 mmHg

Alarm limits specifications for invasive pressures alarms

The following table lists the alarm limits for physiological alarms related to the invasive pressures measurement.

Alarm	Limit range	Limit increment
ABP Sys high / **ABP Dia high** / **ABP Mean high** **Art Sys high** / **Art Dia high** / **Art Mean high** **CVP Sys high** / **CVP Dia high** / **CVP Mean high** **PA Sys high** / **PA Dia high** / **PA Mean high** **ICP Sys high** / **ICP Dia high** / **ICP Mean high** **LAP Sys high** / **LAP Dia high** / **LAP Mean high** **IBP1 Sys high** / **IBP1 Dia high** / **IBP1 Mean high** **IBP2 Sys high** / **IBP2 Dia high** / **IBP2 Mean high** **IBP8 Sys high** / **IBP8 Dia high** / **IBP8 Mean high** **RAP Sys high** / **RAP Dia high** / **RAP Mean high** **RVP Sys high** / **RVP Dia high** / **RVP Mean high** **UAC Sys high** / **UAC Dia high** / **UAC Mean high** **UVC Sys high** / **UVC Dia high** / **UVC Mean high**	-40 to 320 mmHg (-5.3 to 42.7 kPa)	• -40 to 39 mmHg (-5.3 to 5.2 kPa): 1 mmHg (0.13 kPa) • 40 to 320 mmHg (5.3 to 42.7 kPa): 5 mmHg (0.67 kPa)

Alarm	Limit range	Limit increment
ABP Sys low / **ABP Dia low** / **ABP Mean low** **Art Sys low** / **Art Dia low** / **Art Mean low** **CVP Sys low** / **CVP Dia low** / **CVP Mean low** **PA Sys low** / **PA Dia low** / **PA Mean low** **ICP Sys low** / **ICP Dia low** / **ICP Mean low** **LAP Sys low** / **LAP Dia low** / **LAP Mean low** **IBP1 Sys low** / **IBP1 Dia low** / **IBP1 Mean low** **IBP2 Sys low** / **IBP2 Dia low** / **IBP2 Mean low** **IBP8 Sys low** / **IBP8 Dia low** / **IBP8 Mean low** **RAP Sys low** / **RAP Dia low** / **RAP Mean low** **RVP Sys low** / **RVP Dia low** / **RVP Mean low** **UAC Sys low** / **UAC Dia low** / **UAC Mean low** **UVC Sys low** / **UVC Dia low** / **UVC Mean low**		

Alarm limits specifications for temperature alarms

The following table lists the alarm limits for physiological alarms related to the temperature measurement.

Alarm	Limit range	Limit increment
T1 high **T1 low** **T2 high** **T2 low**	10 to 45°C (50 to 113°F)	0.1°C (0.18°F)
Tblood high **Tblood low**	17.5 to 43°C (63.5 to 109.4°F)	0.1°C (0.18°F)

Alarm limits specifications for airway gases alarms

The monitor only supports the adjustment of the airway gas alarm limit from the gas modules. The monitor does not support the adjustment of the airway gas alarm limit from the anesthesia machine. The airway gases alarm limits from anesthesia machine can only be displayed on the monitor screen.

Alarm	Limit range	Limit increment
Apnea (Imped.) / **APN** / **Apnea (CO2)**	NA	NA
EtCO2 high / **EtCO2 low**	0 to 13%	0.1%

Alarm	Limit range	Limit increment
FiCO2 high / **FiCO2 low**	0 to 3%	0.1%
EtO2 high / **EtO2 low**	10 to 100%	1%
FiO2 high / **FiO2 low**	18 to 100%	1%
Etxxx high (**xxx**: **Hal**, **Enf**, **Iso**, **Sev**, **Des**) / **Et xxx low**	AA, HAL, ENF, ISO: 0 to 6% SEV: 0 to 8% DES: 0 to 20%	AA, HAL, ENF, ISO, SEV: 0.1% DES: 0.5%
Fixxx high / **Fixxx low**	AA, HAL, ENF, ISO: 0 to 6% SEV: 0 to 8% DES: 0 to 20%	AA, HAL, ENF, ISO, SEV: 0.1% DES: 0.5%
FiN2O high	82%	NA
RR (CO2) high / **RR (CO2) low**	Adult/Pediatric: 4 to 60 breaths per minute Neonatal : 4 to 100 breaths per minute	1 breath per minute

Alarm limits specifications for spirometry alarms

This monitor does not support adjustment of spirometry alarms limit from anesthesia machine. The monitor can only display the spirometry alarms from the anesthesia machine.

Alarm	Limit range	Limit increment
Ppeak high / **Ppeak low**	• -20 to 100 cmH2O • -20 to 98 hPa • -20 to 98 mbar • -15 to 74 mmHg • -2.0 to 9.8 kPa	• 1 cmH2O • 1 hPa • 1 mbar • 1 mmHg • 0.1 kPa
MVexp high / **MVexp low**	0 to 60 l/min	0.1 l/m
TVexp high / **TVexp low**	0 to 3200 ml	1 ml

Alarm limits specifications for Entropy alarms

The following table lists the alarm delays for physiological alarms related to the Entropy measurement.

Alarm	Limit range	Limit increment
Entropy RE high	0 to 100	1
Entropy RE low	0 to 100	1
Entropy SE high	0 to 91	1
Entropy SE low	0 to 91	1

Alarm limits specifications for NMT alarms

The following table lists the alarm limits for physiological alarms related to the NMT measurement.

Alarm	Limit range	Limit increment
Block recovery	• 1 to 4 count	• 1 count

Alarm limits specifications for BIS alarms

The following table lists the alarm limits for physiological alarms related to the BIS measurement.

Alarm	Limit range	Limit increment
BIS high	0 to 100	1
BIS low	0 to 100	1

Alarm delay specifications

The alarm system delay consists of two components:

- Alarm signal detection delay: <3 s
- Fixed delay of the algorithm and monitor software: see following list for alarm priorities and escalations

Possible interferences and poor quality signals in a clinical environment may extend the disclosed alarm system delays.

Local alarm condition delay to output port: <5 s

Time to alarm for tachycardia

When tested in accordance to YY1079 4.1.2.1g and IEC 60601-2-27 201.7.9.2.9.101b 6), the time to alarm for tachycardia is as follows:

Ventricular tachycardia (206 bpm); halved amplitude: 9.9 s (average) (5.8 to 11.5 s range)
Ventricular tachycardia (206 bpm); normal amplitude: 7.1 s (average) (4.5 to 9.2 s range)
Ventricular tachycardia (206 bpm); doubled amplitude: 4.4 s (average) (3.5 to 6.2 s range)
Ventricular tachycardia (195 bpm); halved amplitude: 7.0 s (average) (4.8 to 8.5 s range)
Ventricular tachycardia (195 bpm); normal amplitude: 5.8 s (average) (3.5 to 8.5 s range)
Ventricular tachycardia (195 bpm); doubled amplitude: 6.1 s (average) (3.5 to 8.5 s range)

Alarm priorities and escalations

Alarm priorities and escalation times for ECG

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Alarm setup changed from Central	MF		0 s			
Arrhythmia Paused	WF	High, Medium, Low		0s, according to priority setting		
		Escalating			0 s	
Arrh Paused	MF	High, Medium, Low		0s, according to priority setting		
	MF	Escalating			0 s	40 s
Artifact	WF		0 s			
Asystole **ASY**	MF, WF DF					0 s
Brady	MF, WF	High, Medium, Low		0s, according to priority setting		
		Escalating			0 s	69 s
		Escalating (when HR <0.75 x low limit, and ECG as a primary source)				0 s
ECG module error	MF				0 s	
ECG measurements removed	MF		5 s		5 s	
Frequent PVCs	MF	High, Medium, Low, Info	2s, according to priority setting			
		Escalating			2 s	71 s
	WF		0 s			
Frequent SVCs	MF, WF	High, Medium, Low, Info	0s, according to priority setting			
		Escalating		0 s	13 s	
Incompatible ECG firmware	MF			3 s		
LA/L lead off **LL/F lead off** **RA/R lead off** **V/C lead off** **V2/C2 lead off** **V3/C3 lead off** **V4/C4 lead off** **V5/C5 lead off** **V6/C6 lead off**	WF		0 s			
RL/N lead off			0s, after **Lead off** disappears.			
Lead changed	WF		0 s			

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Lead off	MF	Low, Info	7 s, according to priority setting, (after "xxx lead off" message appears in WF)			
Leads off	MF	High, Medium, Low		3 s, according to priority setting		
		Escalating		3 s	12 s	60 s
	WF		0 s			
ST Ant high / **ST Ant low** **ST Inf high** / **ST Inf low** **ST Lat high** / **ST Lat low**	MF	High, Medium, Low, Info	60 s, according to priority setting			
Tachy	MF, WF	High, Medium, Low		0s, according to priority setting		
		Escalating			0 s	69 s
		Escalating (when HR >1.25 x high limit, and ECG as a primary source)				0 s
V Fib / V Tach	MF, WF					8 s
V Tach	MF, WF	High, Medium, Low, Info	0s, according to priority setting			
	DF	High, Medium			0s, according to priority setting	
		NOTE 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 NEONATAL mode or over 150 in all other modes.				

A Fib	MF, WF		0s, according to priority setting
Accelerated Ventricular	MF, WF		0s, according to priority setting
Bigeminy	MF, WF		0s, according to priority setting
Couplet	MF, WF		0s, according to priority setting
Irregular	MF, WF		0s, according to priority setting
Missing Beat	MF, WF		0s, according to priority setting
Multifocal PVCs	MF, WF		0s, according to priority setting
Pause	MF, WF		0s, according to priority setting
R on T	MF, WF		0s, according to priority setting
SV Tachy	MF, WF		0s, according to priority setting
Trigeminy	MF, WF		0s, according to priority setting

V Brady	MF, WF		0s, according to priority setting
VT > 2	MF, WF		0s, according to priority setting

Alarm priorities and escalation times for impedance respiration

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Apnea **Apnea (Imped.)** **APN**	MF, WF, DF	Low, Medium, High		X s (X = adjustable limit), according to priority setting		
		Escalating		X s	X + 30 s	X + 60 s
Apnea deactivated	DF		0 s			
Check electrodes	WF, DF		5 s			
Lead I failed **Lead II failed**	WF, DF		2 s			
Lead RL-LL failed			2 s (If disconnect RL, 0s after **Measurement off** disappears)			
Learning	WF, DF		0 s			
Measurement off **OFF**	WF, DF DF		0 s			
Resp artifact	WF, DF		0 s			
RR (Imped.) high **RR (Imped.) low**	MF	Low, High, Medium		20 s, according to priority setting		
		Escalating		20 s	60 s	
Small resp curve	DF		0 s			

Alarm priorities and escalation times for SpO_2

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

During the NIBP measurement, the new **SpO2 high**, **SpO2 low** alarms will de-escalate to the low priority.

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Check Device	DF		0 s			
Check Probe	DF		10 s	5 s	30 s	

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Check SpO2 probe	MF			5 s	30 s	
Faulty Probe	DF		5 s	5 s	30 s	
Identical SpO2 modules	MF				0 s	
Incompatible Probe	DF		0 s	5 s	30 s	
Incompatible SpO2 Probe	MF			5 s	30 s	
Interference	DF		0 s			
Low Perfusion	DF		0 s			
Low signal quality	DF		0 s			
No Probe	DF		5 s	5 s	30 s	
No SpO2 probe	MF			5 s	30 s	
No Pulse	DF		8 s	10 s	15 s, escalates to Medium only if HR source is AUTO or pleth	
No SpO2 pulse	MF			10 s	15 s, escalates to Medium only if HR source is AUTO or pleth	
Poor Signal	DF		0 s			
Probe Off	DF	High, Medium, Low		0 s, according to priority setting		
		Escalating	5 s	5 s	30 s	
Pulse Search	DF		0 s			
SpO2 faulty probe	MF			5 s	30 s	
SpO2 high	MF	High, Medium, Low		10 s, according to priority setting		
		Escalating		10 s, de-escalate to low when NIBP cuff pressure is over 30 mmHg	10 s	42 s
SpO2 low	MF	High, Medium, Low		10 s, according to priority setting For Masimo: Alarm delay time, or 0 s when SpO_2 value below low limit more than 5%		

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
		Escalating		10 s, de-escalate to low when NIBP cuff pressure is over 30 mmHg	10 s For Masimo: Alarm delay time, or 0 s when SpO_2 value below low limit more than 5%	42 s For Masimo: Alarm delay time + 32 s, or 32 s when SpO_2 value below low limit more than 5%
SpO2 measurement removed	MF		5 s (patient discharged)		5 s (patient admitted)	
SpO2 module error	MF				0 s	
STP module error	MF				0 s	
Incompatible Masimo	MF					0 s
Identical STP modules	MF				0 s	
SpO2 probe off	MF	High, Medium, Low		5 s, according to priority setting		
		Escalating		5 s	30 s	

Alarm priorities and escalation times for NIBP

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Call service: Error x where x = 0 - 18	DF				0 s	
Check NIBP	MF				If measurement finished, but value is missing: 0 s If measurement interrupted: 15 s	
Cuff loose	DF				< 30 s	
Cuff occlusion	DF				0 s	
Cuff overpressure displays for 10 s	DF				0 s	
Long measurement time displays for 10 s	MF, DF				0 s	

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
NIBP call service error	MF				0 s	
NIBP cuff loose	MF				< 30 s	
NIBP cuff occlusion	MF				0 s	
NIBP cuff overpressure	MF				0 s	
NIBP manual	MF				0 s	
NIBP SYS high / **NIBP SYS low** **NIBP MAP high** / **NIBP MAP low** **NIBP DIA high** / **NIBP DIA low**	MF	High, Medium, Low		0 s, according to priority setting		
NIBP measurement removed	MF		5 s		5 s	
Select cuff size	MF		0 s			
Unstable zero pressure displays for 10 s	DF		0 s			
Weak pulsation	MF, DF				0 s	

Alarm priorities and escalation times for invasive pressures

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
ABP disconnect **Art disconnect** **UAC disconnect**	MF					5 s
ABP Sys high / **ABP Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
ABP Mean high / **ABP Mean low** **ABP Dia high** / **ABP Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
Art Sys high / **Art Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
Art Mean high / **Art Mean low** **ArtDia high** / **Art Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Calibrating Displays for 10 s	Menu		0 s			
Calibrated	Menu		0 s			
CVP Sys high / **CVP Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
CVP Mean high / **CVP Mean low** **CVP Dia high** / **CVP Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
Failed	Menu		0 s			
Failed: P<100	Menu		0 s			
IBP1 Sys high / **IBP1 Sys low** to **IBP8 Sys high** / **IBP8 Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
IBP1 Mean high / **IBP1 Mean low** to **IBP8 Mean high** / **IBP8 Mean low** **IBP1 Dia high** / **IBP1 Dia low** to **IBP8 Dia high** / **IBP8 Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
ICP Sys high / **ICP Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
ICP Mean high / **ICP Mean low** **ICP Dia high** / **ICP Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
InvBP's not zeroed	MF		8 s	300 s		
LAP Sys high / **LAP Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
LAP Mean high / **LAP Mean low** **LAP Dia high** / **LAP Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
No Px transducer	MF			3 s	30 s	
Not Zeroed	DF		8 s			
Over range > 320 mmHg or **Over range > 43 kPa** **Under range < -40 mmHg** or **Under range < -5 kPa** **Under range < -30 mmHg** or **Under range < -4 kPa**	DF		0 s			

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
P1 over range / **P2 over range** / **P8 over range** **P1 under range** / **P2 under range** / **P8 under range**	MF				0 s	
PA Sys high / **PA Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
PA Mean high / **PA Mean low** **PA Dia high** / **PA Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
RAP Sys high / **RAP Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
RAP Mean high / **RAP Mean low** **RAP Dia high** / **RAP Dia low**		Escalating			0 s	10 s if Brady/ Tachy alarm also present
RVP Sys high / **RVP Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
RVP Mean high / **RVP Mean low** **RVP Dia high** / **RVP Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
STP measurements removed	MF		5 s		5 s	
UAC Sys high / **UAC Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
UAC Mean high / **UAC Mean low** **UAC Dia high** / **UAC Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
UVC Sys high / **UVC Sys low**	MF	High, Medium, Low		0 s, according to priority setting		
UVC Mean high / **UVC Mean low** **UVC Dia high** / **UVC Dia low**		Escalating			0 s	0 s if Brady/ Tachy alarm also present
Zero adj > 100 mmHg	DF		0 s			
Zero ICP separately	MF		0 s			
Zeroed	DF		0 s			
Zeroing	DF		0 s			
Zeroing failed	DF		0 s			
Out of range	DF		0 s			

Alarm priorities and escalation times for temperature

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Performing temp test	DF		0 s			
STP measurements removed	MF		5 s		5 s	
T1 high / **T1 low** **T2 high** / **T2 low** **Tblood high** / **Tblood low**	MF	Medium, Low		60 s	120 s	
T1 temperature error **T2 temperature error**	MF				0 s	
Temperature error	DF		0 s			

Alarm priorities and escalation times for cardiac output

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
C.O. measurement removed	MF		5 s		5 s	
C.O. module error	MF				0 s	
Confirm C.O.	DF, MF		0 s			
Identical C.O. modules	MF				0 s	
Service C.O. module	MF			0 s		
Unstable Tblood	DF		0 s			

Alarm priorities and escalation times for airway gases

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Apnea (CO2) **Apnea** **APN**	MF, DF, WF	High, Medium, Low		20 s, according to priority setting		
	MF	Escalating		20 s	50 s	80 s
	DF, WF			20 s		
Agent Mixture	MF			0 s, MAC/MACage<3	0 s, MAC/MACage>=3	
Agent inaccurate	MF			20 s		
Apnea deactivated	DF		0 s			
Calibrating gas sensor	WF		0 s			
Check water trap and sample gas out. Wait 30 sec and press Home to continue.	WF			40 s		
Check water trap	WF, DF		0 s			
	MF			40 s	60 s	
Check sample gas out	WF, DF		0 s			
	MF			40 s	60 s	
CO2 over scale	WF		0 s			
CO2 inaccurate	MF			20 s		
Continuous blockage. Check sample line and water trap.	WF			40 s		
Etxxx high (**xxx**: **Hal**, **Enf**, **Iso**, **Sev**, **Des**	MF			20 s	90 s	183 s
Etxxx low	MF			20 s	90 s	
EtCO2 high **EtCO2 low**	MF	High, Medium			20 s, according to priority setting	
		Escalating		20 s	60 s	
EtO2 high	MF			20 s	20 s	
EtO2 low	MF			20 s	20 s	82 s or 20 s (when EtO_2 <10%)
Failure in Agent ID	MF				0 s	
	DF		0 s			
Fixxx high	MF	High, Medium			20 s, according to priority setting	
		Escalating		20 s	180 s	273 s

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Fixxx low	MF	High, Medium			20 s, according to priority setting	
		Escalating		20 s	180 s	
FiCO2 high **FiCO2 low**	MF	High, Medium			20 s, according to priority setting	
		Escalating		20 s	60 s	
FiN2O high	MF					20 s
FiO2 high	MF			20 s	20 s	
FiO2 low	MF			20 s	20 s	82 s or 20 s (when FiO_2<18%)
Gas measurements removed	MF		5 s, if patient discharged		5 s, if patient admitted	
Gas module standby	MF		0 s			
Standby	DF					
Gas module standby. Touch to activate. **Gas module standby. Start from CO2 menu.**	WF					
Identical gas modules	MF				0 s	
Low gas sample flow	MF			10 s		
Multiple agents present	MF, DF, WF				0 s	
N2O inaccurate	MF			20 s		
O2 inaccurate	MF			20 s		
Replace water trap	MF			40 s		
RR (CO2) high **RR (CO2) low**	MF	High, Medium, low		20 s, according to priority setting		
		Escalating		20 s	60 s	
Sample line blocked	WF, DF		0 s	40 s		
	MF			40 s	60 s	
Service gas module	MF, WF				0 s	

Alarm priorities and escalation times for spirometry

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Anes: Apnea	MF					0 s
Anesthesia interface removed	MF		5 s		5 s (When patient enters monitoring)	
Anesthesia incompatible device	MF				5 s	
MVexp high / **MVexp low**	MF			0 s	40 s	
Ppeak high	MF				0 s	40 s
Ppeak low	MF				0 s	
TVexp high / **TVexp low**	MF				0 s	

Alarm priorities and escalation times for Entropy

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Artifacts	DF		0 s			
Automatic check off	DF		0 s			
Cable off	DF		0 s			
Checking sensor	DF, WF		0 s			
Confirm sensor electrode 1 **Confirm sensor electrode 2** **Confirm sensor electrode 3**	DF		0 s			
Confirm sensor electrodes	DF		0 s			
Entropy cable off	MF			60 s		
Entropy measurement removed	MF		5s, if patient discharged		5s, if patient admitted	
Entropy RE high / **Entropy RE low**	MF			15 s		
Entropy SE high / **Entropy SE low**	MF			15 s		
Entropy sensor check failed	MF			0 s		

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Entropy sensor off	MF			60 s		
Identical Entropy modules	MF				0 s	
Isoelectric EEG	DF, WF		0 s			
Low signal	DF		0 s			
No Entropy sensor	MF			60 s		
Noise	WF		0 s			
No sensor	DF		0 s			
Sensor check failed	DF		0 s			
Sensor off	DF		0 s			
Starting up	DF		0 s			

Alarm priorities and escalation times for NMT

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Block recovery	MF		0 s			
Check electrodes	DF		0 s			
Identical NMT modules	MF				0 s	
Measurement off	DF		0 s			
NMT cable removed	MF		0 s, patient in discharged	0 s, patient in admitted		
NMT measurement removed	MF		5 s, patient in discharged	5 s, patient in admitted		
Reference not stable	DF		0 s			
Reference set	DF		0 s			
Response too weak	DF		0 s			
Sensor off	DF		0 s			
Setting reference	DF		0 s			
Start measurement	DF		0 s			
Supramax not found	DF		0 s			
Supramax search	DF		0 s			

MESSAGE	LOCATION	ALARM PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Wait to continue	DF		0 s			

Alarm priorities and escalation times for BIS

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	PRIORITY SETTING	PRIORITIES AND ESCALATION TIMES			
			info	low	medium	high
Apply sensor **BIS Apply sensor**	DF MF		0 s			
Artifact	DF, WF		30 s			
Automatic check off	DF		0 s			
BIS high /BIS low	MF			15 s		
BIS measurement removed	MF		5 s if no patient admitted		5 s if no patient admitted	
Checking sensor	DF, WF		0 s			
Demo data	DF, WF		0 s			
DSC error **BIS DSC error**	DF, WF MF		0 s			
High BIS impedance	MF			0 s		
Identical BIS modules	MF				0 s	
Incompatible sensor	DF, WF		0 s			
Module error **BIS module error**	DF, WF MF		0 s		0 s	
No sensor **No BIS sensor**	DF, WF MF		0 s	60 s		
Poor signal	DF, WF		30 s			
Replace sensor **BIS sensor expired**	DF MF		0 s	0 s		
Sensor check failed **BIS sensor check failed**	DF, WF MF		0 s	0 s		
Testing DSC	DF, WF		0 s			

Alarm priorities and escalation times for trends and snapshots

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	PRIORITIES AND ESCALATION TIMES			
		info	low	medium	high
Check OxyCRG	MF	0 s			
Creating OxyCRG snapshot	MF	0 s			
End of 20 min trend data	MF	0 s			
No more space Full disclosure disabled	MF			0 s	
No storage Full disclosure disabled	MF			0 s	
Mark X where xxx = snapshot sequence number Displays for 5 seconds	MF	0 s			
Snapshot created	MF	0 s			
Snapshot memory full. Oldest snapshot erased.	MF	0 s			
Storage fail Full disclosure failure	MF		0 s		

Alarm priorities and escalation times for various situations

The following table shows related messages with their priorities and escalation times. In the table, the message location is indicated by the following: MF = message field; DF = digit field; WF = waveform field. For more information on alarm messages, refer to the user's manual.

MESSAGE	LOCATION	PRIORITIES AND ESCALATION TIMES			
		info	low	medium	high
Alarm setup changed from Central	MF	0 s			
Alarms reset remotely	MF	0 s			
Alarm volume changed	MF		0 s		
All monitors disconnected	MF		0 s		
Audio fail	MF			0 s	
Barcode scanned	MF	0 s			
Barcode too long	MF	0 s			

MESSAGE	LOCATION	PRIORITIES AND ESCALATION TIMES			
		info	low	medium	high
Battery empty	MF			0 s	
Battery low	MF		0 s		
Battery temperature high	MF			0 s	
Call service UMBC error	MF				0 s
Certificate close to expiration	MF		0 s		
Certificate expired	MF		0 s		
Condition battery	MF			0 s	
CS Gateway communication failure	MF	0 s			
DEMO MODE	MF				0 s
E-Manual lost	MF				0 s
Entering standby	MF	0 s			
Frame temperature high	MF			0 s	
Identical IP address noticed	MF			max. 40 s	
Identical unit&bed name noticed	MF			max. 40 s	
Incorrect barcode value	MF	0 s			
Invalid barcode configuration	MF	0 s			
License invalid	MF	0 s			
Monitor disconnected	MF		0 s		
Motion Sensor Start Failed (not for device with VSP 4.0 Upgrade Software)	MF		0 s		
Network: HL7	MF		max. 40 s		
Network down: HL7	MF		max. 40 s		
Network down	MF		max. 40 s		
Network made	MF		max. 40 s		
No battery backup	MF			0 s	
No patients found	MF	0 s			
No printer selected	MF	0 s			
Patient admitted	MF	0 s			
Patient discharged	MF	0 s			
Printing	MF	3 s			

MESSAGE	LOCATION	PRIORITIES AND ESCALATION TIMES			
		info	low	medium	high
Printing Alarm	MF	3 s			
Printer error	MF	0 s			
Printing ready	MF	0 s			
Recorder: cover open	MF	0 s			
Recorder: input voltage high **Recorder: input voltage low**	MF	0 s			
Recorder: out of paper	MF	0 s			
Recorder module removed	MF	0 s			
Recorder system error	MF	0 s			
Recorder thermal array overheat	MF	0 s			
Replace battery	MF			0 s	
Restart needed	MF				0 s
Saving	MF	3 s			
Saving PDF	MF	0 s			
Saving PDF failed	MF	0 s			
Speaker failure	MF			0 s	

Parameter specifications

ECG performance specifications

ECG heart rate range	20 to 300 bpm
ECG heart rate accuracy	±1% or ±1 bpm, whichever is greater.
ECG heart rate resolution	1 bpm
ECG heart rate response time	Indicate 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 60601-2-27 201.7.9.2.9.101 b 4) and YY1079 4.1.2.1e as follows: Ventricular bigeminy: 80 bpm Slow alternating ventricular bigeminy: 30 bpm (normal), 60 bpm (narrow) Rapid alternating ventricular bigeminy: 120-128 bpm Bidirectional systoles: 60 bpm
ECG heart rate averaging computation	Average of 12 second median values
ECG QRS detection range	±0.5 to ±5 mV
ECG QRS detection width (Q to S)	40 to 120 ms
PVC rate range	0 to 300 PVCs per minute
PVC rate resolution	1 PVC per minute
SVC rate range	0 to 300 SVCs per minute
SVC rate resolution	1 SVC per minute
ST numeric range	-20 to +20 mm (-2 to +2 mV)
ST numeric resolution	0.1 mm
ST numeric accuracy	±0.2 mm or ±10%, whichever is greater (within the measurement range of -8 to +8 mm)
ECG display bandwidth	With 50/60 Hz powerline frequency: • Monitoring: 0.5 to 40 Hz (-3 dB) • ST: 0.05 to 40 Hz (-3 dB) • Diagnostic: 0.05 to 145 Hz (-3 dB) • Moderate: 0.5 to 20 Hz (-3 dB)
ECG differential offset voltage (allowable offset)	±0.9V dc ±10%
ECG input impedance	• Common mode: > 10 MΩ @ 50/60 Hz • Differential: > 2.5 MΩ from 0.67 to 40 Hz
ECG common mode rejection ratio	90 dB minimum at 50/60 Hz
Maximum tall T-wave rejection capability (with a 1 mV QRS test signal)	< 1.4 mV

ECG sweep speed options	12.5, 25, and 50 mm/s
ECG leads available	I, II, III, V1 to V6, aVR, aVL, and aVF
ECG leadsets supported	3-, 5-, or 10-leadwire ECG
Pacemaker pulse display capability	Voltage range: ±2 to ±700 mV Pulse width: 0.5 to 2 ms
Pacemaker pulse rejection capability	Voltage range: ±2 to ±700 mV Pulse width: 0.1 to 2 ms Overshoot according to Method A (IEC 60601-2-27 201.12.1.101.13 and YY1079 4.1.4.2) with amplitude max 2 mV **NOTE** According to IEC 60601-2-27 201.12.1.101.13 a) b) c) and YY1079 4.1.4.2 a) b) c) an atrial pace pulse with identical amplitude and duration precedes ventricular pace pulse by 150 ms to 250 ms.
Pacer pulse rejection of fast ECG signals (according to the test defined in IEC 60601-2-27 201.12.1.101.12 and YY1079 4.1.4.3)	5.0 V/s
ECG leads disconnection (direct current for leads-off) detection	• Active patient electrode: < 30 nA each • Reference electrode: < 300 nA
Defibrillation protection	5000 V, 360 J
Defibrillation recovery time	< 5 s
Sync signal	Pulse width: 10 ms (±20%) Output impedance: 110 Ω ± 20% @10 mA
Defibrillator sync delay	< 35 ms
GE recommends every year to verify the total sensitivity by using a standard electrocardiogram testing signal. (according to YY0782 51.103.2).	

Impedance respiration performance specifications

Impedance respiration measurement range	Adult/pediatric: 0 to 120 breaths per minute Neonatal: 0 to 200 breaths per 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 gain range	0.1 to 5 cm/Ω
Impedance respiration waveform sweep speed options	0.625 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s and 50 mm/s
Impedance respiration normalized respiration sensing current	≤ 30 μA
Impedance respiration carrier frequency	55.555KHz

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 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 Oximax technology with Oximax sensors

The Nellcor Oximax Technology with Oximax sensors have 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 hemoximetry. Subjects used to validate SpO_2 measurement accuracies were healthy and recruited from the local population. Subjects comprised both adult men and women and spanned a range of skin pigmentations. Because scatter and bias of pulse oximeter SpO_2 and blood SaO_2 comparisons commonly increase as the saturation decreases, and accuracy specifications are calculated from data spanning the stated range, different accuracy values may result when describing partially overlapping ranges. When sensors are used on neonatal subjects as recommended, the specified accuracy range is increased by ± 1 digit, as compared to adult usage, to account for the theoretical effect on oximeter measurements of fetal hemoglobin in neonatal blood.

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 SpO2 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% SaO2.

Accuracy of Masimo SET technology with Masimo sensors

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% SpO_2 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 technology with TruSignal sensors

GE 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.

GE Oxy-AF and GE Oxy-SE sensors have been validated for neonatal accuracy. The subject demographics included 28 neonates and 1 infant (15 females and 14 males). The subjects ranged in age from newborn to 37 days old. The weights ranged from 560 to 3060 g. The skin tones included in the study were light to dark. For the neonatal study, the Arms of the collected convenience samples were 2.7, the Oxy-AF sensor in the SaO2 range of 87-100% collected 52 data points, and the Oxy-SE sensor in the SaO2 range of 81-100% collected 53 data points.

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.

Masimo SET Technology with Masimo sensors has been validated for motion accuracy in human blood studies on healthy adult volunteers 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 compared against a laboratory CO-oximeter and ECG monitor. The 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.

GE Technology with TS-AF and TS-AP sensors has 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

Nellcor Oximax technology with Oximax sensors has been validated for SpO_2 low perfusion accuracy in bench top testing using Nellcor's PS II simulator with signal strength setting of 0.03% modulation and oxygen saturation levels of 70 to 100% at a pulse rate of 90 BPM. Nellcor Oximax Technology with Oximax sensors has been validated for low perfusion pulse rate accuracy in bench top testing using Nellcor's PS II simulator at a simulated low perfusion level of 0.10% modulation in the pulse rate range of 40 to 250 beats per minute (BPM) at an SpO_2 of 95%.

Low perfusion accuracy of Masimo SET technology

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 strength setting of greater than 0.02% and transmission of greater than 5% for saturation ranging from 70 to 100%. This variation equals ±1 standard deviation. ±1 standard deviation encompasses 68% of the population.

Low perfusion accuracy of GE TruSignal technology with TruSignal sensors

GE TruSignal technology with TruSignal sensors has 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 the 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.

The 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

The following specifications apply to all compatible modules unless otherwise indicated.

Pulse oximetry saturation measurement value and display range	1 to 100%
Pulse oximetry saturation measurement value accuracy	The specified accuracy for each module 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: • Adult/Pediatric (70 to 100%): ◦ Without motion: ±2 ◦ With motion: ±3 ◦ Low perfusion: ±3 • Neonatal (70 to 100%): ◦ Without/with motion: ±3 • SpO_2 (< 70%): Unspecified Nellcor: • Adult/Pediatric (70 to 100%): ±2 • Neonatal (70 to 100%): ±3 • Low perfusion: ±2 • SpO_2 (<70%): Unspecified Masimo: • Without motion: ◦ Adult/Pediatric (70 to 100%): ±2 ◦ Neonatal (70 to 100%): ±3 • With motion: Adult/Pediatric/Neonatal (70 to 100%): ±3 • Low perfusion: ±2 • SpO_2 (<70%): Unspecified
Pulse oximetry saturation display resolution	1 digit (% of SpO_2)
Pulse oximetry peripheral pulse rate range	GE TruSignal: 30 to 250 bpm Nellcor: 20 to 250 bpm Masimo: 25 to 240 bpm
Pulse oximetry peripheral pulse rate accuracy	The specified accuracy for each module 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: • Without motion: ±2 bpm • With motion: ±3 bpm • Low perfusion: ±5 bpm Nellcor: • ±3 bpm Masimo: • Without motion: ±3 bpm • With motion: ±5 bpm
Pulse oximetry peripheral pulse rate display resolution	1 bpm

Pulse oximetry saturation and pulse rate averaging time	The GE TruSignal configuration provides averaging time options of 3, and 12 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 for 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. The Nellcor OXIMAX algorithm used in the device 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 three 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 SpO_2 averaging, signal processing and data transmission delays. The delay consists of the alarm condition and alarm generation delay, which are 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. The Masimo configuration 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 SpO_2 averaging, signal processing and data transmission delays. The delay consists of the alarm condition and alarm generation delay, which are 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.
Pulse oximetry waveform scale options	GE TruSignal: 2, 5, 10, 20, and 50 mod%, and auto Nellcor: 1x, 2x, 4x, and 8x Masmio: 1x, 2x, 4x, and 8x
Wavelength of SpO_2 probe LEDs	Information on the peak wavelengths and maximum output power can be especially useful to clinicians performing photodynamic therapy. GE TruSignal: • Infrared LED: 940 nm • Red: 660 nm Nellcor: • Infrared LED: 900 nm • Red: 660 nm

	Masimo: • Infrared LED: 905 nm • Red: 660 nm
Maximum energy of SpO_2 probe LEDs	Information on the peak wavelengths and maximum output power can be especially useful to clinicians performing photodynamic therapy. GE TruSignal: • Infrared: 42 µJ/pulse • Red: 62 µJ/pulse Nellcor: • ≤ 15 mW Masimo: • Infrared: ≤ 22.5 mW • Red: ≤ 27.5 mW

SPI performance specifications

SPI microtrend length is user-selectable.	
Measurement method	The SPI measurement is derived from the plethysmographic pulse amplitude and pulse interval from the Pleth waveform signal.
Performance	SPI has no measurement unit. Measurement range: 0 to 100
Display resolution	1 digit

SPI calculations

Adaptive histogram transformation (scale of 0 to 100) from the pulse interval and plethysmogram's pulse amplitude (PGA) =

100 - 0.3 * Pulse interval (with normalization) - 0.7 * PGA (with normalization) = SPI

The SPI algorithm is published: Huiku M, Uutela K, van Gils M, Korhonen I, Kymäläinen M, Meriläinen P, Paloheimo M, Rantanen M, Takala P, Viertiö-Oja H, Yli-Hankala A. Assessment of surgical stress during general anaesthesia. (Br J Anaesth 2007; 98: 447-55).

NIBP performance specifications

NIBP measurement technique	Oscillometric
NIBP measurement supported modes	Manual, Auto, and Stat
NIBP measurement time	Adult/child inflate duration time: less than 120 s Neonate inflate duration time: less than 85 s

NIBP measurement range	• Systolic: ◦ Adult/Pediatric: 30 to 290 mmHg ◦ Neonate: 30 to 140 mmHg • MAP: ◦ Adult/Pediatric: 20 to 260 mmHg ◦ Neonate: 20 to 125 mmHg • Diastolic: ◦ Adult/Pediatric: 10 to 220 mmHg ◦ Neonate: 10 to 110 mmHg
NIBP measurement accuracy	No more than 8 mmHg (1.1 kPa) standard deviation
NIBP pulse rate measurement range	30 to 250 bpm
NIBP pulse rate measurement accuracy	±5% or ±5 bpm, whichever is greater
NIBP measurement default initial inflation pressure	• Adult/Pediatric: 135 ±15 mmHg • Neonate: 100 ±15 mmHg
Maximum cuff measurement pressure (overpressure limit) allowed by independent safety controller	• Adult/Pediatric: 300 ±6 to 330 mmHg • Neonate: 150 ±3 to 165 mmHg
NIBP measurement available automatic cycle times	Custom, 1 min, 2 min, 3 min, 4 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 h, 1.5 h, and 2 h

Invasive pressure performance specifications

NOTE
E-module used for this measurement are not suitable for use with neonatal patients.

Invasive pressure measurement range	Monitor: -40 to 320 mmHg (-5.3 to 42.7 kPa) E-COP: -30 to 320 mmHg (-4.0 to 42.7 kPa)
Invasive pressure measurement accuracy	Monitor: ±4% or ±2 mmHg, whichever is greater E-COP: ±4% or ±4 mmHg, whichever is greater
Invasive pressure pulse rate range	30 to 250 bpm
Invasive pressure pulse rate accuracy	±2% or ±2 bpm, whichever is greater
Invasive pressure pulse rate display resolution	1 bpm
Invasive pressure zero adjustment range	±150 mmHg (±20.0 kPa)
Invasive pressure frequency response (waveform filter)	4 Hz, 5 Hz, 6 Hz, 7 Hz, 8 Hz, 9 Hz, 11 Hz, 14 Hz, 17 Hz, or 22 Hz (-3 dB)
Invasive pressure waveform display scale selections	10 to 300 mmHg, with a step size of 10 mmHg (2 to 40 kPa, with a step size of 2 kPa).
Invasive pressure waveform display range	-40 to 320 mmHg (-5.3 to 42.7 kPa)
Invasive pressure sweep speed options	12.5, 25, and 50 mm/s
Invasive pressure transducer sensitivity	5 µV/V/mmHg

SPV and PPV calculations

The algorithm uses the arterial blood pressure monitoring information and looks for respiratory changes in the signal. Respiratory information is derived from the invasive blood pressure data, and the values are calculated over one respiratory cycle.

The unit for SPV is mmHg and the value is calculated as follows:

$SPV = SBP_{max} - SBP_{min}$

where SBP_{max} and SBP_{min} represent the maximum and minimum values of a systolic blood pressure.

The unit for PPV is % and the value is calculated as follows:

$PPV = (PP_{max} - PP_{min})/[(PP_{max} + PP_{min})/2] * 100$

where PP_{max} and PP_{min} represent the maximum and minimum pulse pressure.

Temperature performance specifications

Temperature measurement range	10 to 45°C (50 to 113°F)
Temperature measurement accuracy	±0.1°C without temperature sensor ±0.2 °C including sensor from 25 to 45 °C ±0.3 °C including sensor from 10 to 25 °C (not include 25 °C)
Temperature measurement display resolution	±0.1°C (±0.1°F)
Temperature measurement units	°C or °F
Temperature probe types supported	YSI 400 Series
Temperature probe types time response	• Reusable skin temperature probe: 45 s • Reusable adult R/E temperature probe: 20 s • Reusable pediatric R/E temperature probe: 25 s • Reusable temperature probes by Shenzhen Launch: 150 s • Disposable skin temperature probe: 35 s • Disposable central temperature probe, 9F: 30 s • Disposable central temperature probe, 12F: 35 s • Thermodilution catheter for Tblood: 10 s
Temperature test measurement cycle	At measurement start-up and then every 10 minutes
Temperature probe maximum energy dissipation	Transducer dissipation constant is 8 mW/°C in Well-stieer oil bath

Cardiac output (C.O.) performance specifications

NOTE
E-module used for this measurement are not suitable for use with neonatal patients.

C.O. measurement technique	Thermodilution
C.O. blood temperature range	17.5 to 43°C (63.5 to 109.4°F)

C.O. blood temperature accuracy	17.5 to 33.9°C (63.5 to 93.0°F): ± 0.4°C (0.8°F) 34.0 to 42.0°C (93.2 to 107.6°F): ± 0.3°C (0.5°F) 42.1 to 43.0°C (107.7 to 109.4°F): ± 0.4°C (0.8°F)
C.O. blood temperature display resolution	0.1°C (0.1°F)
C.O. injectate temperature range	0 to 27°C (32.0 to 80.6°F)
C.O. injectate temperature accuracy	0 to 25.4°C (32 to 77.7°F): ±0.3°C (0.5°F) 25.5 to 27°C (77.9 to 80.6°F): ±0.5°C (0.9°F)
C.O. injectate temperature display resolution	0.1°C (0.1°F)
C.O. measurement range	0.5 to 20 l/min
C.O. display resolution	0.01 l/min < 10 l/min, 0.1 l/min ≥ 10 l/min
Right ventricular ejection fraction measurement method	Ejection fraction is determined using an exponential technique by synchronizing sensed R-waves with points of temperature changes on the time temperature (thermodilution curve). Once ejection fraction, cardiac output and heart rate are known, right ventricular volumes may be calculated.
Right ventricular ejection fraction measurement range	1 to 85%
Right ventricular ejection fraction measurement resolution	1%

Airway gases normal conditions

NOTE

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

Accuracy specifications applied in normal conditions:

- Ambient temperature:
  - E-miniC: normal conditions after a 30 minute warm-up period: 18 to 28°C, within ±5°C of calibration
  - E-sCAiO, E-sCO, N-CAiO: normal conditions after a 20 minute warm-up period: 18 to 28°C, within ±5°C of calibration
- Ambient pressure:
  - E-miniC:

    normal conditions after a 30 minute warm-up period: 500 to 800 mmHg, within ±50 mmHg of calibration
  - E-sCAiO, E-sCO, N-CAiO: normal conditions after a 20 minute warm-up period: 660 mbar to 1060 mbar, ±67 mbar of calibration
- Ambient humidity:
  - E-miniC: normal conditions after a 30 minute warm-up period: 20 to 80% RH, within ±20% RH of calibration
  - E-sCAiO, E-sCO, N-CAiO: normal conditions after a 20 minute warm-up period: 20 to 80% RH, non-condensing, within ±20% RH of calibration

Airway gases performance specifications

CO_2 measurement range	E-miniC: 0 to 20% or 0 to 150 mmHg (0 to 20 kPa) E-sCAiO, E-sCO, N-CAiO: 0 to 15 vol% or 0 to 113 mmHg (0 to 15 kPa)
CO_2 measurement accuracy	E-miniC: • 0 to 15% vol: ±(0.2 vol% + 2% of reading) • 15 to 20% vol: ±(0.7 vol% + 2% of reading) E-sCAiO, E-sCO, N-CAiO: ±(0.2 vol% + 2% of reading)
CO_2 measurement display resolution	0.1% or 1 mmHg (0.1 kPa)
CO_2 rise time	E-miniC: < 300 ms E-sCAiO, E-sCO, N-CAiO: • < 260 ms with 2 and 3 m sampling line lengths • < 310 ms with 6 m sampling line length
CO_2 drift	< 0.1 vol%
Gas cross effects to CO_2 by O_2, N_2O, and anesthetic agents	E-sCAiO, E-sCO, N-CAiO: < 0.2 vol%
Total system response time	E-miniC: 2.4 s typical with a 3 m sampling line E-sCAiO, E-sCO, N-CAiO: • < 3.0 s with 2 or 3 m sampling line
Respiration rate range	E-miniC: 4 to 80 breaths per minute E-sCAiO, E-sCO, N-CAiO: 4 to 100 breaths per minute
Respiration rate accuracy	E-miniC: • 4 to 20 breaths per minute: ±1 breath per minute • 20 to 80 breaths per minute: ±5% E-sCAiO, E-sCO, N-CAiO: • 4 to 20 breaths per minute: ±1 breath per minute • 20 to 100 breaths per minute: ±5%
Respiration rate display resolution	1 breath per minute
Respiration rate breath detection	1 vol% change in CO_2 level

Respiration rate verification method

The rated respiration rate range and the corresponding end-tidal gas reading accuracy were tested with reference gases of known concentrations. The test gases were fed to the gas sampling system of the module through an electrically actuated valve with very low internal volume. Depending on its actuation status, the valve directed either room air or a test gas to the gas sampling line. The desired respiration rates were set by the electrical actuating times of the valve.

The measurement accuracy of the end-tidal gas readings was tested using 3-meter gas sampling lines connected to the gas sample port of the water trap. The gas sampled to the sampling line was switched from room air to the test gases using electrically actuated valve with low internal dead space to generate step changes in the gas concentrations. The electrical actuating signal of the valve was generated using a highly accurate signal generator to accurately control the simulated respiration rate.

Expiration time and end-tidal readings

E-miniC: The length of expiration time has impact on the accuracy of the gas-specific end-tidal readings. The longer the expiration time, the better the module achieves the correct end-tidal reading. With I:E 2:1, the gas specific end-tidal values are within specifications up to respiration rate 45 /min. With other I:E values, the end-tidal readings are within specifications.

E-sCAiO, E-sCO, N-CAiO: The length of expiration time has impact on the accuracy of the gas-specific end-tidal readings. The longer the expiration time, the better the module achieves the correct end-tidal reading. With I:E 2:1, the gas specific end-tidal values are within specifications up to respiration rate 45 /min except with halothane (32 /min with halothane). With other I:E values, the end-tidal readings are within specifications.

O_2 measurement range	E-sCAiO, E-sCO, N-CAiO: 0 to 100 vol%
O_2 measurement accuracy	E-sCAiO, E-sCO, N-CAiO: ±(1 vol% + 2% of reading)
O_2 measurement display resolution	E-sCAiO, E-sCO, N-CAiO: 1%
O_2 rise time	E-sCAiO, E-sCO, N-CAiO: • ≤ 260 ms with 2 and 3 m sampling line lengths • ≤ 310 ms with 6 m sampling line length
O_2 drift	E-sCAiO, E-sCO, N-CAiO: < 0.3 vol%
Gas cross effects to O_2 by anesthetic agents	E-sCAiO, E-sCO, N-CAiO: < 1 vol%
Gas cross effects to O_2 by N_2O	E-sCAiO, E-sCO, N-CAiO: < 2 vol%
N_2O measurement range	E-sCAiO, N-CAiO: 0 to 100 vol%
N_2O measurement accuracy	E-sCAiO, N-CAiO: • 0 to 84 vol%: ± (2 vol% + 2% of reading) • 85 to 100 vol%: ± (2 vol% + 8 % of reading)
N_2O measurement display resolution	E-sCAiO, N-CAiO: 1%
N_2O rise time	E-sCAiO, N-CAiO: • ≤ 320 ms with 2 and 3 m sampling line lengths • ≤ 360 ms with 6 m sampling line length
N_2O drift	E-sCAiO, N-CAiO: < 0.3 vol%
Gas cross effects to N_2O by anesthetic agents	E-sCAiO, N-CAiO: < 2 vol%
Anesthetic agents measurement range	E-sCAiO, N-CAiO: • Hal, Enf, Iso: 0 to 6 vol% • Sev: 0 to 8 vol% • Des: 0 to 20 vol%
Anesthetic agents measurement accuracy	E-sCAiO, N-CAiO: ±(0.15 vol% + 5% of reading)

Anesthetic agents display resolution	E-sCAiO, N-CAiO: • Resolution is 0.01% when the AA concentration between 0 to 1% • Resolution is 0.1% when the AA concentration ≥ 1% • In the presence of agent mixture, values between 0 and 9.9%: 0.1% • In the presence of agent mixture, values ≥ 10%: 1%
Anesthetic agents rise time	E-sCAiO, N-CAiO: • < 420 ms (< 800 ms for Halothane) with 2 and 3 m sampling line lengths • < 700 ms (< 1800 ms for Halothane) with 6 m sampling line length
Hal, Enf, Iso, and Sev drift	E-sCAiO, N-CAiO: < 0.1 vol%
Des drift	E-sCAiO, N-CAiO: < 0.3 vol%
Gas cross effects to anesthetic agents by N_2O	E-sCAiO, N-CAiO: 0.15 vol%
Anesthetic agents total system response time	E-sCAiO, N-CAiO: • < 3.5 s (< 3.8 s for Halothane) with 2 and 3 m sampling line lengths • < 5.4 s (< 6.5 s for Halothane) with 6 m sampling line length
Anesthetic agents identification	E-sCAiO, N-CAiO: • The module automatically identifies the anesthetic agent present in the sampled gas and measures the concentration of the identified agent. • Identification threshold is 0.15 vol% • Identification time is < 20 s • The module automatically identifies mixtures of two anesthetic agents present in the sampled gas and measures the concentrations of the two identified agents. • Identification threshold for the second agent at 1 MAC of the first agent: 0.2 vol% + 10% of the concentration of the first agent
Effects of interfering gases and vapors	E-miniC: • Effect of Helium (50 vol%): Decreases CO_2 readings < 0.5 vol% • Effect of Xenon (80 vol%): Decreases CO_2 readings < 0.5 vol% • Effect of Halothane (4%): Increases CO_2 readings < 0.3 vol% • Effect of Isoflurane (5%): Increases CO_2 readings < 0.4 vol% • Effect of Desflurane (15%): Increases CO_2 readings < 0.8 vol% • Effect of Sevoflurane (5%): Increases CO_2 readings < 0.4 vol% • Effect of Enflurane (5%): Increase CO_2 readings < 0.4 vol% • Effect of N_2O (40%): Increases CO_2 readings < 0.4 vol% • Effect of O_2 (40% to 95%): ◦ If compensation is not activated: decreases CO_2 readings < 0.3 vol% ◦ If compensation is activated: error < 0.15 vol% • Effect of N_2O (40% to 80%): ◦ If compensation is not activated: increases CO_2 readings < 0.8 vol% ◦ If compensation is activated: error < 0.3 vol%

	E-sCAiO, E-sCO, N-CAiO: • Effect of Helium (50 vol%): ◦ Decreases CO_2 readings < 0.5 vol% at 5 vol% of CO_2 ◦ Decreases O_2 readings < 2 vol% at 50 vol% of O_2 • Effect of Xenon (80 vol%): ◦ Decreases CO_2 readings < 0.5 vol% at 5 vol% of CO_2 ◦ Decreases O_2 readings < 1.5 vol% at 14 vol% of O_2
Effects of non-interfering gases and vapors	E-miniC: • Ethanol C2H5OH (< 0.3%) • Acetone (< 0.2%) • Isopropanol (< 0.48%) • Methane CH4 (< 0.3%) • Nitrogen N2 • Freon R134A (< 1%) • Water vapor E-sCAiO, E-sCO, N-CAiO: • Ethanol C2H5OH (< 0.036%) • Acetone (< 0.2%) • Isopropanol (< 0.48%) • Methane CH4 (< 0.3%) • Nitrogen N2 • Carton Monoxide CO (< 100 ppm) • Nitrous Oxide NO (< 200 ppm) • Freon R134A (< 1%) (for CO2, O2 and N2O) • Water vapor
Effects of non-interfering gases to the measured gas concentrations	E-miniC: • CO_2: < 0.2 vol% E-sCAiO, E-sCO, N-CAiO: • CO_2: < 0.2 vol% • O_2, N_2O: < 2 vol% • Anesthetic agents: < 0.15 vol%
O_2 compensation	E-miniC: Configured from 21 to 40% or 40 to 100% E-sCAiO, E-sCO, N-CAiO: The system automatically compensates for O_2.
N_2O compensation	E-miniC: Configured from 0 to 40% or 40 to 80% E-sCAiO, E-sCO, N-CAiO: The system automatically compensates for N_2O.
Warm-up time	E-miniC: 1 min for operation, 30 min for full specifications E-sCAiO, N-CAiO: • 60±5 s for operation with CO_2, O_2 and N_2O • 5 min for operation of anesthetic agents • 20 min for full specifications E-sCO: • 60±5 s for operation with CO_2, O_2 • 20 min for full specifications

Flow rate (diverting sampling)	E-miniC: 150 ml/min ± 25 ml/min E-sCAiO, E-sCO, N-CAiO: 120 ml/min ± 20 ml/min

Airway gases calculations

MAC	MAC = ($EtAA_1$ (%)/x(AA_1)) + ($EtAA_2$ (%)/x(AA_2)) + (EtN_2O (%)/100)	where AA_1= primary agent, AA_2= secondary agent, x(AA) is Hal=0.75%, Enf=1.7%, Iso=1.15%, Sev=2.05%, Des=6.0% and N_2O=100%
MACage	MACage (volatile agent) = [(100 x ATMP)/((5xT-85) x 760 mmHg)] x (EtAA (%)/AAage) MACage (N_2O) = [(100 x ATMP)/((5 x 37–85) x 760 mmHg)] x (EtN_2O (%)/(N_2Oage x 100))	where ATMP = atmospheric pressure in mmHg, T = temperature of the patient in Celsius, AAage = agent and age specific constant. AAage ranges: • Hal: 0.99 – 0.49 • Enf: 2.25 – 1.12 • Iso: 1.52 – 0.76 • Des: 7.93 – 3.95 • Sev: 2.71 – 1.35 N_2O age is a specific constant in the range of 1.38 – 0.62. Shown MACage is the sum of MACage of the primary agent, secondary agent, and N_2O.
Balance gas (EtBal)	EtBal = 100 – $EtCO_2$ – EtO_2 – EtN_2O – $EtAA_{(pri)}$ – $EtAA_{(sec)}$	where EtAA(pri) and EtAA(sec) are the primary and secondary end tidal values for the measured anesthetic agent

References for anesthetic agent MAC values:

- Mapleson W.W.: Effect of age on MAC in humans: a meta-analysis. Br. J. of Anaesthesia 1996; 76: 179-185
- Rampil I.J.; Zwass M.; Lockhart S.; Eger E.I. II; Johnson B.H.; Yasuda N.; Weiskopf R.B.: MAC of I653 in surgical patients, Anesthesiology. Tram-Rac71 (3A):A269, September 1989
- Scheller M.S., Partridge B.L., Saidman L.J.: MAC of sevoflurane in humans and the New Zealand white rabbit. Anesthesiology 1987; 67: A373
- ISO21647:2004 + C1:2005, Medical electrical equipment - Particular requirements for the basic safety and essential performance of respiratory gas monitors.

References for MACage calculations:

- Eger, E.I. II.: Age, minimum alveolar anesthetic concentration, and minimum alveolar anesthetic concentration-awake. Anesth. Analg. 2001; 93:947-953
- Rampil I.J.; Zwass M.; Lockhart S.; Eger E.I. II; Johnson B.H.; Yasuda N.; Weiskopf R.B.: MAC of I653 in surgical patients, Anesthesiology. 71 (3A):A269, September 1989

Airway gases CO_2 unit conversions

NOTE
47 mmHg is the partial pressure of the saturated water vapor at 37°C.

The following table lists the relationship between gas concentration and its partial pressure.

Reading in mmHg (dry gas)	(ambient pressure in mmHg * gas concentration in %)/100
Reading in mmHg (water vapor saturated gas)	((ambient pressure in mmHg – 47 mmHg) * gas concentration in %)/100
Reading in kPa (dry gas)	(ambient pressure in mmHg * gas concentraion in %)/750
Reading in kPa (water vapor saturated gas)	((ambient pressure in mmHg – 47 mmHg) * gas concentration in %)/750

Spirometry display specifications

Ppeak, Pmean, PEEP display range	-20 to 100 cmH_2O -20 to 98 hPa -20 to 98 mbar -15 to 74 mmHg -2.0 to 9.8 kPa
Pplat display range	0 to 100 cmH_2O 0 to 98 hPa 0 to 98 mbar 0 to 74 mmHg 0 to 9.8 kPa
Ppeak, Pmean, PEEP, Pplat display resolution	cmH_2O, hPa, mbar, mmHg, kPa: 1 kPa: 0.1
TVexp, TVinsp display range	0 to 2000 ml
TVexp, TVinsp display resolution	1 with interfaced device
MVexp, MVinsp display range	0 to 60 l/min
MVexp, MVinsp display resolution	0.1 with interfaced device
Compl display range	0 to 500 ml/cmH_2O 0 to 510 ml/hPa 0 to 510 ml/mbar 0 to 680 ml/mmHg 0 to 5099 ml/kPa
Compl display resolution	with interfaced device 10 to 500 ml/cmH_2O: 1 0 to 9.9 ml/cmH_2O: 0.1 10 to 510 ml/hPa: 1 0 to 9.9 ml/hPa: 0.1 10 to 510 ml/mbar: 1 0 to 9.9 ml/mbar: 0.1 10 to 680 ml/mmHg: 1 0 to 9.9 ml/mmHg: 0.1 10 to 5099 ml/kPa: 1 0 to 9.9 ml/kPa: 0.1
Raw display range	0 to 100 cmH_2O/l/s

Raw display resolution	with interfaced device 1 $cmH_2O/l/s$ 1 hPa/l/s 1 mbar/l/s 1 mmHg/l/s 0.1 kPa/l/s

Entropy performance specifications

NOTE
The Entropy measurement is not indicated for pediatric patients younger than two years old.

Entropy amplifier input dynamic range	±500 µV
Entropy amplifier input offset range	±300 mV
Entropy amplifier frequency range	0.5 to >100 Hz
Entropy amplifier noise level	< 0.5 µV RMS, <6 µV peak-to-peak
Entropy amplifier input impedance	> 400 kOhm @ 10 Hz
Entropy amplifier common mode rejection ratio (CMRR)	> 90 dB @ 50 Hz
Entropy amplifier defibrillation protection	3000 V
Entropy waveform display range	1000 µVpp
Entropy waveform display scales	±25, ±50, ±100, ±250, ±400, and ±500 µV
Entropy waveform display sweep speeds	12.5, 25, and 50 mm/s
Entropy numeric display range	• RE: 0 - 100 • SE: 0 - 91 • BSR: 0 - 100%
Entropy numeric display resolution	1 digit
Entropy numeric display update interval	1 s
Electrode impedance measurement range	1 to 20 kOhm
Electrode impedance measurement accuracy	±1 kOhm or ±10%
Electrode impedance measurement start	Manual or automatic
Defibrillation recovery time	< 10 s

Entropy calculations

Entropy measurement is based on acquisition and processing of raw EEG and FEMG signals by using the Entropy algorithm, a GE application of Spectral Entropy.

The algorithm is published: Viertiö-Oja H, Maja V, Särkelä M, Talja P, Tenkanen N, Tolvanen-Laakso H, Paloheimo M, Vakkuri A, Yli-Hankala A, Meriläinen P. Description of the Entropy algorithm as applied in the Datex-Ohmeda S/5 Entropy Module. (Acta Anaesthesiologica Scandinavica 2004; Volume 48: Issue 2:154-161, 2004).

NMT performance specifications

NOTE
NMT measurement is not indicated for pediatric patients weighing less than 5 kg (11 lbs).

NMT measurement stimulation modes	• Train of four (TOF) • Double burst (3.3) (DBS) • Single twitch (ST) • 50 Hz tetanic
NMT measurement intervals	• TOF/DBS modes: Manual, 10 s, 12 s, 15 s, 20 s, 1 min, 5 min, 15 min, 30 min, 60 min, and 120 min • ST mode: Manual, 1 s, 10 s, and 20 s
NMT measurement stimulus pulse	A square wave with constant current
NMT measurement pulse width	100, 200, or 300 µs
NMT measurement tetanic stimulation duration	5 s
NMT measurement stimulus current range	• Supramax: 1 to 70 mA • Manual: 1 to 70 mA, in 1 mA steps
NMT measurement range of load impedance and maximum load	Range of load 0.5 to 3 kOhm, max load 3 kOhm (The impedance over this range does not have an effect on the stimulus parameters.)
NMT measurement maximum voltage	300 V peak

BIS performance specifications

Bispectral Index (BIS) display range	0 to 100
EMG display range	0 to 100 dB
SQI display range	0 to 100%
SR display range	0 to 100%
EEG scales supported	±25 to ±500 µV (input dynamic range)
Frequency range	0.25 to 100 Hz
EEG measurement input offset	±300 mV
EEG measurement input noise level	< 6 µV peak-to-peak
EEG measurement signal reproduction accuracy	≤ ±20% or ±10 µV, whichever is greater
EEG sweep speeds supported	12.5, 25, and 50 mm/s
Artifact rejection	Automatic
Common mode rejection	110 dB @ 50/60 Hz
Filters supported	• ON: 2 to 70 Hz with notch • OFF: 0.25 to 100 Hz
Smoothing rate	15 or 30 s

Radiated immunity level	1 V/m

BIS calculations

The BIS is computed in real time using three steps:

1. The raw EEG signal is broken down second by second, and the segments that have artifact are identified and removed.
2. The BIS is calculated by combining EEG features associated with anesthetic effect.
3. The index is modified to reflect the amount of suppressed EEG signal in the raw waveform.

Default settings

Understanding your monitor configuration

The monitor's configuration is dependent on the equipment used, the software license, and the settings that define how the software application behaves.

User modes

The monitor can have up to seven user modes, but only one can be enabled at a time. User modes pre-configure the monitor's behavior and appearance for a specific clinical environment. There are:

- STEP-DOWN: intermediated care
- ED: Emergency Department (also called Emergency Care)
- PACU: Post Anesthesia Care Unit (also called Post Anesthesia Care)
- ICU: Intensive Care Unit
- OR: Operating Room (also called Anesthesia Care)
- PEDIATRIC: Pediatric Care
- NEONATAL: Neonatal Care

Each mode is a group of unique settings suited to a particular care unit or patient demographic. (e.g., alarm limits, screen layouts, trends and snapshot settings). STEP-DOWN is the factory default user mode. The mode's settings can be customized.

User mode settings

User mode settings are password protected. They are established during installation/configuration of the monitor. The mode setting's factory default values are also provided.

The mode settings have three values:

- Current values: Values displayed on the monitor for the current patient.
- 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 recover from failure by reverting to these values for system operation.

Mode settings generally share the same reset behavior. There are three types of reset:

- Patient discharge: Patient is discharged from the monitor. The setting will be changed to saved values (default mode).
- Cold start: The setting will be changed to saved values (default mode).

  The following condition will target cold start:

  - Start-up after an abrupt crash.
  - Start-up after some service settings update, such as language, license, etc.

- Warm start: The settings will still use the current value. Normal restart is regarded as warm start.

Common settings for all modes

When you change the saved values of following settings, will affect all modes.

Settings	How to get there
Patient information • **First Name** • **Last Name** • **MRN** • **Second ID** • **Patient Type** • **Demographics** ◦ **Day** ◦ **Month** ◦ **Year** ◦ **Gender** ◦ **Age** ◦ Age Unit ◦ **Height** ◦ **Weight** ◦ **BSA**	Information area
Screen • **Screen Brightness** • **Brightness Type** (not for device with VSP 4.0 Upgrade Software)	> **Screen Brightness**
Alarm • **High & Medium Alarm Volume** • **Low Alarm Volume**	> **Alarms Setup** > **Audio** tab
(not for device with VSP 4.0 Upgrade Software) • **Alarm Light Type** • **Alarm Light**	**Visual** tab (not for device with VSP 4.0 Upgrade Software)
Sound Volumes • **Alarm Volume** • **High & Medium Alarm Volume** • **Low Alarm Volume** • **Beat Volume** • **Completed NIBP Volume**	> **Sound Volumes**

Settings	How to get there
Export Patient Data • **Graphic Trend** • **Numeric Trend** • **Snapshot** • **Export Latest Data** • **All ECG Waveforms** • **Alarm History** • **Set Key for Patient Data Export**	> **Export Patient Data**
Trends • **Trends Printing**	> (shift to numerical trends if necessary) >
Night Mode • **Beat Volume** • **Screen Brightness** • **Alarm Volume** • **High & Medium Alarm Volume** • **Low Alarm Volume** • **Completed NIBP Volume** • **Alarm Light** (not for device with VSP 4.0 Upgrade Software)	> **Night Mode** > **Setup** tab
• **Scheduled** • Scheduled from/to hour • Scheduled from/to minute	**Enter** tab
Other Patients • **Unit** • **Show**	> **Other Patients**
• **Change All Notifications** • **Change All Priorities** • **Alarm Notification** • **Alarm Priorities**	**Receive Alarms** tab
ECG • **Size** • **Set ISO point**, **Set J point**	HR digit field > **Size** HR digit field > **ST** tab > **Set ISO point** or **Set J point**
Impedance respiration • **Measurement Source** • **Resp Averaging Time**	Resp digit field > **Measurement Source** Resp digit field > **Resp Averaging Time**
IBP • **SPV Source**	IBP digit field > **Advanced** tab > **SPV Source**
Temperature • **Unit**	Temperature digit field > **Unit**
C.O. • **Scale**	C.O. digit field > **Scale**

Settings	How to get there
CO_2 • **Unit**	CO_2 digit field > **Unit**
Entropy • **Check Sensor**	Entropy digit field > **Check Sensor**
NMT • **Current mA** • **Start-up Settings** • **Use Supramax**	NMT digit field > **Current mA** NMT digit field > **Start-up Settings**, **Use Supramax**
BIS • **Sensor Check**	BIS digit field > **Sensor Check** check box
Password • **Password Policy**	> **Service** > enter **Username** and **Password**
Alarm Options - **Local Alarms** tab • **Audio of Alarms** ◦ **Audio Off Allowed** ◦ **Reminder Volume** ◦ **Alarm Tones** ◦ **Low Priority Alarm Tone** ◦ **Alarm Volume Control** ◦ Minimum Alarm Volume Settings • **High & Medium Alarm Volume** • **Low Alarm Volume**	> **Service** > **Alarm Options** > **Audio of Alarms**
• **Allowed Alarm Priorities** ◦ **Tachy** ◦ **V Tach** ◦ **Brady** ◦ **ST Segment high/low** ◦ **Arrhythmia paused** ◦ **ECG lead off** ◦ **ECG leads off** ◦ **SpO2 low** ◦ **SpO2 probe off** ◦ **IBP high/low** ◦ **NIBP high/low** ◦ **RR (Imped.) high/low** ◦ **CO2 high/low** ◦ **Temp high/low** ◦ **Apnea (Imped.)** ◦ **FiAA high/low**	> **Service** > **Alarm Options** > **Allowed Alarm Priorities**
• **Latching Alarms** • **Nurse Call** • **Alarm Light** OFF Allowed (not for device with VSP 4.0 Upgrade Software)	> **Service** > **Alarm Options**

Settings	How to get there
Alarm Options - **Remote Alarms** tab • **From Remote Location** • **For Remote Bed** • **Allow Remote Pausing of** • **Remote Alarm Light** • **Show Remote Patient Name** • **Remote Alarm Tone** • **Remote Bed Selections**	> **Service** > **Alarm Options** > **Remote Alarms** tab
Save Modes • **Default Mode**	> **Service** > **Save Modes** > **Default Mode**
Time and Date • **Time Format**	> **Service** > **Time and Date** > **Time Format**
Time Zone • **Daylight Savings** tab ◦ **Daylight Savings** ◦ **Daylight Savings Offset (HH:MM)** • **DST Adjustment** tab ◦ **Begins** ◦ **Ends** • **Time Source** tab ◦ **Time Source** • **NTP Config** tab ◦ **Difference from GMT (HH:MM) + If Later** ◦ **Primary NTP Server** ◦ **NTS** ◦ **Select Certificate** ◦ **Secondary NTP Server** ◦ **NTS** ◦ **Select Certificate**	> **Service** > **Time Zone**
Parameter Settings • **Units** ◦ **Blood Pressure** ◦ **Height** ◦ **Weight** ◦ **Paw** ◦ **I:E** • **Others** ◦ **CO2 Numbers** ◦ **MAC Type**	> **Service** > **Parameter Settings**
Roving • **Monitor Roving** • **Roving Between Units** • **Manual Bed Entry**	> **Service** > **Roving**

Settings	How to get there
Gesture Control (not for device with VSP 4.0 Upgrade Software) • **Gesture Control** • **Time Period 1** • **Time Period 2** • from/to hour • from/to minute	> **Service** > **Gesture Control** (not for device with VSP 4.0 Upgrade Software)
EWS • **Protocol Type**	> **Service** > **EWS**

Basic default settings

Admit/Discharge settings

Select patient information area to adjust the admit/discharge patient settings.

Setting	Default value
Select **Patient** tab	
First Name	NA
Last Name	NA
MRN	NA
Second ID	Disabled
Patient Type	**Adult/Pediatric**
Select **Demographics**	
Day	NA
Month	NA
Year	NA
Age	NA
Age Unit	**Years** NEONATAL mode: **Days**
Gender	NA
Height	NA
Weight	NA
BSA	NA
Select **Load Patient** tab > **Find Patients**	
MRN	NA
Last Name	NA
First Name	NA
Select **Select Mode** tab	

Setting	Default value
Select Mode	**STEP-DOWN** When **Patient Type** set to **Neonatal**, this mode option is fixed to **NEONATAL**.
Select **Unit & Bed** tab	
Unit Name	Current unit
Bed Name	Current bed
Select **New Unit & Bed**	
Unit Name	NA
Bed Name	NA
Select **Printing**	
Printout	**Waveforms**
Care Unit	NA
Location	**Local** selected
Remote Device	NA

Trends settings

Graphic Trends

Select > **Trends** tab > (shift to graphic trends if necessary) > on the bottom right corner > **Scales** tab to setup the graphic trends scale.

Setting	Default value
General vertical tab	
Time Scale	**2 h**
SpO2	**80–100** %
HR	**0–240** /min
ST	**-5..+5** mm
C.O.	**0–9** l/min
C.I.	**0–10** l/min/m2
PVC	**0–24** /min
Press. vertical tab	
PCWP	**0–30** mmHg
CPP	**0–200** mmHg
Temp vertical tab	
Tblood	**20–40** °C
T1	**20–40** °C
T2	**20–40** °C

Select the **Pages** tab to setup the graphic trends pages.

Setting	Description	Default value		
		STEP-DOWN, PEDIATRIC, NEONATAL	**ED, PACU, OR**	**ICU**
Page 1: Select the **Page 1** vertical tab				
Field 1	Select what displays in the first field.	**HR**		
Field 2	Select what displays in the second field.	**SpO2**		
Field 3	Select what displays in the third field.	**RR (Imped.)**		**ST**
Field 4	Select what displays in the fourth field.	**NIBP**		
Page 2: Select the **Page 2** vertical tab				
Field 1	Select what displays in the first field.	**ST**		**PVC**
Field 2	Select what displays in the second field.	**PVC**		**RR (Imped.)**
Field 3	Select what displays in the third field.	**T1**	**CO2**	**T1**
Field 4	Select what displays in the fourth field.	**T2**	**IBP1**	**T2**
Page 3: Select the **Page 3** vertical tab				
Field 1	Select what displays in the first field.	**IBP1**	**IBP2**	**CO2**
Field 2	Select what displays in the second field.	**IBP2**	**CPP**	**IBP1**
Field 3	Select what displays in the third field.	**CPP**	**T1**	**IBP2**
Field 4	Select what displays in the fourth field.	**CO2**	**T2**	**CPP**
Page 4: Select the **Page 4** vertical tab				
Field 1	Select what displays in the first field.	**C.O.**		
Field 2	Select what displays in the second field.	**C.I.**		
Field 3	Select what displays in the third field.	**PI** OR mode: **NMT T1 & Ratio**		
Field 4	Select what displays in the fourth field.	**OFF** OR mode: **NMT PTC & Count**		

Numerical Trends

Back to the Trends menu, select > on the bottom right corner to setup the numerical trends.

Setting	Default value
Trends Interval	**5 min**
Trends Printing	**Screen Data**

Full Disclosure

Back to the Trends menu, select **Full Disclosure** tab, Select on the bottom right corner to setup the full disclosure.

Setting	Default value
Hemodynamics Sweep Speed	**12.5 mm/s**

Brightness settings

Select the > **Screen Brightness** to adjust the display brightness.

Setting	Default value
Brightness Type (not for device with VSP 4.0 Upgrade Software)	**Manual**
Screen Brightness	**70%**

Sound volume settings

Select the > **Sound Volumes** to adjust the sound volume settings.

Setting	Default value
High & Medium Alarm Volume	5
Low Alarm Volume	5
Beat Volume	0 OR mode: 3
Completed NIBP Volume	3

Night mode settings

Select the > **Night Mode** to adjust the night mode settings.

Setting	Default value
Select **Enter** tab	
Scheduled	Not selected
From	21 : 00
To	07 : 00
Select **Setup** tab	
High & Medium Alarm Volume	5
Low Alarm Volume	5

Setting	Default value
Beat Volume	0
Screen Brightness	10%
Alarm Light (not for device with VSP 4.0 Upgrade Software)	40%
Completed NIBP Volume	0
Silence ALL	Disabled

Screen setup settings

Select the > **Screen Setup** to adjust the screen settings.

Layout 1

Select the **Layout 1** tab.

Setting	Default value						
	STEP-DOWN	**ED**	**PACU**	**ICU**	**OR**	**PEDIATRIC**	**NEONATAL**
Waveform 1	**ECG1**						
Waveform 2	**ECG2**						
Waveform 3	**Pleth(SpO2)**			**ECG3**	**Pleth(SpO2)**		
Waveform 4	**Resp**		**CO2**	**Pleth(SpO2)**	**CO2**	**Resp**	
Waveform 5	**IBP1**	**CO2**	**IBP1**	**Resp**	**IBP1**		**CO2**
Waveform 6	**CO2**	**IBP1**	**IBP2**	**IBP1**	**IBP2**	**CO2**	**IBP1**
Waveform 7	**OFF**		**O2**	**IBP2**	**IBP8**	**OFF**	
Waveform 8	**OFF**		**Resp**	**IBP8**	**NMT**	**OFF**	
Waveform 9	**OFF**			**NMT**	**Entropy**	**OFF**	
Waveform 10	**OFF**						
Waveform 11	**OFF**						
Waveform 12 (need to turn off the lower digital field)	**OFF**						
Combine Pressures	Not selected						
Select **Lower Area** vertical tab							
Lower Area	**ON**						
Lower Field 1	**Temp**						
Lower Field 2	**EWS**			**PCWP**	**MAC**	**OFF**	
Lower Field 3	**NIBP**						
Lower Field 4	**OFF**			**C.O.**	**Gases**	**OFF**	

Setting	Default value						
	STEP-DOWN	ED	PACU	ICU	OR	PEDIATRIC	NEONATAL
Select **Split Screen** vertical tab							
Show	**None**						

Layout 2

Select the **Layout 2** tab.

Setting	Default value						
	STEP-DOWN	ED	PACU	ICU	OR	PEDIATRIC	NEONATAL
Waveform 1	**ECG1**						
Waveform 2	**ECG2**					**Pleth(SpO2)**	
Waveform 3	**Pleth(SpO2)**			**ECG3**	**Pleth(SpO2)**	**Resp**	
Waveform 4	**Resp**		**CO2**	**IBP1**	**CO2**	**IBP1**	**CO2**
Waveform 5	**IBP1**	**CO2**	**Resp**	**IBP2**	**IBP1**	**CO2**	**IBP1**
Waveform 6	**NIBP**	**IBP1**		**IBP8**	**IBP2**		
Waveform 7	**CO2**	**NIBP**	**NMT**	**Pleth(SpO2)**	**IBP8**	**OFF**	
Waveform 8	**OFF**	**NMT**	**OFF**	**CO2**	**Resp**	**OFF**	
Waveform 9	**OFF**			**Resp**	**Entropy**	**OFF**	
Waveform 10	**OFF**				**NMT**	**OFF**	
Waveform 11	**OFF**						
Waveform 12 (need to turn off the lower digital field)	**OFF**						
Combine Pressures	Not selected						
Select **Lower Area** vertical tab							
Lower Area	**ON**						
Lower Field 1	**Temp**			**NIBP**	**Temp**		
Lower Field 2	**EWS**			**PCWP**	**MAC**	**EWS**	
Lower Field 3	**OFF**		**NIBP**	**C.O.**	**NIBP**		
Lower Field 4	**OFF**			**NMT**	**EWS**	**OFF**	
Select **Split Screen** vertical tab							
Show	**None**						

Layout 3

Select the **Layout 3** horizontal tab.

Setting	Default value
Field 1	**HR**
Field 2	**SpO2**
Field 3	**Resp**
Field 4	**NIBP**

Layout 4

Select the **Layout 4** horizontal tab.

Setting	Default value
Field 1	**HR**
Field 2	**IBP1**
Field 3	**SpO2**
Field 4	**Resp**
Field 5	**CO2**
Field 6	**NIBP**

Alarm setup settings

Select the > to setup alarm settings.

Setting	Description	Default value
Select **Alarm Limits** tab. **NOTE** The alarm limits default value is the same as parameter menu, refer to “Parameter default settings” for more details.		
Default Limits	Return to default alarm limits.	NA
Auto Limits	Setup to auto alarm limits.	NA
Cancel	Select to cancel the changes.	NA
Apply	Select to apply the changes.	NA
Select **Audio** tab.		
High & Medium Alarm Volume	Select the volume for High & Medium priority alarms.	**5**
Low Alarm Volume	Select the volume for Low priority alarms.	**5**
Activate All Audible Alarms	Activate all audio off alarms.	NA
None	No alarms are audio off.	Selected
Silence Apnea	Audio off apnea, $EtCO_2$, $FiCO_2$, RR limit alarms.	No selected
Silence ECG	Audio off HR source limit and arrhythmia alarms.	No selected

Setting	Description	Default value
Silence Apn&ECG	Audio off HR source limit, arrhythmia, apnea, $EtCO_2$, $FiCO_2$, RR limit alarms	No selected
Silence ALL	Audio off all alarms except the break-through alarms.	No selected

Select **Priorities** to adjust the alarm priority settings.

Setting	Default value
Select **ECG** vertical tab.	
Tachy	**Medium**
Brady	**Medium** PEDIATRIC and NEONATAL mode: **High**
ST Segment high/low	**Medium** NEONATAL mode: **Low**
Arrhythmia paused	**Escalating**
ECG lead off	**Low**
ECG leads off	**Escalating**
Frequent PVCs	**Low** OR mode: **Escalating**
Frequent SVCs	**Low**
Select **Lethal** vertical tab. The same contents as in ECG alarms default settings.	
Select **Ventri cular** vertical tab. The same contents as in ECG alarms default settings.	
Select **Atrial** vertical tab. The same contents as in ECG alarms default settings.	
Select **IBP** vertical tab.	
Art & ABP high/low	**Medium**
CVP high/low	**Medium**
PA high/low	**Medium**
RAP high/low	**Medium**
RVP high/low	**Medium**
LAP high/low	**Medium**
ICP high/low	**Medium**
UAC high/low	**Medium**
UVC high/low	**Medium**
IBP1 high/low	**Medium**
IBP2 high/low	**Medium**
IBP8 high/low	**Medium**
Select **Others** vertical tab.	
SpO2 high	**Escalating**
SpO2 low	**Escalating**
SpO2 probe off	**Escalating**

Setting	Default value
NIBP high/low	**Medium**
RR (Imped.) high/low	**Escalating**
Apnea (Imped.)	**Escalating**
CO2 high/low	**Medium**
FiAA high/low	**Medium**
Apnea (CO2)	**Escalating**
Temp high/low	**Escalating**
RR (CO2) high/low	**Escalating**

Select **Visual** to adjust the alarm light settings. (not for device with VSP 4.0 Upgrade Software)

Setting	Default value
Alarm Light Type	**Auto**
Alarm Light	**100%**

Printing settings

Select the > **Printing Setup** to setup the printing settings.

Setting	Default value
Select the **Waveforms** tab.	
Waveform 1	**II**
Waveform 2	**OFF**
Waveform 3	**OFF**
Start On Alarms	**No**
Delay	**10 s**
Paper Speed	**25 mm/s**
Length	**30 s**
Select the **Devices** tab.	
Printout	**Waveforms**
Care Unit	NA
Location	**Local** selected
Remote Device	NA

Export patient data settings

Select the > **Export Patient Data** to setup settings.

Setting	Default value
Graphic Trend	Not selected

Setting	Default value
Numeric Trend	Selected
Snapshot	Not selected
Export Latest Data	**2 h**
All ECG Waveforms	Not selected
Alarm History	Selected

OxyCRG settings

Make sure already selected the NEONATAL mode. Select the > **OxyCRG** > **OxyCRG Setup** tab to setup OxyCRG.

Setting	Default value
SpO2 High Limit	**OFF**
SpO2 Low Limit	**88**
Short Apnea	**20**
HR High Limit	**200**
HR Low Limit	**90**

EWS settings

Select the > **EWS**.

Table 1 For National Early Warning Score 2:

Setting	Default value
Select **Calculation** tab	
HR, SpO2, RR, SYS, Temp values are the real time value	
Hypercapnic Respiratory Failure	not selected
Air or oxygen?	Blank
Consciousness	Blank

Table 2 For Modified Early Warning Score:

Setting	Default value
Select **Calculation** tab	
SYS, Pulse (ECG), Temp, RR (CO2) values are the real time value	
Consciousness	Blank
Hourly Urine for 2 hours	Blank

Other patients settings

Select the > **Other Patients** to adjust the remote alarm settings for each individual remote bed or for all remote beds in the selected Unit.

For more information, see the user's manual.

The Receive Alarms tab is only visible when the automatic view on alarm (AVOA) functionality is enabled.

Setting	Description	Default value
View Patients tab		
Unit	Select the care unit.	Current unit
Show	Select which patient beds are shown in the list.	**All Patients**
Receive Alarms		
Change All Notifications	Select the type of alarm notification(s) that will display on this monitor for the selected unit.	**Off**
Change All Priorities	Select the alarm priority level that will display on this monitor for the selected bed.	**High, Medium**
Alarm Notification	Select the type of alarm notification(s) that will display on this monitor for the selected Unit.	**Off**
Alarm Priorities	Select the alarm priority level that will display on this monitor for the selected bed unless the **Alarm Notification** setting is **Off**.	**High, Medium**

Password settings

Select the > **Service** to setup password settings.

Setting	Default value
Username	NA
Password	NA
Select **Reset Password**	
Expiration Date (YYYYMMDD)	NA
Activation Code	NA
Select **Change Password**	
clinical	Not selected
service	Not selected
New Password	NA
Confirm New Password	NA
Select **Password Policy** > **Basic Policy** tab	

Setting	Default value
Password Minimum Length	**8**
Uppercase characters Minimum number	**0**
Lowercase characters Minimum number	**0**
Digit Minimum number (need check)	**0**
Special characters Minimum number	**0**
Select **Password Policy** > **Advanced Policy** tab	
Maximum repeating character length	Not selected , value is **3**
Maximum monotonic sequence length	Not selected , value is **3**
Password history	Not selected , value is **10**
Maximum error attempts	Not selected, value is **3**
Password expired duration(month)	Not selected, value is **3**

Installation default settings

The **Clinical** setup menus include the advanced configuration settings which need password to enter in. We recommend you contact the responsible organization to setup.

To access and customize the installation settings:

1. Select the > **Service**.
2. Enter the **Username** and **Password**.
3. Select **Login**.

NOTE
Username and password are case sensitive.

Alarm options settings

Select the > **Service** > **Alarm Options** to setup.
Select **Audio of Alarms** to setup.

Setting	Description	Default value
Audio Off Allowed	Select if enable alarm audio off feature.	**NO**
Reminder Volume	Select the reminder beep volume.*1	**5**
Alarm Tones	Select the alarm tone patterns.	**ISO2**
Low Priority Alarm Tone	Select the audible alarm tone sound for low priority alarms.	**Single**
Alarm Volume Control	Select whether the alarm volume adjusts **Common for All**, or **Separate for Low**).	**Common for All**

Setting	Description	Default value
High & Medium Alarm Volume	Select the minimum audible alarm volume for high and medium priority alarms.	**5**
Low Alarm Volume	Select the minimum audible alarm volume for low priority alarms.	**5**
*1 Make sure the reminder beep volume is suit for your care environment to avoid missing silenced alarms.		

Select the **Allowed Alarm Priorities** to setup priority options.

Setting	Default value
ECG tab	
Tachy	**Escalating High Medium**
Brady	**Escalating High Medium**
V Tach	**High**
ST Segment high/low	**High Medium Low**
ECG lead off	**Low**
ECG leads off	**Escalating High**
Arrhythmia paused	**Escalating High**
SpO2 tab	
SpO2 low	**Escalating High Medium**
SpO2 probe off	**Escalating High**
BP tab	
IBP high/low	**High Medium**
NIBP high/low	**High Medium**
Others tab	
RR (Imped.) high/low	**Escalating High Medium Low**
Apnea (Imped.)	**Escalating High Medium Low**
CO2 high/low	**High Medium**
FiAA high/low	**High Medium**
Temp high/low	**Escalating Medium Low**

Select the **Alarm Delays** to setup.

Setting	Default value
V Tach Event Duration Criteria	not selected

Setting	Description	Default value
Latching Alarms	Select if keep alarm messages on screen even if initial alarm condition goes away.	**NO**

Setting	Description	Default value
Breakthrough Alarm	Select to allow some alarms to break through (interrupt) an audio off or audio pause condition. The choices are: • **Off**: close breakthrough feature. • **Peds**: turn on breakthrough feature for new fatal alarms, including Brady. • **Adult**: turn on breakthrough feature for new fatal alarms, excluding Brady.	**Adult** PEDIATRIC and NEONATAL mode: **Peds**
Nurse Call	Select the nurse call system electrical level in the hospital. The choices are: • **Normal Open**: high electrical level export from the nurse call connector when there is medium or high priority alarm. • **Normal Close**: low electrical level export from the nurse call connector when there is medium or high priority alarm.	**Normal Open**
Alarm Light (not for device with VSP 4.0 Upgrade Software)	Enable the alarm light to be turned off **0%(OFF) Allowed**.	Disabled

Select the **Remote Alarms** tab to setup.

Setting	Description	Default value
For Remote Bed	Enable Audio pause for a remote bed from this monitor.	**No**
From Remote Location	Select which remote devices on the network can pause alarms for this monitor.	**Not Allowed**
Allow Remote Pausing of	Select the alarm priority levels that can be remotely paused.	**Low Alarms**
Show Remote Patient Name	Enable the patient's name to display when using the AVOA feature.	Disabled
Remote Alarm Light	Enable the alarm light for remote events.	**On**
Remote Alarm Tone	Select the audible alarm tone for remote alarms.	**Local**
Restore after Discharge	Select to restore the list of selected remote beds after a discharge.	Enabled

Snapshot settings

Select the > **Service** > **Snapshot**.

Setting	Description	Default value
Field 1	Select the parameter to display in snapshots.	**ECG1**
Field 2	Select the parameter to display in snapshots.	**IBP1** ED mode: **CO2** ICU mode: **ECG2**
Field 3	Select the parameter to display in snapshots.	**Pleth** ICU mode: **IBP1** OR mode: **CO2**
Create on Alarms	Select if snapshot create on alarms.	**YES**

Parameter settings

Select the > **Service** > **Parameter Settings**.

Setting	Default value
Units tab	
Blood Pressure	**mmHg**
Height	**cm**
Weight	**kg**
Paw	**cmH2O**
I:E	**[-]**
Colors tab > **IBP Page1** vertical tab	
Art	**Red**
RAP	**White**
ABP	**Red**
RVP	**White**
CVP	**Blue**
LAP	**White**
PA	**Yellow**
ICP	**White**
Colors tab > **IBP Page2** vertical tab	
UAC	**Red**
UVC	**White**
IBP1	**Red**
IBP2	**Blue**
IBP8	**Yellow**
Colors tab > **Common** vertical tab	
ECG	**Green**
CO2	**White**
SpO2	**Yellow**

Setting	Default value
O2	**White**
NIBP	**Red**
N2O	**Blue**
Resp	**White**
Temp	**White**
Colors tab > **Specific** vertical tab	
BIS	**Blue**
Entropy	**White**
C.O.	**White**
NMT	**Violet**
Paw	**Yellow**
Flow	**Green**
SPI	**Violet**
Others tab	
CO2 Numbers	**Dry**
MAC Type	**MAC**
ECG Printout Format	**4 x 2.5 - 1 Rhythm**

Roving settings

Select the > **Service** > **Roving**.

Setting	Description	Default value
Monitor Roving	Select if monitor roving is allowed.	**Not Allowed**
Roving Between Units	Select if roving between units is allowed.	**Not Allowed**
Manual Bed Entry	Select if bed names can be entered manually.	**Not Allowed**

Gesture control settings

(not for device with VSP 4.0 Upgrade Software).

Select the > **Service** > **Gesture Control**.

Setting	Description	Default value
Gesture Control	Select to enable or disable gesture control feature.	**Disabled**
Time Period 1	Select to enable the first time period to disable gesture control feature.	Not selected
From To	Set the time period to disable gesture control.	**00:00** - **00:00**

Setting	Description	Default value
Time Period 2	Select to enable the second time period to disable gesture control feature.	Not selected
From To	Set the time period to disable gesture control.	**00:00** - **00:00**

Save modes settings

Select the > **Service** > **Save Modes**.

Setting	Description	Default value
Select **Save Modes** tab.		
Target Mode	Select the target mode to save current or factory settings.	**STEP-DOWN**
Save current settings to Target Mode	Save current settings to target mode	NA
Revert Target Mode to factory default	Revert target mode to factory default settings.	NA
Select **Default Mode** tab.		
Default Mode	Select the default mode.	**STEP-DOWN**

Time and Date settings

NOTE
The monitor can't be the TIME MASTER in network. If the monitor is connected to the network, it follows the central station's time settings and the **Time and Date** is gray.

NOTE
You can't change the time and date settings when the patient has been admitted.

Select the > **Service** > **Time and Date**.

Setting	Description	Default value
Time and Date	Select to view and adjust current time and date.	Keep the current time and date as default.
Select the **Time Format** tab		
Time Format	Select to adjust the time format.	**24 h**

Time zone settings

The **Time Zone** menu is enable only when the monitor is disconnect to the network and patient is discharged.

Select the > **Service** > **Time Zone**.

Setting	Description	Default value
Daylight Savings	Select to turn on/off, or set auto to adjust daylight savings time (DST).	**ON**
Daylight Savings Offset (HH:MM)	Select to set the hours : minutes offset for daylight savings.	**01** : **00**
Select **DST Adjustment** tab[*1]		
Begins	Select to set daylight savings begin time.	• **Month**: **Mar** • **Week (1st...)**: **2nd** • **Day of Week**: **Sun** • **Time 24h Clock**: **02:00**
Ends	Select to set daylight savings end time.	• **Month**: **Nov** • **Week (1st...)**: **1st** • **Day of Week**: **Sun** • **Time 24h Clock**: **02:00**
Select the **Time Source** tab[*2]		
Time Source	Select to set time sync source. • **Unity**: Time sync to CARESCAPE network. • **NTP**: Time sync to NTP server.	**Unity**
Select the **NTP Config** tab[*3]		
Difference from GMT (HH:MM) + If Later	Select to set offset hours : minutes from GMT.	**+01**: **00**
Primary NTP Server	Enter the primary NTP server IP address.	Blank
NTS	Select checkbox to enable Network Time Security (NTS) feature for **Primary NTP Server**, provides cryptographic security for the client-server mode of the Network Time Protocol (NTP).	Not selected
Select Certificate	Select the NTS certificate which have been imported by service or hospital IT.	Disable (select **NTS** to enable)
Secondary NTP Server	Enter the secondary NTP server IP address.	Blank
NTS	Select checkbox to enable Network Time Security (NTS) feature for **Secondary NTP Server**, provides cryptographic security for the client-server mode of the Network Time Protocol (NTP).	Not selected
Select Certificate	Select the NTS certificate which have been imported by service or hospital IT.	Disable (select **NTS** to enable)

[*1] The settings are enable only when **Daylight Savings** is set to **AUTO**

[*2] The tab is shown only when monitor has the **UNITY** and **HL7** license.

[*3] The tab is shown only when monitor has the **HL7** license.

USB import and export settings

Select the > **Service** > **USB Import/Export**.

Setting	Description	Default value
Export settings to USB Disk	Export all modes' settings to the USB storage device.	NA
Import settings from USB Disk	Import all modes' settings from the USB storage device. Restart needed.	NA
Set Key for Patient Data Export	Set key for patient data export to USB disk in PDF format.	NA
Export trends to USB Disk	Export the trends to the USB storage device	NA
Export logs to USB Disk	Export the logs to the USB storage device	NA

EWS settings

Select the > **Service** > **EWS**.

Setting	Description	Default value
Protocol Type	Select the protocol type to be **NEWS2** or **MEWS**.	**NEWS2**

Printer settings

Select the > **Service** > **Page 2** vertical tab > **Printer**.

Setting	Description	Default value
Paper Size	Select the paper size for network printer.	**A4**
ECG Printout Format	Select the all ECG waveform printout format.	**4 x 2.5 - 1 Rhythm**
Print Patient Name	Include the patient name in printout.	Not selected.

Parameter default settings

ECG default settings

Select the HR digit field > **Setup** tab.

Setting	Description	Default value
ECG1 Lead	Select the ECG 1 lead for 3-,5-, 10-lead.	**II**
ECG2 Lead	Select the ECG 2 lead for 3-,5-, 10-lead.	3-lead mode: **Cascade** 5-, 10-lead mode: **V1**
ECG3 Lead	Select the ECG 3 lead for 3-,5-, 10-lead.	3-lead mode: **Cascade** 5-, 10-lead mode: **aVL**
V Lead	Select the V-lead label for 5-, 10-lead.	**V1**
Size	Select the waveform size.	**1x**
Hemodynamics Sweep Speed	Select the hemodynamic waveform speed.	**25 mm/s**
Beat Volume	Select the audible QRS beep tone volume.	**0** OR mode: **3**.
Update Lead Set	Select to update lead set.	NA

Select the **Advanced** tab.

Setting	Description	Default value
Pacemaker Detection	Enable the pacemaker detection program.	**Show** OR mode: **Hide**.
Waveform Filter	Select the filter for waveform display and printed strips.	**Monitoring** OR mode: **Moderate**
QRS Width	Select the level of QRS detection enhancement.	**Normal** NEONATAL mode: **Narrow**.
Primary HR Source	Select the parameter to calculate HR.	**AUTO**
Display with Primary HR	Display a second HR value in the ECG digit field.	**None**
ECG Grid	Display a grid on waveforms.	Disabled
Relearn	Select to relearn the QRS pattern.	NA

Select the **ST** tab.

Setting	Description	Default value
Select the **Adjust ST** vertical tab		
Set ISO point	Select to enable ISO point set.	NA
Set J point	Select to enable J point set.	NA
ST point	Select the ST point	**J+80**
Select the **ST Alarm** vertical tab		
Lateral alarm limits	Select the high/low alarm limits.	**2.0/-2.0**
Lateral alarms on/off	Enable alarm when limits are violated.	**OFF**
Inferior alarm limits	Select the high/low alarm limits.	**2.0/-2.0**
Inferior alarms on/off	Enable alarm when limits are violated.	**OFF**

Setting	Description	Default value
Anterior alarm limits	Select the high/low alarm limits.	**2.0/-2.0**
Anterior alarms on/off	Enable alarm when limits are violated.	**OFF**

ECG alarms default settings

Select the **Alarms** tab > **HR** vertical tab.

Setting	Description	Default value
HR alarm limits	Select the high/low alarm limits.	**160/40** PEDIATRIC mode: **160/70** NEONATAL mode: **200/90**
HR alarms on/off	Enable alarm when limits are violated.	**ON**

Select the **Lethal** vertical tab.

Alarms	Alarm priority settings	Create Snapshot
Asystole	Fixed	ON
V Fib / V Tach	Fixed	ON
V Tach	High	ON

Setting	Description	Default value
Minimum HR/min	Select the minimum HR value to trigger the V Tach alarm.	**100** NEONATAL mode: **160**
Event Duration	Select how long time is needed to trigger the V Tach alarm.	**3 s**

Select the **Ventri cular** vertical tab.

Alarms	Alarm priority settings	Create Snapshot
VT > 2	**Medium**	ON
R on T	**Medium**	OFF
V Brady	**Medium** OR mode: **High**	ON
Couplet	**Low**	ON
Bigeminy	**Low**	ON
Accelerated Ventricular	**Low**	OFF NEONATAL mode: ON
Trigeminy	**Low**	OFF OR and NEONATAL mode: ON
Multifocal PVCs	**Off**	OFF

Select the **Atrial** vertical tab.

Alarms	Alarm priority settings	Create Snapshot
A Fib	**Off** OR mode: **Low**	OFF
Irregular (NEONATAL mode only)	**Low**	ON
SV Tachy	**Off**	OFF
Missing Beat	**Off** OR mode: **Low**	OFF
Pause	**Low**	OFF OR mode: ON

Setting	Description	Default value
Pause Interval	Select the time interval between two adjacent beats before Pause alarm sounds.	**3 s** NEONATAL mode: **5 s**
SVT Length	Define the number of beats before the **SVT** alarm sounds.	**6 Beats**
HR for SVT /min	Select the HR value to target SVT alarm.	**120** NEONATAL mode: **180**

Select the **PVC** vertical tab

Setting	Description	Default value
PVC alarm	Select the high alarm limit.	**20** OR mode: **6**
PVC alarm on/off	Enable alarm when limits are violated.	**OFF**

Select the **SVC** vertical tab

Setting	Description	Default value
SVC alarm	Select the high alarm limit.	**10**
SVC alarm on/off	Enable alarm when limits are violated.	**OFF**

Impedance respiration default settings

Select impedance respiration digit field.

Setting	Description	Default value
Size	Select the waveform display size.	**0.8** NEONATAL mode: **1.0**.
Measurement	Display respiration measurement.	**OFF**
Measurement Source	Select the lead to measure respiration.	**II**

Setting	Description	Default value
Sweep Speed	Select the waveform display sweep speed.	**6.25 mm/s** NEONATAL mode: **0.625 mm/s**.
Resp Averaging Time	Select the respiration average time.	**10**

Select the **Alarms** tab.

Setting	Description	Default value
Respiration Rate alarm limits	Select the high/low alarm limits.	**60/4** OR mode: **60**/**OFF** NEONATAL mode: **50/20**
Respiration Rate alarm on	Enable alarm when limits are violated.	**ON** OR mode: **OFF**
Apnea Limit Seconds	Select Apnea alarm delay time.	**20** NEONATAL mode: **15**

SpO_2 default settings

Select the SpO_2 digit field to setup.

Setting	Description	Default value
Pleth Scale	Select the waveform display scale.	• GE SpO_2: **AUTO** OR mode: **20** • Nellcor/Masimo SpO_2: **1x**
SpO2 Response (GE SpO_2 only.)	Select the averaging time.	**Normal**
Averaging (Masimo SpO_2 only.)	Select the averaging time.	**8s** NEONATAL mode: **12s**
Sensitivity (Masimo SpO_2 only.)	Select the SpO_2 sensor sensitivity level.	**Normal**
Beat Volume	Select the volume of the pulse rate beat tone.	**0** OR mode: **3**
Primary HR Source	Select the parameter to calculate HR.	**AUTO**
Show PI (GE and Masimo SpO_2 only.)	Select to show/hide PI.	**ON**

Select the SpO_2 digit field > **Alarms** tab to setup.

Setting	Description	Default value
SpO_2 alarm limits	Select the high/low alarm limits.	**OFF /90** PEDIATRIC mode: **OFF/94** NEONATAL mode: **OFF/88**
SpO_2 alarms on	Enable alarm when limits are violated.	**ON**

Setting	Description	Default value
Alarm Delay (Masimo SpO_2 only.)	Select the **SpO2 low** alarm delay time.	**5s**

NIBP default settings

Select the NIBP digit field > **Setup** tab.

Setting	Description	Default value
Cuff Size	Select the NIBP cuff size.	**(Not Selected)** NEONATAL mode: **Neonatal**
NIBP Manual	Start/stop once NIBP measurement.	NA
NIBP Auto	Start/stop auto NIBP measurement.	NA
Start STAT	Start/stop STAT NIBP measurement.	NA
Cycle Time	Select the amount of time between automatic measurements.	**5 min** PACU mode: **15 min**. NEONATAL mode: **10 min**.
Completed NIBP Volume	Select the tone volume that sounds when an NIBP measurement is complete.	**3**
Use Default Inflation Pressure	Enable automatic selection of initial cuff inflation pressure.	Enabled
Infl. Press.mmHg	Select the cuff initial inflation pressure.	• When **Cuff Size** is **Adult/Child**: **135** PEDIATRIC mode: **125** • When **Cuff Size** is **Neonatal**: **100**

Select the **Custom Series** tab.

Setting	Description	Default value
X BP Series	Select the first BP series measurement time.	**q5min**
repeat	Select the BP series measurement repeat time.	**X4**
X BP Series	Select the second BP series measurement time.	**q15min**
repeat	Select the BP series measurement repeat time.	**X4**
X BP Series	Select the third BP series measurement time.	**q30min**
repeat	Select the BP series measurement repeat time.	**X2**
X BP Series	Select the fourth BP series measurement time.	**q60min**
repeat	Select the BP series measurement repeat time.	**X1**

Select the **Venous Stasis** tab.

Setting	Description	Default value
Cuff Size	Select the type of cuff size.	**Adult/Child**
Stasis Press.	Select the stasis pressure.	**80**
Start Stasis	Start or stop the venous stasis measurement.	NA

Select the **Alarms** tab.

Setting	Description	Default value
Systolic alarm limits	Select the high/low adult and pediatric alarm limits. (When cuff size is **Adult/Child**)	**150/70** OR mode: **180/80**
	Select the high/low neonatal alarm limits. (When cuff size is **Neonatal**)	**100/40** OR mode: **120/50**
Systolic alarm on	Enable alarm when limits are violated.	**ON**
Mean alarm limits	Select the high/low adult and pediatric alarm limits. (When cuff size is **Adult/Child**)	**100/40** OR mode: **140/60**
	Select the high/low neonatal alarm limits. (When cuff size is **Neonatal**)	**70/30** OR mode: **80/40**
Mean alarm on	Enable alarm when limits are violated.	**ON**
Diastolic alarm limits	Select the high/low adult and pediatric alarm limits. (When cuff size is **Adult/Child**)	**90/30** OR mode: **100/40**
	Select the high/low neonatal alarm limits. (When cuff size is **Neonatal**)	**60/20** OR mode: **70/30**
Diastolic alarm on	Enable alarm when limits are violated.	**ON**

Invasive pressure default settings

The default **IBP1** pressure site for STEP-DOWN, ED, PACU, ICU, OR, and PEDIATRIC mode is **Art**, for NEONATAL mode is **UAC**.

The default **IBP2** pressure site for STEP-DOWN, ED, PACU, ICU, OR, and PEDIATRIC mode is **CVP**, for NEONATAL mode is **UVC**.

The default **IBP8** pressure site is **PA**, for NEONATAL mode is NA.

Setting	Description	Default value												
		IBP1	IBP2	IBP8	Art	CVP	PA	RAP	RVP	LAP	ICP	ABP	UAC	UVC
Select the IBP digit field > **Setup** tab.														
Label	Select the pressure site label.	**IBP1**	**IBP2**	**IBP8**	**Art**	**CVP**	**PA**	**RAP**	**RVP**	**LAP**	**ICP**	**ABP**	**UAC**	**UVC**
Scale mmHg	Select the trend scale.	**0-200**	**0-20**	**0-60**	**0-200**	**0-20**	**0-60**	**0-20**	**0-60**	**0-20**	**0-20**	**0-200**	**0-100**	**0-10**
Digit Format	Select the pressure values display format.	**S/D**	**Mean**	**S/D**	**S/D**	**Mean**	**S/D**	**Mean**	**S/D**	**Mean**	**CPP**	**S/D**	**S/D**	**Mean**
Hemodynamics Sweep Speed	Select the waveform display sweep speed.	**25 mm/s**												
HR Source	Select the parameter to calculate HR.	**AUTO**												
Select the **Advanced** tab.														
Response	Select the IBP averaging time.	**Normal**												
Filter Frequency Hz	Select the waveform filter.	**22**	**9**	**9**	**22**	**9**	**9**	**9**	**9**	**9**	**9**	**22**	**14**	**14**
Ventilation Mode	Select the mode for ventilation	**Contrl**, NEONATAL mode: **Spont**												
SPV Source	Select the source for SPV.				**Off**							**Off**		
Select the **Alarms** tab.														
Systolic alarm limits	Select the low/high alarm limits.	**80/180**	**5/20**	**10/40**	**80/180**	**5/20**	**10/40**	**5/20**	**10/40**	**5/30**	**0/20**	**80/180**	**40/90**	**5/15**, OR mode:**0/20**

Setting	Description	Default value											
		IBP1	IBP2	IBP8	Art	CVP	PA	RAP	RVP	LAP	ICP	ABP	UAC	UVC
Systolic alarms on	Enable alarm when limits are violated.	**ON**, OR mode: **OFF**	**OFF**	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**ON**	**ON**, OR mode: **OFF**	**OFF**, OR mode: **ON**
Mean alarm limits	Select the low/ high alarm limits.	**60/140**	**-5/15**, OR mode:**0 /15**	**5/30**	**60/140**	**-5/15**, OR mode:**0 /15**	**5/30**	**0/15**	**5/35**	**5/20**	**0/15**	**60/140**	**30/60**, OR mode: **30/70**	**-5/15**, OR mode: **0/15**, NEO mode: **0/5**
Mean alarms on	Enable alarm when limits are violated.	**OFF**, OR mode: **ON**	**ON**	**OFF**	**OFF**	**ON**	**OFF**, OR mode: **ON**	**OFF**	**OFF**, OR mode: **ON**			**OFF**	**ON**	**ON**, OR mode: **OFF**
Diastolic alarm limits	Select the low/ high alarm limits.	**40/100**	**-5/10**	**5/20**	**40/100**	**-5/10**	**5/20**	**0/10**	**0/20**	**0/20**	**0/10**	**40/100**	**20/50**	**0/5**, OR mode: **-5/10**
Diastolic alarms on	Enable alarm when limits are violated.	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**, PACU, OR mode: **ON**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**ON**, OR mode: **OFF**	**OFF**

Temperature default settings

Select the temperature digit field to setup.

Setting	Description	Default value
T1 Label	Select the temperature site label.	**T1**
T2 Label	Select the temperature site label.	**T2**
Unit	Select the temperature unit.	**°C**

Select the **Alarms** tab.

Setting	Description	Default value
T1 alarm limits	Select the high/low alarm limits.	**38.0/34.0** OR mode: **38.5/34.0** PEDIATRIC mode: **38.0/35.5** NEONATAL mode: **37.5/36.0**
T1 alarms on/off	Enable alarm when limits are violated.	**OFF** OR mode: **ON**
T2 alarm limits	Select the high/low alarm limits.	**38.0/15.0** OR mode: **38.5/15.0** NEONATAL mode: **37.5/36.0**
T2 alarms on/off	Enable alarm when limits are violated.	**OFF** OR mode: **ON**
Tblood alarm limits	Select the high/low alarm limits.	**38.5/34.0** PEDIATRIC mode: **38.0/35.5**
Tblood alarms on/off	Enable alarm when limits are violated	**OFF** OR mode: **ON**

Cardiac output (C.O.) default settings

Select the C.O. digit field to setup.

NOTE
C.O. feature is not available for NEONATAL mode.

Select the **Setup** tab.

Setting	Description	Default value
Catheter Type	Select the catheter type.	**777F8**
Measurement Type	Select the measurement detection type.	**Auto**
REF Measurement	Enable REF measurement.	Disable
Injectate Volume	Select the initial injectate volume.	**10 ml**
Computation Constant	Select the computation constant value.	0.542

Setting	Description	Default value
Scale	Select the waveform scale.	**1.0**
Show With C.O./C.I.	Select what to show.	**NONE**

Select the **Alarms** tab.

Setting	Description	Default value
Tblood alarm limits	Select the high/low alarm limits.	**38.5/34.0** PEDIATRIC mode: **38.0/35.5**
Tblood alarms on/off	Enable alarm when limits are violated	**OFF** OR mode: **ON**

Airway gases default settings

CO_2 default settings

Select the CO_2 digit field.

Setting	Description	Default value
Scale	Select the CO_2 scale.	**6%**
FiO2 Level	Select the level of FiO_2 used to make compensation to measured CO_2 values.	**21-40%**
CO2 Sweep Speed	Select the CO_2 sweep speed.	**6.25 mm/s**
Unit	Select the CO_2 unit	**%**
N2O Level	Select the level of N_2O used to make compensation to measured CO_2 values.	**0-40%**
Measurement	Display the CO_2 measurement.	**ON**
Measurement Source	Select the gases measurement source: auto, gas module, or anesthesia	**Automatic (A)**

Select the **Alarms** tab.

Setting	Description	Default value
$EtCO_2$ alarm limits	Select the high/low alarm limits (%).	**8.0/3.0** NEONATAL mode: **6.0/3.0**
$EtCO_2$ alarms on/off	Enable alarm when limits are violated.	**ON**
$FiCO_2$ alarm limits	Select the high/low alarm limits (%).	**3.0**/**OFF**
$FiCO_2$ alarms on/off	Enable alarm when limits are violated.	**ON**

Setting	Description	Default value
RR (CO_2) alarm limits	Select the high/low alarm limits (min).	**60/4** NEONATAL mode: **75/20** OR mode: **60/OFF**
RR (CO_2) alarms on/off	Enable alarm when limits are violated.	**ON** OR mode: **OFF**

O_2 default settings

Select the O_2 digit field.

Setting	Description	Default value
Scale	Select the O_2 scale.	**DIFF6**
Measurement	Display the CO_2 measurement.	**ON**
O2 Sweep Speed	Select the O_2 sweep speed.	**6.25 mm/s**

Select the **Alarms** tab.

Setting	Description	Default value
EtO_2 alarm limits	Select the high/low alarm limits (%).	**OFF**/**10**
EtO_2 alarms on/off	Enable alarm when limits are violated.	**OFF**
FiO_2 alarm limits	Select the high/low alarm limits (%).	**OFF**/**18**
FiO_2 alarms on/off	Enable alarm when limits are violated.	**ON**

Anesthetic agent/N_2O default settings

Select the AA digit field.

Setting	Description	Default value
Agent Scale	Select the agent scale.	AA, Hal: **1.2** Enf, Iso: **2.5** Des: **10** Sev: **5**
Agent Measurement	Display the agent measurement.	**ON**
Agent Sweep Speed	Select the agent sweep speed.	**6.25 mm/s**
N2O Measurement	Display the N_2O measurement.	**ON**

Select the **Alarms** tab.

Setting	Description	Default value
EtHal alarm limits	Select the high/low alarm limits (%).	**1.5**/**OFF** OR and NEONATAL mode: **1.3**/**OFF**

Setting	Description	Default value
EtEnf alarm limits		**3.4**/**OFF** OR and NEONATAL mode: **2.9**/**OFF**
EtIso alarm limits		**2.3**/**OFF** OR and NEONATAL mode: **2.0**/**OFF**
EtDes alarm limits		**8.0**/**OFF** OR and NEONATAL mode: **10.0**/**OFF**
EtSev alarm limits		**3.4**/**OFF**
EtAA alarms on/off	Enable alarm when limits are violated.	**OFF**
FiHal alarm limits	Select the high/low alarm limits (%).	**2.2**/**OFF**
FiEnf alarm limits		**5.1**/**OFF**
FiIso alarm limits		**3.4**/**OFF**
FiDes alarm limits		**12.0**/**OFF**
FiSev alarm limits		**5.1**/**OFF** OR and NEONATAL mode: **6.0**/**OFF**
FiAA alarms on/off	Enable alarm when limits are violated.	**ON**

Entropy default settings

Select the Entropy digit field.

NOTE
The Entropy is available in OR mode only.

Setting	Description	Default value
Entr. EEG Scale	Select the EEG waveform scale.	**250**
EEG Sweep Speed	Select the EEG sweep speed.	**25 mm/s**
Display Format	Select the value display format.	**RE+SE**
Entropy/SPI Trend Length	Select the trend length.	**5 min**
Check Sensor Automatic	Enable automatic sensor check.	Enabled

Select the **Alarms** tab.

Setting	Description	Default value
RE alarm limits	Select the high/low alarm limits (%).	**OFF**
RE alarms on/off	Enable alarm when limits are violated.	**OFF**
SE alarm limits	Select the high/low alarm limits (%).	**OFF**
SE alarms on/off	Enable alarm when limits are violated.	**OFF**

NMT default settings

Select the NMT digit field.

NOTE
The NMT feature not available for NEONATAL mode.

Setting	Description	Default value
Start-up Settings	Select when a new measurement starts.	**AUTO**
Use Supramax	Enable the search for the supramaximal stimulus current search.	Enabled
Current mA	Select the simulation current value for TOF, DBS and ST stimulation modes.	**S (70 mA)**
Cycle Time	Select the TOF/DBS stimulation mode cycle time.	**20 s**
	Select the ST stimulation mode cycle time.	**1 s**

Select the **Advanced** tab.

Setting	Description	Default value
Stimulus Mode	Select the stimulus mode.	**TOF**
Stimulation Type	Select the stimulation pulse width.	**Adult**
Recovery Note	Enable a recovery note to display.	**OFF**
Stimulus Beep Volume	Select the volume of the audible stimulus beep tone.	**0**
Show Ratio Microtrend	Select whether microtrend is shown.	Enabled

BIS default settings

Select the BIS digit field to setup.

NOTE
This measurement is not available in the Neonatal mode.

Setting	Description	Default value
BIS EEG Scale µV	Select the waveform scale.	**100**
EEG Sweep Speed	Select the waveform sweep speed.	**25 mm/s**
Smoothing Rate	Select the amount of data used to calculate the BIS value.	**30 s** OR, PACU mode: **15 s**
Filters	Enable the EEG high and low pass filter frequencies.	Enabled

Setting	Description	Default value
Sensor Check Automatic	Enable automatic combined sensor impedance check and ground impedance check.	Enabled

Select the **Alarms** tab.

Setting	Description	Default value
BIS alarm limits	Select the high/low alarm limits.	**OFF**
BIS alarms on/off	Enable alarm when limits are violated.	**OFF**

Spirometry default settings

Select the Spirometry digit field.

Setting	Description	Default value
Paw Scale	Select the scale for PAW waveform.	**60**
Flow Scale	Select the scale for Flow waveform.	**40**
Paw Sweep Speed	Select the sweeping speed for Paw waveform.	**6.25 mm/s**
Flow Sweep Speed	Select the sweeping speed for Flow waveform.	**6.25 mm/s**
Show Volume	Select the volume.	**TV**

Select the **Alarms** tab.

Setting	Description	Default value
Ppeak	Enable alarm when limits are violated.	**OFF**
MVexp	Enable alarm when limits are violated.	**OFF**
TVexp	Enable alarm when limits are violated.	**OFF**
Apnea (Ane. Machine)	Enable alarm when limits are violated.	**OFF**

Electromagnetic compatibility

Standards compliance

In addition to the standards listed in the user documentation, the system is also compatible with the following Electromagnetic disturbances – Requirements and tests standard:

- IEC 60601-1-2/ EN 60601-1-2

Compliance with the standard IEC 60601-1-2 / EN 60601-1-2 applies only to those products that are currently being manufactured and shipped. It does not apply to older devices or devices that have their software upgraded.

Essential performance in EMC

Parameter	Essential performance
General	• No loss of or change to user settings, stored data or operating mode. • No permanent loss of display or unrecoverable loss of function due to equipment damage. • No loss of patient data, mode of operation, or stored data during loss of AC mains or battery power > 10 s. • Ability to generate a technical alarm during abnormal operation. • Resumption of normal operation without data loss within 10 seconds following exposure to electrosurgery.
ECG heart rate accuracy	• ±1% or ±1 bpm, whichever is greater.
Impedance respiration rate accuracy	• 0 to 120 breaths per minute: ±1 bpm
SpO_2 saturation measurement value accuracy	GE TruSignal, Nellcor, Masimo: • Adult/Pediatric (70 to 100%): ±2 • Neonatal (70 to 100%): ±3
NIBP measurement accuracy	• The measurement of the cuff pressure reading ≤2 mmHg, and ≤8 mmHg (1.1 kPa) standard deviation
Invasive pressure measurement accuracy	• Monitor: ±4% or ±2 mmHg, whichever is greater • E-COP: ±4% or ±4 mmHg, whichever is greater
Temperature measurement accuracy	• ±0.3°C including sensor
C.O. blood temperature measurement accuracy	• 17.5 to 33.9°C (63.5 to 93.0°F): ±0.4°C (0.8°F) • 34.0 to 42.0°C (93.2 to 107.6°F): ±0.3°C (0.5°F) • 42.1 to 43.0°C (107.7 to 109.4°F): ±0.4°C (0.8°F)
CO_2 measurement accuracy	• E-sCAiO, E-sCO, N-CAiO: ±(0.2 vol% + 2% of reading) • E-miniC: 0 to 15% vol: ±(0.2 vol% + 2% of reading), 15 to 20% vol: ±(0.7 vol% + 2% of reading)
O_2 measurement accuracy	• ±(1 vol% + 2% of reading)

Parameter	Essential performance
N_2O measurement accuracy	• 0 to 84 vol%: ±(2 vol% + 2% of reading) • 85 to 100 vol%: ±(2 vol% + 8 % of reading)
AA (Desflurane) measurement accuracy	• ±(0.15 vol% + 5% of reading)
Entropy total noise level	• ≤ ±20 % of the nominal output value or ±10 µV, whichever is greater.
BIS total noise level	• ≤ ±20 % of the nominal output value or ±10 µV, whichever is greater.

Entropy accessories and electromagnetic compatibility

The Entropy accessories meet the IEC 60601-1-2 standard requirements for immunity with the following exceptions:

- The radiated Proximity RF fields immunity compliance level of the Entropy measurement is 10 V/m at 450 MHz. Higher levels may cause disturbance to the Entropy curve and numerical values.

Based on the standard, these degradations of the Entropy measurement are acceptable as they do not cause an unacceptable risk to the user or patient.

The user can easily notice the electromagnetic disturbance because there are changes in the Entropy values or the appearance of the Entropy curve (for example, excessive noise or a sine wave). If you suspect electromagnetic disturbance to the Entropy measurement, it is recommended that you select the Entropy curve to be shown on the screen.

If there is a disturbance on the Entropy curve and/or values, increase the distance between Entropy accessories and portable RF communications equipment.

BIS accessories and electromagnetic compatibility

The BIS accessories meet the IEC 60601-1-2 standard requirements for immunity with the following exceptions:

- The radiated RF immunity compliance level of the BIS measurement is 1 V/m with some frequencies. Higher levels may cause disturbance to the BIS curve and numerical values.
- When the BIS sensor is connected to the PIC+ cable, the maximum compliance level for the electrostatic air discharge of the BIS sensor connector is ± 8 kV. Higher levels may cause loss of BIS measurement.

Based on the standard, these degradations of the BIS measurement are acceptable as they do not cause an unacceptable risk to the user or patient.

The user can easily notice the electromagnetic disturbance because BIS measurement is lost or there are changes in the BIS values or the appearance of the BIS curve (for example, excessive noise or a sine wave). If you suspect electromagnetic disturbance to the BIS measurement, it is recommended that you select the BIS curve to be shown on the screen.

Depending on the error that the system detects if exposed to a significant electromagnetic interference, different actions may be required from the user. For example, the user may need to disconnect the BIS interface cable from the E-BIS module and immediately reconnect it back to the E-BIS module. If there is a disturbance on the BIS curve and/or values, increase the distance between BIS accessories and portable RF communications equipment.

Electromagnetic emissions

Guidance and manufacturer's declaration — 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	The monitors use RF energy only for their 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	
* Deviation from IEC 60601-1-2: tested with the test setup defined in IEC 60601-2-49.		

NOTE

The emissions characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required), this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

Electromagnetic immunity

Guidance and manufacturer's declaration — 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.**			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment — guidance**
Electrostatic Discharge (ESD) IEC 61000-4-2	± 8 kV contact ± 2 kV, ± 4 kV, ± 8 kV, ± 15 kV air	± 8 kV contact ± 2 kV, ± 4 kV, ± 8 kV, ± 15 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	± 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	± 0.5 kV, ± 1 kV differential mode ± 0.5 kV, ± 1 kV, ± 2 kV common mode	± 0.5 kV, ± 1 kV differential mode ± 0.5 kV, ± 1 kV, ± 2 kV common mode	

Guidance and manufacturer's declaration — 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.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment — guidance**
Voltage dips IEC 61000-4-11	U_t = 0%, 0.5 cycle (0, 45, 90, 135, 180, 225, 270, and 315 degrees) U_t = 0%, 1 cycle U_t = 70%, 25/30 cycles (0 degrees)	U_t = 0%, 0.5 cycle (0, 45, 90, 135, 180, 225, 270, and 315 degrees) U_t = 0%, 1 cycle U_t = 70%, 25/30 cycles (0 degrees)	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.
Short interruptions and voltage variations on power supply input lines IEC 61000-4-11	U_t = 0%, 250/300 cycles	U_t = 0%, 250/300 cycles	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 Magnetic Field IEC 61000-4-8	30 A/m 50 Hz or 60 Hz	30 A/m 50 Hz and 60 Hz	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_t is the AC mains voltage prior to application of the test level.			

Electromagnetic immunity for RF

Guidance and manufacturer's declaration — 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.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz 6 Vrms 150 kHz to 80 MHz[*1]		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. Recommended separation distance for 1 W: d = 1.2 √P 150 kHz to 80 MHz

Guidance and manufacturer's declaration — 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.**			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Radiated RF IEC 61000-4-3[*2]	3 V/m[*3] 80 MHz to 2.7 GHz	3 V/m 80 MHz to 2.7 GHz	d = 1.2 √P 80 MHz to 800 MHz. d = 2.3 √P 800 MHz to 2.7 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[*4] should be less than the compliance level in each frequency range[*5]. Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE
At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE
These guidelines may not apply in all situations. Electromagnetic propagation is affected by reflection from structures, objects, and people.

[*1] The ISM (industrial, scientific and medical) bands between 0.15 MHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

[*2] Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.

[*3] For more information, see section Proximity field immunity compliance.

[*4] 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.

[*5] Over the frequency range 150 KHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distances

Recommended separation distances between portable and mobile RF communications equipment and the device.

This device is intended for use in an electromagnetic environment in 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 2.7 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.

NOTE
At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE
These guidelines may not apply in all instances. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Proximity field immunity compliance

Guidance and manufacturer's declaration — electromagnetic immunity (IEC/EN 60601-1-2)

Test frequency (MHz)	Band (MHz)	Service	Modulation	Maximum power (W)	Distance (m)	Immunity compliance level (V/m)	Immunity test level (V/m)
385	380 to 390	TETRA 400	Pulse Modulation 18 Hz	1.8	0.3	27	27
450	430 to 470	GMRS 460, FRS 460	FM ± 5kHz deviation 1 kHz sine	2	0.3	28	28
710	704 to 787	LTE Band 13, 17	Pulse Modulation 217 Hz	0.2	0.3	9	9
745							
780							
810	800 to 960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	Pulse Modulation 18 Hz	2	0.3	28	28
870							

Guidance and manufacturer's declaration — electromagnetic immunity (IEC/EN 60601-1-2)							
Test frequency (MHz)	**Band (MHz)**	**Service**	**Modulation**	**Maximum power (W)**	**Distance (m)**	**Immunity compliance level (V/m)**	**Immunity test level (V/m)**
930							
1720	1700 to 1990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse Modulation 217 Hz	2	0.3	28	28
1845							
1970							
2450	2400 to 2570	Bluetooth, WLAN, 802.11 b/g/n, RFID 2450, LTE Band 7	Pulse Modulation 217 Hz	2	0.3	28	28
5240	5100 to 5800	WLAN 802.11 a/n	Pulse Modulation 217 Hz	0.2	0.3	9	9
5500							
5785							

NOTE
The distance values represent the recommended separation distance between interfering equipment and the monitor, modules, and accessories.

Guidance and manufacturer's declaration — Test specifications for enclosure part immunity to proximity magnetic fields		
Test frequency	**Modulation**	**Immunity test level (A/m)**
134.2 kHz	Pulse modulation[a)] 2.1 kHz	65[b)]
13.56 MHz	Pulse modulation[a)] 50 kHz	7.5[b)]

[a)] The carrier shall be modulated using a 50% duty cycle square wave signal.

[b)] r.m.s (root mean square), before modulation is applied.

Guidance and manufacturer's declaration — electromagnetic immunity (AIM STANDARD 7351731, MEDICAL ELECTRICAL EQUIPMENT AND SYSTEM ELECTROMAGNETIC IMMUNITY TEST FOR EXPOSURE TO RADIO FREQUENCY IDENTIFICATION READERS)				
Test frequency	**RFID standard the test is based on[*1]**	**Distance**	**Immunity compliance level**	**Immunity test level**
134.2 kHz	ISO 14223	2.5 cm	65 A/m RMS	65 A/m RMS
13.56 MHz	ISO/IEC 14443-3 (Type A)	1.0 mm	7.5 A/m RMS	7.5 A/m RMS
13.56 MHz	ISO/IEC 14443-4 (Type B)	1.0 mm	7.5 A/m RMS	7.5 A/m RMS
13.56 MHz	ISO/IEC 15693 (ISO 18000-3 Mode 1)	1.0 mm	5.0 A/m RMS	5.0 A/m RMS
13.56 MHz	ISO 18000-3 Mode 3	5.0 cm[*2]	8 A/m	12 A/m
433 MHz	ISO/IEC 18000-7	20.0 cm	3 V/m	3 V/m
860 - 960 MHz	ISO/IEC 18000-63 Type C	20.0 cm	54 V/m	54 V/m
2.45 GHz	ISO/IEC 18000-4 Mode 1	20.0 cm	54 V/m	54 V/m

Guidance and manufacturer's declaration — electromagnetic immunity (AIM STANDARD 7351731, MEDICAL ELECTRICAL EQUIPMENT AND SYSTEM ELECTROMAGNETIC IMMUNITY TEST FOR EXPOSURE TO RADIO FREQUENCY IDENTIFICATION READERS)				
Test frequency	**RFID standard the test is based on**[*1]	**Distance**	**Immunity compliance level**	**Immunity test level**

NOTE
The distance values represent the recommended separation distance between interfering equipment and the monitor.

[*1] **Tests are based on the listed RFID ISO standards that RFID systems can comply with.**

[*2] RFID readers emitting RF per ISO 18000-3 Mode 3 at 13.56 MHz should be more than 5 cm away from the device during patient monitoring.

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 this device.

The device can radiate radio frequency energy and, if not installed and used in accordance with these instructions, may itself cause harmful interference with other susceptible devices in the vicinity.

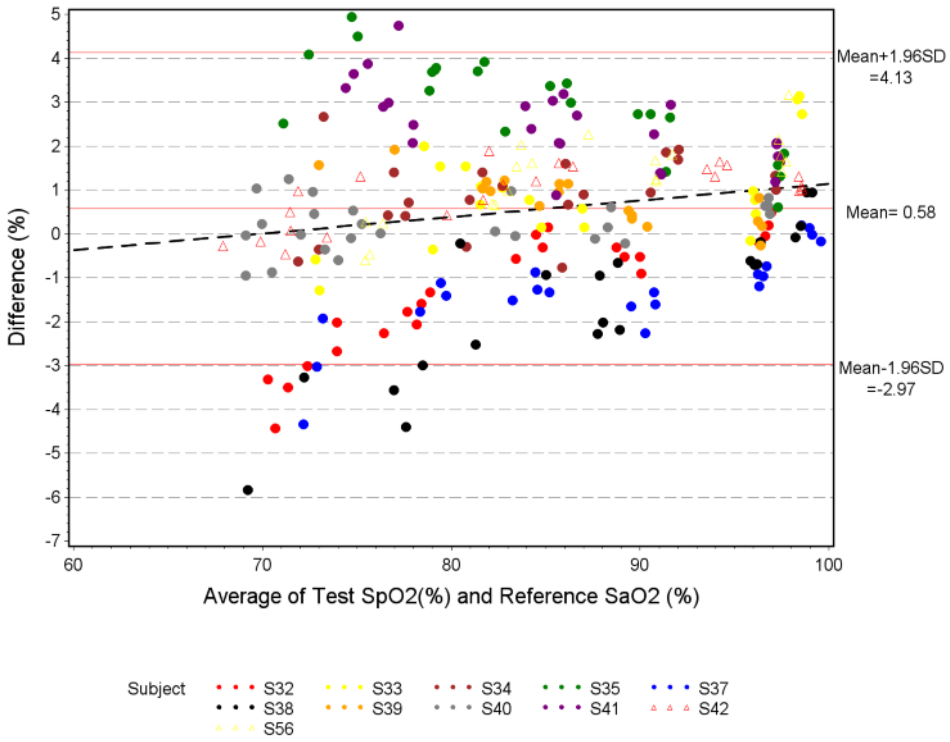
SpO2 supplemental analysis graphs

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.

Figure 1 Bland-Altman plot for SpO_2 - TS-W-D sensor

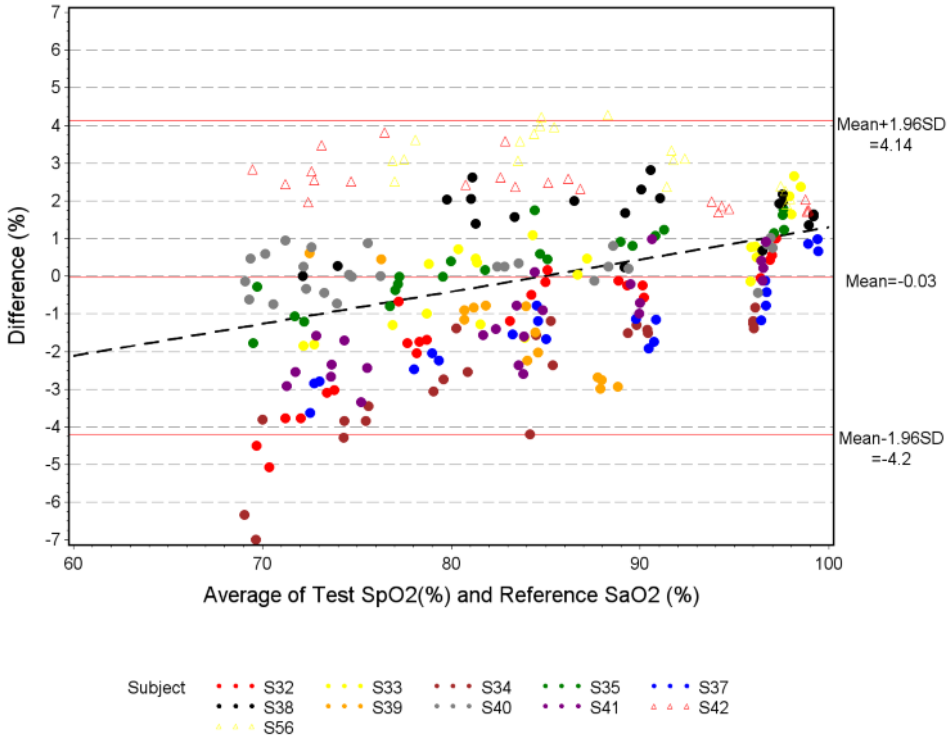


The TS-W-D sensor is a reusable sensor. It is not provided sterile.

Table 3 TS-W-D sensor accuracy

Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
2.503	1.555	1.411

Figure 2 Bland-Altman plot for SpO_2 - TS-SE-3 sensor

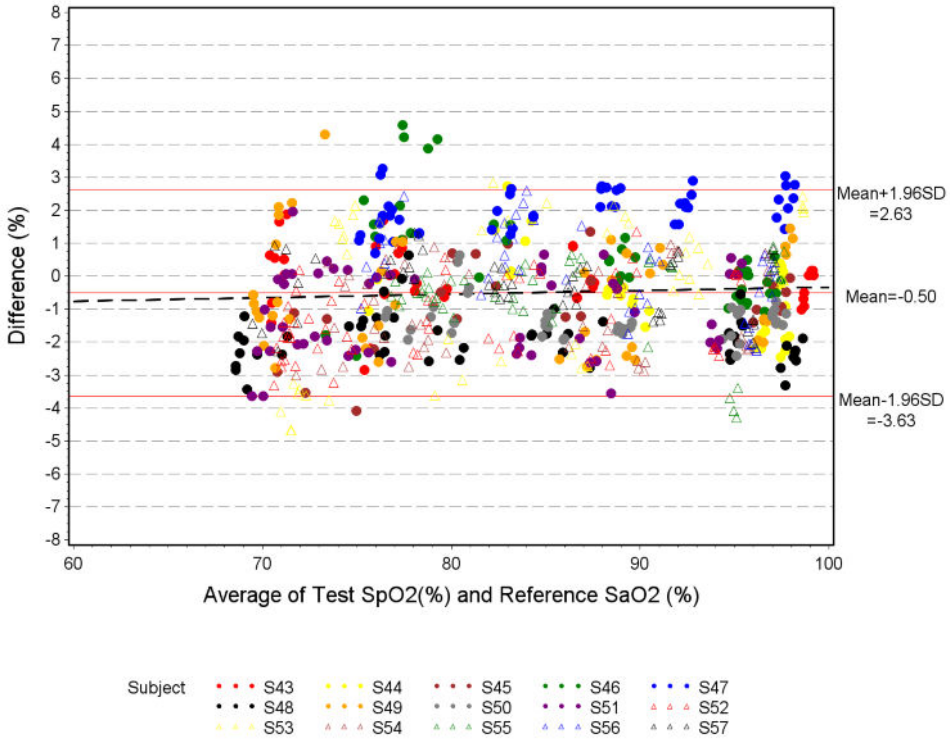


The TS-SE-3 sensor is a reusable sensor. It is not provided sterile.

Table 4 TS-SE-3 sensor accuracy

Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
2.586	1.997	1.52

Figure 3 Bland-Altman plot for SpO_2 - TS-E-D, TS-E2-GE, TS-E4-GE sensors

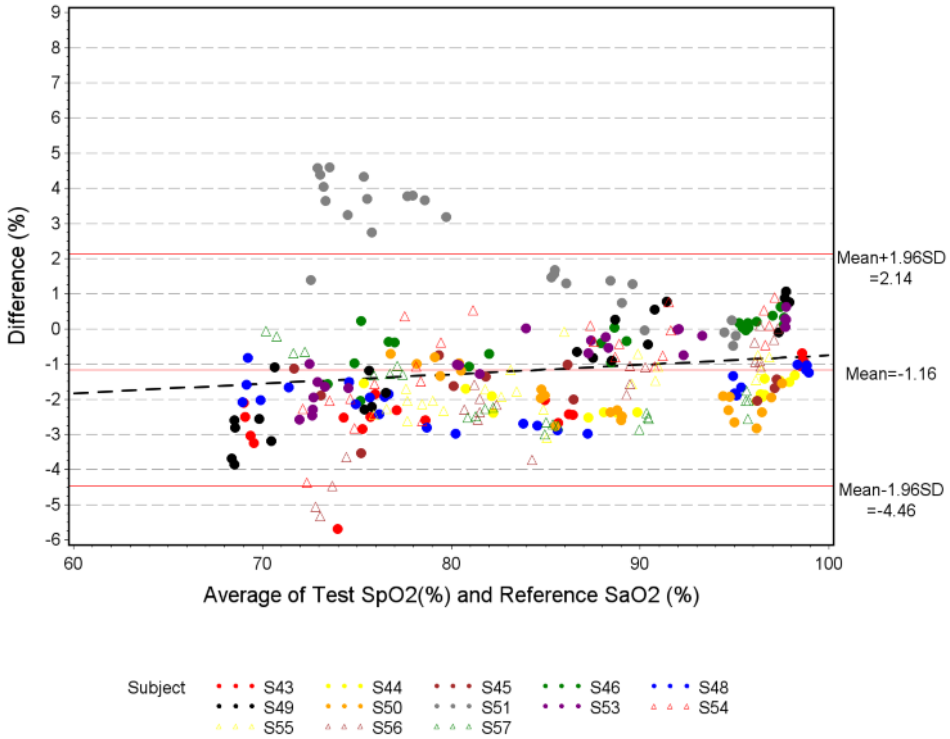


The TS-E-D, TS-E2-GE, TS-E4-GE sensors are reusable sensors. They are not provided sterile.

Table 5 TS-E-D, TS-E2-GE, TS-E4-GE sensor accuracy

Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
1.831	1.502	1.567

Figure 4 Bland-Altman plot for SpO_2 - TS-F-D, TS-F2-GE, TS-F4-GE sensors

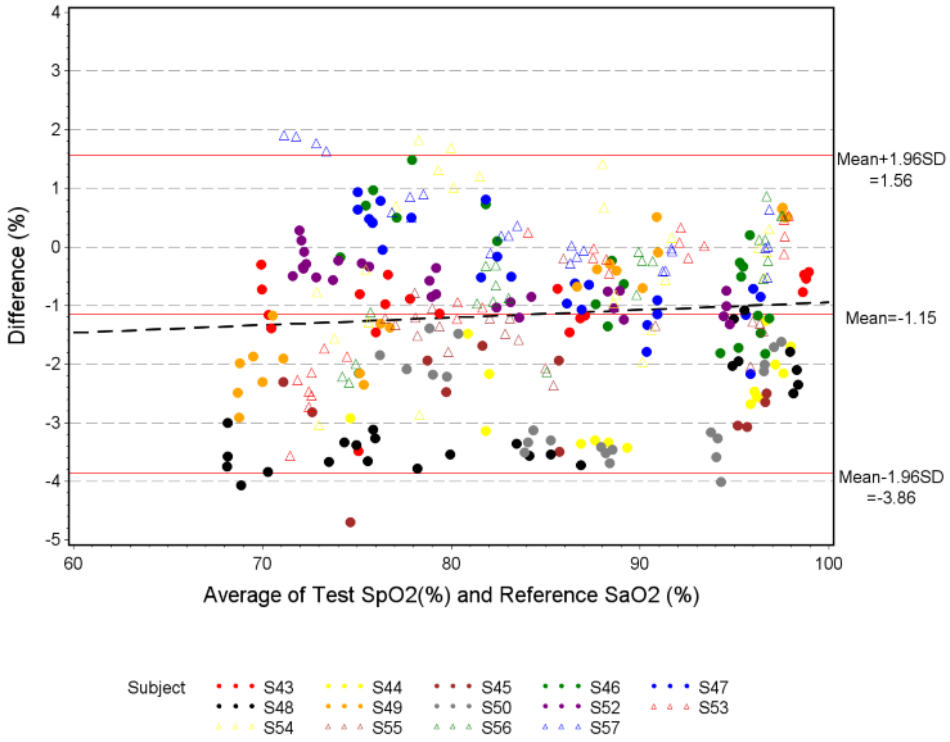


The TS-F-D, TS-F2-GE, TS-F4-GE sensors are reusable sensors. They are not provided sterile.

Table 6 TS-F-D, TS-F2-GE, TS-F4-GE sensor accuracy

Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
2.587	1.895	1.376

Figure 5 Bland-Altman plot for SpO_2 - TS-SA-D, TS-SA4-GE, and TS-SP-D sensors

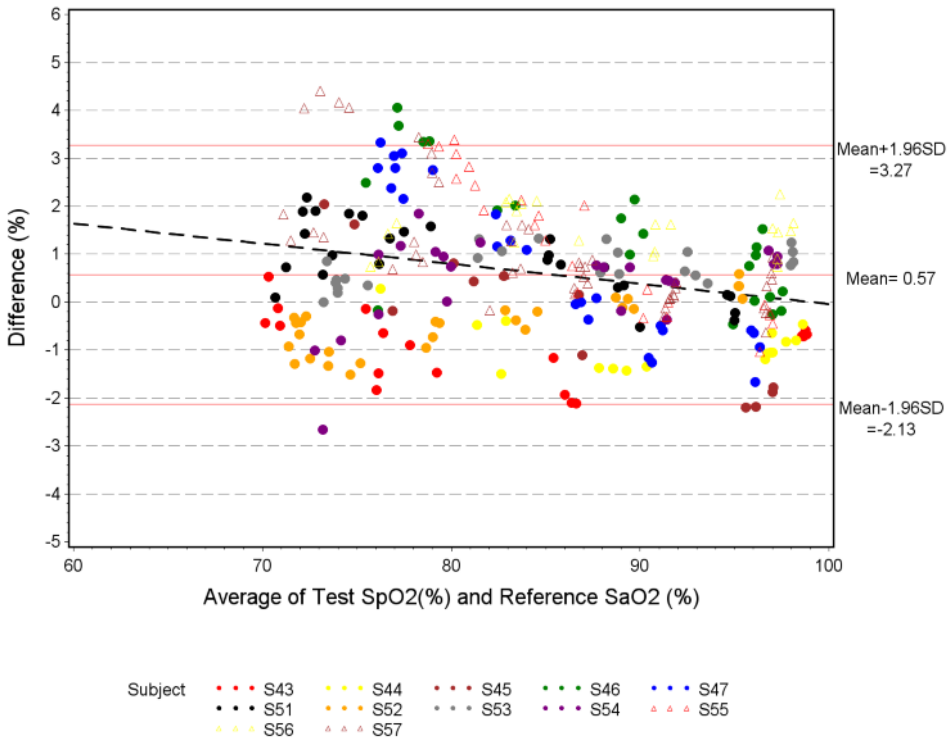


The TS-SA-D, TS-SA4-GE, and TS-SP-D sensors are reusable sensors. They are not provided sterile.

Table 7 TS-SA-D, TS-SA4-GE, and TS-SP-D sensor accuracy

Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
1.874	1.78	1.597

Figure 6 Bland-Altman plot for SpO_2 - TS-AF-10, TS-AF-25 sensors

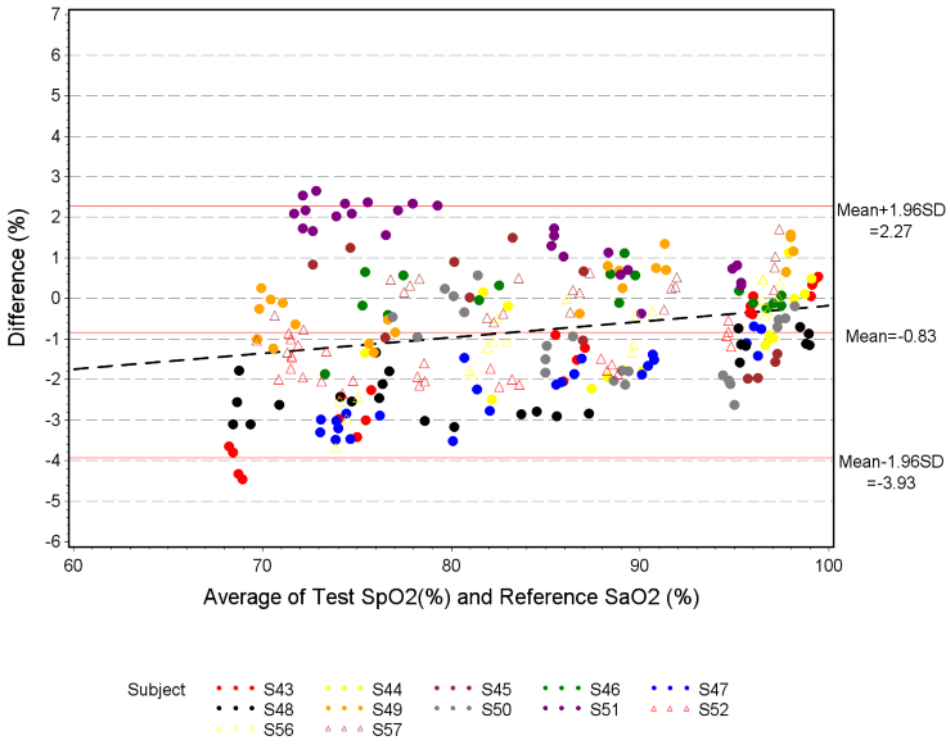


The TS-AF-10, TS-AF-25 sensors are single-patient-use sensors. They are not provided sterile.

Table 8 TS-AF-10, TS-AF-25 sensor accuracy

Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
1.971	1.23	0.898

Figure 7 Bland-Altman plot for SpO_2 - TS-AP-10 and TS-AP-25 sensors

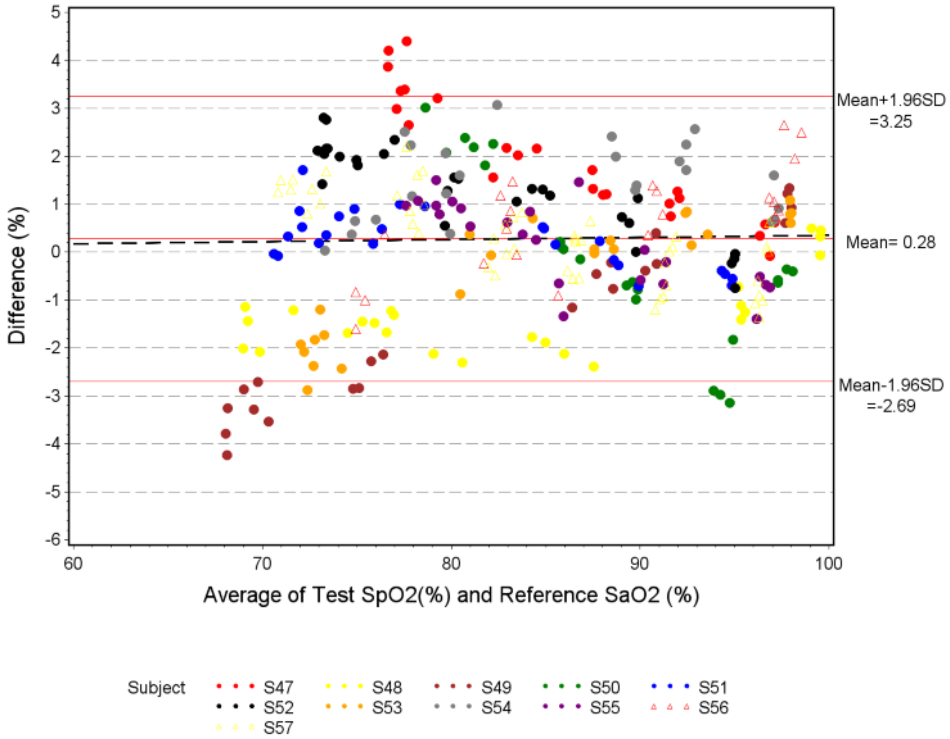


The TS-AP-10 and TS-AP-25 sensors are single-patient-use sensors. They are not provided sterile.

Table 9 TS-AP-10 and TS-AP-25 sensor accuracy

Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
2.342	1.572	1.058

Figure 8 Bland-Altman plot for SpO_2 - TS-AAW-10, TS-AAW-25, TS-PAW-10, and TS-PAW-25 sensors



The TS-AAW-10, TS-AAW-25, TS-PAW-10, and TS-PAW-25 sensors are single-patient-use sensors. They are not provided sterile.

Table 10 TS-AAW-10, TS-AAW-25, TS-PAW-10, and TS-PAW-25 sensor accuracy

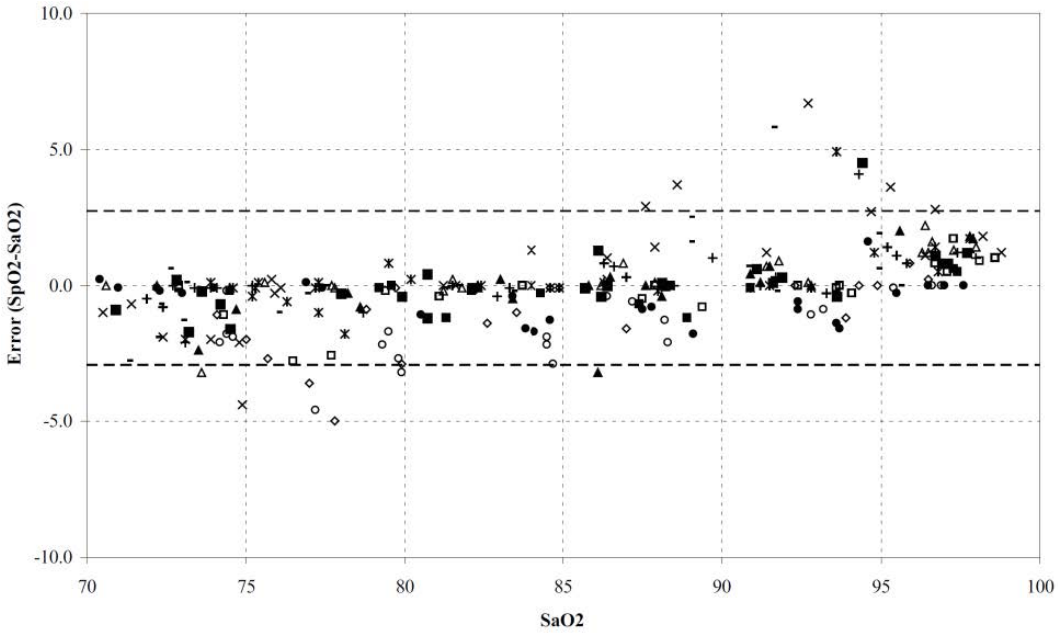
Accuracy 70-80% (ARMS)	Accuracy 80-90% (ARMS)	Accuracy 90-100% (ARMS)
1.945	1.156	1.117

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.

Figure 9 Adtx/Pdtx

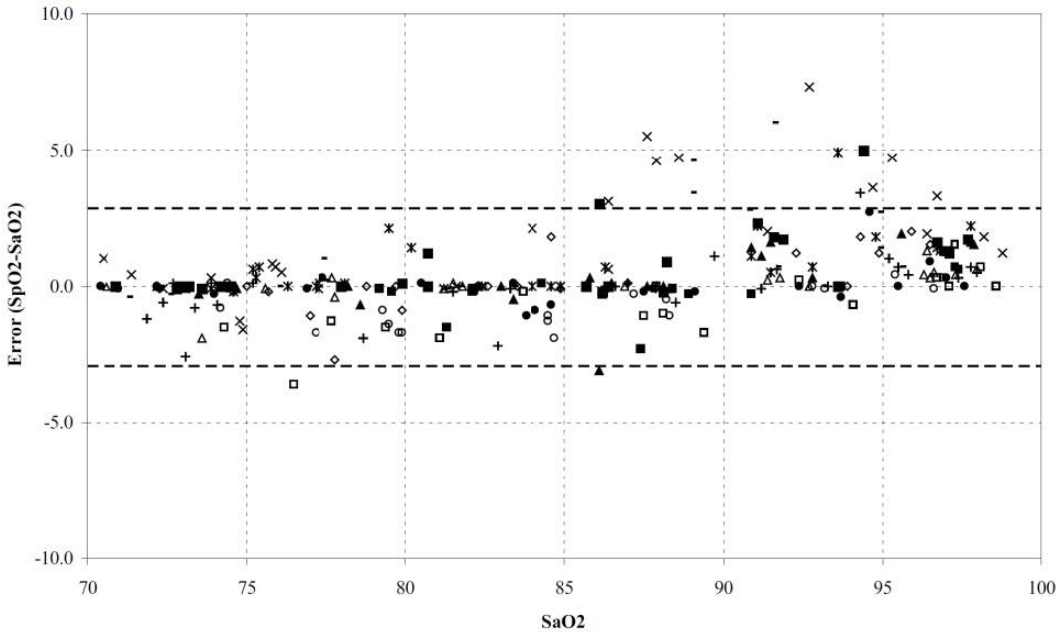


The Adtx/Pdtx are single-patient-use sensors. They are not provided sterile.

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%

Figure 10 Inf/Neo/NeoPt

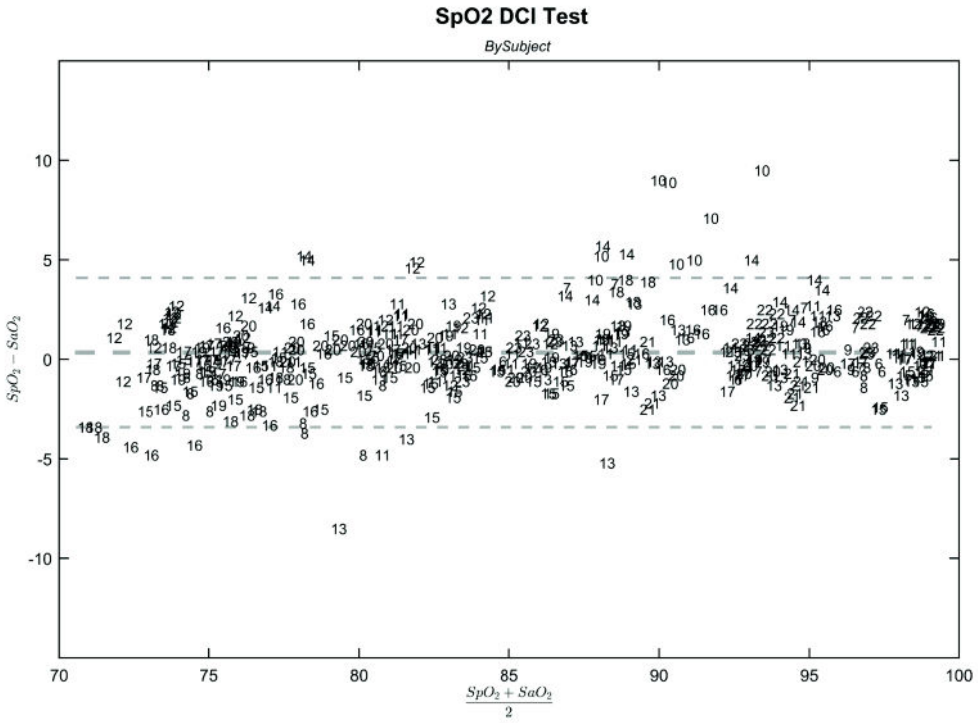


The Inf/Neo/NeoPt sensors are single-patient-use sensors. They are not provided sterile.

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}**		
	Inf	**Neo***	**Neo Pt***
70-100%	± 2%	± 2% Adult ± 3% Neonatal	± 3%
* The saturation accuracy of the Neonate and Preterm sensors was validated on adult volunteers and 1% was added to account for the properties of fetal hemoglobin.			

Figure 11 DCI/DCIP

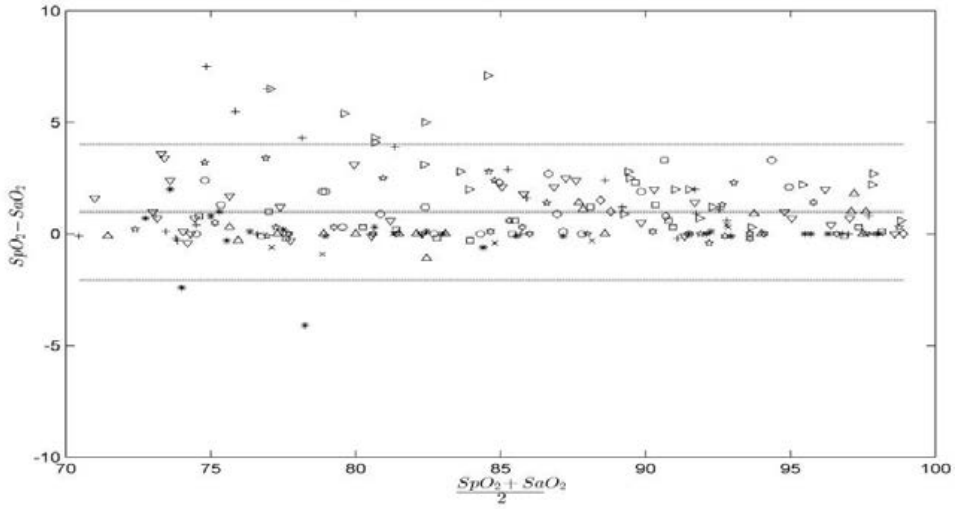


The DCI/DCIP sensors are reusable sensors. They are not provided sterile.

Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.44%
80-90%	2.30%
70-80%	1.84%

Overall claimed accuracy value	
Range	**A_{RMS}**
70-100%	1.90%

Figure 12 TCI



The TCI sensor is a reusable sensor. It is not provided sterile.

Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.05%
80-90%	1.67%
70-80%	2.43%

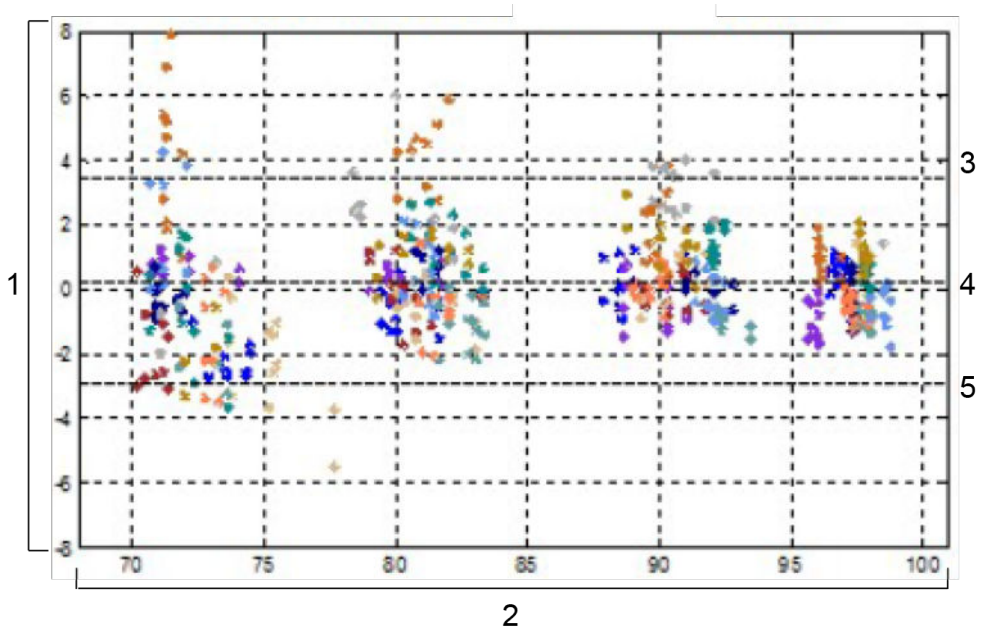
Overall claimed accuracy value	
Range	**A_{RMS}**
70-100%	3.5%

Additional accuracy information for 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.

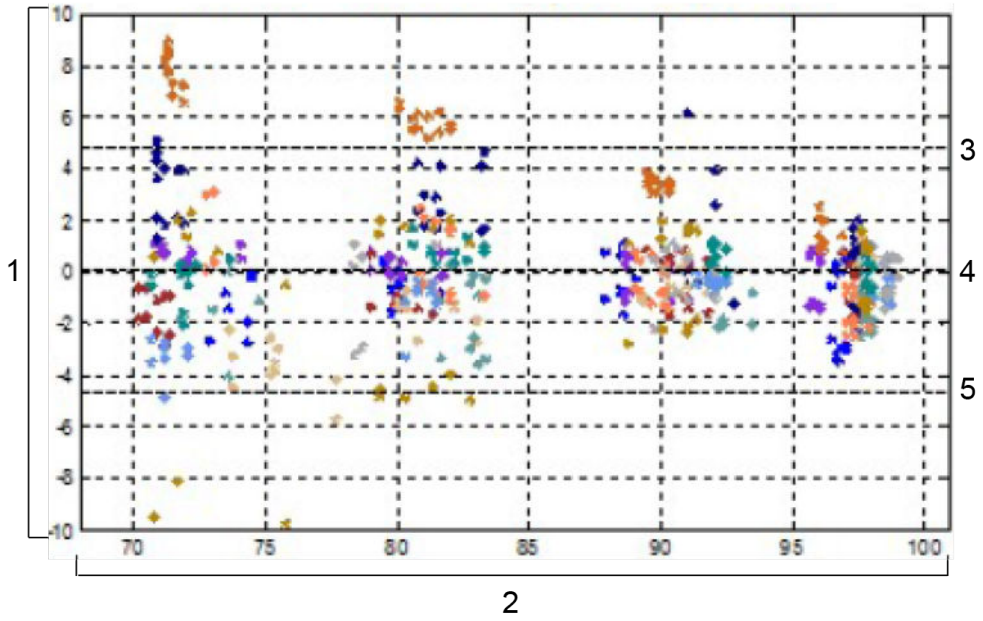
Figure 13 Modified Bland-Altman for SpO_2 - DS-100A Sensor: SaO_2 vs. (SpO_2 - SaO_2)



1.	SpO_2 - SaO_2 (%)	4.	Bias
2.	SaO_2 (%)	5.	Bias - (1.96 x σ (errs))
3.	Bias + (1.96 x σ (errs))		

Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.16%
80-90%	1.67%
70-80%	2.25%

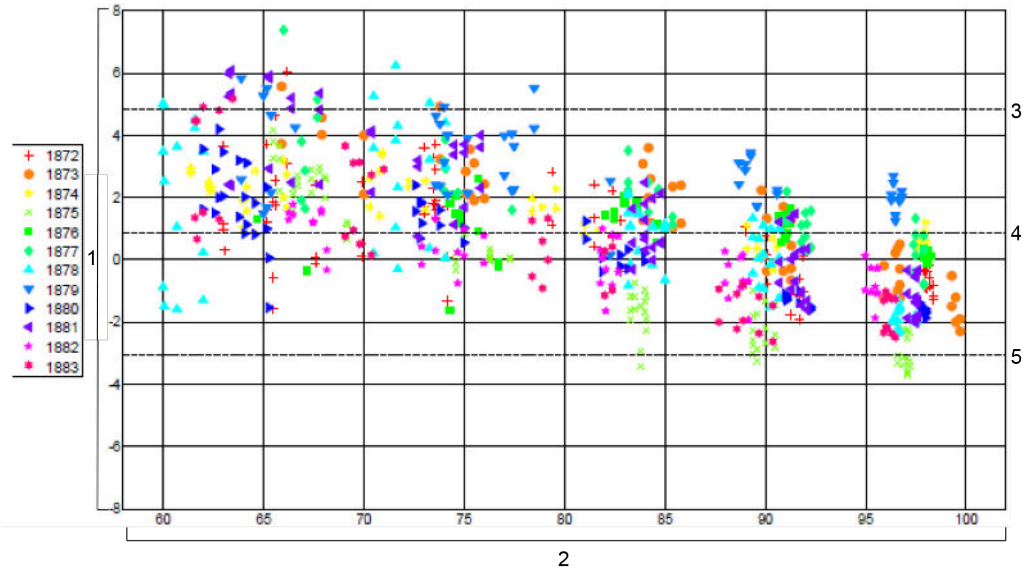
Figure 14 Modified Bland-Altman for SpO_2 - D-YS, D-YSE, D-YSPD, OXI-A/N, OXI-P/I Sensors: SaO_2 vs. (SpO_2 - SaO_2)



1.	SpO_2 - SaO_2 (%)	4.	Bias
2.	SaO_2 (%)	5.	Bias - (1.96 x σ (errs))
3.	Bias + (1.96 x σ (errs))		

Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.38%
80-90%	2.5%
70-80%	3.6%

Figure 15 Modified Bland-Altman for SpO_2 - MAX-A, MAX-AL, MAX-N, MAX-I, MAX-P, MAX-R Sensor: SaO_2 vs. (SpO_2 - SaO_2)



1.	SpO_2 - SaO_2 (%)	4.	Mean Bias
2.	SaO_2 (%)	5.	Lower 95%
3.	Bias + (1.96 x σ (errs))		

Measured A_{RMS} values	
Range	**A_{RMS}**
90-100%	1.49%
80-90%	1.57%
70-80%	2.5%

GE Medical Systems (China) Co., Ltd.
No. 19, Changjiang Road,
Wuxi National Hi-Tech Development Zone,
214028 Jiangsu, P.R. China

EC REP

GE Medical Systems SCS
283 Rue de la Miniere
BUC 78530 France

GE HealthCare

www.gehealthcare.com