ati nt oni tor

p rator s anua

Release time: May 2023

Revision: 9.0

A I G

- **F ra aw A r str i ts t, is vi to sa a, or on t, or r o a p, si i an or ot, r pra ti ti on r i ns a, stat aw to us or or r t, us o t, is vi**

Intellectual Property Statement

SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD. (hereinafter called Mindray) owns the intellectual property rights to this Mindray product and this manual. This manual may refer to information protected by copyright or patents and does not convey any license under the patent rights or copyright of Mindray, or of others.

Mindray intends to maintain the contents of this manual as confidential information. Disclosure of the information in this manual in any manner whatsoever without the written permission of Mindray is strictly forbidden.

Release, amendment, reproduction, distribution, rental, adaptation, translation or any other derivative work of this manual in any manner whatsoever without the written permission of Mindray is strictly forbidden.

mindray is the trademark, registered or otherwise, of Mindray in China and other countries. All other trademarks that appear in this manual are used only for informational or editorial purposes. They are the property of their respective owners.

This posting serves as notice under 35 U.S.C.§287(a) for Mindray patents: http://www.mindrayna.com/patents.

Manufacturer's Responsibility

Contents of this manual are subject to changes without prior notice.

Mindray is responsible for the effects on safety, reliability and performance of this product, only if:

- all installation operations, expansions, changes, modifications and repairs of this product are conducted by Mindray authorized personnel;
- the electrical installation of the relevant room complies with the applicable national and local requirements;
- the product is used in accordance with the instructions for use.

WARNING

- **Only trained professionals should operate this equipment.**
- **It is important for the hospital or organization that owns this equipment to provide adequate maintenance. Failure to do so may result in premature equipment failure and possible patient injury.**

Service

Mindray maintains a network of service representatives and factory-trained distributors. Prior to requesting service, perform a complete operational check of the instrument to verify proper control settings. If operational problems continue to exist, contact Mindray service.

In North America contact the Service Department at (800) 288-2121, ext: 8116 for Technical Support or (201) 995-8000 for assistance in determining the nearest field service location.

Please include the instrument model number, the serial number, and a description of the problem with all requests for service.

Any questions regarding the warranty should be directed to the local sales or service representative.

Co pan Conta t

r a

anua urpos

This manual contains the instructions necessary to operate the product safely and in accordance with its function and intended use. Observance of this manual is a prerequisite for proper product performance and correct operation and ensures patient and operator safety.

This manual is based on the maximum configuration and therefore some contents may not apply to the product. If you have any question, please contact Mindray.

This manual is an integral part of the product. It should always be kept close to the equipment so that it can be obtained conveniently when needed.

Int n Au i n

This manual is geared for clinical professionals who are expected to have a working knowledge of medical procedures, practices and terminology as required for monitoring of patients.

l ustrati ons

All illustrations in this manual serve as examples only. They may not necessarily reflect the setup or data displayed on the patient monitor.

Conv nti ons

- ***It t*** is used in this manual to quote the referenced manuals, chapters, sections and formulas.
- **Bo t** is used to indicate the screen texts and names of hard keys.
- → is used to indicate operational procedures.

Contents

a t

a t In or ation

A I G

- In i at sapot ntia aar orunsa pra ti t ati notavoi ou r sutin at ors rious inur

CA I

- In i at sapot ntia aar orunsa pra ti t ati notavoi ou r sutin inorp rsona inur orpro u tprop rt a a

E

- rovi sappi ationtipsorot rus u inor ationt at o snotinvov pati ntorus rris

arnin s

A I G

- ati ntwit apa a r onv ntri uarpa pati nts piso so ntri uar a ar ia a nota wa s t t Donotr ntir uponts st sauto at arr t ia t tion a orit ppa a rpati ntsun r os surv i an
- is quip ntisus orasin pati ntatati
- oavoi posion a ar s onotus t quip ntint prs n o o n ri at osp rs a a an st tis orot r a a a nts
- Donottou t quip nts ta partsor onn torsw nin onta twit t pati nt ot rwis pati ntinur a r sut
- v r i pati nt tro t p sor ran s Dissi iar tasorot rino pati iti s a aus onsi ra as in ritan a in ras tra r ov r ti at r i ri ation
- or u t a ar o urns urin i r qu n sur i a pro ur nsur t att onitors a san trans u rsn v r o into onta twit t tro sur r unit E
- n utra tro o t tro sur r unit E s a propr onta tt pati nt t rwis urns a r sut
- unsa t ri s onitorsar notint n to us wit int a n ti sonan nviron nt
- B or onn tin t quip nttot ainspow r nsur t att vota an r qu n ratin s o t pow rin ar t sa ast os in i at ont quip nts a orint is anua
- B or puttin t s st intoop rationt op rator ustv ri t att quip nt onn tin a san a ssori sar in orr twor in or ran op ratin on ition
- oavoi ris o tri s o t quip nt ustona onn t to ainspow rwit prot tiv art orop rat on att r pow r
- Donottou t pati ntan iv partssi utan ous t rwis pati ntinur a r sut
- Donottou t pati ntor ta partsin onta twit t pati nt urin i ri ation t rwis s riousinur or at ou r sut
- Donotop nt quip nt ousin s A s rvi in an utur up ra s ust arri out train an aut ori p rsonn

- Do not r usiv ont au i, aar s st orpati nt onitorin urnin t aar vou toa ow v oro a r sutina, aar tot pati nt A was pt pati ntun r os surv i an
- A ar s ttin ss ou , usto i a or in topati ntsituations
- Do notpa t quip ntora ssori sinan positiont at i t aus itto a ont pati nt
- Do not start oropra t quip ntun sst s tupwasv ri i to , orr t
- oavoi ina v rt nt is onn tion rout a a , sinawa topr v ntastu in a ar rap an s ur ss a in tor u ris o ntan nt , pati ntsorp rsonn p sioo i ataan aar ssa s ispa ont quip ntar orr r n on an annot , ir t us or ia nosti int rpr tation quip nts ou not , us ast so asis or i a isions lt ust , us in on un tionwit ini a si nsan s pto l an asur nts squ stiona , irst t pati nts vita si ns , at rnat ansan t n t quip nt orprop r un tionin

Cautions

CA I

- s on partsan a ssori ssp ii int is anua
- Disposa , a ssori sar not si n to , r us us a aus ari s o onta ination an a tt asur nta ura
- Ensur t att quip ntis suppi wit ontinuous tri pow r urin op ration ro t ainspow ror att ri s u npow r aiur a aus ata oss
- n no att r isinsta nsur t att onitoris suppi wit ontinuous tri pow r urin op ration u npow r aiur a a to ata oss
- tor an us t quip ntinsp ii nviron nta on ition onitor an a ssori s a not tt p r or an sp ii ation u toa in stor or us outsi t sp ii t p ratur an u i it ran
- a n ti an tri a i sar apa , o int r rin wit t prop rp r or an o t quip nt For t isr ason a sur t ata t rna vi sop rat int vi init o t quip nt o p wit t r vant E Cr quir nts o , p on s X ra quip nt an l vi sar possi , sour so int r r n ast a it i r v so tro a n ti ra iation
- A wa sinsta or arr t quip nt prop r to avoi a a aus , rops i pa ts stron vi , rations or ot r ani a or s
- Dr t quip nti iat in as o rain or wat r spra
- o s ttin s ar passwor prot t an anon , an , aut ori p rsonn Conta t our part nt ana ror , o i a n in rin part nt or t passwor s us at our a i it
- Do not oop t pati nt a in into ati t oi or wrap aroun t vi ast t is an a a t pati nt a in
- Dispos o t pa a at ria asp rt appi a , wast ontro r uations pit out o i r n s r a ,
- Att n o its s rvi i t quip nt as w asits a ssori s ust , ispos o in o pian wit t ui in s r uatin t isposa o su , pro uts l ou , av an qu stions on rnin isposa o t quip nt p as onta t in ra

ot s

E

- quip nt so twar op ri tis so own , in ra o or ani ation orin ivi ua s a r sort to o i in op in or an in itor to an ot rin rin nt onitin an or or , an ans wit out u p r ission
- utt quip ntina o ation w r it an , asi vi w an op rat
- quip nt us s a ainspu asiso ation ans to t ainspow r Do not o at t quip ntina pa i i uttoa sst ainspu
- Durin nor a us t op rator is p t to a t ront o t quip nt
- ov t att r , or s ippin t onitor ori it wi not , us or an t n p rio o ti
- ov t att r , or transportin t quip nt ori t quip nt wi not , us or a on ti
- so twar was v op in o pian wit IEC
- is anua is as ont ai u oni uration an t r or so ont nts a not app to t pro u t l ou av an qu stion p as onta t in ra
- s rvan o t is anua is a pr r quisit or prop r pro u t p r or an an orr t op ration an nsur spati nt an op rator sa t
- pt is anua int vi init o t quip nt so t atit an , r r n w nn

Equip nt o s

o	D s ription	o	D s ription
	General warning sign		Refer to instruction manual/booklet
	Serial number	REF	Catalogue number
	Date of manufacture		Manufacturer
	USB connector	IPX1	Protected against vertically falling water drops per IEC 60529
	Battery indicator		Computer network
	Equipotentiality		Alternating current
	Defibrillation-proof type CF applied part		Defibrillation-proof type BF applied part

	Description		Description
	Stop USB		Plastic identification symbol
	NIBP start/stop		Calibration
LOT	Batch code		Menu
	Stand-by		Graphical record
	Gas outlet		Gas inlet
	Output		Input/output
	IBP zero key		Pushing prohibited (wheels locked, no pushing)
	Non-ionizing electromagnetic radiation	EC	Authorised representative in the European Community
	Dispose of in accordance to local requirements		
	The presence of this label indicates the machine was certified by ETL with the statement: Conforms to AAMI Std. ES 60601-1, IEC Std. 60601-1-6, IEC Std. 60601-1-8, IEC Std. 60601-2-25, IEC Std. 60601-2-27, IEC Std. 60601-2-34, IEC Std. 80601-2-49, IEC Std. 80601-2-30, ISO Std. 80601-2-55, ISO Std. 80601-2-56, ISO Std. 80601-2-61 Certified to CSA Std. C22.2 NO. 60601-1, NO. 60601-1-6, NO. 60601-1-8, NO. 60601-2-25, NO. 60601-2-27, NO. 60601-2-34, IEC Std. 80601-2-49, NO. 80601-2-30, NO. 80601-2-55, NO. 80601-2-56, NO. 80601-2-61		

Equip nt Intro u tion

In i ations or s

The ePM 10M/ePM 12M patient monitors are intended for monitoring, displaying, reviewing, storing, alarming, and transferring of multiple physiological parameters including ECG (3-lead, 5-lead, 6-lead or 12-lead selectable, Arrhythmia Detection, ST Segment Analysis, QT Analysis, and Heart Rate (HR)), Respiration Rate (Resp), Temperature (Temp), Pulse Oxygen Saturation (SpO_2), Pulse Rate (PR), Non-invasive Blood Pressure (NIBP), Invasive Blood Pressure (IBP), Pulmonary Artery Wedge Pressure (PAWP), Cardiac Output (C.O.), Carbon Dioxide (CO_2), Oxygen (O_2), Anesthetic Gas (AG). The system also provides an interpretation of resting 12-lead ECG.

All the parameters can be monitored on single adult, pediatric, and neonatal patients except for the following:

- The PAWP monitoring is intended for adult and pediatric patients only.
- C.O. monitoring is intended for adult patients only.

The monitors are to be used in healthcare facilities by clinical professionals or under their guidance. They should only be used by persons who have received adequate training in their use. The ePM 10M/ePM 12M monitors are not intended for helicopter transport, hospital ambulance, or home use.

E

- **is anua is as ont ai u oni uration an t r or so ont nts a not app to t pro u t l ou av an qu stion p as onta t in ra**

Appi arts

The applied parts of the monitor are:

- ECG electrode and leadwire
- SpO_2 sensor
- Temp probe
- NIBP cuff
- IBP transducer
- C.O. sensor
- CO_2 sampling line/nasal sampling cannula, water trap, and mask
- AG sampling line, water trap, airway adapter, and mask

st Co pon nts

The monitor consists of the main unit, display, external modules, input devices, and output devices.

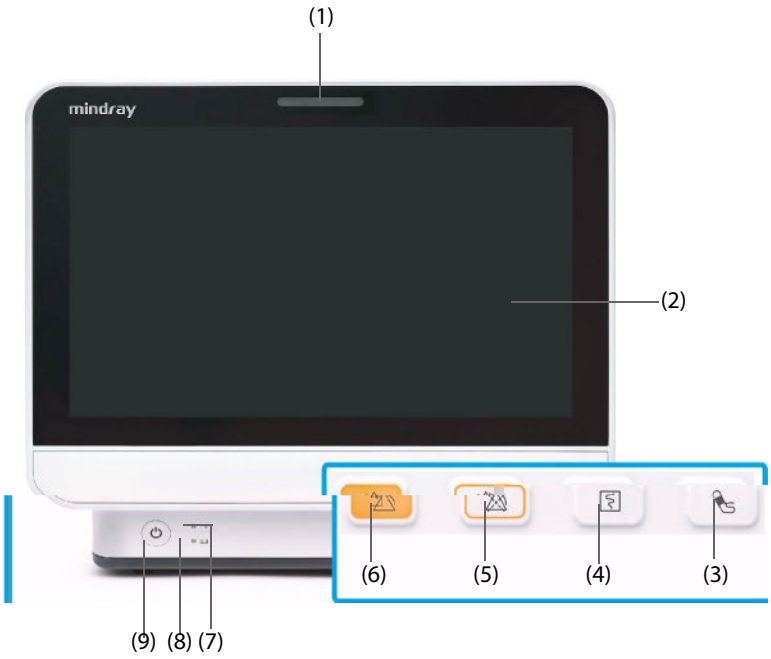
E

- **onitor a notin u a t s o pon nts Conta t t o a s rvi p rsonn or avai a o pon nts**

ain nit

The main unit processes data from modules and sends information to displays and, optionally, among networked devices.

Front i w



(1) Alarm lamp

When a physiological alarm or technical alarm occurs, this lamp lights and flashes corresponding with the alarm priority:

- High priority alarms: the lamp quickly flashes red.
- Medium priority alarms: the lamp slowly flashes yellow.
- Low priority alarms: the lamp lights in cyan without flashing.

(2) Display

(3) NIBP Start/Stop hard key: starts an NIBP measurement or stops the current NIBP measurement.

(4) Record Start/Stop hard key: starts a recording or stops the current recording.

(5) Alarm Pause hard key: pauses the physiological alarm system.

(6) Alarm Reset hard key: resets the alarm system.

(7) AC Power indicator

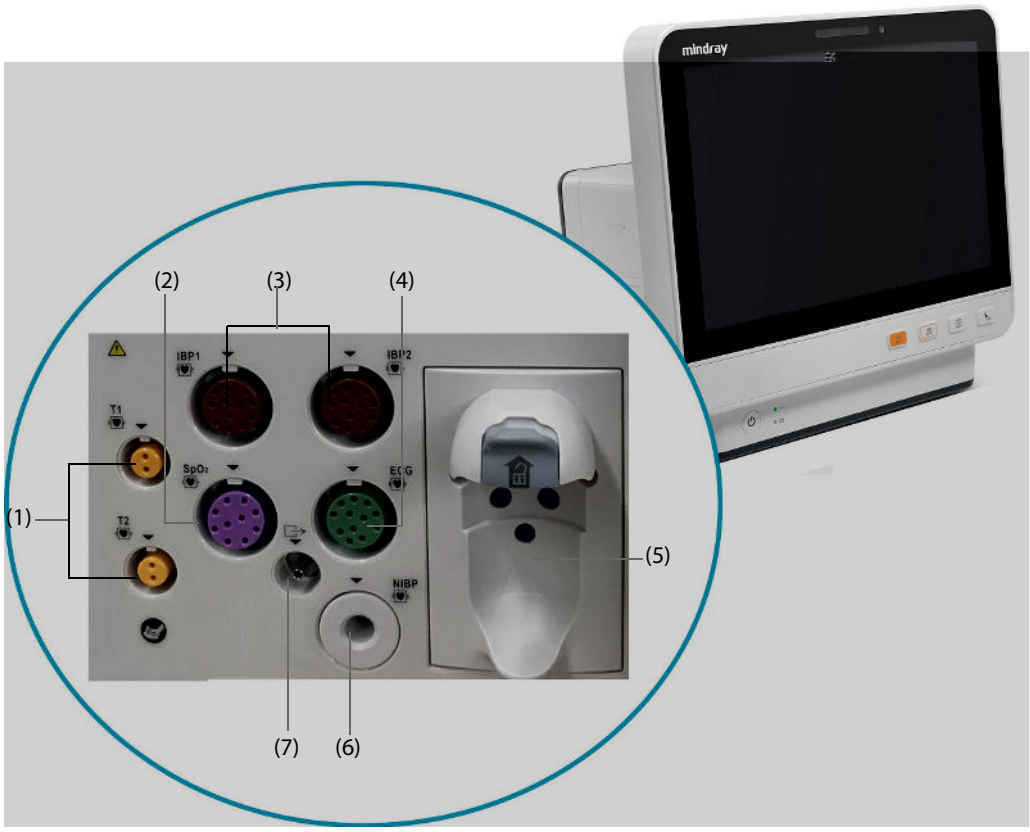
- On: when the AC power is connected.
- Off: when the AC power is not connected.

(8) Battery indicator

- Yellow: the battery is being charged.
- Green: the battery is fully charged.
- Flashing green: the monitor operates on battery power.
- Off: no battery is installed, or the battery is malfunctioning, or the monitor is powered off and no power is connected.

(9) Power switch

- Pressing this switch turns on the monitor.
- When the monitor is on, pressing and holding this switch turns off the monitor.



(1) Temperature probe connector

(2) SpO_2 probe connector

(3) IBP cable connector

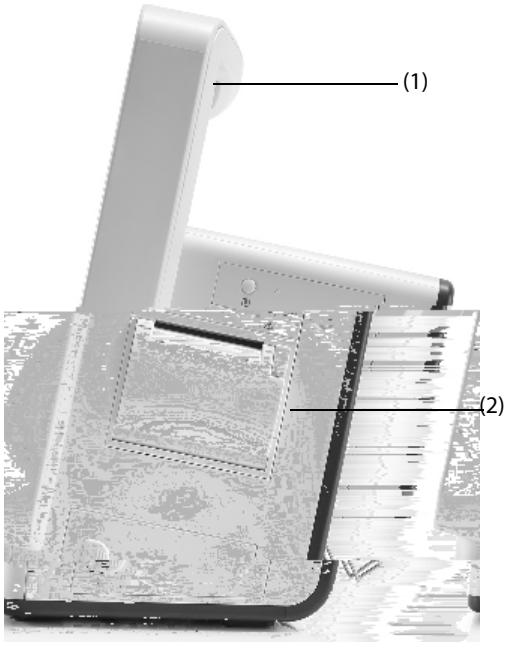
(4) ECG cable connector

(5) CO_2 watertrap seat

(6) NIBP cuff connector

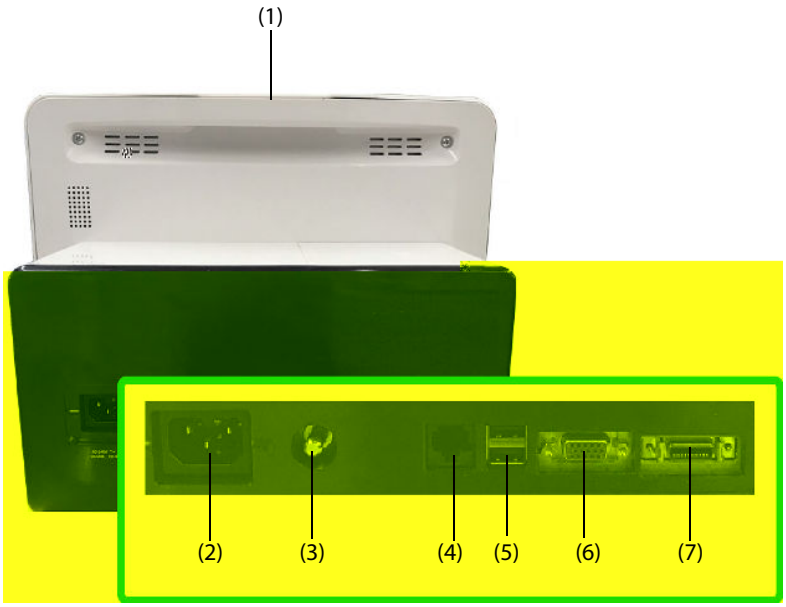
(7) Gas outlet

i t i w



(1) Handle (2) Recorder

ar i w



(1) Alarm lamp

When a physiological alarm or technical alarm occurs, this lamp lights and flashes corresponding with the alarm priority:

- High priority alarms: the lamp quickly flashes red.
- Medium priority alarms: the lamp slowly flashes yellow.
- Low priority alarms: the lamp lights in cyan without flashing.

(2) AC Power input

(3) Equipotential Grounding Terminal

When using the monitor together with other devices, connect their equipotential grounding terminals together to eliminate the potential difference between them.

(4) Network Connector

It is a standard RJ45 connector which connects the monitor to the central monitoring system (CMS) or other network devices.

(5) USB connectors

Connect approved USB devices, for example the barcode reader.

(6) VGA connector

Connects a mirrored external display.

(7) Multifunctional connector

Outputs analog ECG, IBP and defibrillator synchronization signals, also provides RS232 communication for interfacing with external devices, DIAP, etc..

Б t rna o u s

The external modules are used to monitor the patient's physiological parameters, and record patient information and data, and connect external devices. The monitor provides the following modules:

- Parameter modules: acquires and processes the patient's data and sends the data to the main unit. For details, see the relevant parameter chapters.

Avai a , o u s

Refer to *28.9 External Modules* for available modules.

The monitor can simultaneously use maximum of two IBP modules (besides the built-in IBP modules). The other modules can only be used one at a time. Otherwise, the monitor will issue a module conflict prompt.

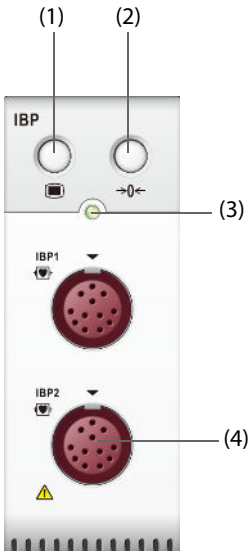
For example, if a CO_2 module is already loaded and then another CO_2 module is inserted, the monitor will then prompt module conflict. To solve the problem of module conflict, just remove one of the modules.

Б a p o u

The parameter modules have similar structure:

- The parameter label is marked at the upper left corner.
- Hard keys are located on the upper part.
- Patient cable connectors are located at the lower part.

Take the IBP module as an example:



(1) IBP dialog hard key: enters or exits the IBP dialog.

(2) Zero IBP hard key: enters the **Z ro IB** dialog.

(3) Module status indicator

- On: the module works properly.
- Flashing: the module is initializing.
- Off: the module is not connected or the module fails.

(4) IBP cable connectors

Input D vi s

The monitor allows data entry through touchscreen, remote controller, hard key, and barcode reader.

Only Mindray specified input devices should be used.

ri nti n D vi s

The monitor can use Mindray specified printer and/or recorder to output patient information and data.

The monitor is configured with a built-in recorder.

The printer can be connected to the monitor through the network to output patient reports.

G tti n tart

Equip nt r parati on a t In or ati on

A I G

- s on insta ation a ssori s sp i i , in ra
-

onitor Insta ation

The monitor can be installed in various ways as required.

- Wall mount
- Placed on desk
- Trolley tray
- Bedrail clamp
- Bedrail hook

npa in an C in

Before unpacking, examine the packaging carefully for signs of damage. If any damage is detected, contact the carrier, distributor, or Mindray.

If the packing case is intact, open the package and remove the equipment and accessories carefully. Check all materials against the packing list and check for any mechanical damage. Contact Mindray in case of any problems.

Environ nta quir nts

The operating environment of the equipment must meet the requirements specified in this manual.

The environment where the equipment is used shall be reasonably free from noises, vibration, dust, corrosive, flammable and explosive substances. Moreover, to maintain good ventilation, the equipment shall be at least 2 inches (5cm) away from the walls of the cabinet.

When the equipment is moved from one place to another, condensation may occur as a result of temperature or humidity difference. In this case, never start the system before the condensation evaporates.

ttin pt Equip nt

Observance of this manual is a prerequisite for proper product performance and correct operation. It ensures patient and operator safety.

Conn tin t AC ains

The monitor is powered by an AC power supply. Before connecting the equipment to the AC mains, check that the voltage and frequency ratings of the power line are the same as those indicated beside the AC power input.

To use the AC power source, follow this procedure:

1. Connect the female end of the power cord with the AC power input.
2. Connect the male end of the power cord with a wall AC outlet.
3. Check that the AC indicator is on.

The AC indicator is off if the AC mains is not connected. When AC mains is connected, the AC indicator is illuminated in green.

A I G

- **p rat t quip nt on att r pow ri t int rit o t prot tiv art on u tor or t prot tiv art in s st int insta ation is in ou t**

CA I

- **A wa s us t a o pan in pow r or iv r wit t onitor**
- **B or onn tin t quip nt to t AC ains nsur t att vo ta an r qu n ratin so**

E

- **s t a r tain rtos ur t pow r or topr v ntit ro a in o**

Conn tin t Input D vi s

Connect the barcode reader to the USB ports if necessary.

Conn tin t ara t r o u

ovin t ara t r o u

To remove the parameter module, follow this procedure:

1. Pull outwards the lock at the bottom of the module to unlock the module.
2. Lift the latches at the bottom of the module to release it and slide the module out of the module rack. Hold on the module to make sure it does not drop when it comes out.

CA I

- **nr ovin t o u a ar u not to ropit A wa s support t o u wit on an w i pu in out wit t ot r**

---

urnin on t onitor

Before beginning measurements, turn on the monitor. Perform the following inspections:

1. Check the monitor and modules for any mechanical damage. Make sure that all external cables, plug-ins and accessories are properly connected.
2. Connect the power cord to the AC power source.

Pressing the power switch turns on the monitor. When the monitor is turned on, the alarms are paused for two minutes. Then the alarm system is activated.

CA I

- **C t at visua an au itor a ar si na s ar pr s nt orr t w n t quip nt is pow r on**
-

◆ To discharge a patient, swipe from top to bottom.

o in t ou s r n

To avoid accidental use, you can temporarily disable the touchscreen by holding and pressing the **ai n nu** quick key and sliding as directed by the arrow. A padlock symbol displays at the top of the main menu quick key if the touchscreen is disabled.

The touchscreen lock period is configurable. To do so, follow this procedure:

1. Access **Di sp a** in either of the following ways:
   - ◆ Select the **r n tup** quick key → select the **Di sp a** tab.
   - ◆ Select the **ai n nu** quick key → from the **Di sp a** column select **Di sp a** .
2. Set **r n o Durati on**.

The touchscreen is enabled when the preset time is reached. To manually enable the touchsceen, hold and press the **ai n nu** quick key and slide as directed by the arrow.

CA I

- **Ç t at t tou s r n is not a a ro n or oos l t r is an si n o a a stop usi n t oni tor an onta t t s rvi p rsonn**

---

si n t n r n oar

The on-screen keyboard enables information entry:

- Enter the information by selecting one character after another.
- Select the Backspace key to delete single characters or select to delete the entire entry.
- Select the Caps Lock key to access uppercase letters.
- Select the Enter key to confirm the entry and close the on-screen keyboard.

If a conventional keyboard is connected to the monitor, you can use it instead of, or in combination with, the on-screen keyboard.

si n t Bar o a r

The monitor supports both a linear (1D) barcode reader and two-dimensional (2D) barcode reader. The barcode reader is connected to the monitor's USB connector.

E

- **in ra usto ar o r a r ans an ot D an D ar o s t r ar o r a rs an on output t pati nt s i a r or nu a r an vi si t nu a r**

C ari n Data For ats or t in ra Custo D Bar o a r

If you are using the Mindray custom 2D barcode reader (Model HS-1R or HS-1M), before using it for the first time, clear old data formats and configure the barcode reader. To do so, follow this procedure:

1. Scan the engineering barcode to clear the previous data format.
2. Scan the 2D engineering barcode which contains the hospital's data format.

E

- **Conta t t s ann r anu a tur r or in ra to o tai n t ar o s or ari n ata or ats an pro ra in t ospi ta s ata or at**

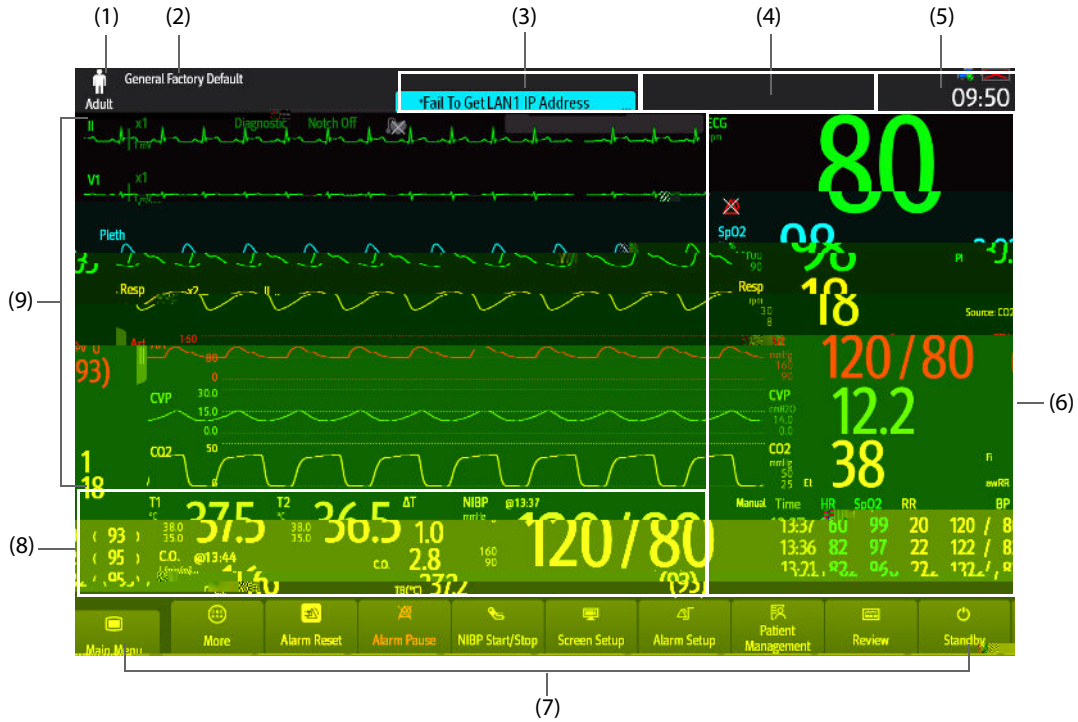
---

sin t ot Contro r

The remote controller can control the monitor by connecting the receiver of the remote controller to the monitor's USB connector. For more information on how to use the remote controller, see the Instructions for Use delivered with the remote controller.

r n Disp a

The following figure shows the normal screen:



(1) Patient information area: displays patient information, including patient category, gender, department, room number, bed number, and so on. The displayed patient information is configurable. Selecting this area enters the **ati nt ana nt** dialog. For more information, see *5.2.1 Entering the Patient Management Dialog*.

(2) The current configuration: displays the name of the configuration that can be loaded from the main menu.

(3) Technical alarm information area: displays prompt messages at the top; displays technical alarm messages at the bottom.

(4) Physiological alarm information area: displays high priority physiological alarms at the top; displays medium and low priority physiological alarms at the bottom.

(5) System status information area: displays alarm symbol, battery status, network status, currently connected CMS, storage device status, and system time. For more information, see *3.6.1 On-screen Symbols*.

(6) Parameter numerics area: displays parameter values, alarm limits, and alarm status. This area can also display the parameter list. For more information, see *3.9.3 Displaying the Parameter List*. Selecting a parameter numeric area enters the corresponding parameter dialog. Selecting the parameter list enters Tabular Trends review.

(7) Quick key area: displays quick keys.

(8) Parameter numeric/waveform area: unique area of the screen that can be configured to display either parameter numerics or parameter waveforms. Depending on the configuration, the tiles take on the characteristics of either area (6) or area (9).

(9) Parameter waveform area: displays parameter waveforms, measurement ranges, and magnifications. Selecting a waveform enters the corresponding parameter dialog.

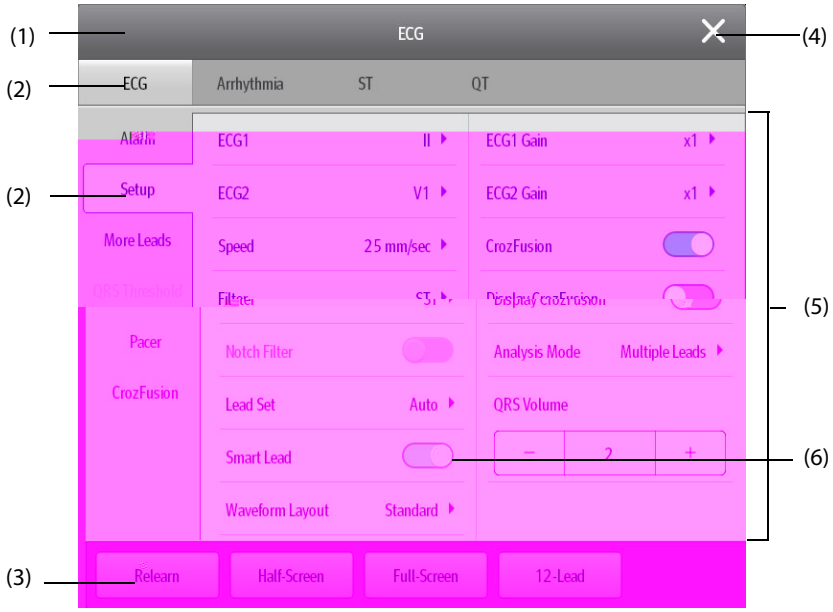
n s r n o s

The following table lists the on-screen symbols displayed on the system status information area:

o	D s ri pti on	o	D s ri pti on
	Adult, male		Adult, female
	Pediatric, male		Pediatric, female
	Neonate, male		Neonate, female
	All the alarms are paused.		Individual physiological alarms are turned off or the monitor is in the alarm off status.
	Audible alarm tones are paused.		Audible alarm tones are turned off.
	The alarm system is reset.		The battery is working correctly. The green portion represents the remaining charge.
	The battery has low power and needs to be charged.		The battery has critically low charge and needs to be charged immediately. Otherwise, the monitor will soon automatically shut down soon.
	The battery is being charged.		No battery is installed.
	Wired network is connected.		Wired network is not connected.
	Wireless network is connected. The solid part indicates network signal strength.		Wireless network is not connected.
	Wireless network is disabled.		

Dialogs

All dialogs have similar style and structure, see the figure below:



(1) Dialog heading

(2) Tabs

(3) Operation buttons

(4) Exit button: closes the current dialog.

(5) Main body area: includes dialog items and options.

(6) Switch:

- Green: the switch is on.
- Gray: the switch is off.

Quick Keys

The monitor provides quick keys for you to quick access to some functions. The quick key area is located at the bottom of the screen. The **Main Menu** key is permanently located the right, and the **Monitor** key is permanently located at the left. Selecting the **Monitor** quick key shows more quick keys. The quick keys displayed on the screen are configurable.

Available Quick Keys

The following table shows available quick keys.

Icon	Name	Function	Icon	Name	Function
	Main Menu	Enters the main menu.		More	Shows more quick keys.
	Alarm Setup	Enters the **Alarm Setup** dialog.		Alarm Reset	Resets the alarm system.
	Alarm Pause	Pauses the physiological alarm system (Availability depends on configuration of **Pause** in **Maintenance** → **Alarm** → **Pause** in **System** dialog).		Audio Pause	Pauses alarm tone (Availability depends on configuration of **Pause** in **Maintenance** → **Alarm** → **Pause** in **System** dialog).
	Review	Enters the **View** dialog to review historical data.		Standby	Enters the standby mode.
	Patient Management	Enters the **Patient Management**			

	ECG Lead/Gain	Enters the **ECG** a **Gain** dialog.		Night Mode	Enters the night mode.
	Volume	Enters the **ou** dialog.		Freeze	Freezes waveforms.
	Calculations	Enters the **Ca u ations** dialog.		Load Config	Enters the **oa Con i** dialog.
	Print	Starts printing a real-time report.		Record	Starts/Stops a recording.
	End Case Report	Prints the selected end case reports.		GCS	Enters the **GC** dialog.
	Discharge Patient	Enters the **Dis ar ati nt** dialog to discharge the patient and restore pre-configured default settings.		Discharged Patients	Enters the **Dis ar ati nts** dialog and displays previously discharged patients.
	ECG Full-Screen	Opens the ECG full screen.		OxyCRG	Opens the **C G** screen.
	Privacy Mode	Enters Privacy mode.		ECG 24h Sum	Views the 24-hour ECG summary.
	EWS	Opens the **E** screen.		Targeted Goal	Opens the Targeted Goal screen.

Con i urin t Disp a ui s

To select the quick keys for display, follow this procedure:

1. Access **ui s** in either of the following ways:
   - Select the **r n tup** quick key → the **t ui s** tab.
   - Select the **ain nu** quick key → from the **Disp a** column select **ui s**.
2. Select the **Curr nt** tab to configure the quick keys for display on the screen: From the top of this page, select a block location to show a certain quick key, and then select the quick key from the quick key list. For example, to show the **r n tup** quick key at the first block, select the first block, and then select **r n tup** from the list.
3. Select the **or** tab to configure the quick keys for display when the **or** quick key is selected.

p rati n o s

The monitor provides different operating modes.

oni torin o

The monitoring mode is the most frequently used clinical mode for patient monitoring. When the monitor is turned on, it automatically enters the monitoring mode.

Privacy

The privacy mode is a special clinical monitoring mode. In the privacy mode, the monitor does not display patient information and monitoring data. This provides controlled access to patient data and ensures confidentiality.

The privacy mode is only available when the patient admitted by the monitor is also monitored by the CMS. The monitor continues monitoring the patient, but patient data is only visible at the CMS.

Entering Privacy

To enter the privacy mode, choose either of the following ways:

- Select the **Privacy** quick key → select .
- Select the **Main Menu** quick key → from the **Display** column select **Privacy** → select .

The monitor has the following features after entering the privacy mode:

- The screen turns blank.
- Except for the low battery alarm, the monitor inactivates alarm tones and alarm lights for all other alarms.
- The monitor suppresses all system sounds, including heart beat tone, pulse tone, and prompt tone.

WARNING

- **In the privacy mode, alarm sound suppression and alarm light deactivation affect monitor alarm presentation. Pay attention to potential risks.**

NOTE

- **The privacy mode is not available if the patient is not admitted.**
- **You cannot enter the privacy mode if no alarm is active.**

Exiting Privacy

The monitor automatically exit the privacy mode in any of the following situations:

- The monitor disconnects from the CMS.
- The low battery alarm occurs.

You can also operate the touchscreen, mouse, or keyboard to manually exit the privacy mode.

Night Mode

The night mode is a special clinical monitoring mode. To avoid disturbing the patient, you can use the night mode.

You can disable the night mode feature. This is password protected. For more information, see **Disable Night Mode** in *24.3.9.4 Setting the Night Mode Switch*.

Entering Night Mode

Select the **Night Mode** quick key to enter the night mode. You can also follow this procedure to enter the night mode:

1. Access night mode setup in either of the following ways:
   - Select the **Main Menu** quick key → from the **Display** column select **Night Mode** .
   - Select the **Alarm Setup** quick key → select the **Night Mode** tab.
2. Change the night mode settings if necessary.
3. Select **Enter Night Mode** .

CA I

- ri t ni t o s ttin s , or nt rin t ni t o a att ntion to pot nti a ris in

E

- I our onitoris onn t tot C it auto ati a itst ni t o i t onn tion to t C isint rrupt
- onitorr v rts to t pr viouss ttin s a t r itin t ni t o

tan o

You can temperately stop patient monitoring without switching off the monitor by entering the standby mode.

Ent rin t tan o

1. Select the **tan** quick key, or select the **ain nu** quick key → from the **ati nt ana nt** column select **tan** .
2. Define where the patient is by selecting a location in the drop down list when the monitor enters the standby mode.
3. Select .

The monitor behaves as follows after entering the standby mode:

- Stops all parameter measurements.
- Disables all the alarms and prompt messages, except for the battery low alarm.
- Turns screen brightness to the dimmest after entering the standby mode for 30 seconds.

A I G

- a att ntion to t pot nti a ris o p ain t onitor to stan lnt stan o t onitor stops a para t r asur nts an isa a t aar in i ations pt ort att r ow a ar

C an in t ati nt o ation at tan

To change the patient's location, select patient location from the Standby screen.

Exitin t tan o

To exit the standby mode, choose any of the following ways:

- Select **su onitor** to exit the standby mode and resume monitoring the current patient.
- Select **Dis ar ati nt** to discharge the current patient.

If the monitor automatically enters the standby mode after a patient is discharged, choose any of the following ways to exit the standby mode:

- Select **onitor** to exit the standby mode and admit a new patient.
- Select **ati nt ana nt** to enter the patient information for preparing to admit a new patient.

When the monitor exits the standby mode and resumes monitoring, the alarms are paused for two minutes,

Setting the System Date and Time

To set the system time, follow this procedure:

1. Select the **Main Menu** quick key → from the **Basic** column select **Time**.
2. Set **Date** and **Time**.
3. Set **Date Format**.
4. If you want to use the 12-hour mode, switch off **24 Hour Time**.
5. If you want to use daylight savings time, switch on **Daylight Saving Time**. You can manually switch on or off daylight saving time only when the auto daylight savings time function is disabled. For more information, see *24.8.2 Enabling Auto Daylight Savings Time* for details.

If the monitor is connected to a central monitoring system (CMS) or hospital clinical system (HIS), the date and time are automatically taken from the CMS. In this case, you cannot change the date and time on the monitor.

CAUTION

- **Changing the date and time may affect storage of trends and events and review of stored data.**

Adjusting the Screen Brightness

To adjust the screen brightness, follow this procedure:

1. Access **Display** in either of the following ways:
   - Select the **Screen Setup** quick key → select the **Display** tab.
   - Select the **Main Menu** quick key → from the **Display** column select **Display**.
2. Set **Brightness**. If **Brightness** is set to **Auto**, the monitor automatically adjusts the screen brightness according to the ambient light.

NOTE

- **Screen brightness automatically changes when switching between Brightness settings to Auto.**

Adjusting Volume

- Set **Alarm Volume** in either of the following ways:
  - Select the **Volume** quick key.
  - Select the **Main Menu** quick key → from the **Alarm** column select **Setup**.
- Set **Prompt Volume** by selecting the **Main Menu** quick key → from the **Alarm** column select **Setup**.
- Set **Key Volume** in any of the following ways:
  - Select the **Volume** quick key.
  - From the ECG dialog select **Setup**.
  - From the SpO_2 dialog select **Setup**.
- Select the **Volume** quick key to set **Volume**.

General Operation

This section describes the operations that are generally used when monitoring a patient.

Switching Parameter Modules

You can manually switch on or off a parameter when its module is connected. If setting parameter switches is not password protected, follow this procedure to set parameter switches:

1. Access **Parameter Configuration** in either of the following ways:
   - Select the **Screen Setup** quick key → select the **Parameter Configuration** tab.
   - Select the **Main Menu** quick key → from the **Parameters** column select **Parameter Configuration**.

2. Switch on or off the desired parameters.

When a parameter is switched off, the monitor stops data acquisition and alarming for this measurement.

E

- **n a para t ris anua swit o ou annot onitor t is para t r v ni t orr spon in para t r o u ispu in an r at a sson i so t is para t rar onn t**

E

- **on s r n ui is not ava a , or spiration t p ratur an C onitorin**

C an in asur nt Co ors

You can set the color of measurement values and waveforms for each parameter. To do so, follow this procedure:

1. Select **ain nu** quick key → from the **ara t rs** column select **ara t r Co or**.
2. Select the **Curr nt** tab and set the colors of the currently monitoring measurement values and waveforms.
3. Select the **A** tab and set the colors of measurement values and waveforms for all parameters.

Initiatin a anua Ev nt

To save a manual event, follow this procedure:

1. Select the **anua Ev nt** quick key to enter the **anua Ev nt** menu.
2. Select a name for this event, for example **Intu at** , or input a name.
3. Select .

To edit the name of preset event names, select to enter the **anua Ev nt tup** menu.

Selecting or editing manual event name functionality is available only if the **anua Ev nt E it** switch is turned on. For more information, see *24.14.3 Setting the Manual Event Edit Switch*.

You can review the manual events. For more information, see *17.2.7 Events Review Page*.

Fr in av or s

During patient monitoring, the freeze feature allows you to freeze the currently displayed waveforms on the screen so that you can have a close examination of the patient's status. Additionally, you can select any frozen waveform for recording.

Fr in av or s

To freeze waveforms, select the **Fr** quick key. Except waveforms of the following screens, all displayed waveforms stop refreshing and scrolling after you select the **Fr** quick key:

- **initr n s** screen
- **C G** screen
- **ot i w** screen
- **E** screen

i win Fro n av or s

To view the frozen waveforms, follow this procedure:

- Select the or button in the **Fr** screen.
- Slide the frozen waveform leftward or rightward.

At the lower right corner of the bottom-most waveform displays the freeze time. The initial frozen time is **s**. With the waveforms scrolling, the freeze time changes at an interval of 1 second. For example, **s** means two seconds before the frozen time. This change will be applied for all waveforms on the screen.

E

- **You an vi w t ro n wav or so up to s on s**

n r in av or s

To unfreeze the frozen waveforms, select the button at the upper right corner of the **Fr** screen.

rintin Fro n av or s

To print the frozen waveforms, select the button at the upper left corner of the **Fr** screen.

Capturin t r n

The monitor provides the function of screen capture. To capture the current screen display, follow this procedure:

1. Connect the USB drive to the monitor's USB connector.
2. Press and hold the **or** quick key. Wait until it turns from blue to grey.

The screen capture function is disabled default. If you need this function, contact the service personnel.

Conn tin t C

You can connect the monitor to the BeneVision CMS through wired LAN or wireless LAN. When connected to the CMS, the system provides the following function.

- The monitor can transmit parameter values, waveforms, alarms, and events to the CMS. From the CMS, you can check the patient's monitoring data and alarms.
- The monitor can transmit parameter values and alarms from the connected external devices to the CMS. From the CMS you can check the patient's monitoring data and alarms obtained from the connected external devices.
- Patient information, alarm settings, and alarm status can be synchronized between the monitor and the CMS.
- You can start or stop NIBP measurements from the CMS.
- In case of network disconnection, the monitor can transmit the offline data to the CMS when the network is reconnected.

For more information on the CMS, see the operator's manual of corresponding central monitoring system.

To select a CMS, select the system status information area at the top right corner of the main screen. Select the desired CMS from the popup CMS list.

E

- **You ans tC on w nt tC swit ison For or in or ation s**
  En n tn C

Conn tin t Gat wa

You can connect the monitor to the eGateway through wired LAN or wireless LAN to implement interaction between the monitor and external devices. When connected to the eGateway, the system provides the following functions:

- The monitor can transmit parameter values, waveforms, alarm settings, and events to the eGateway.
- The monitor can transmit parameter values and alarm settings received from the external devices to the eGateway.
- Clock can be synchronized between the monitor and the eGateway.

Conn tin t ir ss twor

You can add up to five wireless networks for the monitor. For more information, see *24.12.4 Setting the Wireless Network*.

If connecting the current wireless network fails, the monitor automatically connects other wireless networks in the order when they were added.

To manually switch the wireless network, from the system status information area on the top right conner of the screen select , and select the desired wireless network.

Dis onn tin t ir ss twor

To disconnect the wireless network manually, follow this procedure:

1. Swipe the screen from top down with a single finger.
2. Select .

To reconnect the wireless network after it is disconnected manually, follow this procedure:

1. Swipe the screen from top down with a single finger.
2. Select .

urnin t oni tor

Before turning off the monitor, perform the following check:

1. Ensure that monitoring of the patient has been completed.
2. Disconnect the cables and sensors from the patient.
3. Save or clear the patient data as required.

To turn off the monitor, press and hold the power switch for 3 seconds.

CA I

- **r ss an o t pow r swit or s on s to or i s ut own t oni tori it ou not s ut own nor a is a aus oss o pati nt ata**

E

- **urnin o t oni tor o s not is onn t t oni tor ro t AC ains o o p t is onn t t pow r supp unp u t pow r or**
- **In as o a t porar pow r ai ur i t pow r is r stor wit in inut s oni torin wi r su wit a a tiv s ttin s un an I t oni tor is wit out pow r or or t an inut s it av s t sa asi it w r nor a turn o**

The monitor provides different user screens to facilitate patient monitoring in different departments and clinical applications.

C oosin a r n

The monitor enters the normal screen after it is powered on. The normal screen is most frequently used for patient monitoring. To select other screens, follow this procedure:

1. Access the **C oos r n** tab in either of the following ways:
   - Select the **r n tup** quick key.
   - Select the **ain nu** quick key → from the **Disp a** column select **C oos r n**.
2. Select the desired screen.

You can also quickly choose a screen by swiping across the screen with two fingers.

- For adult and pediatric patients:
  - From the minitrends screen, swiping left or right across the touchscreen can switch screens between the normal screen, the big numeric screen, and the minitrends screen.
  - From the EWS screen, swiping left or right across the touchscreen can switch screens between the normal screen, the big numeric screen, and the EWS screen.
- For neonatal patients, swiping left or right across the touchscreen can switch screens between the Targeted Goal screen, the OxyCRG screen, and the big numeric screen.

tin r ns wit , wipin A ross t r n

You can select maximum of four screens that can be switched by swiping across the screen with two fingers. To do so, follow this procedure:

1. Access **r n tup** in either of the following ways:
   - Select the **r n tup** quick key.
   - Select the **ain nu** quick key → from the **Disp a** column select **C oos r n**.
2. Select the **wit r n** tab
3. Respectively set **r n**, **r n**, **r n**, and **r n**.

or a r n

The normal screen is most frequently used for patient monitoring. For general department, ICU, and CCU, normal screen is used by default.

Ent rin t or a r n

To enter the normal screen, choose any of the following ways:

- Swipe left or right across the touchscreen with two fingers until you switch to the normal screen.
- Select the **r n tup** quick key → select the **C oos r n** tab → select **or a r n**.
- Select the **ain nu** quick key → from the **Disp a** column select **C oos r n** → select **or a r n**.

w s r

Ys r utu

1. Access **Display Layout** in either of the following ways:
   - Select the **Screen Setup** quick key.
   - Select the **Main Menu** quick key → from the **Display** column select **Display Layout**.
2. Select a parameter numeric area or waveform area, and then from the popup list select an element you want to display in this area. The parameters and waveforms you did not select will not displayed.

Big Numerics Screen

The Big Numerics screen displays parameter numerics in big font size. The Big Numerics screen displays measurement values and waveforms of up to six parameters. You can configure the parameters and their layout on the big numeric screen.

Entering the Big Numerics Screen

To enter the big numerics screen, choose any of the following ways:

- Swipe left or right across the touchscreen with two fingers until you switch to the big numerics screen.
- Select the **Screen Setup** quick key → select the **Choose Screen** tab → select **Big Numerics**.
- Select the **Main Menu** quick key → from the **Display** column select **Choose Screen** → select **Big Numerics**.

Configuring the Big Numerics Screen

To configure the big numerics screen, follow this procedure:

1. Access **Choose Screen** in either of the following ways:
   - Select the **Screen Setup** quick key.
   - Select the **Main Menu** quick key → from the **Display** column select **Choose Screen**.
2. Select the **Big Numerics** tab
3. Select a parameter numeric area or waveform area, and then from the popup list select an element to display in this area.

Minitrends Screen

The Minitrends screen shows the recent graphic trends of parameters.

Entering the Minitrends Screen

Choose one of the following methods to enter the Minitrends screen:

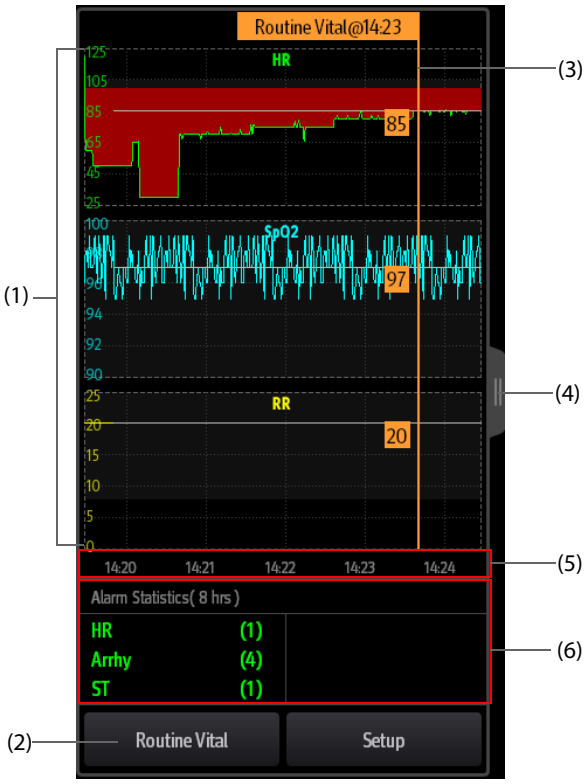
- Select the **Minitrends** quick key.
- Select the **Screen Setup** quick key → Select the **Choose Screen** tab→ select **Minitrends**.
- Select the **Main Menu** quick key → from the **Display** column select **Choose Screen** → select **Minitrends**.

For adult and pediatric patients, when the Minitrends screen is hidden as  , you can also choose one of the following methods to quickly enter the Minitrends screen.

- Swipe left or right across the touchscreen with two fingers until you switch to the Minitrends screen.
- Swipe right across the touchscreen with a single finger.
- Select the  button.

Display of Minitrends Screen

The following figure shows the minitrends screen. Your display may be configured to look slightly different.



(1) Scale

(2) **outine ita Bas ine** button. If the department is set to , then the **Bas ine** button is available. For other departments, the **outine ita** button is available.

(3) Routine Vital/Baseline

(4) Select this button to view the long trends, or contract the long trends screen to the Minitrends screen.

(5) Time line

(6) Alarm statistic area

iewing the Long Trends

To expand the Minitrends screen to view the long trends, choose either of the following ways:

- Select the button.
- Swipe right across the Minitrends screen with a finger.

etting Minitrends Parameters

To set parameters, follow this procedure:

1. Enter the Minitrends screen.
2. Select the **tup** button.
3. Set parameters. If you want to use the default parameters, select **Default Parameters**.

ttin t initr n nt

To set the Minitrend length, follow this procedure:

1. Enter the Minitrends screen.
2. Select the tup button.
3. Set the initr n nt.

ttin t Aar tatisti s wit

The Minitrends screen can be configured to display the statistic number of physiological alarms in its lower half screen. To set the alarm statistics switch, follow this procedure:

1. Enter the Minitrends screen.
2. Select the tup button.
3. Switch on or off the **Aar tatisti s** switch.

ttin t Aar tatisti s Duration

The time length within which the alarms statistics are made is configurable. To set the alarm statistics length, follow this procedure:

1. Enter the Minitrends screen.
2. Select the tup button.
3. Set **Aar tatisti s Duration**.

outin ita Bas in

The Routine vital/Baseline function is used for marking the parameter measurements of certain moment for later reference. If the department is set to , then the **Bas in** button is available. For other departments, the **outin ita** button is available.

anua ar in t outin ita Bas in

To manually mark the Routine Vital/Baseline, follow this procedure:

1. Enter the Minitrends screen.
2. Select the **outin ita** button or **Bas in** button.

E

•

About OxyCRG

The monitor displays the OxyCRG screen by default when the neonatology department is selected. The OxyCRG screen is available in any department setting, but only when Patient Category is set to Neo. This screen displays 6-minute HR, SpO_2 trends, CO_2/Resp compressed waveform, ABD parameters, and the latest ABD events.

The OxyCRG function is intended for neonatal patients only.

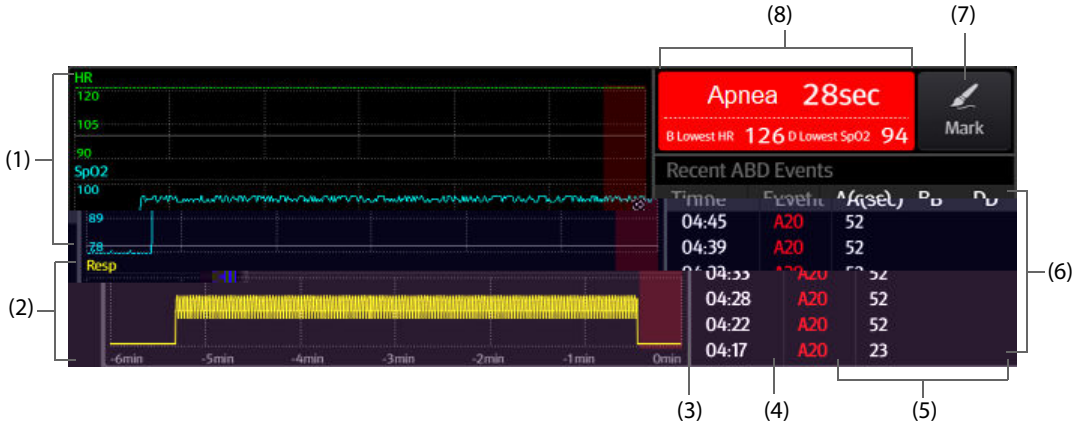
Entering the OxyCRG Screen

To enter the OxyCRG screen, choose any of the following ways:

- Swipe left or right on the touchscreen with two fingers to switch to the OxyCRG screen.
- Select the OxyCRG quick key.
- Select the Configuration quick key → select the Choose Screen tab → select OxyCRG.
- Select the Main Menu quick key → from the Display column select Choose Screen → select OxyCRG.

Displaying the OxyCRG Screen

The following figure shows the OxyCRG screen. Your display may be configured to look slightly different.



(1) HR, SpO_2 trend

(2) Resp/CO_2 compressed waveform

(3) Event time

(4) Event type

(5) Parameter values of ABD events

(6) ABD event list: displays the latest red ABD events. Selecting the ABD event list area enters the OxyCRG review page.

(7) Mark button: opens the Mark dialog to edit the events.

(8) ABD event prompt area: displays parameter values of currently active OxyCRG events.

ar t Goa r n

If you are concerned with specific parameters and their trends, you can use the Targeted Goal screen. The Targeted Goal screen focuses on the target parameter and displays parameter measurements in big numerics. You can easily identify whether parameter target is reached via a dashboard and review the statistics of the target parameter by sections.

The Targeted Goal screen displays parameter measurements and waveforms of ECG, SpO_2, IBP, PI, PR, CO_2, Resp, NIBP, and Temp. You can define the target parameter and secondary parameters. The measurements of these parameters displays in big numerics.

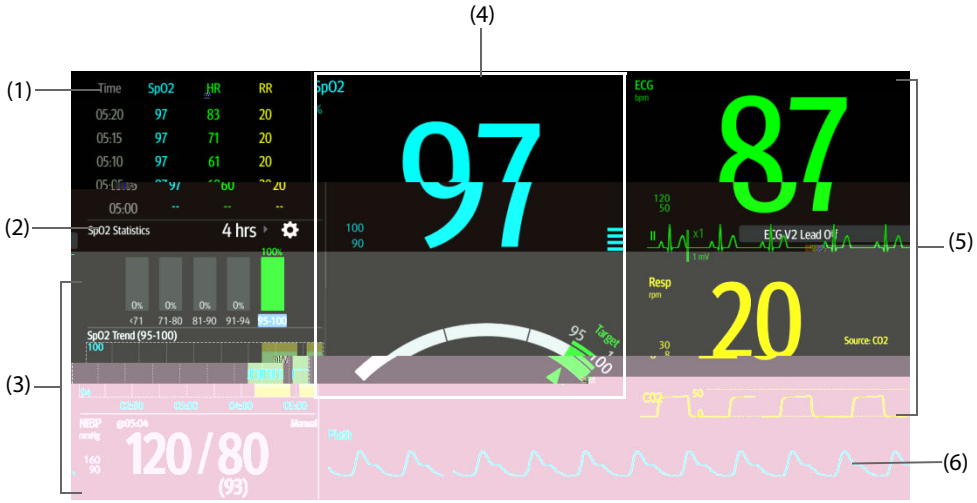
Ent rin t ar t Goa r n

To enter the Targeted Goal screen, choose any of the following ways:

- Select the **ar t Goa** quick key.
- Select the **r n tup** quick key → select the **C oos r n** tab → select **ar t Goa**.
- Select the **ain nu** quick key → from the **Di sp a** column select **C oos r n** → select **ar t Goa**.
- If **ati nt Cat or** is set to **o**, swipe left or right on the touchscreen with two fingers to switch to the Targeted Goal screen.

Di sp a o t ar t Goa r n

The following figure shows the Targeted Goal screen. Your display may be configured to look slightly different.



(1) Parameter trends area: displays trends of the target parameter and secondary parameters. If the target parameter is Art, this area only lists the trend of arterial pressure. Selecting this area enters the **a u ar r n s** review page.

(2) Target parameter statistics area: displays the statistics of the target parameter by sections.

(3) Target parameter trends area: displays the graphic trends of the target parameter. If this area is not configured to display the trends of the target area, other selected parameter is displayed.

(4) Other parameter area: displays parameter measurements and alarm limits of parameters other than the target parameter and secondary parameters.

(5) Target parameter area: displays the measurement of the target parameter in big numerics, as well as its target range, and alarm limits.

- If the target parameter is Resp or PR, parameter source is also displayed.
- The dashboard shows the target range in green.
- The △ pointer below the dashboard indicates the current measurement value.
- Selecting this area enters the corresponding parameter setup menu.

(6) Secondary parameters area: displays parameter measurement of secondary parameters in big numerics, as well as waveforms and alarm limits. If secondary parameters are Resp and PR, parameter sources are also displayed.

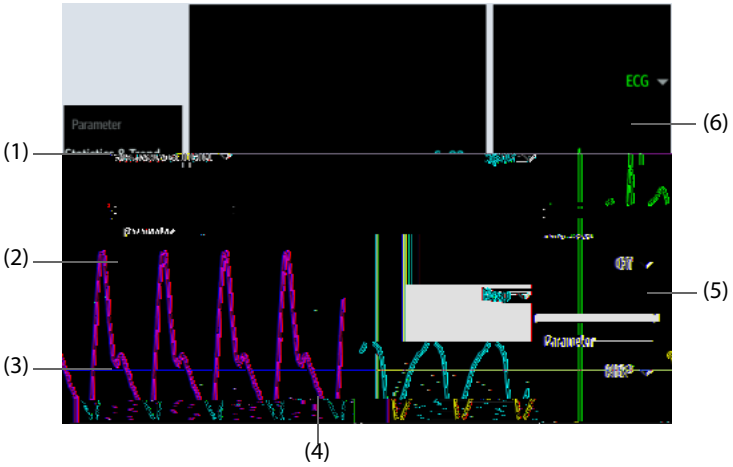
(7) Target parameter waveform area: displays the waveform of the target parameter.

- If the target parameter is Resp or PR, the waveform of the source parameter is displayed.
- If the target parameter is ECG, the fist ECG waveform is displayed by default.

Configuring Target Goal Screen

To configure the parameter numerics, waveforms, and their sequence displayed on the Targeted Goal screen, follow this procedure:

1. Access the Targeted Goal screen in either of the following ways:
   - Select the **Screen Setup** quick key → select the **Choose Screen** tab → select **Target Goal**.
   - Select the **Main Menu** quick key → from the **Display** column select **Choose Screen** → select Targeted Goal Screen.
2. Select a parameter numeric area or waveform area, and then from the popup list select an element to display in this area. The parameters and waveforms not selected will not be displayed.



(1) Select this area to define items to be displayed for the target area:

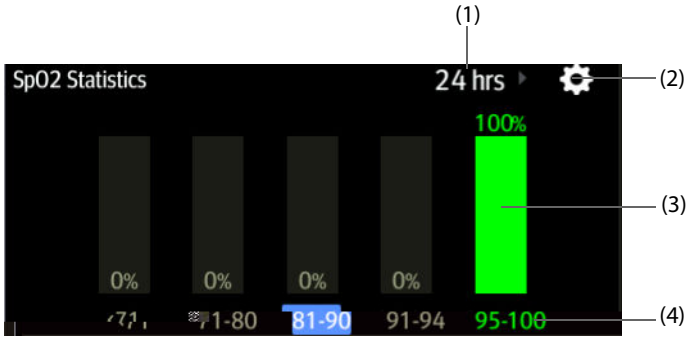
- Statistics: this area displays the statistics of the target parameter by sections.
- Statistics & Trend: this area displays the statistics of the target para

Setting Parameter Statistics

You can show the statistics of the target parameter for a defined period of time. To do so, follow this procedure:

1. Select from the target parameter statistics area to enter the parameter statistics menu.
2. Select the range of each section: from the **To** column select the SpO2 value at which corresponding section ends.
3. From the **Target** column select the target section. The target section is highlighted in green in the SpO_2 statistics area.
4. From the target parameter statistics area, select the duration to redefine the statistics duration.

The following figure shows the target parameter statistics area when SpO_2 is set as the target parameter:



(1) Statistics duration: select here to change the statistics duration.

(2) Statistics setup icon: select to enter the parameter statistics menu.

(3) Statistics results: the percentage of parameter measurements falling into the corresponding section.

(4) Sections for statistics: the section in green indicates the target range.

tin t an o Ea ara t r tion an t ar t tion

For the target parameter, to define the range of each parameter section, follow this procedure:

1. Select from the target parameter statistics area.
2. From the **o** column select the target parameter value at which corresponding section ends.
3. From the **ar t** column select the target section. The target section is highlighted in green in the target parameter statistics area.

tin t tatisti s Duration o t ar t ara t r

The statistics duration of the target parameter is configurable. From the target parameter statistics area, select the duration to redefine its statistics duration.

ot i w r n

On your monitor, you can observe alarm conditions and view real time physiological data from patients on other networked monitoring devices.

A device from a remote site is called a remote device or bed, for example, a bedside monitor. You can simultaneously watch up to 12 remote devices. You can also view the realtime screen of one remote device (the main bed) on your monitor.

You can watch the remote devices on the **ot i w** screen or the alarm watch tiles on the main screen.

From the **ot i w** screen you can watch the following information:

- The alarm status and alarm messages of up to 12 remote devices.
- The realtime parameter values and waveforms from the main bed.

E

- **You an a so vi w t is onitor ro r ot vi s is onitor an , vi w , at ost r ot vi s att sa ti in w i i tr ot vi s an wat t is onitor s wav or s**

Ent rin t ot i w r n

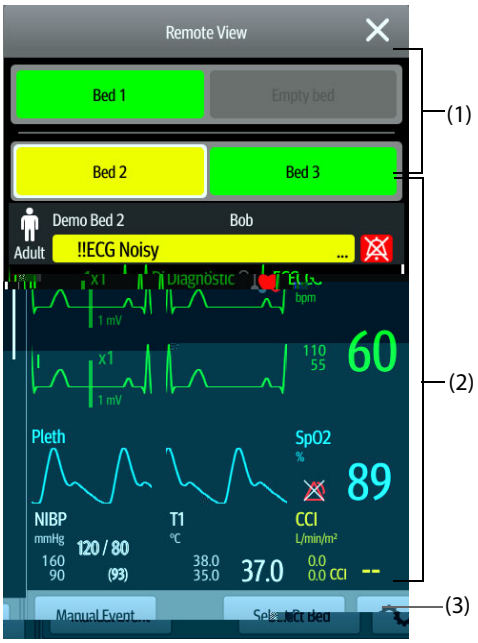
To enter the **ot i w** screen, choose one of the following ways:

- Select the **ot i w** quick key.
- Select the bed at the alarm watch tile on the main screen. For more information, see *4.8.7.2 Displaying the Alarm Watch Tile on the Main Screen* for configuring to display the tile on the main screen.

■ Select the **r n tup** quick key → select the **C oos r n** tab → select **ot i w**.

The **ot i w** screen displays parameter measurements and waveforms of the remote device.

The following figure shows the **ot i w** screen.



(1) Alarm watch area

- Displays the room number and bed number of the remote bed if only one remote device is watched.
- Each bed cyclically displays room number, bed number, and alarm of the highest priority if multiple remote beds are watched.
- The background color of each bed indicates the status of this bed as follows:

Ba roun Co or	**D s ri pti on**
Green	No alarm is occurring to the bed.
Red	The remote device is disconnected or a high priority alarm is occurring. The high priority alarm currently is the highest alarm level on the bed. If the remote device is disconnected, is displayed.
Yellow	The medium priority alarm is occurring. The medium priority alarm currently is the highest alarm level on the bed.
Cyan	The low priority alarm is occurring. The low priority alarm currently is the highest alarm level on the bed.
Grey	The remote device is in the standby mode.
Black	The remote device is powered off.

(2) Main area: displays the realtime parameters and waveforms from the main bed. Scrolling up and down can view more parameters and waveforms.

(3) Remote view setup button: select it to enter the **ot i w** setup menu.

A in a B

You need to add the desired remote devices, and then the alarms from these devices can be watched on your monitor. To add a remote device, follow this procedure:

1. Enter the **t B** menu. To do so, choose either of the following ways:
   - On the **ot i w** screen, select **t B** . For more information, see *4.8.1 Entering the Remote View Screen* for entering the **ot i w** screen.

- Select the icon at the alarm watch tile if the tile is configured to display on the main screen.

2. In the **tB** menu, select a desired department. All the beds under this department will be listed. To select beds in the same care groups during the shift of care groups in the CMS, select **tB sB Car Group**.
3. Select a desired tile at the A-W1 or A-W2 areas and then select a bed from the bed list. The selected bed will appear in the alarm watch area and the alarm watch tile if configured.

E

- **a isin i at a ar √ att to t ist**

ovin aB

If you do not want to monitor a remote device any longer, you can remove it. To remove a remote device, follow this procedure:

1. Enter the **tB** menu. Choose either of the following ways:
   - In the **ot i w** screen, select **tB**. For more information, see *4.8.1 Entering the Remote View Screen* for entering the **ot i w** screen.
   - Select the icon in the alarm watch tile if the tile is configured to display on the main screen.
2. In the **tB** menu, select a bed at the A-W1 or A-W2 area, and then select **C ar B**. If you want remove all beds, select **C ar A B s**.

Dispain t ainB

To watch the real time monitoring screen of a remote bed, select the bed from the alarm watch area. This bed is called the main be. 2830cR01(l 0 r)8 TwE2.)4E(NO)25.4842(TE)]-9801(wa)pla alu whe -1206( )(d)1 TcR1298 7.1 Ed08(7.35)(d)

About Alarm Watch

The main screen can display up to two alarm watch tiles, namely A-W1 and A-W2. Each tile can accommodate up to six beds.

The following figure shows the alarm watch tiles.

The alarm watch tile on the main screen is similar to the alarm watch area on the **Review** screen. For more information, see *4.8.1 Entering the Remote View Screen*.

Displaying Alarm Watch Contents

To configure the alarm watch tile to be displayed on the monitor's main screen, follow this procedure:

1. Select the **Main Menu** quick key → from the **Display** column select **Screen Setup** to enter the **Screen Setup** menu.
2. Select the **Display** tab.

- **Hi n** : Only when a high priority alarm is issued, the monitor automatically switches to the alarm bed.
- **Hi** : If **o up lnt rva** is set to and when a high priority alarm or medium priority alarm is issued, the monitor automatically switches to the alarm bed. If **o up lnt rva** is set to **s** , **s** , or **s** and multiple remote beds issue alarms, the monitor cyclically displays the alarm beds with higher priority in the order of alarm time. For example, if both high priority alarms and medium priority alarms are issued, only beds with high priority alarms are cyclically displayed.

5. Set **wit B ro pt oi** . If this function is enabled, the monitor issues a reminding sound each time the main bed switches.

ana in _ ati nts

tartin onitorin a_ ati nt

After turning on the monitor, follow this procedure to monitor a patient:

1. Admit the patient.
2. Check patient settings. Make sure that alarm limits, patient category and paced status, and so on, are appropriate for the patient. Change them if necessary.
3. Perform desired measurements. For more information, see corresponding measurement chapters.

A itin a_ ati nt

The monitor admits a new patient in the following situations:

- After a patient is manually discharged, the monitor automatically admits a new patient.
- After being switched off for the selected time period, the monitor automatically discharges the previous patient and admits a new patient at startup.
- If the monitor has not detected certain patient vital signs (ECG, SpO_2, PR, RR, NIBP) for 30 minutes, it will prompt whether to start monitoring a new patient if any of the above vital signs are detected again.

Always input patient information as soon as the patient is admitted. For more information, see *5.2.2 Editing Patient Information* for details.

A I G

- **au t ati nt Cat or s ttin is A ut an _a s ttin is nsp ii t a an i t _ati nt Cat or s ttin is orr t or t pati nt**
- **For pa pati nts s t a to Y s l itisin orr t s tto o t onitor ou ista apa pu s or a an ai to a ar w nt ECG si na is too w a**
- **For non pa pati nts s t a to o**

Ent rin t _ ati nt ana nt Dia o

Use any of the following methods to enter the **_ ati nt ana nt** dialog:

- Select the patient information area at the top left corner of the screen.
- Select **_ ati nt ana nt** from the **Dis ar** screen.
- Select the **_ ati nt ana nt** quick key.
- Select the **ain nu** quick key → from the **_ ati nt ana nt** column select **_ ati nt ana nt**.

E itin _ ati nt In or ation

Edit patient information after a patient has been admitted, or when patient information is incomplete, or when it is necessary to change patient information:

To edit patient information, follow this procedure:

1. Enter the **_ ati nt ana nt** dialog. For more information, see *5.2.1 Entering the Patient Management Dialog*.
2. Edit patient information as required.

If a barcode reader is connected to the monitor, scanning the patient's barcode will enter the patient's information.

D tin _ ati nt Data

To delete the data of discharged patients, follow this procedure:

1. Access the **Dis ar _ ati nts** dialog box by either of the following ways:
   - Select the **Dis ar _ ati nts** quick key.
   - Select the **ain nu** quick key → from the **_ ati nt ana nt** column select **Dis ar _ ati nts**.
2. From the patient list select desired patients.
3. Select **D t** .

toppin a_ ara t r asur nt

To stop monitoring a parameter, follow this procedure:

1. Remove corresponding sensor from the patient.
2. Disconnect the sensor from the patient cable.
3. Disconnect the patient cable from the parameter module.

Dis ar in a_ ati nt

Before monitoring a new patient, discharge the previous patient. The technical alarms are reset, and monitor settings return to their defaults. For more information, see *23.3 Setting Default Patient Category*.

After a patient is discharged, the monitor automatically admits a new patient.

A I G

- **A was is ar t pr vious pati nt a, or startin to onitor a n w pati nt Fai ur to o so an a to ata a, in asso iat wit t wron pati nt**

To manually discharge a patient, use any of the following methods to access the **Dis ar _ ati nt** dialog:

- Swipe down the touchscreen with two fingers.
- Select the **Dis ar _ ati nt** quick key.
- Select the patient information area at the top left corner of the screen→ **Dis ar _ ati nt**.
- Select the **_ ati nt ana nt** quick key → **Dis ar _ ati nt**.
- Select the **ain nu** quick key → from the **_ ati nt ana nt** column select **Dis ar** .

Select a button in the **Dis ar _ ati nt** dialog:

- **_ rint En Cas port**: prints the end case report when the patient is discharged.
- **Dis ar** : clears the waveform data of the current patient. The monitor loads the default configuration and goes to the standby mode. The current patient becomes a discharged patient.
- **C ar_ ati nt Data**: discharges the current patient and clears the waveform data. The monitor loads the default configuration and does not go to the standby mode. The current patient becomes a discharged patient.

Int r a in wit Et rna D vi s

Intro u tion to Int r a in wit Et rna D vi s

External devices, including Draeger Apollo Anesthesia Machine, Masimo Rainbow SET Intellivue Module Pulse CO-Oximeter, Hamilton G5 Ventilator, Radiometer TCM4 Gas Monitor, TOF-Watch SX NMT Monitor, B Braun Perfusor Space Infusion Pump, can be connected to the monitor through the multifunctional connector. Information (patient data, alarms, etc.) from external devices can be displayed, saved, recorded, or printed through the monitor. If the monitor is connected with the CMS or eGateway, information from external devices can also be transmitted to the CMS or eGateway.

Int r a in at In or ation

A I G

- para t r a, sus ont pati nt onitor a , i r nt ro t os us ont t rna vi
- aar s ro t rna vi s a , a , or trans issionto t pati nt onitor
- r an , i r n s , tw nt aar ssa san aar priorit is ispa ont onitorsan t os ispa ont onn t t rna vi s

E

- aar ssa s ro t rna vi sar riv ro t op nproto o o t orr spon in t rna vi For or in or ationa outt s aar sp as s t op rators anua ort orr spon in vi s

Di r n sin Dispa au s

In certain cases, there may be differences between the numerics displayed on the monitor and those on external devices. The table below lists some situations and possible reasons.

it uation	ossi , asons
Some parameter values are displayed as invalid values on the monitor.	The patient monitor and the external device may have different parameter configuration or displaying range of values. If the patient monitor displays a parameter not configured in the external device, or a parameter value from the external device exceeds the displaying range of the monitor, then the corresponding parameter value is displayed on the monitor as an invalid value.
The monitor and external device display parameter values with different numbers of places of decimals.	The monitor displays parameter values from the external device based on the monitor displaying rules. Same parameter value is displayed differently when the monitor and the external device display numbers with different precision.
Non-continuously measured values and continuously measured values have the same displaying mode in the patient monitor.	For non-continuously measured values, the monitor displays the latest measured values until a new measurement is transmitted by the external device.
Parameter values displayed on the patient monitor and those displayed in the external device are slightly different.	Some parameter values are converted to different units when transmitted to the monitor. Sometimes, values from the external device may be delayed before transmission to the patient monitor.

E

- nt pr ssur units ar onv rt a on H_2 aan ar t para t rva u s r ain un an or a p H_2 a ar wi a i r ro so t rna vi s

Conn tin an E t rna D vi

To connect an external device, follow this procedure:

1. Connect one end of the serial port cable with the multifunctional connector of the monitor.
2. Connect the other end of the serial port cable with an external device.
3. Switch on the external device.

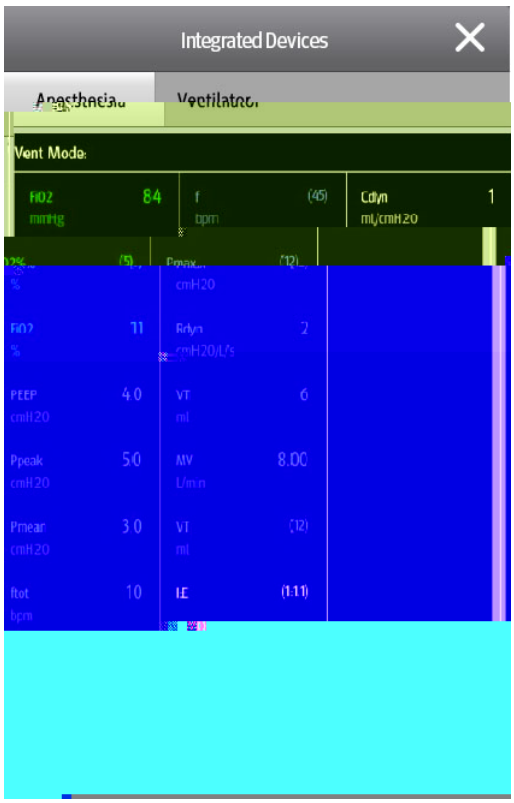
CA I

- **Fi rst insta ation an au in s ou a, ut a, in ra s rvi p rsonn or aut ori t ni ian**

A ssin t Int rat D vi s r n

You can view the information of external devices in the **Int rat D vi s** screen of the monitor. The **Int rat D vi s** screen provides information of both individual device and multi devices. To access the **Int rat D vi s** screen, follow this procedure:

- Select the **Int rat D vi s** quick key.
- Select the r n tup quick key → select **Int rat D vi s**.
- Select the ain nu quick key → from the **Di sp a** column select **C oos r n** →select **Int rat D vi s**.
- Select the numeric area or waveform area of any parameter from the external device →select **Int rat D vi s** button.



The **Int rat D vi s** screen has the following features:

- For the parameters measured by the external device, the measurements display directly after the parameter labels.
- For the parameters input on the external device, the settings are enclosed in parenthesis after parameter labels.
- For the measured parametersand input parameters that have the same label, parameter measurements and settings are displayed after parameter labels with the settings are also enclosed in parenthesis. For example, PEEP 18 (20), in which PEEP is parameter label, 18 is the measurement, and (20) is the setting.

E

- **ara t rsint Int rat D vi ss r nar ispa int or rass ownint s tion ia o l t s r n annot ispa a t s t para t rs t para t rwit i r positions ro topto ,otto an ro ttoni t int t ara t r ia o u ar ispa**

ttin ara t rs ro E t rna D vi s or Dispa

To select parameters displayed in the **Int rat D vi s** screen, follow this procedure:

1. From the **Int rat D vi s** screen select **t ara t r**.
2. Select desired parameters.

ttin A ar s ro E t rna D vi s

To enable or disable the storage, display, and sound of the external device alarms of a certain priority and category, follow this procedure:

1. From the **Int rat D vi s** screen select **tup**.
2. Set switches as desired.

If the storage, display, or audio settings of a specific alarm are different from its category or priority, set them individually by adding the Alarm ID to the alarm list. To do so, follow this procedure:

1. From the **Int rat D vi s** screen select **tup**.
2. Input the Alarm ID for this alarm, and select **A** .

To delete a specific external device alarm, select the desired Alarm ID, and select **D t** .

Dispa in Data ro E t rna D vi sont ain r n

This monitor can display data from external devices on the main screen:

- Display waveforms from external devices in the waveform area.
- Display labels and measurements of parameters from external devices in the numeric area.
- If an anesthesia system is connected, display its set parameters (+Anes set) in the numeric area

To display data from external devices on the main screen, follow this procedure:

1. Access **i a out** in either of the following ways:
   - Select the **r n tup** quick key → select the **i a out** tab.
   - Select the **ain nu** quick key → from the **Dispa** column select **i a out**.
2. Select a parameter numeric area or waveform area, and then from the popup list select the external device element you want to display in this area.

E

- **n ispa int onitor ains r n para t r a, so t rna vi sar pr i wit t pu si n For a p i p 2is ro an t rna vi its a, is ispa as p 2 an itswav or a, is ispa as t**
- **l apara t r an a, o tain it r ro t onitor or an t rna vi t asur va u wav or or oops o in ro t onitor wi a, ispa pr r ntia**

tin av or rop rti s or ara t rs ro E t rna D vi s

To set the waveform properties for parameters from external devices, follow this procedure:

1. Access the parameter setup dial0 from ex

Aars

Aar Introu tion

This chapter describes alarm functions and alarm settings.

Aar at In or ation

A I G

- **Apot ntia aar an isti i rnta ar pr stsan aut oni urations ttin sar us or t sa orsi iar quip ntint sa ar ar a or a p anint nsiv ar unitor ar ia op ratin roo**
- **I t onitoris onn t tot ntra onitorin s st C orot r onitors a ar s an pr s nt an ontro r ot ot susp nsionin i tion orr s to onitor a ar s via t C orot r onitors a aus apot ntia aar For or in or ation s t op rators anua s ort C an t ot r onitors**
- **onitorsint ar ar a a av i rnta ar s ttin s to suit i rnt pati nts Awas tatt aar s ttin sar appropriat ort pati nt or startin t onitorin Awas a sur t atn ssar aar i itsar a tiv an s ta or in tot pati nts ini a on ition**
- **ttin aar i its to tr va u s a aus t aar s st to o in tiv For a p sttin t p i aar i itto is quiva nt to swit in t aar o**
- **nt aar soun is swit o t onitor iv s no aar ton s v ni an w aar o urs B ar u w n onsi rin to swit o t aar soun nt aar sar o or w i aar au ioispaus it rt porari orin init o s rv t pati nt r qu nt**
- **n onitorin pati nts t atar not ontinuous att n a ini a op rator prop r oni ur t aar s st an a ust aar s ttin sas p rt pati nts on ition**
- **Do not r usiv ont au i aar s st or onitorin A ust nt o aar vo u to a ow v a r sutin a aar tot pati nt**

n rstan in t Aar s

Aar Cat ori s

The monitor has two different types of alarms: physiological alarms and technical alarms.

- Physiological alarms are triggered by patient measurement exceeding the parameter limits, or by an abnormal patient conditions.
- Technical alarms are triggered by an electrical, mechanical, connectivity, or other monitor abnormal operation, or by failure of a sensor or component. Technical alarm conditions may also be caused when an algorithm cannot classify or interpret the available data.

Apart from the physiological and technical alarms, the monitor can also prompt with some messages describing the system status or patient status.

Aar ri ori ti s

By severity, the alarms are classified into the following priority levels:

- High priority alarms: indicate a life threatening situation or a severe device malfunction. High priority alarms require an immediate response.
- Medium priority alarms: indicate abnormal vital signs or a device malfunction. Medium priority alarms require a timely response.

- Low priority alarms: indicate a discomfort condition, a device malfunction, or an improper operation. Low priority alarms require you to be aware of this condition.
- Messages: provides additional information on the patient or the equipment.

Aar In i ators

When an alarm occurs, the monitor indicates it through visual or audible alarm indications. For more information, see the following table.

Aar In i ator		Hi _ riorit Aar	iu _ riorit Aar	ow_ riorit Aar	ssa	Co nts
Alarm lamp		Red Flashing frequency: 1.4 - 2.8 Hz Duty cycle: 20 - 60% on	Yellow Flashing frequency: 0.4 - 0.8 Hz Duty cycle: 20 - 60% on	Cyan No flashing Duty cycle: 100% on	None	None
Audible tone pattern	ISO	Repeat pattern of triple + double+ triple + double beeps	Repeat pattern of triple beeps	Repeat pattern of single beep	None	None
	ISO3	Repeat pattern of triple + double + triple + double beeps	Repeat pattern of triple beeps	Repeat pattern of double beeps	None	
Alarm message		White text inside a red box	Black text inside a yellow box	Black text inside a cyan box	White text	Alarm messages are displayed in the alarm information area at the top of the screen. You can select the alarm messages to show the alarm list.
Alarm priority indicator		!!!	!!	!	None	The indicator appears in front of the corresponding alarm message.
Parameter value		White text inside a flashing red box	Black text inside a flashing yellow box	Black text inside a flashing cyan box	None	None

E

- **n utip aar so i rntpriorit v so ursi utan ous t onitors tst i stpriorit aar toi tt aar a pan issu t aar ton**
- **n utip aar so i rntpriorit v so ursi utan ous an sou a, ispa in t sa ar a t onitoron ispa st ssa s ro t i stpriorit aar**
- **n utip aar so t sa priorit v so ursi utan ous aar ssa sar ispa ia**
- **o p sioo i a aar s su asAs sto ar usiv av i nti a aar ton san aar i tswit nor a i v p sioo i a aar s utt iraar ssa sar ispa usiv atis w nan usiv p sioo i a aar an anor a i v p sioo i a aar ar tri r si utan ous on usiv p sioo i a aar ssa wi a, ispa**

Alarm Status Symbols

Apart from the alarm indicators as described in *7.3.3 Alarm Indicators*, the monitor uses the following symbols to indicate the alarm status:

Highlight Display of Alarm Messages

When any of the following alarms is triggered, alarm messages are highlighted to indicated that the patient may be in a critical condition.

- Arrhythmia alarms, including Asystole, V-Fib/V-Tach, V-Tach, Vent Brady, Extreme Tachy, and Extreme Brady.
- SpO2 Desat
- Apnea

When an alarm is highlighted, the alarm message covers both the physiological alarm area and the technical alarm area with enlarged word size. Messages of technical alarms and other physiological alarms are displayed at the left of the highlighted alarm.

Alarm Limits

When a parameter measurement exceeds the alarm limit, the monitor generates an alarm according to the alarm priority setting.

Guard Limit

The monitor provide guard limits for HR, Sp_2, RR, NIBP, IBP, Temp, CO_2, and some arrhythmia thresholds to prevent alarm limits from being set too high or too low. Setting guard limits is password protected.

For more information on setting guard limits, see *24.3.4 Setting Guard Limits*

o u	_ara t r	_ati nt Cat or	ow r i it	pp r i it	Auto i it an
Resp	RR (rpm)	Adult/ Pediatric	RR × 0.5 or 6 (whichever is greater, no greater than 12)	(RR × 1.5) or 30, or guard limit (whichever is smaller, no less than 20)	6 to 55
		Neonate	(RR - 10) or 30 (whichever is greater)	(RR + 25) or 85 or guard limit (whichever is smaller, no less than 70)	10 to 90
SpO_2	SpO_2 (%)	All	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
NIBP	NIBP-S (mmHg)	Adult	(SYS × 0.68 + 10) or guard limit (whichever is greater, no greater than 110)	(SYS × 0.86 + 38), or guard limit (whichever is smaller, no less than 140)	45 to 270
		Pediatric	(SYS × 0.68 + 10) or guard limit (whichever is greater, no greater than 90)	(SYS × 0.86 + 38), or guard limit (whichever is smaller, no less than 100)	45 to 185
		Neonate	(SYS - 15) or 45 (whichever is greater, no greater than 60)	(SYS + 15) or 105 (whichever is smaller, no less than 80)	35 to 115
	NIBP-D (mmHg)	Adult	(Dia × 0.68 + 6) or guard limit (whichever is greater, no greater than 60)	(Dia × 0.86 + 32), or guard limit (whichever is smaller, no less than 80)	25 to 225
		Pediatric	(Dia × 0.68 + 6) or guard limit (whichever is greater, no greater than 50)	(Dia × 0.86 + 32), or guard limit (whichever is smaller, no less than 60)	25 to 150
		Neonate	(Dia - 15) or 20 (whichever is greater, no greater than 30)	(Dia + 15) or 80 (whichever is smaller, no less than 50)	20 to 90
	NIBP-M (mmHg)	Adult	(Mean × 0.68 + 8) or guard limit (whichever is greater, no greater than 80)	(Mean × 0.86 + 35), or guard limit (whichever is smaller, no less than 100)	30 to 245
		Pediatric	(Mean × 0.68 + 8) or guard limit (whichever is greater, no greater than 60)	(Mean × 0.86 + 35), or guard limit (whichever is smaller, no less than 80)	30 to 180
		Neonate	(Mean - 15) or 35 (whichever is greater, no greater than 40)	(Mean + 15 or 95) (whichever is smaller, no less than 60)	25 to105
Temp (xx refers to temperatu re site)	Txx (°C)	All	(Txx - 0.5)	(Txx + 0.5)	1 to 49
	ΔT (°C)	All	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range

IBP: ART/ Ao/UAP/ BAP/FAP/ LV/P1-P4 (Arterial pressure)	IBP-S (mmHg)	Adult	SYS × 0.68 + 10 or guard limit (whichever is greater, no greater than 110)	SYS × 0.86 + 38 or guard limit (whichever is smaller, no less than 140)	45 to 270
		Pediatric	SYS × 0.68 + 10 or guard limit (whichever is greater, no greater than 90)	SYS × 0.86 + 38 or guard limit (whichever is smaller, no less than 100)	45 to 185
		Neonate	(SYS - 15) or 45 (whichever is greater, no greater than 60)	(SYS + 15) or 105 (whichever is smaller, no less than 80)	35 to 115
	IBP-D (mmHg	Adult	(Dia × 0.68 + 6) or guard limit (whichever is greater, no greater than 60)	(Dia × 0.86 + 32) or guard limit (whichever is smaller, no less than 80)	25 to 225
		Pediatric	(Dia × 0.68 + 6) or guard limit (whichever is greater, no greater than 50)	(Dia × 0.86 + 32) or guard limit (whichever is smaller, no less than 60)	25 to 150
		Neonate	(Dia - 15) or 20 (whichever is greater, no greater than 30)	(Dia + 15) or 80 (whichever is smaller, no less than 50)	20 to 90
	IBP-M (mmHg)	Adult	Mean × 0.68 + 8 or guard limit (whichever is greater, no greater than 80)	Mean × 0.86 + 35 or guard limit (whichever is smaller, no less than 100)	30 to 245
		Pediatric	Mean × 0.68 + 8 or guard limit (whichever is greater, no greater than 60)	Mean × 0.86 + 35 or guard limit (whichever is smaller, no less than 80)	30 to180
		Neonate	(Mean - 15) or 35 (whichever is greater, no greater than 40)	(Mean + 15) or 95 (whichever is smaller, no less than 60)	25 to 105
IBP: PA	PA-S (mmHg)	All	SYS × 0.75, no less than guard limit and no greater than 15	SYS × 1.25, no greater than guard limit and no less than 25	3 to 120
	PA-M (mmHg)	All	Mean × 0.75, no less than guard limit and no greater than 5	Mean × 1.25, no greater than guard limit and no less than 10	3 to 120
	PA-D (mmHg	All	Dia × 0.75, no less than guard limit and no greater than 5	Dia × 1.25, no greater than guard limit and no less than 6	3 to 120
IBP: CVP, LAP, RAP, UVP, P1-P4 (venous pressure)	IBP-M (mmHg)	All	Mean × 0.75, no less than guard limit and no greater than 5	Mean × 1.25, no greater than guard limit and no less than 10	3 to 40
IBP: CPP	CPP-M (mmHg)	Adult	CPP × 0.68 + 8, no less than 60	CPP × 0.86 + 35, no greater than 90	20 to 235
		Pediatric	CPP × 0.68 + 8, no less than 50	CPP × 0.86 + 35, no greater than 70	25 to175
		Neonate	(CPP-15) or 35, (whichever is greater, no less than 40)	(CPP+15) or 95, (whichever is smaller, no greater than 70)	25 to 100
CO_2	$EtCO_2$ (mmHg)	All	0 to 32: remains the same 33 to 35: 29 36 to 45: (EtCO2 - 6) 46 to 48: 39 >48: remains the same	0 to 32: remains the same 33 to 35: 41 36 to 45: (EtCO2 + 6) 46 to 48: 51 >48: remains the same	Same as the measurement range
	$FiCO_2$	All	None	Same as the default alarm limit	Same as the measurement range
	awRR (rpm)	Adult/ Pediatric	awRR × 0.5 or 6 (whichever is greater)	awRR × 1.5 or 30 (whichever is smaller)	6 to 55
		Neonate	(awRR - 10) or 30 (whichever is greater)	(awRR+25) or 85 rpm (whichever is smaller)	10 to 90

o u	ara t r	ati nt Cat or	ow r i it	pp r i it	Auto i it an
AG	$EtCO_2$	All	Same as the CO_2 module		
	$FiCO_2$	All	Same as the CO_2 module		
	awRR (rpm)	Adult/ Pediatric	awRR × 0.5 or 6 (whichever is greater)	awRR × 1.5 or 30 (whichever is smaller)	6 to 55
		Neonate	(awRR - 10) or 30 (whichever is greater)	(awRR+25) or 85 rpm (whichever is smaller)	10 to 90
	FiAA/EtAA	All	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
	$FiO_2/EtCO_2$	All	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
	FiN_2O/ EtN_2O	All	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
C.O.	TB (°C)	Adult	TB - 1)	TB + 1	Same as the measurement range

Initiatin Auto A ar its

The monitor provides the auto alarm limits function to automatically adjust alarm limits according to the patient's vital signs. When auto limits are selected, the monitor calculates safe auto limits based on the latest measured values. To get accurate auto alarm limits, collect a set of measured vital signs as a baseline.

To initiate auto alarm limits, follow this procedure:

1. Access the **i its** page in either of the following ways:
   - Select the **A ar tup** quick key.
   - Select the **ain nu** quick key → from the **A ar** column select **i its**
2. From the **i its** page, select **Auto i its** at the left bottom.
3. Select from the popup dialog box.

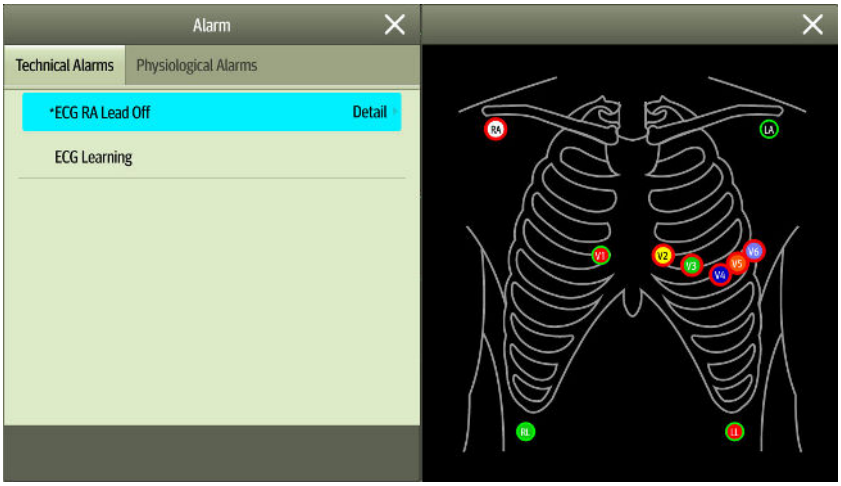
A ssin n s r nH p or ni a Aar s Aar i t

In the technical alarm list, alarm messages followed by **D tai** include help messages or pictures to help you identify the problem. This function is called AlarmSight. To access AlarmSight, follow this procedure:

1. Select an alarm displaying in the technical alarm information area to enter the **A ar s** dialog.
2. From the alarm list select the desired alarm.

E

- **I t r ar no ispa aar st ns tin t t ni a aar ar awi not op nan ia o s**



C in t sioo i a Aar s ist

If the patient monitor has more than one physiological alarm, you can see the physiological alarm list by selecting the physiological alarm information area to enter the **A ar s** dialog. If there is only one physiological alarm, selecting the physiological alarm information area enters the **vi w** dialog for the event created by this alarm.

C an in A ar tti n s

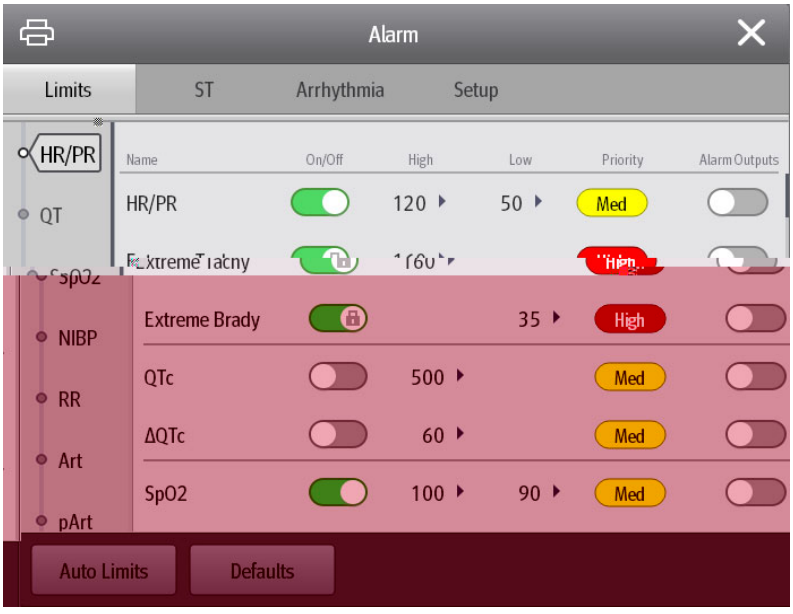
Alarms settings can be changed by selecting Main Menu and choosing from the list in the Alarm column.

tti n ara t r A ar rop rti s

To set parameter alarm properties, follow this procedure:

1. Access the **i its** page in either of the following ways:
   - Select the **A ar tup** quick key.
   - Select the **ain nu** quick key → from the **A ar** column select **i its**
2. Select a parameter tab and set alarm properties as desired. Enter the password if required. For more information, see *24.13.3 Selecting Password for User Authentication*.

You can also change the alarm properties of individual parameter from the corresponding parameter dialog.



E

- **onitor an a, oni ur tor qui r an passwor or o into an a ar s ttin s For or in or ation r rto . . . t n , ss or or s r Aut nt t on**

C an in t A ar ou

To change the alarm volume, follow this procedure:

1. Access the **tup** page in either of the following ways:
   - Select the **A ar tup** quick key → select the **tup** tab.
   - Select the **ain nu** quick key → from the **A ar** column select **tup**
2. Set **A ar ou** . The alarm volume can be set from X to 10, in which X is the minimum volume allowed by your department, and 10 is the maximum volume.
3. Select **Hi A ar ou** to set the volume of the high priority alarm.
4. Select **in r ou** to set the volume of the reminder tone.

E

- **A ar vo u an on a, s t to i t onitoris onn t to a C st**
- **nt a ar vo u iss t to t a ar soun isturn o an t au ioo s o app ars on t s r n**
- **You an s tt A ar ou to on w n our onitoris onn t tot C l our onitor is not onn t tot C t ow sts ttin o A ar ou is**
- **nt onitoris onn t tot C an A ar ou iss t to A ar ou auto ati a an sto i t C is is onn t**
- **You annots tt vo u o i prionit a ar si A ar ou iss t to**

ttin t Apn a D a i

To set the apnea delay time, follow this procedure:

1. Access the **tup** page in either of the following ways:
   - Select the **A ar tup** quick key → select the **tup** tab.
   - Select the **ain nu** quick key → from the **A ar** column select **tup**
2. Select **Apn a D a** to set the apnea delay time.

wit in nor a at in

When **a at in o** is switched on, you can switch on or off **a at in** . To do so, follow this procedure:

1. Access the **tup** page in either of the following ways in either of the following ways:
   - Select the **A ar tup** quick key → select the **tup** tab.
   - Select the **ain nu** quick key → from the **A ar** column select **tup**
2. Switching on or off **a at in** .

stori n t D au t A ar ttin s

To reset all alarm settings to the defaults, follow this procedure:

1. Access the **A ar** page in either of the following ways:
   - Select the **A ar tup** quick key.
   - Select the **ain nu** quick key → from the **A ar** column select **i its**
2. On the **i its** page, select **D au ts** at the bottom.

Setting the Length of Printed Waveforms

You can define the length of printed waveforms when an alarm is triggered. To do so, follow this procedure:

1. Access the **Setup** page in either of the following ways:
   - Select the **Alarm Setup** quick key → select the **Setup** tab.
   - Select the **Main Menu** quick key → from the **Alarm** column select **Setup**
2. Set **Printing Duration on Alarm**.

Pausing Alarms/Pausing Alarm Tones

You can either pause alarms or pause alarm tones. This depends on the pause setting. To set the pause function, refer to *24.3.2.1 Defining the Pause Function*.

Pausing Alarms

If the Pause function is configured to alarm pause, pressing the **Alarm Pause** quick key can temporarily disable alarm indicators. For the configuration of the pause function, see *24.3.2.1 Defining the Pause Function*. When alarms are paused, the following rules are followed:

- No physiological alarm will be presented.
- Except battery-related technical alarms, sounds of the other technical alarms are paused, but alarm lamps and alarm messages continue to be presented.
- The remaining alarm pause time is displayed in the physiological alarm information area.
- The alarm pause symbol is displayed in the system information area.

When the alarm pause time expires, the alarm paused state is automatically deactivated. You can also cancel the alarm paused state by pressing the **Alarm Pause** quick key again.

Prolonging the Alarm Pause Time

If enabled, you can temporarily prolong the alarm pause time after the monitor enters the alarm paused state. This capability is disabled by default. To prolong the alarm pause time, follow this procedure:

1. In the physiological alarm information area, select the alarm pause countdown.
2. Select **Pause 1 min**, **Pause 2 min**, or **Pause 3 min**.

NOTE

- **Prolonging alarm pause time does not affect setting of alarm pause time.**

Switching Off Alarms

If **Pause Time** is set to **Permanent** (see section *24.3.2.2 Setting the Alarm Pause Time/Alarm Tone Pause Time*), pressing the **Alarm Pause** quick key permanently switches off all alarms. The alarm off state has the following features:

- Physiological alarms are switched off. The alarm lamp does not flash and alarm sound is not issued.
- Alarm sound of technical alarms is switched off, but alarm lamp flashes and alarm messages are presented.
- The message **Alarm Off** with red background is displayed in the physiological alarm information area.
- The alarm off symbol is displayed in the system status information area.

To exit the alarm off state, press the **Alarm Pause** quick key again.

WARNING

- **Pausing or switching off alarms is risky as it may lead to patient**

Pausing Alarm Sound

If the Pause function is configured to Audio Pause, pressing the **Audio Pause** quick key pauses alarm tone and sets the quick key to be highlighted. For the configuration of the pause function, see section *24.3.2.1 Defining the Pause Function*. When alarm tones are paused, the following rules are followed:

- The sound of all physiological alarms and technical alarms are switched off.
- The remaining audio pause time is displayed in the physiological alarm information area.
- The audio pause symbol is displayed in the system information area.

When the audio pause time expires, the audio paused state is automatically deactivated. You can also cancel the audio paused state by pressing the highlighted **Audio Pause** quick key.

Prolonging Alarm Pause

If enabled on the machine, you can temporarily prolong the alarm tone pause time after the monitor enters the alarm tone paused state. This capability is disable by default. To prolong the audio pause time, follow this procedure:

1. In the physiological alarm information area, select the alarm pause countdown.
2. Select the alarm tone pause time. Options may include **Pause 1 min**, **Pause 2 min**, or **Pause 3 min**.

NOTE

- **Prolonging alarm pause time does not change the alarm tone pause time.**

Switching Alarm Sound

If **Pause** is set to **Permanent** (see section *24.3.2.2 Setting the Alarm Pause Time/Alarm Tone Pause Time*), pressing the **Audio Pause** quick key permanently switches off all alarm sound. The audio off state has the following features:

- Alarm sound of both physiological alarms and technical alarms is switched off.
- The audio off symbol is displayed in the system information area.

To exit the audio off state, press the **Audio Pause** quick key again.

WARNING

- **Pausing or switching off alarm sound may result in a patient safety hazard.**

Resetting Alarms

Press the **Alarm Reset** quick key to reset the alarm system. When the alarm system is reset, the alarm reset symbol displays in the system status information area for alarm symbols.

NOTE

- **If an alarm is triggered after the alarm system is reset, the alarm reset symbol disappears and the alarm indication will be reactivated.**

Resetting Physiological Alarms

For physiological alarms, when the alarm system is reset, the following occur:

- The alarm sound is silenced.
- A check mark appears before the alarm message.
- The color of the parameter numeric background corresponds with the alarm priority, but the parameter numeric does not flash.

s tti n ni a Aar s

For technical alarms, when the alarm system is reset, the following occur:

- Some technical alarms are cleared. The monitor gives no alarm indications.
- Some technical alarms are changed to prompt messages.
- For some technical alarms, the alarm is silenced and a check mark appears before the alarm message.

For details about the indications of technical alarms when the alarm system is reset, see *D.2 Technical Alarm Messages*.

at in A ar s

The latching setting for physiological alarms defines how alarm indicators behave if you do not reset the alarms.

- If you do not "latch" physiological alarms, their alarm indications disappear when the alarm condition ends.
- If you "latch" physiological alarms, all visual and audible alarm indications remain (if configured) until the alarms are reset. For latched alarms the time when the alarm is last triggered is displayed behind the alarm message.

The monitor can be set to separately latch visual indications or simultaneously latch the visual and the audible indications.

- When visual indications are latched, visual indications, including alarm lamp, alarm message and its background remain when the alarm condition ends and the time when the alarm last triggered is displayed behind the alarm message.
- When audible indications are latched, the monitor continues to issues alarm sounds when the alarm condition ends.

To set how you want to latch the physiological alarms, see section *24.3.3 Latching Physiological Alarms*.

E

- **C an in aar prionit a a tt at in statuso t orr spon in aar D tr in i ou n toa ustt at in status ort sp ii aar w n ou av an itsaar prionit**
- **nt aar s st isr s t at p sioo i aaar sar ar**

urs Ca

The monitor provides a nurse call connector to output a nurse call signal when a user-defined alarm occurs. To obtain a nurse call signal, use the nurse call cable to connect the hospital nurse call system with the monitor's nurse call connector.

Alarms are indicated on the nurse call device only when the following conditions are met:

- The nurse call system is enabled.
- A user-defined alarm occurs.
- Alarms are not paused or reset.

A I G

- **Do not r usiv ont nurs a s st ora ar noti i ation a, rt att ost r ia, aar noti i ation o in sau i, an visua aar in i ationswit t pati nts ini a on ition**

Ca in orH p

This monitor can be configured to call monitors in the same department and the CMS system so that nearby doctors and nurses can come for help.

Issuin t Ca H p i na

To call help, select the **Ca H p** quick key and select from the popup dialog box. If is not selected within 5 seconds then the monitor will automatically send out the call help signal.

After the call help signal is sent out, the **Ca H p** quick key flashes in red. Select the **Ca H p** quick key again to stop the call help signal.

Monitors receiving the call help signal issue a sound and a dialog box pops up indicating which monitor is calling. Select to acknowledge the call and stop the sound at this monitor.

E

- **a p un tion wor s on w n t oni tor i s onn t to t n twor**
- **a p soun a i stur pati nts i n t sa part nt**

C B o

The CPB (Cardiopulmonary Bypass) mode is activated only if you set the department to .

In the CPB mode, all the physiological alarms and technical alarms are switched off. So when performing CPB, you can put the monitor in the CPB mode to inactivate unnecessary alarms.

Ent ri n t C B o

To enter the CPB mode, choose either of the following ways:

- Select the **C B o** quick key.
- Select the **ai n nu** quick key → from the **A ar** column select **C B o** .

In the CPB mode, **C B o** is displayed in the physiological alarm area with a red background color.

E

- **n t C B o i s nt r t oni tor stops a IB asur nts You an r start IB asur nts a t r nt ri n t C B o**

E i ti n t C B o

To exit the CPB mode, choose either of the following ways:

- Select the **C B o** quick key.
- Select the **ai n nu** quick key → from the **A ar** column select **E i t C B o** .

Intu ati on o

Intubation mode is available for Resp, CO_2, and AG monitoring. When performing intubation during general anesthesia, you can put the monitor in the intubation mode in order to inactivate unnecessary alarms.

In the intubation mode, Resp, CO_2, and AG related physiological alarms are switched off.

Ent ri n t Intu ati on o

To enter the intubation mode, choose either of the following ways:

- Select the **Intu ati on o** quick key.
- From the bottom of the **sp**, **C** , or **AG** dialog, select **Intu ati on o** .
- Select the **ai n nu** quick key → from the **A ar** column select **Intu ati on o** .

E i ti n t Intu ati on o

To exit the intubation mode, choose either of the following ways:

- Select the **Intu ati on** Mode quick key.

- From the bottom of the **sp**, **C** , or **AG** dialog, select **E i t Intu ati on o** .
- Select the **ain nu** quick key from the **A ar** column → select **E i t Intu ati on o** .

sti n A ar s

The monitor automatically performs a selftest at startup. Check that an alarm tone is heard, the alarm lamp illuminates, one after the other, in red, yellow, and cyan. This indicates that the visible and audible alarm indicators function correctly.

To further test individual measurement alarms, perform measurements on yourself or using a simulator. Adjust alarm limits and check that appropriate alarm behavior is observed.

This page intentionally left blank.

onitorin ECG Arr t ia an

ECG Intro u tion

The electrocardiogram (ECG) measures the electrical activity of the heart and displays it on the monitor as waveforms and numerics. ECG monitoring provides 3-, 5-lead ECG monitoring, ST-segment analysis, arrhythmia analysis, QT/QTc measurements.

The associated monitor incorporating ST analysis has the ST label.

ECG a t In or ation

A I G

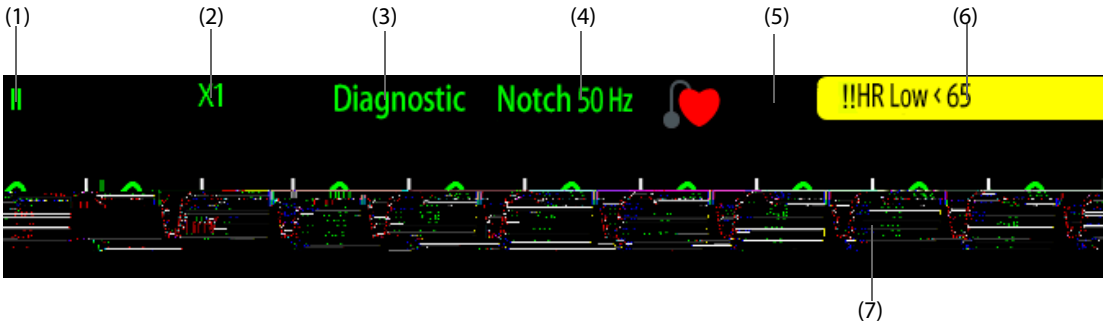
- is quip ntis notint n or ir t ar ia appi ation
- Ensur t att on u tiv parts o ECG tro san asso iat onn tors in u in t n utra tro o not o into onta twit an ot r on u tiv partsin u in art
- A wa s us i ari ation proo ECG a s urin i ari ation
- Do not tou t pati nt or ta vi s onn t tot pati nt urin i ari ation
- o ini i t a ar o urns urin i r qu n sur i a pro ur s nsur t att onitors a s an trans u rsn v r o into onta twit t trosur r unit E
- o ini i t a ar o urns urin us o i r qu n sur i a unit E t ECG tro ss ou not a o at a tw nt sur i a sit an t E r turn tro

CA l

- n us partsan a ssori ssp ii int is anua Fo ow t instru tions or us an a r to a warnin s an autions
- rio i a insp tt tro appi ationsit sto nsur s inint rit l t s inquait an s r pa t tro sor an t appi ationsit
- Int r r n ro an un roun instru nt n art pati nt or trosur r usa anin u nois an arti a tintot wav or s

ECG Disp a

The following figures show the ECG waveform and numeric areas. The display may be configured to look slightly different.



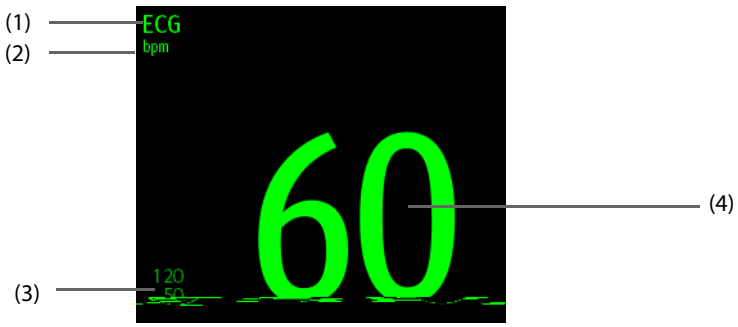
(1) ECG lead label of the displayed waveform (2) ECG waveform gain

(3) ECG filter mode (4) Notch filter status

(5) Paced status: If a is set to Y s, is displayed. If a is set to o, is displayed.

(6) HR/PR alarm message

(7) Pace pulse marker: If a is set to Y s, pace pulse markers "|" are displayed corresponding to detected pacer for each beat.



(1) Parameter label (2) HR measurement unit

(3) HR alarm limits (4) HR value

r pari n or ECG oni tori n

r pari n t ati nt in

Proper skin preparation is necessary to ensure good signal quality at the electrode sites, as the skin is a poor conductor of electricity. To properly prepare the skin, choose flat areas and then follow this procedure:

1. Shave hair from skin at chosen electrode sites.
2. Gently rub skin surface at sites to remove dead skin cells.
3. Thoroughly cleanse the site with a mild soap and water solution. We do not recommend using ether or pure alcohol, because this dries the skin and increases the resistance.
4. Dry the skin completely before applying electrodes.

App in E tro san Conn tin t ati nt

To connect ECG cables, follow this procedure:

1. Check that electrode packages are intact and the electrodes are not past the expiry date. Ensure the electrode gel is moist. If you are using snap electrodes, attach the snaps to the electrodes before placing electrodes on the patient.
2. Place the electrodes on the prepared sites. Ensure that all electrodes have good skin contact.
3. Connect the leadwires to the patient cable if not already connected.
4. Plug the patient cable into the ECG connector.

CA I

- v r i pati nt tro t p sor ran s is a a toi p an is at sissu s

E

- **n app in t tro s avoi on ar a o ious a rs o at an a or us s us ov nt an r su tin tri a int r r n App in tro s on a or us s or a p on us so t t ora a a to rron ous arr t ia a ar s u to ssiv us ov nt**

a ir Co or Co

The following table lists the color coding of leadwires for AHA standards:

a	a	Co or
Right arm	RA	White
Left arm	LA	Black
Right leg (neutral)	RL	Green
Left leg	LL	Red
Chest	V1	Brown

ECG E tro a nts

In this section, electrode placement is illustrated using the AHA naming convention.

a wir E tro a nt

The following is the electrode configuration when a 3-leadwire cable is used:

- RA placement: directly below the clavicle and near the right shoulder.
- LA placement: directly below the clavicle and near the left shoulder.
- LL placement: on the left lower abdomen.

a wir E tro a nt

The following is the electrode configuration for a 5-leadwires cables:

- RA placement: directly below the clavicle and near the right shoulder.
- LA placement: directly below the clavicle and near the left shoulder.
- RL placement: on the right lower abdomen.
- LL placement: on the left lower abdomen.
- V placement: on the chest in any of the V1 to V6 positions.

C st E tro a nt

The chest electrode can be placed at the following positions:

■

- nusin E nvrpa ECG tro snart roun in pat ot E ast is an aus a oto intr rn ont ECGsi na
- nusin E nsur prop r onta to t E r turn tro tot pati nt to avoi urns at onitor asur ntsit s A so nsur t att E r turn tro isn art op ratin ar a

Coosin t ECG a p

To choose ECG lead type, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **tup** tab.
3. Set **a t** according to the lead type you are going to use. The default lead type is **Auto**. In this case, the monitor automatically detects the lead type.

C in a tatus

It is important to correctly set the patient's paced status before you start monitoring ECG. The paced symbol is displayed when **a** is set to **Y s**. Pace pulse markers "|" are displayed on each ECG waveform whenever a pacer signal is detected. If **a** is set to **o** or unspecified, the symbol will be shown in the ECG waveform area.

To change the paced status, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **a r** tab.
3. Set **a** to **Y s** or **o**.

You can also change the patient's paced status from the **ati nt ana nt** dialog. For more information, see *5.2.1 Entering the Patient Management Dialog*.

If you did not set the paced status, the monitor issues a prompt tone when pace pulse is detected. At the same time, the paced symbol flashes and the message **as i t pati nt as a pa a r** appears in the ECG waveform area. Check and set the patient's paced status.

A I G

- **For pa pati nts ou ust s t a to Y s l itis in orr t s t to o t onitor ou ista apa pu s ora o p an ai to a ar w nt ECGsi na is too w a nv ntri u ar pa pati nts piso so v ntri u arta ar ia a not a wa s t t Do not r ntir upon t s st s auto at arr t ia t tion a ont**
- **Fa s ow art rat or a s as sto a ar s a r su t wit rtain pa a rs aus o pa a r arti a ts su as tri a ov rs oot o t pa a r ov r appin t tru o p s**
- **Do not r ntir on rat t r a ar s w n onitorin pati nts wit pa a rs A wa s p t s pati nts un r os surv i an**
- **auto pa rr o nition un tion is not appi a top iatri pati nts n onata pati nts an pati nts wit onitorin**

Ena in a r tion

To eliminate the pacing pulse from the ECG waveform of paced patients, it is recommended to enable the pace pulse rejection function. The pace pulse rejection function is disabled by default. To enable this function, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **a r** tab.
3. Switch on **a r t**.

E

-

CA I

- **Ensur t at ou av s t t opti a a swit t , st wav or a pitu an t i st si na to nois ratio tin t opti a a sisi portant or t tin , ats assi in , ats an t tin v ntri u ar i , i ation**

C an in ECG av or i

If the ECG waveform is too small or clipped, you can change its size by selecting the appropriate **Gain** setting. To do so, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **tup** tab.
3. Select **ECG Gain** to set the size of each ECG waveform.
4. If more than three ECG waveforms are displayed, select the **or a s** tab, and then select **ECG Gain** to change the sizes of other ECG waveforms. If you select **Auto**, the monitor automatically adjusts the size of the ECG waveforms for all the leads.

C an in ECG av or p

To change ECG waveform speed, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **tup** tab.
3. Set the desired **p** .

ttin t ECG Fi t r

To set the appropriate ECG waveform filter mode, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **tup** tab.
3. Set **Fi t r**.
   - **Dia nosti** : use when diagnostic quality ECG is required. The unfiltered ECG waveform is displayed so that changes such as R-wave notching or discrete elevation or depression of the ST segment are visible.
   - **oni tor**: use under normal monitoring conditions.
   - **ur r** : use when the signal is distorted by high frequency or low frequency interference. High frequency interference usually results in large amplitude spikes making the ECG signal look irregular. Low frequency interference usually leads to wandering or rough baseline. The surgery filter reduces artifacts and interference from electrosurgical units. Under normal measurement conditions, selecting **ur r** may suppress certain features or details of the QRS complexes.
   - : recommended for ST monitoring.

wit in nor t ot Fi t r

The notch filter removes the line frequency interference. To switch on or off the notch filter, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **tup** tab.
3. Switch on or off **ot Fi t r**.

E

- **not i t r an on , swit on or o w n ECG Fi t r iss t to Dia nosti In ot r i t r o s t not i t ris a wa s on**

Disabling the Smart Lead Off Function

The monitor provides the smart lead off function. When the lead corresponding to the first ECG wave gets detached but another lead is available, the monitor automatically switches to the available lead to recalculate heart rate, and to analyze and detect arrhythmias. When you reconnect the detached leads, the monitor automatically switches back to the original lead.

The smart lead off function is enabled by default. To disable this function, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **Setup** tab.
3. Switch off **Smart Lead**.

Adjusting the QRS Volume

To adjust the QRS volume, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **Setup** tab.
3. Set **QRS Volume**.

When valid SpO_2 measurements are available, the monitor adjusts the pitch of QRS tone based on the SpO_2

onitorin Arr t ia

Arrhythmia monitoring is intended for adult, pediatric and neonatal patients.

Arr t ia a t In or ation

A I G

- H art rat r a in a a t ar ia arr t ias Do not r ntir on art rat a ar s w n onitorin pati nts wit arr t ias A wa s pt s pati nts un r os surv i an
- arr t ia ana sis pro ra is int n to t tv ntri u ar arr t ias an atria i ation ltis not si n to t ta t atria or suprav ntri u ar arr t ias lt a in orr t i nti t pr s n or a s n o an arr t ia r or ap si ian ust ana t arr t ia in or ation wit ot r ini a in in s
- Atria i ation A Fi a t tion un tion is not int n or p iatri pati nts
- Atria i ation A Fi a r ot Captur an a r ot a in t tion un tions ar not

Arrhythmia	Description
Run PVCs	More than two consecutive PVCs, but lower than the V-Brady PVCs limit, and the ventricular rate is lower than the V-Tach rate limit.
Couplet	A Pair of PVCs detected in between normal beats.
Multiform PVC	Multiform PVCs detected in Multif. PVC's Window (which is adjustable).
PVC	One PVC detected in between normal beats.
Bigeminy	A dominant rhythm of N, V, N, V, N, V.
Trigeminy	A dominant rhythm of N, N, V,N, N, V, N, N, V.
Tachy	The heart rate is greater than the tachycardia limit.
Brady	The heart rate is lower than the bradycardia limit.
Pacer Not Capture	No QRS complex detected for 300 ms following a pace pulse (for paced patients only).
Pacer Not Pacing	No pace pulse detected for 1.75 x average R-to-R intervals following a QRS complex (for paced patients only).
Missed Beat	At least 3 consecutive Ns, and The current RR interval is greater than 1.5 x previous RR interval, and The next RR interval is lower than 1.5 x average RR interval, and HR lower than 100 and the current RR interval is greater than 1.75 x average RR interval , or HR is greater than or equal to 100 and the current RR interval is greater than 1000 ms.
Nonsus V-Tach	The number of consecutive PVCs is lower than the V-Tach PVCs limit but greater than 2, and the ventricular rate is greater than or equal to the V-Tach Rate limit.
Vent Rhythm	The number of consecutive PVCs is greater than or equal to the V-Brady PVCs limit, and ventricular rate is greater than or equal to the V-Brady Rate limit but lower than V-Tach Rate limit.
Pause	No QRS complex is detected within the set pause time threshold.
Irr Rhythm	Consistently irregular rhythm (N, irregular RR interval change is greater than 12.5%)
A-Fib (for adult only)	P wave is absent and normal beat RR intervals are irregular.
PVCs/min	PVCs/min exceeds high limit.
Pauses/min	Pauses/min exceeds high limit.
Irr Rhythm End	Irregular rhythm no longer detected for the irregular rhythm end delay time.
A-Fib End (for adult only)	Atrial fibrillation no longer detected for the A-Fib end delay time.

nor a at v ntri u ar at

Disp a in Arr t ia In or ation

You can display the arrhythmia information in the numeric area. To do so, follow this procedure:

1. Access **i a out** using either of the following ways:
   - Select the **r n tup** quick key → select the **i a out** tab.
   - Select **ain nu** quick key → from the **Disp a** column select **i a out**.
2. Click the numeric area where you want to display the arrhythmia information, and then select ECG → **Arr t ia**.

C an in Arr t ia tti n s

C an in Arr t ia A ar tti n s

To set the arrhythmia alarm properties, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **Arr t ia** tab→ **A ar** tab.
3. Set alarm properties as desired.

E

- **You an swit o t a arr t ia a ar s on w n ou av on i ur t onitor to a ow t a arr t ia a ar s to , turn o For or in or ati on s *tt n Gu r ts***
- **pri ori t o t a arr t ia a ar sis a wa s i lt annot , a t r**

C an in Arr t ia

tti n r s o s or C at A ar s

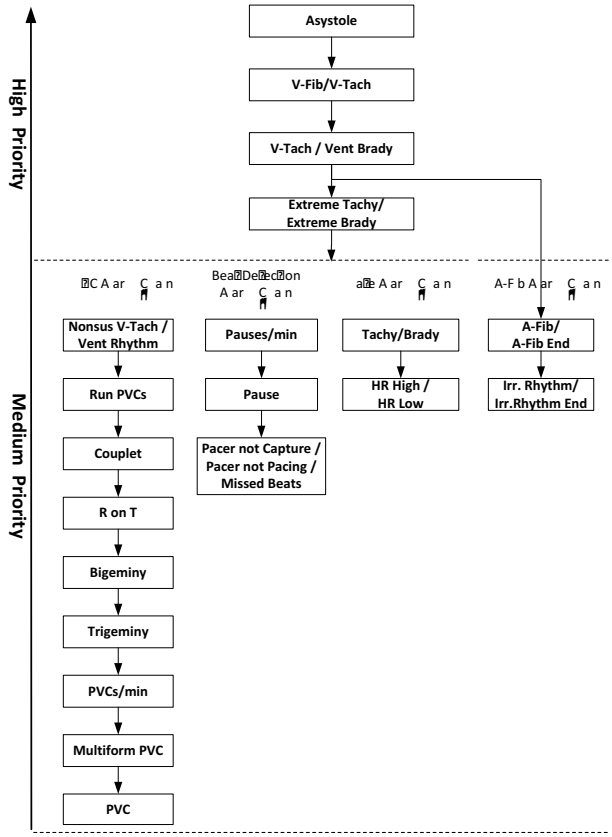
PVC-related alarms are detected on the basis of the current PVC rate and the number of consecutive PVCs.

To set the required thresholds for PVC-related alarms, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the **Arr t i a** tab → select the **or r s o**

Arr t ia Aar C ains

If multiple alarms overlap, announcing all of the detected alarm conditions would be confusing, and a more serious condition might be overlooked. So arrhythmia alarms are prioritized by alarm "chains".



Arr t ia Aar i in u s

The following table explains how audible and visual alarms are indicated during arrhythmia alarm shielding period.

r vious aar	Curr nt aar	Aar in i ation
Aar in i priorit ain	Alarm in high priority chain	Alarm light and alarm tone
	Alarm in medium priority chain	During the shielding period, alarm light and alarm tone are disabled. When the shielding period is reached, alarm light and alarm tone are reactivated.
Aar in iu priorit ain	Alarm in high priority chain	Alarm light and alarm tone
	Alarm in the same medium priority chain, but with higher priority	Alarm light and alarm tone
	The same alarm reoccurs	During the shielding period, alarm light and alarm tone are disabled. When the shielding period is reached, alarm light and alarm tone are reactivated.
	Alarm in the same medium priority chain, but with lower priority	During the shielding period, alarm light and alarm tone are disabled. When the shielding period is reached, alarm light and alarm tone are reactivated.
	Alarm in other medium priority chain	Alarm light and alarm tone

Arr t ia A ar ra tor ri o

For the following eight alarms in medium priority chain, there is a 30-second refractory period. That is to say, if the same alarm is not presented within 30 seconds after the previous alarm disappears.

- Couplet
- R on T
- PVCs/min High
- Multiform PVCs
- PVC
- Missed Beat
- Pacer Not Capture
- Pacer Not Pacing

nt onitorin

ST segment analysis is intended for adult, pediatric and neonatal patients. To use this feature, the monitor must be labeled to support ST analysis.

a t In or ation

A l G

- s nt viationvaus a a t su atorsas rtain ru sor ta oi an on u tion isturan s
- viationisot n a uat atai o s t ro t Jpoint C an sin artrat a a t
- si nii an o t s nt an sn to a, t r in a, a inii an
- is onitorprovi sin or ationr ar in an sin viation v s ini a si nii an o t v an in or ations ou a, t r in a, ap si ian

Ena in onitorin

The ST monitoring function is disabled by default. Before you start ST monitoring, enable the ST function. To do so, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the tab→ select the **tup** tab.
3. Switch on **Ana sis**.

Reliable ST monitoring cannot be ensured under the following situations:

- You are unable to get a lead that is not noisy.
- Arrhythmias, such as atrial fibrillation or atrial flutter, which may cause an irregular baseline.
- The patient is continuously ventricularly paced.
- The patient has left bundle branch block.

In these cases, you may consider switching off ST monitoring.

Dispain D viation u ri s

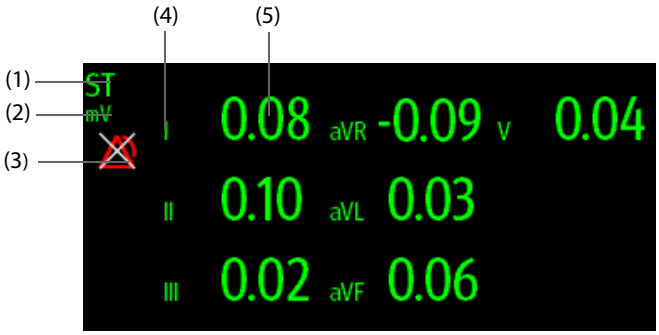
To display ST numerics, follow this procedure:

1. Access **i a out** by either of the following ways:
   - Select the **r n tup** quick key → select the **i a out** tab.
   - Select **ain nu** quick key → from the **Disp a** column select **i a out**.
2. Click the numeric area where you want to display the ST numerics, and then select **ECG** → .

The ST parameter display area is configured differently according to the ECG cable used:

- When you are using the 3-lead ECG leadwires, a separate ST numeric area does not appear on the display. The ST deviation value displays in the ECG numeric area.
- When you are using the 5-lead ECG leadwires, the ST numeric area displays 7 ST deviation values: ST-I, ST-II, ST-III, ST-aVR, ST-aVL, ST-aVF, ST-V.

This example shows the ST numeric area when 5-lead ECG cable is used. The monitor screen may look slightly different:



(1) Parameter label

(2) ST measurement unit

(3) ST alarm off symbol

(4) Lead labels

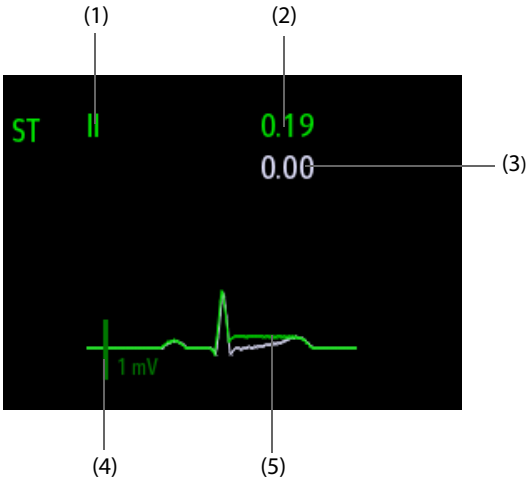
(5) ST numerics: a positive value indicates ST segment elevation, and a negative value indicates ST segment depression.

Displaying ST Segments in the Waveform Area

You can display ST segments in the waveform area. To do so, follow this procedure:

1. Access the **ST Setup** by either of the following ways:
   - Select the **Screen Setup** quick key → select the **ST Setup** tab.
   - Select **Main Menu** quick key → from the **Display** column select **ST Setup**.
2. Select the waveform area where you want to display the ST segments, and then select **ECG** → **ST Segment**.

ST segment shows a QRS complex segment for each measured ST lead. The current ST segment is drawn in the same color as the ECG wave, usually green, superimposed over the stored reference segment, drawn in a different color. The information is updated once every ten seconds.



(1) ST lead

(2) Current ST deviation value

(3) Baseline ST deviation value

(4) 1 mV scale

(5) Current ST segment (green) and baseline ST segment (white)

Entering the ST View

In ST View mode a complete QRS segment for each ST lead is displayed. The color of the current ST segments and ST deviation values is consistent with the color of the ECG waveforms, normally green. The color of the baseline ST segments and ST deviation values is white.

To enter the ST View, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the tab.
3. From the bottom of the dialog, select **View**.

Saving the Current ST Deviation and Setting as Baseline

ST deviation is typically monitored as a relative change from a baseline value. Set an ST baseline when ST deviation values become stable. If you did not set the ST baseline, the monitor automatically saves the baseline when valid ST deviation values appear for 5 minutes. To set the ST baseline, follow this procedure:

1. From the **View**, select **Set Baseline**.
2. From the pop-up dialog box, select to set the current ST segments and values as the baseline.

From the **View**, you can also perform the following operations:

- Display or hide ST baseline by selecting **Display Baseline** or **Hide Baseline**.
- Display or hide the position of ISO point, J point and ST point by selecting **Display Marker** or **Hide Marker**.

CAUTION

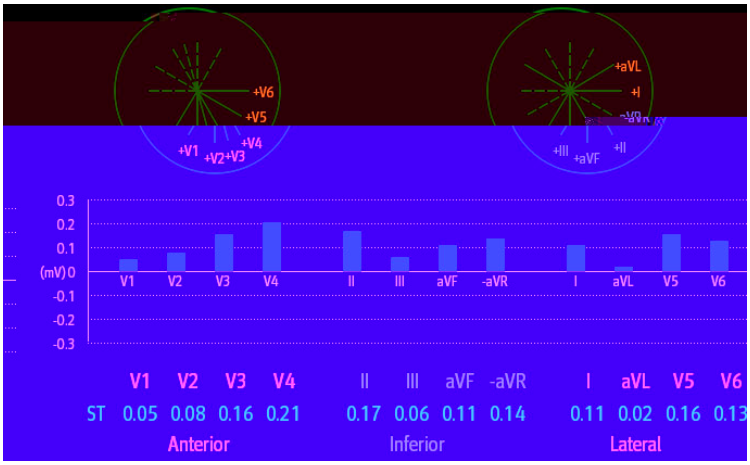
- Palpation may cause inaccurate ST measurements.

Entering the ST Graphic

To display the **Graphic**, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the tab.
3. Select **Graphic**.

The following figure shows the ST Graphic when **Area** is set to **Absolute**. The height of the bar indicates the ST deviation value of corresponding ST lead. The color of the bar indicates ST alarm status: green indicates that corresponding ST deviation value is within alarm limits; cyan, yellow and red indicate that the ST deviation value exceeds the alarm limits. The color matches ST alarm priority.



The following figure shows the ST Graphic when **Alarm** is set to **Relative**. The height of grey bar indicates the baseline ST deviation value and the green bar (cyan, yellow or red if an alarm occurs) indicates relative ST from that baseline.

Changing Settings

Setting Alarm Properties

To set ST alarm properties, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the tab→ **Alarm** tab.
3. Set **Alarm** to **Absolute** or **Relative**.
   - **Absolute**: you can separately set the alarm properties for each ST alarm for each lead.
   - **Relative**: you can set the alarm properties for **Min** and **Dual** alarms.
4. Set ST alarm properties.

Changing Waveform Display

The monitor automatically selects the three most deviated leads for ST display. You can also manually select the leads. To do so, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the tab → select the **Setup** tab.
3. Set **Lead**. You can select up to 3 leads.

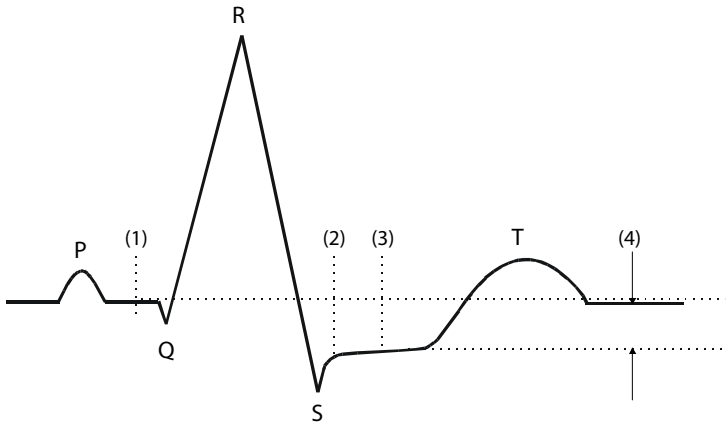
Showing ISO Point, J Point and ST Point Markers

In the waveform area, the ISO point, J point, and ST point marker do not display on the ST segments by default. To display these markers, follow this procedure:

A ustin asur nt oints

A out oint l oint an J oint

The ST deviation value for each beat is the potential difference between the isoelectric (ISO) point and the ST point. The ISO point provides the baseline. The ST point is located between the J point and the start of the T-wave. The J point is the end of the QRS complex. As the ST point is at a fixed distance away from the J point (40, 60, 80 etc msec), manually adjusting the J point helps you correctly position the ST point.



(1) ISO point (2) J point (3) ST point (4) ST deviation

tin oint l oint an J oint

CA l

- **l Auto A ust is ori t pati nts, art rat or ECG orp o o an ssi ni i ant t l an points n to a, o asiona a ust a, aus t is a a tt int rva an t ust, o ation o t point Fa s s nt pr ssion or vation a o uri t iso tri point or t point isin orr t s t**
- **A wa s nsur t att o ations o points ar appropri at or t pati nt**

To set the ST point, ISO point, and J point, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the tab→ select the **A ust** tab.
3. Set oint.

The setting for **Auto A ust** defines the method of adjusting the ISO and J point locations. **Auto A ust** is enabled by default. In this case, the locations of the ISO point and J point are automatically determined by the algorithm. When **Auto A ust** is disabled, you need to manually adjust the position of the ISO point and J point using the arrows at the right sides of **I** and **J**.

- The ISO point (isoelectric) location shown is relative to the R-wave peak. Position the ISO point in the middle of the flattest part of the waveform (between the P and Q waves).
- The J point location is indicated relative to the R-wave peak. Position the J point at the end of the QRS complex and the beginning of the ST segment.
- The ST point is positioned a fixed distance from the J point. Position the ST point relative to the J point at **J s**, **J s**, **J s** or **J s**. When **J s** is selected, the ST point will be positioned 80 ms (heart rate 120 bpm or less) or 60 ms (heart rate more than 120 bpm) from the J point.

Int rva onitorin

The QT interval is the time between the beginning of the Q-wave and the end of the T-wave. It represents the total duration of the depolarization (QRS duration) and repolarization (ST-T) phases of the ventricles. QT interval monitoring can assist in the detection of long QT syndrome.

The QT interval has an inverse relationship to heart rate. Faster heart rates shorten QT interval and slower heart rates prolong QT interval. Therefore, several formulas are commonly used to correct the QT interval for heart rate. The heart rate corrected QT interval is abbreviated as QTc.

QT/QTc interval monitoring is intended for adult, pediatric, and neonatal patients.

onitorin i itations

Some conditions may make it difficult to achieve reliable QT/QTc monitoring, for example:

- R-wave amplitudes are too low
- The presence of frequent ventricular ectopic beats
- RR intervals are unstable
- P-waves tending to encroach on the end of the previous T-wave at high heart rates
- The T-wave is very flat or T-wave are not well defined
- The end of the T-wave is difficult to delineate because of the presence of U-waves
- QTc measurements are not stable
- In the presence of noise, asystole, ventricular fibrillation, atrial fibrillation, or ECG lead off

For reliable QT/QTc monitoring, choose lead with good T-wave amplitude and no visible flutter activity, and without a predominant U-wave or P-wave.

Some conditions such as left or right bundle branch block or ventricular hypertrophy can lead to a widened QRS complex. If a long QTc is observed you should verify it to ensure that it is not caused by QRS widening.

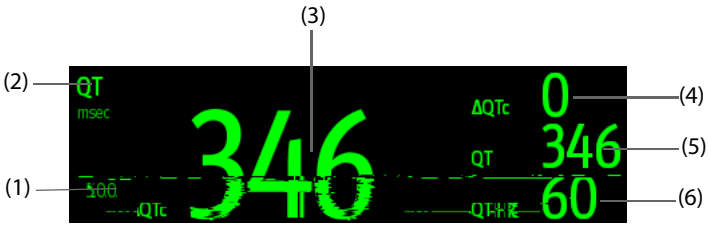
Because normal beats followed by ventricular beats are not included in the analysis, no QT measurement will be generated in the presence of a bigeminy rhythm.

If the heart rate is extremely high (over 150 bpm for adults and over 180 bpm for pediatrics and neonates), QT will not be measured. When the heart rate changes, it can take several minutes for the QT interval to stabilize. For reliable QTc calculation it is important to avoid measurements when the heart rate is changing.

Ena in onitorin

The QT monitoring function is disabled by default. Before

The following picture shows the QT numeric area. The monitor screen may look slightly different:



(1) QTc alarm limit (if QTc alarm is off, the alarm off symbol is displayed)

(2) Parameter label (3) QTc value

(4) ΔQTc value (the difference between the current and baseline QTc values)

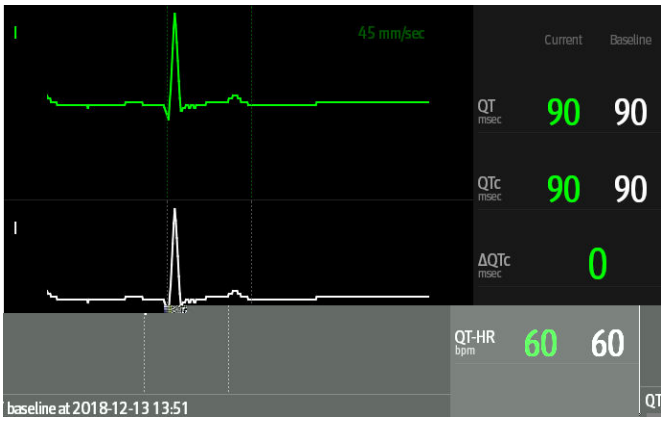
(5) QT value

Entering the QT View

QT View shows the current and baseline QT parameter values and waveforms. To enter QT View, follow this procedure:

1. Select the ECG numeric area or waveform area to enter the **ECG** dialog.
2. Select the tab.
3. Select **View**.

The following picture shows a typical QT view.



- The current waveform is shown in the upper half in green.
- The baseline waveform is shown below in white.
- The waveform of selected lead is highlighted, while the waveforms of other leads are in light green or light gray.
- The start of the QRS complex and the end of the T wave are marked with a vertical line.
- In some conditions, no QT measurement can be made. Then the cause of failed QT measurement is shown at the bottom of the QT numerics area and the message "Cannot Analyze QT" is shown in the technical alarm area.

Select the left or right arrow to switch leads, and the corresponding waveform will be highlighted.

Saving the Current Values as Baseline

In order to quantify changes in the QTc value, you can set a QTc baseline. If no baseline has been set for this patient within the first five minutes after getting valid QT values, the monitor will automatically set a baseline. To set the current values as baseline, follow this procedure:

1. From the **View**, select **Set Baseline**.
2. From the pop-up dialog box, select . This baseline will then be used to calculate ΔQTc.

If you set a new baseline the previous baseline is discarded.

From the **View**, you can also perform the following operations:

- Select the left or right arrow to select a lead label to highlight corresponding waveform.
- Select **Display Baseline** or **Hide Baseline** to display or hide the baseline waveform.

CALC

•

2. Select **arn**.

CA I

- **Initiat ECG r arnin on urin p rio so pr o inant nor a r t an w nt ECG si na isr ativ nois r l ECG arnin ta spa urin arr t ias t topi a, ats a a, in orr t arn as nor a o p s is a r sutin iss t tion o su a, s qu nt arr t ia v nts**

D i a, i ation n roni ation u s utput

The monitor provides an analog out connector to output synchronization pulses for defibrillators. If a defibrillator is connected, it receives a synchronization pulse (100 ms, +5 V) through the analog out connector each time an R-wave is detected.

A I G

- **A or in to IEC t pa o t s n roni i a, i ator is ar s ou a, iv r wit in so t pa o t wav si na att ECG output s n pus ont onitoris a a, ai u o st jo i a nin rs ou vri t att ECG D i a, i ator o j nation o s not r o n ai u a o s**
- **B or i a, i ation nsur t at a, ot i a, i ator an onitor av pass t s st t st an an a, sa us to t r**

ECG rou a, s ootin

This section lists some of the problems that might be encountered during ECG monitoring. If you encounter problems when using the monitor or accessories, check the table below before requesting for services. If the problem persists after you have taken corrective actions, contact the service personnel.

E

- **For t p sio o i a an t ni a aar ssa s s App n i *DA r ss s***

ro a,	Corr tiv A tions
Noisy ECG traces	1. Check that the electrodes are not detached or dry. Replace with fresh and moist electrodes if necessary. 2. Check that leadwires are not defective. Replace leadwires if necessary. 3. Check that the patient cable or leadwires are not routed too close to other electrical devices. Move the patient cable or leadwires away from electrical devices and their cables if necessary.
Excessive electrosurgical Interference	Use ESU-proof ECG cables. For more information, see *28.1 ECG Accessories*.
Muscle Noise	Inadequate skin preparation, tremors, tense subject, and/or poor electrode placement. 1. Perform skin preparation again and re-place the electrodes. For more information, see *8.4.1 Preparing the Patient Skin* and *8.4.2 Applying Electrodes and Connecting the Patient*. 2. Apply fresh, moist electrodes. Avoid muscular areas.
Intermittent Signal	1. Check that cables are properly connected. 2. Check that electrodes are not detached or dry. Perform skin preparation again as described in *8.4.1 Preparing the Patient Skin* and apply fresh and moist electrodes. 3. Check that the patient cable or leadwires are not damaged. Change them if necessary.

Excessive alarms: heart rate, lead fault	1. Check that electrodes are not dry. Perform skin preparation again and replace the electrodes. For more information, see *8.4.1 Preparing the Patient Skin* and *8.4.2 Applying Electrodes and Connecting the Patient*. 2. Check for excessive patient movement or muscle tremor. Reposition the electrodes. Replace with fresh and moist electrodes if necessary.
Low Amplitude ECG Signal	1. Check that the ECG gain is not set too low. Adjust the gain as required. For more information, see *8.5.3.2 Changing ECG Waveform Size*.

/ onitorin l p an spiratio sp

sp Intro u tion

Impedance respiration is measured across the thorax. When the patient is breathing or v

(1) Resp waveform gain (2) Resp lead label (3) Alarm limits

(4) Respiration rate (RR) (5) RR source

E

- **I E proo ECG a, sar us t, sp wav or ar awi isp a t, ssa C, a s. pa t, ECG a, i n ssar**

r parin or l p an sp onitorin

r parin t, ati nt

Follow this procedure to prepare the patient:

1. Shave hair from skin at chosen sites.
2. Gently rub skin surface at sites to remove dead skin cells.
3. Thoroughly cleanse the site with a mild soap and water solution.
4. Dry the skin completely before applying the electrodes.

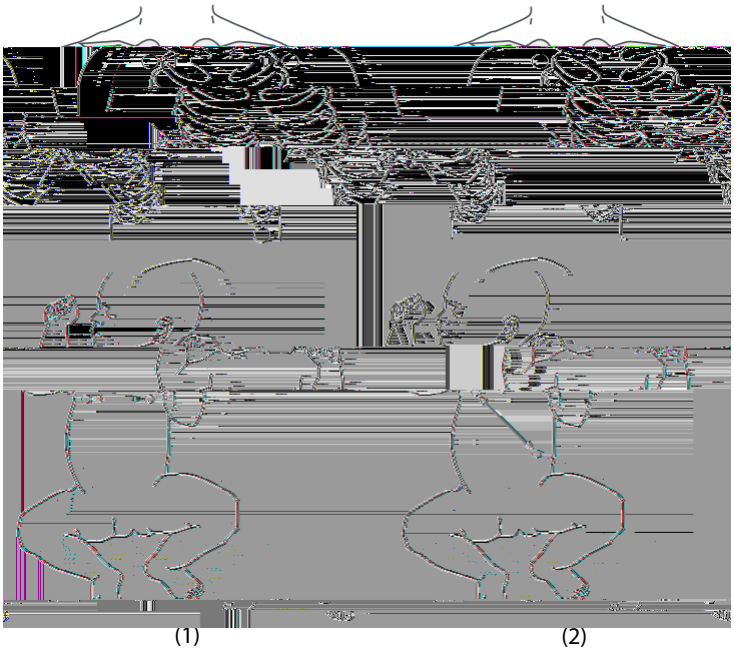
CA I

- **rop rs inpr paratonisn ssar or oo si na quait att, tro sit, ast, s inisapoor on u toro tri it**

ain t, E tro s

Impedance respiration is acquired using standard ECG electrodes and cables. Either lead I (RA-LA) or lead II (RA-LL) can be used.

For more information, see *8.4.4 ECG Electrode Placements*.



(1) (2)

(1) Lead I (2) Lead II

CA I

- Corr t tro pa nt an ptor u int r rn ro ar ia r at i p an an s avoi in u in t iv rar aan t v ntri so t art a, tw nt r spirator tro s isisparti u ar i portant orn onat s
- o pati ntswit r stri t ov nts ar at ain a a, o ina lnt s ass ou a n topa t t tro ont ta a, o natt point o ai u a a, o ina pansion to opti i t r spirator wav or
- o pati nts sp ia n onat s pan t ir sts at ra ausin an ativ intrat ora i pr ssur lnt s as sitis a, tt r topa t twor spiration tro sint ri t i ai ar an t t at ra star asatt pati nts ai u point o t ar at in ov nt to opti i t i p an r spirationwav or
- o opti i t i p an r spirationwav or pa t Aan A tro s ori onta w n onitorin r spirationwit ECG a l pa t Aan tro s ia ona w n onitorin r spirationwit ECG a ll
- rio i a insp t tro appi ationsit sto nsur s inint rit l t s inquait an s r pa t tro sor an t appi ationsit

E

- tor t tro satroo t p ratur p nt tro pa a i iat prior to us
- C t att tro pa a sar inta tan t att tro sar not past t piration at Ensur t tro is oist

C an in sp ttin s

ttin t sp A ar rop rti s

To set the Resp alarm properties, follow this procedure:

1. Select the Resp numeric area or waveform area to enter the **sp** dialog.
2. Select the **A ar** tab.
3. Enter the password if required. For more information, refer to *24.13.3 Selecting Password for User Authentication*.
4. Set alarm properties as desired.

ttin t our

To set RR source, follow this procedure:

1. Select the Resp numeric area or waveform area to enter the **sp** dialog.
2. Select the **tup** tab.
3. Choose **our** from the dropdown list.

When you select **Auto**, the monitor automatically selects the RR source following order of priority: first **C** , and then **ECG**. When the manually selected RR source is not available, the monitor automatically switches the **our** to **Auto**.

C oosin t spiration a

To set the respiration lead, follow this procedure:

1. Select the Resp numeric area or waveform area to enter the **sp** dialog.
2. Select the **tup** tab.
3. Set **sp a** .

If you cannot get an acceptable impedance Resp waveform or you suspect the veracity of the Resp value after choosing the Resp lead, you may need to adjust the electrode placement.

Setting the Resp Waveform Size

To set the Resp waveform size, follow this procedure:

1. Select the Resp numeric area or waveform area to enter the **Resp** dialog.
2. Select the **Setup** tab.
3. Set **Gain**.

Setting the Resp Waveform Speed

To set the Resp waveform speed, follow this procedure:

1. Select the Resp numeric area or waveform area to enter the **Resp** dialog.
2. Select the **Setup** tab.
3. Set **Speed**.

Setting the Auto Detection Switch

To set the auto detection switch, follow this procedure:

1. Select the Resp numeric area or waveform area to enter the **Resp** dialog.
2. Select the **Setup** tab.
3. Switch on or off **Auto Resp Detection**.
   - If **Auto Resp Detection** is switched on, the monitor automatically adjusts the Resp waveform detection level, or threshold.
   - If **Auto Resp Detection** is switched off, you have to manually adjust the Resp waveform threshold. For more information, see *9.5.7 Adjusting the Resp Waveform Detection Threshold*.

In the auto threshold detection mode, if you are monitoring Resp and the ECG parameter is switched off, the monitor cannot compare the heart rate and Resp rates to detect cardiovascular artifact. The respiration detection level is automatically set higher to prevent the detection of cardiovascular artifact as respiration.

In the manual detection mode (where auto threshold detection is off), cardiovascular artifact can, in certain situations, trigger the respiration rate counter. This may lead to a false indication of a high respiration or an undetected apnea condition. If you suspect that cardiovascular artifact is being registered as respiratory activity, raise the detection level above the zone of cardiovascular artifact. If the Resp wave is so small that raising the detection level is not possible, you may need to optimize the electrode placement.

Adjusting Resp Detection Level

Use the manual detection mode (where auto threshold detection is off) in the following situations:

- The respiration rate and the heart rate are close.
-

onitorin us n aturation p 2

p Intro u tion

Pulse Oxygen Saturation (SpO_2) monitoring is a non-invasive technique used to measure the amount of oxygenated hemoglobin and pulse rate by measuring the absorption of selected wavelengths of light. The light generated in the emitter side of the probe is partly absorbed when it passes through the monitored tissue. The amount of transmitted light is detected in the detector side of the probe. When the pulsative part of the light signal is examined, the amount of light absorbed by the hemoglobin is measured and the pulse oxygen saturation can be calculated. This device is calibrated to display functional oxygen saturation.

SpO_2 monitoring is intended for adult, pediatric and neonatal patients.

The monitor can be configured with Masimo or Nellcor SpO_2 module:

- Masimo SpO_2: the connector is purple and the logo of Masimo SET.
- Nellcor SpO_2: the connector is grey and the logo of Nellcor.

E

- p 2 tnsion a, us ust a, o pati a, wit t p 2 s nsor onn tors us For a p on t asi o p 2 tnsion a, an a, onn t tot asi o p 2 s nsor onn tors
- asur nt a ura vri iation p a ura as a, nvri i in u an pri nts a, o parin wit art ria a,oo sa p r rh asur wit aC oi t r us oi t r asur nts ar statisti a istri ut an a,out two tir so t asur nts ar p t to o wit int sp ii a ura ran o par toC oi t r asur nts
- A un tiona t st ror p 2 si uator an a, us to t r in t pus rat a ura
- A un tiona t st ror p 2 si uator annot a, us to ass sst p 2 a ura

p a t In or ation

A I G

- natr n towar pati nt o nationisin i at ana t a,oo sa p s wit a a,orator o o i t r to o p t un rstan t pati nts on ition
- Do not us p s nsors urin an ti r sonan i ain l ln u urr nt ou pot ntia aus s,urns s nsor a a tt li a an t lunit a a tt a ura o t oi t r asur nts
- ro on ontinuous onitorin a in ras t ris o un sira a, an sins in ara t risti s su asirritation r nin a,ist rin or a,urns Insp tt s nsor sit v r two ours an ov t s nsori t s inquait an s C an t appi ationsit v r our ours For n onat s or pati nts wit poor p rip ra a,oo ir uation ors nsitiv s in insp tt s nsor sit or r qu nt
- l t s nsor is too ti t a, aus t appi ationsit is too ar or a, o s too ar u to a ssiv pr ssur or pro on p rio s a r su tin v nous on stion ista ro t appi ationsit a in to int rstitia aan tissu is ia
- npati nts ar un r oin p oto na i t rap t a a, s nsitiv to i tsour s us oi t r a a, us on un r ar u ini a sup rvision or s ortti p rio sto ini i int r r n wit p oto na i t rap
- ttin aar i its to tr va us a aus t aar s st to a, o in tiv For a p i o n v s a pr ispos apr atur in anttor tro nta i a,ropasia l t isis a onsi ration onots tt i aar i itto w i is quiva nttoswit in o t aar

- p is pri a ai rat in at a ut vo unt rs wit nor a v so ar o o in C H an t o o in t H
- o prot t ro tri s o a wa s r ov t s nsor or at in t pati nt
- pus o i tr un tion o t si onitor s ou not us or apn a onitorin
- pus o i t r un tion o t si onitor s ou not us or arr t ia ana sis

CA I

- C an t appi ationsit orr pa t s nsor an or pati nt a w n ap rsist nt p ow i na uait ssa is ispa ont quip nt s ssa s a ini at t atpati nt onitorin ti is aust ont pati nt a or s nsor
- pa t a or s nsor w na p nsor p o nsor or p ow i na uait ssa is onsist nt ispa w i onitorin ons utiv pati nts at r o p tin trou s oot in st psist int is anua
- ariation in asur nts a pro oun an a a t sa pin t niqu as w as t pati nt sp sio o i a on itions An r suts i j tin in onsist n wit t pati nts ini a status s ou r pat an or supp nt wit a itiona t st ata B oo sa p ss ou ana a a orator instru nts prior to ini a ision a in to o p t un rstan t pati nt s on ition
- s on p s nsors sp ii int is anua Fo ow t p s nsor s instru tions or us an a r to a warnin s an autions
- Do not pa t a si onitor w r t ontro s an an t pati nt
- l usin pus o i tr urin u o irra iation pt s nsor out o t ra iation i l t s nsor is pos to t ra iation t r ain i t a ina urat ort vi i tr a ro or t uration o t ativ irra iation prio

E

- A itiona in or ation sp ii to t asi os nsors o pati wit t quip nt in u in in or ationa out para t r asur nt p r or an urin otion an ow p rusion a oun int s nsors ir tions or us DF
- asi o a san s nsors ar provi wit X Ca t no o to ini i t ris o ina urat r ain san unanti ipat oss o pati nt onitorin rto t Ca or nsor DF ort sp ii uration o t pati nt onitorin ti

p asur nt i itations

The following factors may influence the accuracy of SpO_2 measurement:

- Patient physiological characteristics:
  - Cardiac arrest
  - Hypotension
  - Darkly pigmented skin
  - Shock
  - Severe vasoconstriction
  - Hypothermia
  - Severe anemia
  - Ventricular septal defects (VSDs)
  - Venous pulsations
  - Poor perfusion
  - Dysfunctional hemoglobin, such as carboxyhemoglobin (COHb) and methemoglobin (MetHb)
  - Elevated levels of bilirubin
  - Vasospastic disease, such as Raynaud's, and peripheral vascular disease

- Hemoglobinopathies and synthesis disorders such as thalassemias, Hb s, Hb c, sickle cell, etc.
-

CA I

- **Do not app s nsor too ti t ast isr su tsin v nous pu sation w i a s v r o stru t ir u ation an a toina urat asur nts**
- **At vat a i ntt p ratur s ar u wit asur ntsit st atar notw p r us aus t is an aus urns a t r pro on appi ation**
- **Avoi p ain t s nsor on tr iti swit an art ria at t r an lB u or anintravas u ar v nousin usion in**
- **For n onata pati nts a sur t ata s nsor onn tors an a apt r a onn tors ar outsi t in u ator u i at osp r insi an aus ina urat asur nts**

C an in t p ttin s

C an in t p A ar ttin s

To change the SpO_2 alarm settings, follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** dialog.
2. Select the **A ar** tab.
3. Enter the password if required. For more information, refer to *24.13.3 Selecting Password for User Authentication*.
4. Set the alarm properties as desired.

E

- **sata ar isa i v a ar noti in ou o pot nti a i t r at nin ropsin o n saturation nt p va u is owt sata ar i itan sata ar swit iss ton t ssa p D sat is ispa**
- **You an swit o t p D sata ar on w n ou av oni ur t onitor to a owt p D sata ar to turn o s s tion** ***ttn Gu r ts***

or at on s A ar ana nt

With traditional alarm management, high and low alarm limits are set for monitoring oxygen saturation. During monitoring, once an alarm limit is violated, an audible alarm immediately sounds. When the patient SpO_2 fluctuates near an alarm limit, the alarm sounds each time the limit is violated. Such frequent alarms can be distracting. Nellcor's SatSeconds alarm management technique is used to reduce these nuisance alarms.

After approximately 11 seconds, a Sat-Second alarm would sound, because the limit of 50 SatSeconds would have been exceeded.

Saturation levels may fluctuate rather than remaining stea

Maximum sensitivity is recommended for use on patients with weak signals (e.g. high ambient noise and/or patients with very low perfusion) and for use during procedures or when clinician and patient contact is continuous such as in higher acuity settings.

To set SpO_2 sensitivity, follow this procedure:

1. Select the SpO

To set the averaging time, follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** | dialog.
2. Select the **tup** tab.
3. Set **Av ra in** .

onitorin p an IB i u tan ous

When monitoring SpO_2 and NIBP on the same limb simultaneously, you can switch on **IB i u** to lock the SpO_2 alarm status until the NIBP measurement ends. If you switch off **IB i u** , low perfusion caused by NIBP measurement may lead to inaccurate SpO_2 readings and therefore cause false physiological alarms.

To set the **IB i u** , follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** | dialog.
2. Select the **A ar** tab.
3. Set **IB i u** .

C an in t w p p o t t av or

To set the sweep speed of Pleth waveform, follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** | dialog.
2. Select the **tup** tab.
3. Set **p** .

C an in t tti n s

C an in t A ar tti n s

To change the PR alarm settings, follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** | dialog.
2. Select the tab.
3. Enter the password if required. For more information see *24.13.3 Selecting Password for User Authentication*.
4. Set the alarm properties as desired.

C an in t ou

If the **A ar our** is set to , the QRS tone is derived from PR measurements. To set the QRS volume, follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** | dialog.
2. Select the tab.
3. Select the **tup** tab.
4. Set **ou** .

If the SpO_2 value is valid, the monitor also adjusts the QRS tone (pitch tone) according to the SpO_2 value. For information, see*24.14.4 Setting the SpO_2 Tone Mode*.

E

- **C an in t vou s tti n sint tup pa aso an st vou s tti n sint tup pa o t ECG ia o**

tti n t _ our

Current pulse source is displayed in the PR numeric area if current PR source is not SpO_2. The PR from current pulse source has the following characteristics:

- PR is stored in the monitor's database and can be reviewed in the graphic and tabular trends.In graphic trends, as the PR curve has the same color as that of current PR source.
- PR is sent via the network to the CMS, if available.

To set which parameter is used as a PR source, follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** | dialog.
2. Select the _ tab.
3. Select the **tup** tab.
4. Set _ **our** .

The dropdown list of the _ **our** displays the currently available PR sources from top to bottom by priority. When you select **Auto**, the system will automatically select the first option as the PR source. If the current PR source is unavailable, the system will automatically switch _ **our** to **Auto**. When you select **IB** , the system will automatically select the first pressure label as the PR source.

owin Hi in _

You can set whether to display the PR value in the SpO_2 parameter area. To do so, follow this procedure:

1. Select the SpO_2 numeric area or waveform area to enter the **p** | menu.
2. Select the _ tab.
3. Select the **tup** tab.
4. Switch on or off **Disp a** _

Disp ain p tatisti s

You can show SpO_2 statistics for a defined period of time on the normal screen and the Target Goal screen.

To display SpO_2 statistics on the normal screen, follow this procedure:

1. Access the **i a out** in either of the following ways:
   - Select the **r n tup** quick key → select the **i a out** tab.
   - Select the **ain nu** quick key → from the **Disp a** column select **i a out**.
2. Select the parameter numeric area where you want to display SpO_2

Problem	Solution
Do not see SpO_2 numeric area or waveform area on the main screen	1. Check that the SpO_2 is set to display in the **Screen Setup → Display Setup** page. For more information, see *3.9.2 Displaying Parameter Numerics and Waveforms*. 2. Check that the SpO_2 parameter switch is enabled. If not, enable the SpO_2 measurement. For more information, see *3.9.1 Switching On or Off a Parameter*. 3. Check that the cable connections of the SpO_2 sensor and the extension cable are tight. Replace the SpO_2 sensor or the extension cable if needed.
Dashes "- -" display in place of numerics	1. Check that the cable connections of SpO_2 sensor and the extension cable are tight. Replace the SpO_2 sensor or the extension cable if needed. 2. Reconnect the SpO_2 sensor if the alarm **Please Check Sensor** appears. 3. Check the PI value. If the PI value is too low, adjust the SpO_2 sensor, or apply the sensor to a site with better perfusion. 4. Move the sensor to a place with weaker ambient light, or cover the sensor to minimize the ambient light if the alarm **Please Shield Sensor from Light** appears.
Low amplitude SpO_2 signal	1. The SpO_2 sensor and NIBP cuff are placed on the same limb. Change the monitoring site if necessary. 2. Check the PI value. If the PI value is too low. Adjust the SpO_2 sensor, or apply the sensor to a site with better perfusion.
SpO_2 value is inaccurate	1. Check the patient's vital signs. 2. Check for conditions that may cause inaccurate SpO_2 readings. For more information, see *10.3 SpO_2 Measurement Limitations*. 3. Check the monitor or the SpO_2 module for proper functioning.

Nellcor Information

Patents

This posting serves as notice under 35 U.S.C.§287(a) for Covidien patents: http://www.covidien.com/patents.

Disclaimers

Possession or purchase of this device does not convey any express or implied license to use the device with unauthorized replacement parts which would, alone, or in combination with this device, fall within the scope of one or more of the patents relating to this device.

Masimo Information

Masimo Patents

This posting serves as notice under 35 U.S.C.§287(a) for Masimo patents: http://www.masimo.com/patents.htm.

Disclaimers

Possession or purchase of this device does not convey any express or implied license to use the device with unauthorized sensors or cables which would, alone, or in combination with this device, fall within the scope of one or more of the patents relating to this device.

as o En s r i ns A r nt

THIS DOCUMENT IS A LEGAL AGREEMENT BETWEEN YOU (“PURCHASER”) AND SHENZHEN MINDRAY. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, PROMPTLY RETURN THE ENTIRE PACKAGE, INCLUDING ALL ACCESSORIES, IN THEIR ORIGINAL PACKAGE, WITH YOUR SALES RECEIPT TO SHENZHEN MINDRAY FOR A FULL REFUND.

1. Grant of License. In consideration of payment of the license fee, which is part of the price paid for this product, Shenzhen Mindray grants to Purchaser a nonexclusive, nontransferable license, without right to sublicense, to use the copy of the incorporated software/firmware, and documentation in connection with Purchaser's use of the Masimo Products for their labeled purpose. Shenzhen Mindray reserves all rights not expressly granted to Purchaser.
2. Ownership of Software/Firmware. Title to, ownership of, and all rights and interests in, any Masimo software and/or firmware and the documentation, and all copies thereof, remain at all times vested in Masimo Corporation, licensor to Shenzhen Mindray, and they do not pass to Purchaser.
3. Assignment. Purchaser shall not assign or transfer this License, in whole or in part, by operation of law or

C an in p ratur ttin s

ttin t p ratur Aar rop rti s

To set the temperature alarm properties, follow this procedure:

1. Select the temperature numeric area to enter the p dialog.
2. Select the **A ar** tab.
3. Enter the password if required. For more information, see *24.13.3 Selecting Password for User Authentication*.
4. Set the alarm properties as desired.

tin t p ratur a

Select the temperature label according to the measurement site. To do so, follow this procedure:

1. Select the temperature numeric area to enter the p dialog.
2. Select the **tup** tab.
3. Set the temperature label.

a	D s ription	a	D s ription
T1	Temperature of application site 1	T amb	Ambient temperature
T2	Temperature of application site 2	T airw	Airway temperature
T skin	Skin temperature	T vesic	Vesical temperature
T core	Core temperature	T blood	Blood temperature
T axil	Axillary temperature	T myo	Myocardial temperature
T naso	Nasopharyngeal temperature	T tymp	Tympanic temperature
T eso	Esophageal temperature	T cereb	Cerebral temperature
T rect	Rectal temperature		

Dispain t p ratur Di r n

To display the temperature difference between two measurement sites, switch on ΔT. To do so, follow this procedure:

1. Select the temperature numeric area to enter the p dialog.
2. Select the **tup** tab.
3. Switch on .

p ratur rou s ootin

This section lists the problems that might occur. If you encounter the problems when using the equipment or accessories, check the table below before requesting service. If the problem persists, contact your service personnel.

E

- **For t p sioo i an t ni a aar ssa s s App ni *DA r ss s***

ro	o uti on
Do not see Temp numeric area on the main screen	1. Check that if the Temp parameter switch is enabled. If not, enable the Temp measurement. For more information, see *3.9.1 Switching On or Off a Parameter*. 2. Check that the connections of the temperature probe and the temperature cable are tight.
Measurement fails/'--' is displayed in the Temp numeric area	1. If using a disposable probe, check the connection between the probe and the temperature cable. 2. Try using a known good probe in case the sensor is damaged.

onitorin oninvasiv Boo r ssur IB

IB Intro u tion

The monitor uses the oscillometric method for meas

- v r onn tintra art ria orintra v nous in s oran ot rin o pati onn tors to t IB os is an aus s riousin ur or at
- IB ia nosti si nii an ust i t ospita s ini ian sta

CA I

- asurin IB on pati nts onn t to an Intra Aorti Ba oon u p IAB a in a r su tin t IB asur nt in u in to ina urat or ai
- n us parts an a ssori ssp ii int is anua Fo ow t instru tions or us an a r to a warnin s an autions
- A ura o IB asur nt p n son usin a u o prop r si lti s ss nti a to asur i ir u r n an oos a u wit prop r si

IB asur nt i itations

Measurements are impossible with heart rate extremes of less than 30 bpm or greater than 300 bpm, or if the patient is on a heart-lung machine. The measurement may be inaccurate or impossible in the following situations:

- Regular arterial pressure pulses are hard to detect
- Excessive and continuous patient movement such as shivering or convulsions
- Cardiac arrhythmias
- Rapid blood pressure changes
- Severe shock or hypothermia that reduces blood flow to the peripheries
- On an edematous extremity
- Obesity, where a thick layer of fat surrounding a limb dampens the oscillations coming from the artery

E

- tiv n ss o t is sp o ano t r as not n sta is in pr nant wo n in u in pr a pti pati nts

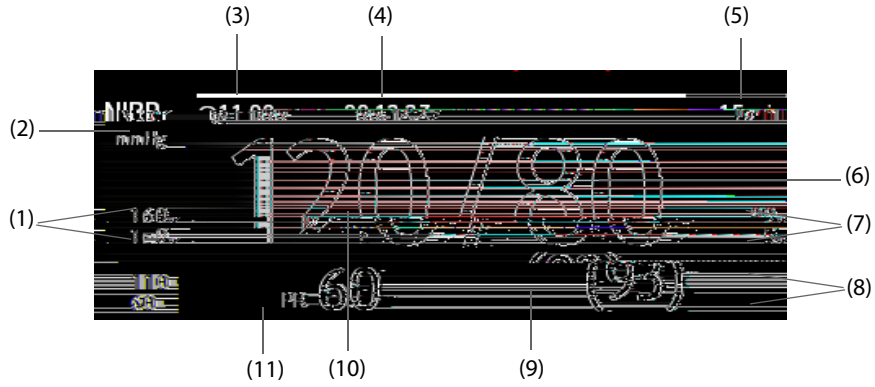
asur nt o s

The monitor provides the following NIBP measurement modes:

- Manual: measurement on demand.
- Auto: repeated measurements at set interval.
- STAT: continual rapid series of measurements over a five-minute period.
- Sequence: continually automatic measurement at set durations and intervals.

IB Disp a

The NIBP display shows only numerics.



(1) Systolic pressure alarm limits (2) NIBP unit: mmHg or kPa (3) The last NIBP measurement time

(4) Time to the next measurement (for Auto mode and Sequence mode)

(5) Measurement mode: for Auto NIBP, interval is displayed; for Sequence mode, the current phase and interval are displayed

(6) Diastolic pressure (7) Diastolic pressure alarm limits (8) Mean pressure alarm limits

(9) Mean pressure (displayed after measurement completed) or cuff pressure (displayed during the measurement)

(10) Systolic pressure (11) Pulse Rate

E

- **I IB asur nt ais XX is ispa i IB asur ntis notta n or IB asur nt sits asur ntran s is ispa**
- **IB nu ri sin a oor wit ai toutin in i at t att asur ntis o an s t oni ur IB asur nt i outti s ttn r t r sur nt out s IB va u sar notr o n orr r n**

r pari n or IB asur nts

r pari n t ati nt or IB asur nts

In normal use, perform NIBP measurement on a patient who is in the following position:

- Comfortably seated
- Legs uncrossed
- Feet flat on the floor
- Back, arm and feet supported

E

- **ltisr o n t att pati ntr ains a an r a sas u as possi a, or p r or in t asur nt an t att pati nt o snotta urin t asur nt**
- **t r a tors t at av a, ns own to r su tin an ov r sti ation o a, oo pr ssur ar a, or a, r at in u a, a r pain t**

a in t IB Cu

To place the NIBP cuff, follow this procedure:

1. Verify that the patient category setting is correct.
2. Connect the air tubing to the NIBP connector.
3. Select an appropriately sized cuff for the patient, and then wrap it around the limb directly over the patient's skin as follows:
   a Determine the patient's limb circumference.
   b Select an appropriate cuff by referring to the limb circumference marked on the cuff. The width of the cuff should be 40% (50% for neonates) of the limb circumference, or 2/3 of the length of the upper arm or the thigh. The inflatable part of the cuff should be long enough to overlap at least 50% to 80% of the limb.
   c Apply the cuff to the patient's upper arm or leg and make sure the Φ marking on the cuff matches the artery location. The cuff should fit snugly, but with enough room for two fingers to be placed between the cuff and the patient's arm (on adults), and loosely on neonates with little or no air present within the cuff. Otherwise it may cause discoloration and ischemia of the extremities. Make sure that the cuff index line falls within the range markings on the cuff. If it does not, use a cuff that fits better.
   d Middle of the cuff should be at the level of the right atrium of the heart. If it is not, use the measurement correction formula to correct the measurement. For more information, see *12.9.7 Setting the NIBP Display Format*.
4. Connect the cuff to the air tubing. Avoid compression or restriction of pressure tubes. Air must pass unrestricted through the tubing.

CA I

- **Do not tou or app t rna pr ssur a ainst t u an air tu in uri in IB asur nt is a aus ina urat oo pr ssur va u s**
- **s ar w npa in t u on an tr it us or oni tori in ot r pati nt para t rs**

tarti n an topp i n IB asur nts

Start and stop NIBP measurement by selecting the NIBP quick keys or from the NIBP dialog.

as	B ui	Fro IB ia o
Start a manual measurement	**IB tart top** quick key	**tart IB** button
Start auto NIBP series	**IB tart top** quick key	**tup** tab → set **Int rva** → **tart IB** button
	IB asur quick key →select **Int rva**	
Start NIBP sequence measurement	**IB asur** quick key → **qu n**	**qu n** tab → set NIBP sequence → **tart IB** button
Start STAT measurement	**IB A** quick key	**A** button
	IB asur quick key → **A**	
Stop the current NIBP measurements	**IB tart top** quick key	**top IB** button
End auto NIBP series or NIBP Sequence	**IB top A** quick key	**IB top A** button
Stop STAT measurement and end series	**IB tart top** quick key	**top IB** or **IB top A** button
	IB top A quick key	

i win IB Ana sis

NIBP analysis provides a dynamic analysis of NIBP changes and distribution over the time scale. It provides information on the patient's condition over the latest 24 hours before entering the NIBP Analysis window.

To view NIBP analysis, follow this procedure:

1. Select the NIBP numeric area to enter the **IB** menu.
2. Select the **Ana sis** tab.

You can also select anywhere in the **IB Ana sis** window to enter the tabular trends review page. For more information, see *17 Review*.

C an in IB tin s

tin t IB A ar rop rti s

To set the NIBP alarm properties, follow this procedure:

1. Select the NIBP numeric area to enter the **IB** dialog.
2. Select the **A ar** tab.
3. Enter the password if required. For more information, see *24.13.3 Selecting Password for User Authentication*.
4. Set the alarm properties as desired.

tin t Initia Cu In ation r ssur

To set initial cuff inflation pressure, follow this procedure:

1. Select the NIBP numeric area to enter the **IB** dialog.
2. Select **Initia r ssur** , and then select the appropriate setting.

E

- **For nown p rt nsiv pati nts ou n tos tiniti a u pr ssur toa i rva u tor u t asur nt ti**

tin t IB Int rva

For auto NIBP measurement, you need to set the interval between two NIBP measurements. To set the NIBP interval, follow this procedure:

1. Select the NIBP numeric area to enter the **IB** dialog.
2. Set **Int rva** . Selecting **anua** switches to manual mode.

E

- **IB asur ia o iv squi a ss tostartin an s ttin t int rva tin anoption ro t IB asur ia o wi an t IB int rva tot ats tion an startt IB asur nt**

tin IB tart o

Start mode defines how future NIBP measurements are initiated with automatic measurement mode. To set the

measurement is started at 14:03, the next measurement will be taken at 14:20, and then at 14:40, 15:00, and so on.

- **Int rva** : after the first measurement, the monitor automatically repeats measurements at set interval. For example, if **Int rva** is set to in, and NIBP auto measurement is started at 14:03, the next measurement will be taken at 14:23, and then at 14:43, 15:03, and so on.

Ena in t IB En on

The monitor can issue a reminder tone at the completion of NIBP measurement. The NIBP End Tone is off by default. To switch on the NIBP end tone, follow this procedure:

1. Select the NIBP numeric area to enter the **IB** dialog.
2. Switch on **IB En on** .

tin IB qu n

NIBP sequence measurement can have up to five phases: A, B, C, D, and E. The duration and interval of each phase can be set individually.

To set NIBP sequence, follow this procedure:

1. Select the NIBP numeric area to enter the **IB** dialog.
2. Select the **qu n** tab.
3. Set **Durati on** and **Int rva** of each phase.

tin t IB Disp a For at

To set the NIBP display format, follow this procedure:

1. Select the NIBP numeric area to enter the **IB** 2. Slectthe **Dut t a t p** **IB** d2.

Assisting Venous Puncture

You can use the NIBP cuff to cause sub-diastolic pressure to block the venous blood vessel and therefore help venous puncture. To assist venous puncture, follow this procedure:

1. Select the **Venipuncture** quick key or select the NIBP numeric area → **Setup** tab.
2. Set **Venipuncture Pressure**.
3. Select **Venipuncture** at the bottom of the dialog.
4. Puncture vein and draw blood sample.
5. Select the **IBP Start/Stop** quick key to deflate the cuff. If the cuff is not manually deflated, the cuff automatically deflates after a fixed period of time (170 seconds for adult and pediatric patient, 85 seconds for neonatal patient).

During venous puncture, pay attention to the cuff pressure and the remaining time displayed in the NIBP numerics area.

IBP Troubleshooting

This section lists the problems that might occur. If you encounter the problems when using the equipment or accessories, check the table below before requesting for services. If the problem persists, contact your service personnel.

NOTE

- **For the possible causes and solutions of alarm messages, see Appendix A Alarm Messages.**

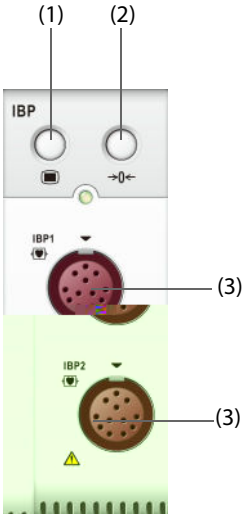
Problem	Solution
Cannot see NIBP numeric area on the main screen	1. Check that the NIBP is set to display in the **Screen Setup** → **Display Layout** page. For more information, see *3.9.2 Displaying Parameter Numerics and Waveforms* 2. Check that if the NIBP parameter switch is enabled. If not, enable the NIBP measurement. For more information, see *3.9.1 Switching On or Off a Parameter*.

IB Intro u tion

IBP monitoring is intended for adult, pediatric, and neonatal patients. PAWP monitoring is only intended for adult and pediatric patients.

You can monitor up to 4 invasive blood pressures (using the built-in IBP module and the external IBP module together).

The following picture shows the external IBP module.



(1) IBP dialog hard key (2) Zero IBP hard key (3) IBP cable connector

IB a t In or ation

A I G

- s on pr ssur trans u rs sp ii int is anua v rr us isposa pr ssur trans u rs apt r. A ssor s orsp ii pr ssur trans u rs
- a sur t att appi parts n v r onta tot r on u tiv parts
- or u t a ar o urns urin i r qu n sur i a pro ur s nsur t att onitors a san trans u rs n v r o into onta twit t i r qu n sur i a units
- nusin a ssori st irop ratin t p ratur s ou ta ninto onsi ration For or in or ation s instru tions orus o a ssori s
- A invasiv pro ur sinvo v ris stot pati nt s as pti t niqu Fo ow at t r anu a tur rsinstru tions
- ani a s o tot invasiv oo pr ssur trans u r a aus s v r s itsin ro an an ai ration an aus rron ous r a in s
- n utra tro o t tro sur r unit E s a prop r onta tt pati nt t rwis urns a r su t

CA I

- asurin IB on pati nts onn t to an Intra Aorti Ba oon u p IAB a in a r su tin t IB asur nt in u in to ina urat or ai

r parin or IB onitorin

IB Equip nt to ati nt Conn tion

(1) Pressure bag

(2) IBP module

(3) IBP cable

(4) IBP transducer

(5) Three-way valve

asurin an Invasiv B oo r ssur

To monitor IBP, follow this procedure:

1. Connect one end of the IBP cable to the IBP cable connector, and the other end to the IBP transducer.
2. Flush the IBP transducer system to exhaust all air from the tubing according to the manufacturer's instructions. Ensure that the system is free of air bubbles.
3. Connect the IBP transducer to the patient, making sure that the transducer is at the same horizontal level as the heart.
4. Select the proper pressure label for currently measured pressure. For more information, see *13.6.2 Changing the Pressure Label*.
5. Zero the IBP transducer. For more information, see.*13.3.3 Zeroing the IBP transducer*. After a successful zeroing, turn off the three-way valve to the air and turn on the three-way valve to the patient.

CA I

- **a sur t, at a t, trans u rs ar ro orr t , or a in IB asur nts**
- **a sur t, at a air u , s av , n us, ro t, IB trans u rs st , or a in IB asur nts**
- **I asurin intra ranial pr ssur IC wit, a sittin pati nt v t, trans u r wit, t, top o t, pati nt s ar In orr t v in a iv in orr t va u s not appi a , i asurin IC wit, t, Co an IC trans u r.**

Zeroing the IBP transducer

To avoid inaccurate pressure readings, the monitor requires a valid zero. Zero the transducer in accordance with your hospital policy. The IBP transducer should be zeroed in the following conditions:

- The IBP transducer, adapter cable or module is reconnected.
- The monitor restarts.
- The readings are in doubt.
- The monitor displays the prompt message **Zero required**.

To zero the transducer, follow this procedure:

1. Connect the IBP transducer, the IBP adapter cable and the monitor.
2. Turn off the three-way valve (the one near the transducer) to the patient, in order to vent the transducer to the atmospheric pressure.
3. Zero the transducer by one of the following methods:
   - Press the **Zero** hard key on the module. In the **Zero IBP** dialog, select to zero an IBP, or select to zero all IBP.
   - Select the numeric area (such as the Art numeric area), and then select **Zero** button.
   - Select the **Zero IBP** quick key. In the **Zero IBP** dialog, select to zero an IBP, or select to zero all IBP.
4. After the zero calibration is completed, close the three-way valve to the air and open the three-way valve to the patient.

Zero calibration may fail in case of pressure fluctuation or pressure exceeding the calibration range. If zero calibration fails, follow this procedure:

1. Check that the three-way valve (the one near the transducer) is open to the air.
2. Perform zero calibration again. Do not sway the IBP transducer and tubing during zero calibration.

Measuring ICP using the Codman ICP transducer

Zeroing the Codman ICP transducer

The Codman ICP transducer (Model: 82-6653) must be zeroed before use. To zero the ICP transducer, follow this procedure:

1. Connect the ICP transducer, the ICP adapter cable and the monitor.
2. Follow the manufacturer's instructions to prepare the ICP transducer.
3. Zero the ICP transducer: when the message **Zero warn** is displayed in the ICP numeric area, select the ICP waveform area or numeric area to enter the **ICP** dialog → select the **Zero** tab → select the **Zero** button.
4. Record the zero reference value on the blank area of the ICP transducer for reference.

If the ICP transducer zero calibration failed or the zero reference value is in doubt, perform the zero calibration again.

Measuring ICP

To perform the ICP measurement, follow this procedure:

1. Zero the Codman ICP transducer. For more information, see section *13.4.1 Zeroing the Codman ICP transducer*.
2. Disconnect the ICP transducer and ICP adapter cable. Follow the manufacturer's instructions to apply the ICP transducer to the patient.
3. Reconnect the ICP transducer and ICP adapter cable.
4. Check that the zero reference value displayed on the monitor is consistent with that recorded on the ICP transducer.
   - Consistent: select **Accept**.
   - Inconsistent: input the zero reference value recorded on the ICP transducer, and select **Accept**.

If the patient being monitored for ICP must be transported, check that the target monitor supports the Codman ICP transducer. For more information, see *13.4.1 Zeroing the Codman ICP transducer*. If the target monitor does not support the Codman ICP transducer, do not use it for ICP monitoring.

If the target monitor supports the Codman ICP transducer, follow this procedure to transport the patient:

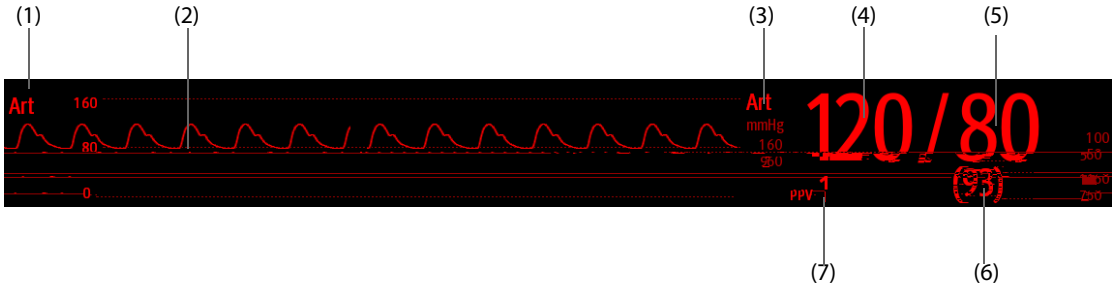
1. Disconnect the ICP adapter cable from the measurement module, or remove the module from the monitor.
2. Connect the ICP adapter cable, measurement module, and the target monitor, or insert the measurement module into the target monitor.
3. Check that the zero reference value displayed on the monitor is consistent with that recorded on the ICP transducer.
   - Consistent: select **A pt**.
   - Inconsistent: input the zero reference value recorded on the ICP transducer, and select **A pt**.

CA I

- **I onitors o i r nt ran sar us to rot Co an IC trans u r t ro r n va u s an i r nt s a in ra onitor to Z rot Co an IC trans u ri ou wi ta IC asur nt usin a in ra onitor t rwis t IC asur nt ou ina urat**

IB Disp a

The IBP measurement is displayed on the monitor as a waveform and numeric pressures. For arterial pressure, the IBP numeric area displays systolic pressure, diastolic pressure and mean pressure. For venous pressure, the IBP numeric area displays only the mean pressure. The figure below shows the waveform and numerics for the Art pressure.



(1) Pressure label

(2) Waveform

(3) Pressure Unit

(4) Systolic pressure

(5) Diastolic pressure

(6) Mean pressure

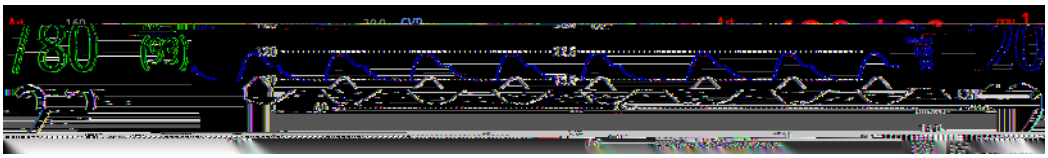
(7) PPV measurement

For some pressures, the parameter window may show the mean pressure only. For different pressures, their defaults unit may be different. If the Art and ICP pressures are measured simultaneously, the ICP parameter area will display numeric CPP, which is obtained by subtracting ICP from the Art mean.

v r appin IB av or s

The IBP waveforms can be displayed together. To combine IBP waveforms, follow this procedure:

1. Access i a **out** by either of the following ways:
   - Select the r n **tup** quick key → select the i a **out** tab.
   - Select ain **nu** quick key → from the **Disp a** column select i a **out**.
2. Select the waveform area where you want to display the overlapped IBP waveforms, and then select the IBP waves to be overlapped on the left side of the same line.
3. Repeat step 2 in another waveform area if needed.
4. Select to save the setting and exit the screen. The main screen will display the overlapped IBP waves.



Selecting the overlapped IBP waveforms on the main screen opens the **v r appin av or tup** dialog, where you can make the following settings:

- Scale
  - Set **t a** for the arterial pressure.
  - Set **i t a** for the venous pressure.
  - Set **C a** individually if the CVP waveform is combined and CVP unit is different from IBP unit.
  - Set **IC a** individually if the ICP waveform is combined and ICP unit is different from IBP unit.
  - Set **A a** individually if the PA waveform is combined.
- Switch on or off **Gri in s** to show or hide gridlines in the overlapped waveform area.
- Set **p** for the overlapped waveforms.

E

- **unit o C s a is onsist nt wit t C para t r unit**

C an in IB tti n s

C an in t IB A ar tti n s

To change the IBP alarm settings, follow this procedure:

1. Select the IBP numeric area or waveform area to enter the corresponding pressure dialog.
2. Select the **A ar** tab.
3. Enter the password if required. For more information, see *24.13.3 Selecting Password for User Authentication*.
4. Set the alarm properties of pressure.

C an in t r ssur a

The pressure label is a unique identifier for each type of pressure. Therefore, it is recommended to select the proper pressure label for the source of the pressure being monitored.

To select the pressure label, follow this procedure:

1. Select the IBP numeric area or waveform area to enter the corresponding pressure dialog.
2. Select the **tup** tab.
3. Set **IB a** or **IB a** .

a	D s ri pti on	a	D s ri pti on
Art	Arterial blood pressure	PA	Pulmonary artery pressure
Ao	Aortic pressure	UAP	Umbilical arterial pressure
BAP	Brachial arterial pressure	FAP	Femoral arterial pressure
CVP	Central venous pressure	LAP	Left atrial pressure
RAP	Right atrial pressure	ICP	Intracranial pressure
UVP	Umbilical venous pressure	LV	Left ventricular pressure
P1 to P4	Non-specific pressure label		

E

- **sa a annot s t or i r nt pr ssur s n two pr ssur s ar t t avin t sa a t onitor auto ati a an s on pr ssur a to a urr nt unus on**

ttin t r ssur p or Dis pa

For the non-specific pressure (P1, P2, P3 or P4), the displayed pressure type is configurable. To set the displayed pressure type, follow this procedure:

1. Select the numeric area or waveform area of the non-specific pressure to enter the corresponding pressure dialog.
2. Select the **tup** tab.
3. Set **asur** :
   - If this non-specific pressure is arterial pressure, set the **asur** to **A** . In this case, its corresponding numeric area displays systolic pressure, diastolic pressure and mean pressure.
   - If this non-specific pressure is venous pressure, set the **asur** to **an n** . In this case, its corresponding numeric area displays only the mean pressure.

C an in t nsitivit

The IBP value displayed on the monitor screen is the average of data collected within a specific time. The shorter the averaging time is, the quicker the monitor responds to changes in the patient's blood pressure, and the higher the sensitivity. Contrarily, the longer the averaging time is, the slower the monitor responds to changes in the patient's blood pressure, the lower the sensitivity, but the measurement accuracy will be improved. For critically ill patients, selecting higher sensitivity will help with understanding the patient's state.

To set the sensitivity, follow this procedure:

1. Select the IBP numeric area or waveform area to enter the corresponding pressure dialog.
2. Select the **tup** tab.
3. Set **nsitivit** .

ttin t IB av or

To set the IBP waveform, follow this procedure:

1. Select the IBP numeric area or waveform area to enter the corresponding pressure dialog.
2. Select the **tup** tab.
3. Set the following properties of the IBP waveform:
   - **p**
   - **a** : if **Auto** is selected, the size of the pressure's waveform will be adjusted automatically.

ttin t Dis pa For at o Art r r ssur

To set the display format of the artery pressure, follow this procedure:

1. Select the numeric area or waveform area of any arterial pressure to enter the corresponding menu.
2. Select the **tup** tab.
3. Set **Dis pa For at**.

owin Hi in t Aar i its o Art r r ssur

To set whether to display the alarm limits of the arterial pressure, follow this procedure:

1. Select the numeric area or waveform area of any arterial pressure to enter the corresponding menu.
2. Select the **tup** tab.
3. Switch on or off **Dis pa Aar i its**

Ena in asur nt

PPV indicates pulse pressure variation. When measuring the arterial pressure (except PA), the PPV measurement is available. To enable the PPV measurement, follow this procedure:

1. Select the IBP numeric area or waveform area to enter the corresponding pressure dialog.
2. Select the **tup** tab.
3. Switch on **asur** .

You can select PPV source after enabling the PPV measurement.

A I G

- **is onitor an a uat ro at to at va u s o an art ria pu sati pr ssur ir u stan sun r w i t a uation o a va u is in i a anin u appropriat an r ia ust t r in a p si ian**
- **ini a va u o t riv in or ation ust t r in a p si ian A or in to r nts i nti i it ratur t ini a r van o in or ation is r stri t to s at pati nts r ivin ontro ani a v nti ation an ain r ro ar ia arr t ia**
- **a uation a a to ina urat va u s in t o owin situations**
  - **at r spiration rat s ow rp**
  - **urin v nti ation wit ti a vo u s ow r t an**
  - **or pati nts wit a ut ri t v ntri u ar s un tion or pu ona**
- **asur nt as n vai at on or a u t pati nts**

A

Pulmonary Artery Wedge Pressure (PAWP) values, used to assess cardiac function, are affected by fluid status, myocardial contractility, and valve and pulmonary circulation integrity.

Obtain the measurement by introducing a balloon-tipped pulmonary artery flotation catheter into the pulmonary artery. When the catheter is in one of the smaller pulmonary arteries, the inflated balloon occludes the artery allowing the monitor to record changes in the intrathoracic pressures that occur throughout the respiration cycle.

The pulmonary wedge pressure is the left ventricular end diastolic pressure when the airway pressure and valve function are normal. The most accurate PAWP values are obtained at the end of the respiration cycle when the intrathoracic pressure is fairly constant and the artifact caused by respiration is minimal.

A I G

- **A onitorin is not int n or n onata pati nts**

A Equip nt to ati nt Conn tion

r pari n to asur A

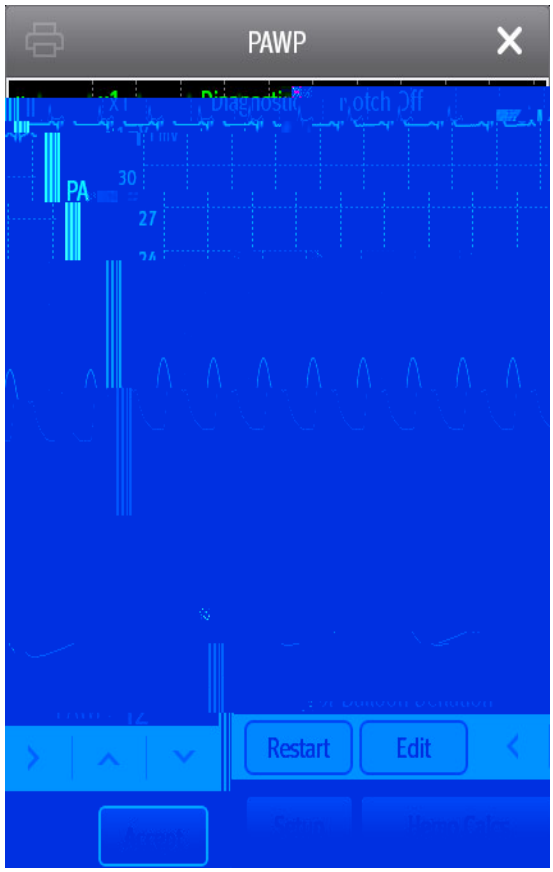
To prepare to monitor PAWP, follow this procedure:

1. Connect the IBP transducer, the IBP cable and the monitor. For more information, see *13.3.2 Measuring an Invasive Blood Pressure*.
2. Follow the manufacturer's instructions to connect the PA port of the thermodilution catheter and the patient end of the IBP transducer.
3. Zero the IBP transducer. For more information, see *13.3.3 Zeroing the IBP transducer*.
4. Set the IBP label to **A**

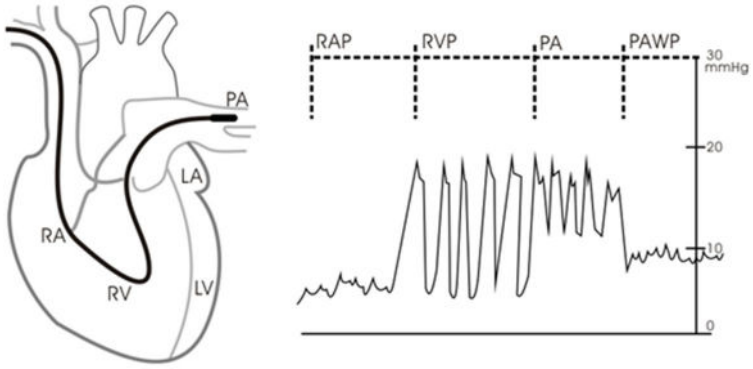
asurin _ A _

To measure the PAWP, follow this procedure:

1. Select the PA numeric area or waveform area to enter the_ **A** dialog, and then select_ **A** _ .



2. Wedge the flotation catheter into the pulmonary artery by observing the PA waveform changes on the screen, referring to the following figure.



3. Select **tart**.
4. Inflate the balloon and pay attention to PA waveform changes on the screen when the prompt message **a For Ba oon D ation** appears.
5. Deflate the balloon when the prompt message **a For Ba oon D ation** appears. If the PA waveform is stable, but the monitor is still not showing the prompt message **a For Ba oon D ation**, select **Fr** to freeze the waveform, and deflate the balloon.
6. Select **A pt** to save the PAWP value.
7. If you need to start a new measurement, repeat step 3 to step 6.

If the measurement fails or you need to adjust the PAWP value, you can use the following buttons to adjust the PAWP waveform and measurement.

- Select the up or down arrow button to adjust the PAWP value.
- Select the left or right arrow button to view the frozen waveforms of 40 seconds.
- Select **A pt** to save the PAWP value.

A I G

- **ro on in ation an aus pu onar orr a in ar tion or ot ln at t a oon ort ini u ti n ssar to tana urat asur nt**
- **l t A is r at rt ant A s stoi at t a oon an r portt ini ntin a or an wit ospita poi B aus t pu onar art r ou a a i nta ruptur an t A va u riv wi notr tt pati nts o na i stat utwi r r tt pr ssur int at t ror a oon**
- **l t otation t r o i ution at t r ri tsintot w positionwit outin ationo t a oon t A wav or assu saw app aran a appropriat a tion ina or an wit stan ar pro ur s to orr tt situation**

E

- **A aar isturn o auto ati a w nt onitor nt rst A s r n**

ttin t av or so t A r n

On the **A** screen, select **tup** to enter the **A tup** dialog. In the **A tup** dialog, you can make the following settings:

- Select **r n av or** to set an ECG lead wave as the first reference wave.
- Select **r n av or** to set a respiration wave as the second reference wave.
- Select **p** to set a sweep speed for the displayed waveforms on the **A** screen.
- Select **a** to set the size of the PA waveform on the **A** screen.

ttin t s AD as A wit

The PA-D value can be configured to replace the PAWP value for hemodynamic calculation. To do so, follow this procedure:

1. Select the PA numeric area or waveform area to enter the **A** dialog.
2. Select the **tup** tab.
3. Switch on or off **s AD as A** .

For more information on hemodynamic calculation, see *19.4 Hemodynamic Calculations*.

r or in H o na i Ca u ation

On the **A** screen, select **H o Ca s** to enter the **Ca u ations** dialog. For more information, see *19.4 Hemodynamic Calculations*.

Conn tin a Ca ino D vi

The IBP module can interface with the Camino multi-parameter monitor (Model: MPM-1) to measure intracranial pressure (ICP).

To connect the Camino, follow this procedure:

1. Plug the IBP module into the module rack.
2. Connect the Camino ICP cable to the IBP module.
3. Connect the Camino ICP cable to the ICP adapter.
4. Connect the ICP connector to the ICP adapter.
5. Connect the Camino cable to the Camino monitor.

A I G

- rto t, Ca ino p rator s anua to a ust s ttin s an onn tt, onitor wit t, pati nt
- IC aar s ttin s ont, in ra pati nt onitor ar in p n nt o t, Ca ino onitor a ar s ttin s an t, us a , i r nt_ as pa sp ia att ntion to t, aar s ont, Ca ino

ro	olution
Zeroing of IBP channel(s) fails.	1. Ensure that the channels are open to air. 2. Perform zero calibration again. Do not sway the IBP transducer and tubing during zero calibration. For more information, see *13.3.3 Zeroing the IBP transducer*. 3. If zero calibration still fails, replace the transducer.

Monitoring Cardiac Output (C.O.)

C Introduction

The cardiac output (C.O.) measurement invasively measures cardiac output and other hemodynamic parameters using the right heart (atria) thermodilution method. A cold solution of known volume and temperature is injected into the right atrium through the proximal port of a pulmonary artery (PA) catheter. The cold solution mixes with the blood in the right ventricle and the change in blood temperature is measured with a thermistor at the distal end of the catheter in the pulmonary artery. The temperature change is displayed as a curve on the C.O. split screen, and the monitor calculates the C.O. value from this curve. The C.O. value is inversely proportional to the area under the curve. As cardiac output varies continuously, a series of measurements must be carried out to achieve a reliable C.O. average value. Always use the average of multiple thermodilution measurements for therapy decisions. The monitor is capable of storing 6 measurements.

C.O. monitoring is intended for adult patients only.

You can monitor C.O. using the built-in C.O. module or the external C.O. module.

The following picture shows the external C.O. module.

C asur nt i itations

The following factors may influence the accuracy of C.O. measurement:

- temperature of injectate solution
- volume of injectate solution
- baseline of patient's blood temperature
- patient's inspiratory/expiratory cycle
- placement of catheter with relation to proximity of lung field
- the catheter itself
- patient's heart rate and hemodynamic status
- any solution infused with intravenous injection during the C.O. measurement

To obtain accurate C.O. measurements, follow these recommendations:

- Temperature of injectate solution must be at least 10 ºC cooler than that of the patient's blood.
- Inject solution at end of expiration.
- Inject solution rapidly and smoothly.
- Finish injection within four to five seconds.

C Disp a

The C.O. display shows only C.O., C.I. (cardiac index), and TB (blood temperature) in the C.O. numeric area.

(1) C.O. label

(2) Primary parameter unit

(3) Labels and values for primary parameters

(4) Labels and values for secondary parameters

E

- **C va u isinvai i itis ispa inoutin ont**

C Equip nt to ati nt Conn tion

(1) C.O. module
(2) 12-pin C.O. cable (Model: CO7702)
(3) TI cable connector
(4) In-line probe
(5) Injectate solution
(6) Injectate syringe
(7) Three-way valve
(8) Proximal injectate port
(9) Balloon inflation valve
(10) Thermistor connector
(11) PA distal port
(12) Thermodilution catheter
(13) Thermistor

r or in C asur nt

r parin or C asur nt

1. Connect the C.O. cable to the C.O. connector and thermistor connector, making sure the C.O. numeric area is displayed on the monitor's main screen.
2. Follow the hospital's policy and procedures to prepare the patient for the C.O. measurement.
3. Follow the manufacturer's instructions to set up the catheter and other accessories.
4. Check that all the accessories are properly connected.

E

- **For an in in pro , s tup a sur t in in s nsor is s ur onn t to t tu in For t at pro , s tup a sur t at pro , is orr t s nsin t in tat t p ratur**

tin C asur nt

Before performing the C.O. measurement, follow this procedure:

1. Select the C.O. numeric area to enter the **C asur** dialog.
2. Select the **tup**.
3. Perform the following check or setup:
   - Check if the height and weight are appropriate for your patient. Change if necessary. The patient's height and weight values are required for determining cardiac index (C.I.).
   - Check that the correct computation constant is entered. The computation constant has a close relationship with the entered injectate volume, injectate probe type (in-line probe or bath probe) and temperature. See the Instructions for Use of the pulmonary artery catheter to determine correctness.

To change the computation constant, select **Co p Const** and then input the correct value. When a new catheter is used, the computation constant should be adjusted in accordance with the manufacturer's instructions for use.

- Switch on or off **Auto . I**. If **Auto . I** is switched on, the system automatically detects the injectate temperature, and . **I** setting is disabled. If **Auto . I** is switched off, you need to input the injectate temperature at . **I**.
- Switch on or off **Auto . tart**. If **Auto . tart** is switched on, the monitor automatically takes the C.O. measurement after establishing a baseline of blood temperature. If **Auto . tart** is switched off, you need to click the . **tart** button in the **C asur** dialog for a new measurement.

r or in C asur nt

To perform the C.O. measurement, follow this procedure:

1. Select the C.O. numeric area to enter the **C asur** dialog.

(1) Average values

(2) Historical measurement dialogs

(3) Current measurement values

(4) Current C.O. curve

(5) Prompt message area

(6) Buttons

2. Proceed as follows to perform the C.O. measure:
   - If **Auto . tart** is switched off, select the . **tart** button, and then inject the solution quickly when you see the message . **as ai t**. As shown in the figure above, during the measurement, the currently measured thermodilution curve is displayed. At the end of the measurement, the thermodilution curve is transferred to one of the 6 measurement areas and the monitor prompts you to wait for a certain period of time before starting a new measurement.
   - If **Auto . tart** is switched on, inject the solution quickly when you see the message **a For w . t asur nt**. The monitor consecutively takes C.O. measurements automatically without the need for pressing the . **tart** button between two measurements. A new thermodilution measurement is possible as soon as the message **In t ow** is displayed on the screen. The monitor automatically detects further thermodilution measurements.

3. Acquire the average value of C.O. and C.I. A maximum of 6 measurements can be stored. If you perform more than six measurements without rejecting any, the oldest will automatically be deleted when a seventh curve is stored. Select from the 6 measurement curves and the system will automatically calculate and display the averaged C.O. and C.I. values. Then select the **A pt Av ra** button to accept and store the averaged values.

When injecting, the stopcock to the thermodilution catheter is open and the stopcock to the injectate solution is closed. After completing the measurement, turn off the stopcock to the thermodilution catheter and turn on the stopcock to the injectate solution, and then draw the injectate solution into the injectate syringe.

The button area also provides you with the following functions:

- Select **top** to stop the current measurement. Select **tup** to enter the **C** dialog.
- Select **H o Ca s** to enter the **Ca u ations** dialog.

E

- **tartin a asur nt wit out oo t p ratur in sta a aus asur nt ai ur**
- **Ba ar s ar ina tivat urin a C asur nt an wi r a tivat auto ati a a t rt o p tion o C asur nt**
- **as s t Instru tions or s o t r o i ution at t rto t r in t Co p Constan t vo u o in tat so ution**

C an in C ttin s

ttin C A ar rop rti s

To set the C.O. alarm properties, follow this procedure:

1. Select the C.O. numeric area to enter the **C asur** dialog.
2. Select **tup** to enter the **C** dialog.
3. Select the **A ar** tab.
4. Enter the password if required. For more information, see *24.13.3 Selecting Password for User Authentication*.
5. Set the alarm properties as desired.

C rou s ootin

This section lists the problems that might occur. If you encounter the problems when using the equipment or accessories, the table below may help with troubleshooting before requesting a service personnel visit. If the problem persists, contact your service personnel.

E

- **For t p sio o i a an t ni a ar ssa s s App n i *DA r ss s***

ro	o ution
Do not see C.O. numeric area on the main screen	1. Check that the C.O. is set to display in the r n **tup** dialog. For more information, see *3.9.2 Displaying Parameter Numerics and Waveforms*. 2. Check that if the C.O. parameter switch is enabled. If not, enable the C.O. measurement. For more information, see *3.9.1 Switching On or Off a Parameter*. 3. Check that the patient type is adult. 4. Check the connection of C.O. cable, thermodilution catheter and TI sensor.
C.O. value is inaccurate	1. Check that the thermodilution catheter is positioned properly. 2. Check that the computational constant is proper for current injectate temperature, injectate volume and injectate probe type. 3. Inject solution rapidly and smoothly. 4. Finish injection within four to five seconds. 5. Inject more volume, or inject colder solution. 6. Check that the height and weight of patient is properly configured. 7. If **Auto I** is switched off, check that the entered temperature is correct.
C.O. measurement fails	1. Inject more volume, or inject colder solution. Make sure that the injectate temperature is at least 10°C colder than the patient blood temperature. 2. Finish injection within four to five seconds. 3. Check the connection of C.O. cable, thermodilution catheter and TI sensor.

C Intro u tion

CO_2 monitoring is a continuous, non-invasive technique for determining the concentration of CO_2 in the patient's airway by measuring the absorption of infrared (IR) light of specific wavelengths. CO_2 has its own absorption characteristic and the amount of light passing the gas probe depends on the concentration of the measured CO_2. When a specific band of IR light passes through respiratory gas samples, some of IR light will be absorbed by the CO_2 molecules. The amount of IR light transmitted after it has been passed through the respiratory gas sample is measured with a photodetector. From the amount of IR light measured, the concentration of CO_2 is calculated.

CO_2 measurement is used to monitor the patient's respiratory status. The Sidestream/Microstream CO_2 measurement takes a sample of the respiratory gas with a constant sample flow from the patient's airway and analyzes it with a remote CO_2 sensor built into the Sidestream or Microstream CO_2 module.

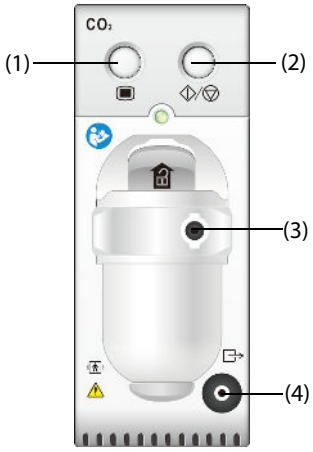
The sidestream and microstream CO_2 measurement can be used, with specified accessories, with intubated and non-intubated adult, pediatric, and neonatal patients. With intubated patients, a sample of the respiratory gas is drawn from the patient's breathing circuit through an airway adapter and a gas sampling line. With non-intubated patients, the gas sample is drawn through a nasal cannula.

CO_2 monitoring is intended for adult, pediatric and neonatal patients.

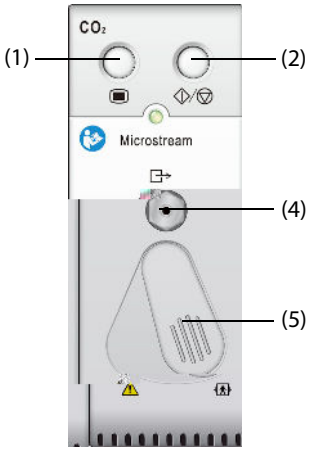
I nti in C o u s

For ePM 12M, you can monitor CO_2 using the built-in CO_2module or the external CO_2 module. For ePM 10M, you can monitor CO_2 using the external CO_2 module only.

The following figures show the controls and connectors of different CO_2 module.



Sidestream CO_2 module



Microstream CO_2 module

(1) CO_2 dialog hard key

(2) CO_2 Measure/standby hard key

(3) CO_2 watertrap seat

(4) Gas outlet

(5) Sample line connector

To measure CO_2 using the AG module, see *16 Monitoring Anesthetic Gas (AG)*.

C a t In or ation

A I G

- out a tu in awa ro t pati nt s t roat to avoi stran u ation

CA I

- ov t airwa sa p in ro t pati nt s airwa w i n ui i ations ar in iv r asurin C urin n ui ation a a toina urat C r a in s
- EtC va u s asur ro t C o u a i r ro t os ro t oo as ana sis
- Avoi ani a s o to t si str a C o u

E

- C o u auto ati a suppr ss sp sio o i a a ar s unti r at in wav s av n t t Ensur t att pati nt is prop r onn t w nus in t C o u

C asur nt i itations

asurin C sint i str a i rostr a C o u

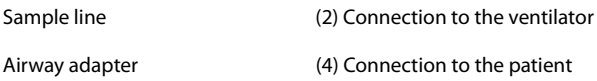
r parin to asur C sint i str a C o u

To prepare the CO_2 measurement, follow this procedure:

1. Select the appropriate gas sample line and watertrap according to the patient category.
2. Connect the watertrap to the CO_2 module, and connect the gas sample line to the watertrap.

(1) Watertrap receptacle (2) DRYLINE II watertrap (3) Gas sample line

3. Connect the other end of the gas sample line to the patient.
   - For intubated patients requiring an airway adapter, install the airway adapter between the patient circuit and the ventilator Y-piece.



(1) Sample line (2) Connection to the ventilator

(3) Airway adapter (4) Connection to the patient

   - For non-intubated patients, place the nasal cannula onto the patient.

4. If the equipment is used in the presence of anesthetic gases, nitrous oxide or high concentrations of oxygen, connect the gas outlet to the scavenging system using an exhaust tube.

After the watertrap is connected, it enters measure mode by default and the monitor displays **C tartin** . CO_2 can be measured after the start-up sequence is complete.

A l G

- **Do not us t a u t orp iatri wat rtrap wit an onat pati nt t rwis pati nt inur ou r sut**
- **Conn tt as out t tot s av n in s st w n asurin C usin t si str a C o u**

CA l

- **a a int rat in orsa pin s st a aus t ispa EtC va u sto si ni i ant ow A was a sur t ata o pon nts ar s ur onn t**
- **Insp tt airwa a apt r orati t onn tion an prop r op ration or atta in it tot pati nt**
- **qu in or n in t sa p in urin si str a or i rostr a C asur nt a aus ina urat C r a in s or nor a in**
- **o avoi o in t airwa pt t D Y l Ellwat rtrap ontain rw n v r a u pain t D Y l Ellwat rtrap on a ont isr o n Dispos o a u uat ui sin a or an wit ospita poi or our o a r uations**
- **D Y l Ellwat rtrap as a i t r pr v ntin a t riu wat ran s r tions ro nt rin t o u E t n us ou stro t i t rin wat rtrap an ai to stop t a t riu wat ran s r tions nt rin t o u r sut in a a in t as o u an avin in tion ris**

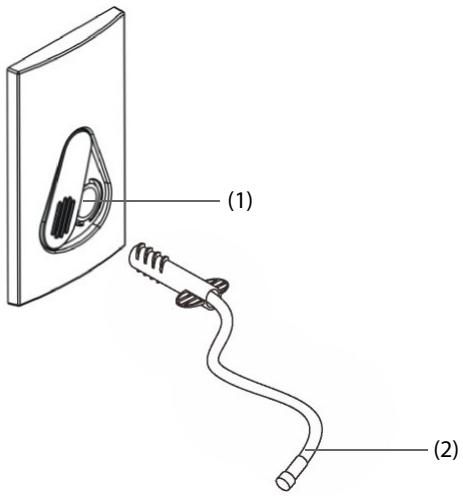
E

- **o t n t i ti o t wat rtrap an o u is onn t t wat rtrap ro t o u an s t t op ratin o to tan o w nC onitorin is not r quir**
- **sa p rat sar i r ntw n i r ntt p so wat rtraps ar us**
- **pt in int rva o t D Y l Ella ut p iatri wat rtrap is ours in sa p aso C roo t p ratur o C an H**
- **pt in int rva o t D Y l Elln onata wat rtrap is ours in sa p aso C roo t p ratur o C an H**

r parin to asur C sin t i rostr a C o u

To prepare the CO_2 module for measurement, follow this procedure:

1. Connect one end of the sample line to the microstream CO_2 module.



(1) Sample line connector (2) Sample line

2. Connect the other end of the sample line to the patient.

- For intubated patient requiring an airway adapter, install the airway adapter between the patient circuit and the ventilator Y-piece.
- For non-intubated patient, place the nasal cannula onto the patient.
- For patient prone to mouth breathing, place the oral-nasal cannula onto the patient.

3. Connect the gas outlet to the a scavenging system using an exhaust tube.

After the sample line is connected, it enters measure mode by default and the monitor displays **C nsor ar up**. CO_2 can be measured after the start-up sequence is complete.

A I G

- **Conn tt asout ttot s av n in s st w n asurin C usin t i rostr a C ou**

E

- **Dis onn tt sa p in ro t ou w nC onitorin is not r quir**

Zroin t i str a i rostr a C ou

The sidestream and microstream CO_2 modules perform a zero calibration automatically when needed. Once the zero calibration is started, the CO_2 module stops measuring and "**Zroin** " is displayed in the CO_2 numeric area.

After the zero calibration is completed, the CO_2 module reacquires the CO_2 readings. During the reacquisition period, "**Zro ov rin** " is displayed in the CO_2 numeric area. Valid data will reappear 30 seconds after the zero calibration is started. You can hide the display of the "**Zro ov rin** " message, but values displayed during the reacquisition period may not be accurate. See *24.5.5 Hiding the Invalid Display after Zeroing the CO_2 Module* for more information.

The automatic zero calibration will not start under the following conditions:

- Physiological alarms related to CO_2 or AG are active.
- An apnea alarm is active.
- No breath has been detected for over 30 seconds.

You can also perform the zero calibration manually. For more information, see *24.5.4 Manually Zeroing the CO_2 Module*.

C an in tt in s or A C ou s

C an in C A ar tt in s

To change the CO_2 alarm settings, follow this procedure:

1. Select the CO_2 numeric area or waveform area to enter the **C** dialog.
2. Select the **A ar** tab.
3. Enter the password if required. For more information, see *24.13.3 Selecting Password for User Authentication*.
4. Set alarm properties as desired.

tt in t C av or

To set the CO_2 waveform, follow this procedure:

1. Select the CO_2 numeric area or waveform area to enter the **C** dialog.
2. Select the **tup** tab.
3. Set **av or p , p , a** or **C a** of the CO_2 waveform.

tti n t our

To set the respiration rate (RR) source, follow this procedure:

1. Select the CO_2 numeric area or waveform area to enter the **C** dialog.
2. Select the **tup** tab.
3. Set **our** .

■ BTPS (microstream): $P_{CO2}(mmHg)=CO_2(vol\%) \times (1- 0.03) \times P_{amb}/100$

Where, $P_{CO2}(mmHg)$= *partial pressure, vol%=CO_2 concentration, P_{amb}=ambient pressure, and unit is mmHg.*

For the sidestream and microstream CO_2 module, set the humidity compensation on or off according to the actual condition.

To set the humidity compensation, follow this procedure:

1. Select the CO_2 numeric area or waveform area to enter the **C** | dialog.
2. Select the **tup** tab.
3. Set **B** **Co p nsati on**.
   - ◆ Switch on for BTPS.
   - ◆ Switch off for ATPD.

tin t Gas Co p nsation

The presence of interfering gas affects the CO_2 measurement. To get the best possible measurement result, it is recommended to set the gas compensation. The configured concentration of the interfering gas should be in accordance with its actual proportion.

For the microstream CO_2 module, gas compensations are not required.

CA I

- **a sur tous t appropri at o p nsati ons Inappropri at o p nsati ons a aus ina urat asur nt va u s an r su tin is ia nosis**

For the sidestream CO_2 module, follow this procedure to set the gas compensation:

1. Select the CO_2 numeric area or waveform area to enter the **C** | dialog.
2. Select the **tup** tab.
3. Set the compensation according to the actual condition.

C oosin a i Int rva or a i in

For microstream CO_2 modules, select a time interval for picking the highest CO_2

5. Select the **o u** tab → **C** tab.
6. Check that the current flow rate is less than 10ml/min, and the alarm message "**C Airwa u** " does not disappear.

   This indicates that the module does not leak. If the alarm message disappears, or the flow rate is equal to 10ml/min or greater, it indicates that the module leaks. Perform the leakage test again. If the problem remains, contact your service personnel for help.

C Cai ,rati on

For sidestream and microstream CO_2 modules, a calibration is needed every year or when the measured values have a great deviation.

To calibrate the CO_2 module, contact your service personnel.

CA I

- **Conn tt as out ttot s av n in s st w n ai ,rati n t C o u**

st t o s to D t r in t spiration at asurin an

To determine the RR measurement range, follow this procedure:

1. Connect the 5% CO_2 + N_2 (BAL) gas cylinder, reduction valve, rhythm generator and gas sampling path of a monitor.
2. Respectively set the rhythm generator to generate a respiration rate of 0 rpm, 6 rpm, 20 rpm, 60 rpm, 120rpm, and 150 rpm.
3. Verify that it meets the specifications.

E

- **r t n rator ntion a ,ov is as nsor sa pin sit in Fi ur st apparatus ort A Y E E E l Eo an G o l**

C rou , s ootin

This section lists the problems that might occur. If you encounter the problems when using the equipment or accessories, check the table below before requesting service. If the problem persists, contact your service personnel.ff

E

- **For t p sioo i a an t ni a aar ssa s s App n i *DA r ss s***

rou , s ootin t i str a i rostr a C o u

ro ,	o ution
$EtCO_2$ measurements too low	1. Check the patient status. 2. Check the sample line and connectors for leakage. 3. Ventilate the room if the environmental CO_2 concentration is too high.

ri ion In or ati on

ri ion_ at nts

This posting serves as notice under 35 U.S.C.§287(a) for Covidien patents: http://www.covidien.com/patents.

ol pi i ns

Possession or purchase of this device does not convey any express or implied license to use the device with unauthorized CO_2 sampling consumables which would, alone, or in combination with this device, fall within the scope of one or more of the patents relating to this device and/or CO2 sampling consumable.

This page intentionally left blank.

AG Intro u ti on

The anesthetic gas (AG) module measures the patient's anesthetic and respiratory gases by connecting to the airway of intubated patients or collecting the gases with specified accessories. It also incorporates the features of the O_2 module.

The AG module determines the concentration of certain gases using the infrared (IR) light absorption measurement. The gases that can be measured by the AG module absorbing IR light. Each gas has its own absorption characteristic. The gas is transported into a sample cell, and an optical IR filter selects a specific band of IR light to pass through the gas. For multiple gas measurements, there are multiple IR filters. The higher the concentration of gas in a given volume, the more IR light is absorbed. This means that higher concentration of IR absorbing gas causes a lower transmission of IR light. The

AG a t In or ation

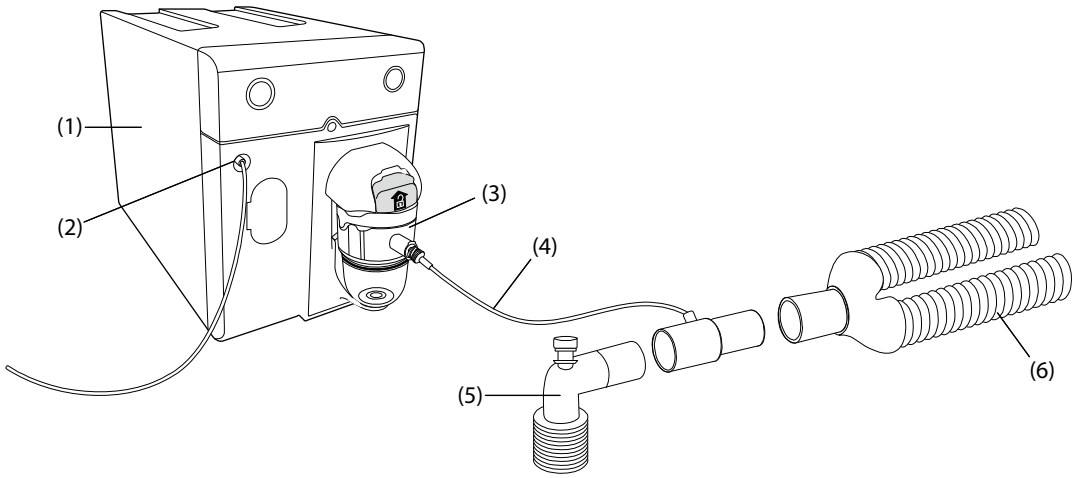
A I G

- o avoi p osion a ar o notus a a an st ti a ntsu as t ran opropan ort is quip nt
- pr s n o ot rsu stan sint pati nts r at in ir uit su as t ano a ton t ano isopropano r on ast a i ation arri r as s an ot rin rar a sor jn as s anin u n t an st siaa nti nti i ationan a toin orr t asur ntsan i nti i ation
- sin i r qu n trosur i a units a in r as t ris o s in urn Int is as o notus

AA represents one of the following agents: Des (desflurane), Iso (isoflurane), Enf (enflurane), Sev (sevoflurane), or Hal (halothane).

If only one anesthetic agent is used, the AA waveform area displays the waveform of this anesthetic agent. If several anesthetic agents are used, the AA waveform area displays the waveform of the primary anesthetic agent.

AG Equip nt to_ ati nt Conn tion



(1) AG module

(2) Gas outlet

(3) Watertrap

(4) Gas sample line

(5) Airway adapter (connected to patient)

(6) Y-piece (connected to the anesthesia machine)

r parin or AG onitorin

To prepare to monitor AG, follow this procedure:

1. Select the appropriate gas sample line and watertrap according to the patient category.
2. Connect the watertrap to the AG module, and connect the gas sample line to the watertrap.
3. Connect the other end of the gas sample line to the patient via the airway adapter.
4. Connect the gas outlet to a scavenging system or the patient respiration circuit using an exhaust tube.
5. Check that the connections are tight.

After the AG module is connected to the monitor, the AG module enters the measurement mode by default and the monitor prompts **AG tartin** . AG measurement is available after the start-up is completed.

A l G

- **l t sa p asisr turn tot ar at in s st t r a ,ari s o pati nt rossin tion**
- **l t sa p asisr turn tot ar at in s st insta ar at in s st it r o piant wit t l an l stan ar sont pati nt n**
- **a sur t att onn tionsar ti t An a int s st anr sutin rron ousr a in s u toa ,nt air i in wit pati nt as s**
- **A wa sinsp tt airwa a apt r orati t onn tionan prop rop rations, or atta in itto t pati nt**
- **qu in or ,n in t assa p in urin AG asur nt a aus rron ousr a in s ornor a in s**

CA I

- **ositiont airwa apt rsot att part onn tin tot assa p in ispointin upwar s ispr v nts on ns wat r ro passin intot assa p in an ausin ano usion**
- **wat rtrap o tswat r rops on ns int sa p in an t r or pr v ntst ro nt rin t ou oavoi a,o in t airwa pt t wat rtrap ontain rw n v r a u**
- **wat rtrap asa it rpr v ntin a t riu wat ran s r tions ro nt rin t ou A t r on t r us ustorot rsu stan s a o pro is t p r or an o t it ror v n a,o t airwa lnt is as rpa t wat rtrap pain t wat rtrapon a ont is r o n**

E

- **Do not app a ut wat rtrap to t n onata pati nt t rwis pati ntinur ou r su t**
- **o t n t i ti o t wat rtrap an o u is onn tt wat rtrap ro t ou an s tt op ratin o to tan a, w n AG onitorin is not r quir**

Z roin t AG o u

The AG module performs a zero calibration automatically when needed. Once the zero calibration is started, the AG module stops measuring and "**Z roin** " is displayed in the AG numeric area.

After the zero calibration is completed, the AG module reacquires the AG readings. During the reacquisition period, "**Z ro ov rin** " is displayed in the AG numeric area. Valid data will reappear 30 seconds after the zero calibration is started. You can hide the display of the "**Z ro ov rin** " message, but values displayed during the reacquisition period may not be accurate. See *24.5.7 Hiding the Invalid Display after Zeroing the AG Module* for more information.

The automatic zero calibration will not start under the following conditions:

- Physiological alarms related to CO_2 or AG are active.
- An apnea alarm is active.
- No breath has been detected for over 30 seconds.

You can also perform the zero calibration manually. For more information, see *24.5.6 Manually Zeroing the AG Module*.

AC au s

Minimum alveolar concentration (MAC) is the minimum concentration of the agent in the alveoli. It is a basic index to indicate the depth of anesthesia. The standard ISO 80601-2-55 defines MAC as this: alveolar concentration of an inhaled anesthetic agent that, in the absence of other anesthetic agents and at equilibrium, prevents 50% of patients from moving in response to a standard surgical stimulus.

MAC values are listed below:

A nt	D s	Iso	En	v	Ha	2
1 MAC	6%	1.15%	1.7%	2.1%	0.77%	105%*

* indicates 1 MAC nitrous oxide can only be reached in hyperbaric chamber.

E

- **t p so as sus or a uatin t AC va u an a, s t For or in or ations** ***t n t G s p or sur nt***
- **AC va u ss ownint ta a, a ov ar t os pu is a, t Foo an Dru A inistration ora, at ar o a ut a pati nt**
- **In a tua appi ations t AC va u a a, a t a, a wi tan ot r a tors**

The formula to calculate the MAC value is as follows:

$$MAC = \sum_{i=0}^{N-1} \frac{EtAgent}{AgentVol_{age}i}$$

Where N is the number of all agents (including N_2O) that the AG module can measure, $EtAgent_i$ is the concentration of each agent, and $AgentVol_{age}i$ is the concentration of each agent at 1 MAC with age correction.

The formula for calculating age correction of 1 MAC is:

$$MAC_{age} = MAC_{40} \times 10^{(-0.00269 \times (age - 40))}$$

For example, the Des concentration at 1 MAC of a 60-year old patient is.

$$6\% \times 10^{(-0.00269 \times (60 - 40))} = 6\% \times 0.88$$

The AG module measures 4% of Des, 0.5% of Hal and 50% of N_2O in the patient's end-tidal gas:

$$MAC = \frac{4.0\%}{6\% \times 0.88} + \frac{0.5\%}{0.77\% \times 0.88} + \frac{50\%}{105\% \times 0.88} = 2.04$$

E

- **or uaa ov ison suita orpati ntsw oar o rt anon ar l t pati ntis sst an on ar t s st us son aro to oa orr tion**

C an in AG ttin s

C an in AG A ar ttin s

To change the AG alarm settings, follow this procedure:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select the desired gas tab.
3. Select the **A ar** tab.
4. Enter the password if required. For more information, see *24.13.3 Selecting Password for User Authentication*.
5. Set alarm properties as desired.

ttin t Co p nsati on

If the AG module does not incorporate the O_2 module, you need to set the amount of O_2 in the ventilation gas mixture. To set the O_2 compensation, follow this procedure:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select the **tup** tab.
3. Set **Co p nsati on**:
   - Select when the amount of O_2 is less than 30%.
   - Select the other options in accordance with the O_2 concentration in the gas mixture.

The **Co p nsati on** setting is available only when the AG module does not incorporate the O_2 module. If the AG module incorporates the O_2 module, the system directly uses the O_2 concentration detected by the O_2 module to make compensation.

Ent rin t tan a o

Set the AG module to one of the following modes according to the module status:

- Select **asur** mode when using the AG module for monitoring.
- Select **tan a** mode when not using the AG module.

The default operating mode is **asur** . If not using the AG module, follow this procedure to enter the Standby mode:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select the desired gas tab.
3. Select the **tup** tab.
4. Set **p ratin o** to **tan** .

tin Auto tan

The monitor enters the standby mode automatically after the configured period of time if no breath is detected since the last detected breath. To set the auto standby, follow this procedure:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select the desired gas tab.
3. Select the **tup** tab.
4. Set **Auto tan** .

tin t Gas av or

To set the gas waveform, follow this procedure:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select the desired gas tab.
3. Select the **tup** tab.
4. Set the speed and scale of gas waveforms. For CO_2, set **av or** **p** .

tin t our

To set the RR (respiration rate) source, follow this procedure:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select the desired gas tab.
3. Select the **tup** tab.
4. Set **our** .

When the current RR source does not have valid measurement, the system will automatically switch **our** to **Auto**.

Entrin t Intu ation o

When performing intubation during general anesthesia, enter the intubation mode to reduce unnecessary alarms. To enter the intubation mode, follow this procedure:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select **Intu ation o** from the bottom of the dialog.

For the details of the intubation mode, see *7.14 Intubation Mode*.

Ena in or Disa in AC Disp a

Set whether MAC value is displayed in the AG numeric area by following this procedure:

1. Select the AG numeric area or waveform area to enter the **Gas** dialog.
2. Select the desired anesthetic agent tab.
3. Switch on or off **AC**.

Changing Anesthetic Agent

When the anesthetic agent used on the patient is changed, the AG module detects the mixed anesthetic gas during the transition of two anesthetic agents. The time required for completing the replacement of anesthetic agent depends on anesthesia type (low flow or high flow) and the characteristics of anesthetic agents (pharmacokinetics). During the transition of two anesthetic agents, the monitor gives no prompt messages and the MAC value displayed may be inaccurate.

The AG module can identify two anesthetic agents automatically. When the proportion of primary and secondary anesthetic agents in the mixture changes, the AG module can distinguish between them according to their contributions to the MAC value. Then primary and secondary anesthetic agents will be exchanged for display.

Error in AG Leakage Test

The AG leakage test is required every time before the AG measurement. To perform the AG leakage test, follow this procedure:

1. Plug the AG module into the module rack.
2. Wait for about one minute until the AG module warms up. Completely block the gas inlet of the AG

Vi w

vi w v rvi w

Trends are patient data collected over time and displayed in graphic, tabular, or other forms to give you a picture of how the patient's condition is developing. The vi w dialog enables access to review the events, full disclosure waveforms, and so on.

vi wDi a o

The vi w dialog contains tabs to display trend data in tabular, graphic, or other forms.

A ssi n t vi wDi a o

To enter the review dialog, choose any of the following ways:

- Select the vi w quick key → select the desired tab. If reviewing patient data is password protected, input the monitor's clinical password (local password)..

(5) Event area: displays the event of the cursor time. Selecting the event accesses the event list. If there is no event at the cursor time, the cursor time is displayed.

(6) Numeric area: displays numeric values at the cursor indicated time. The background color of numeric values matches the alarm priority.

(7) Cursor: this is adjusted by touching different locations. Adjusting this changes the data displayed in the Event area and Numeric area.

(8) Slider: indicates the position of current screen time in the entire time length. Dragging this button left or right enables you to locate the trend data at a specific time and also refreshes trend data in current screen accordingly.

(9) Button area.

Icons on review pages

The following table lists the symbols on review pages.

Icon	Description
	Slider: indicates the position of current screen time in the entire time length. Dragging the slider left or right enables you to locate the trend data at a specific time and also refreshes data in current screen accordingly.
/	Goes to the previous or next event.
	Event list: displays events in a chronological order. The most recent event is displayed at the top.Thu 26 (e 0. 71) 8 00381(

Common operations

This section describes common operations for all review pages.

Browsing Trend Data

To browse trend data, choose any of the following ways:

- Move the cursor.
- Move the slider .
- Slide your finger on the screen.

Viewing Events

You can view the following types of events:

- Manually triggered events
- Parameter-related operation events and alarm-related events, such as starting C.O. measurement
- Operation events not related to parameters, such as system time change

To view events, choose either of the following ways:

- Select and select the desired event.
- Select or to jump to the previous event or next event.

Events are displayed in a chronological order. The most recent event is displayed at the top. The number of asterisk symbols before an event indicates alarm priority as follows:

- !!!: high priority alarm
- !!: medium priority alarm
- !: low priority alarm

Tabular Trends Review Page

The tabular trends review page displays trend data in a tabular form.

Entering the Tabular Trends Review Page

To enter the tabular trends review page, choose any of the following ways:

- Select the **View** quick key → select the **Tabular Trends** tab.
- Select the **Main Menu** quick key → from the **View** column select **Tabular Trends**.

Changing the Tabular Trend Group

To change the tabular trend group, follow this procedure:

1. Enter the tabular trends review page.
2. Set **Trend Group**.

Editing the Tabular Trend Group

The setting of the **Trend Group** defines the contents of displayed and printed trends. It is possible to edit any trend group except for the **All** and **Standard** trend groups. To do so, follow this procedure:

1. Enter the tabular trends review page:
2. Select **Group Setup** → select the desired tab.
   - Rename the trend group (optional): select the symbol at the upper left corner and input the desired name.
   - Add parameters: select desired parameters from the **Candidates** column, and then select **Add**. Selecting **Add All** adds all parameters (up to the maximum of 83).
   - Delete parameters: select desired parameters from the **Select** column, and then select **Delete**. Selecting **Delete All** deletes all parameters except for HR.
   - Move the position of parameters displayed on the trend page: select desired parameters from the **Select** column, and then select **Move Up**, **Move Down**, **Move to Top**, or **Move to Bottom**.
   - Display two parameters side by side: select two parameters from the **Select** column, and then select **Overlap**. Then, the symbol appears at the right of the overlapped parameters. The overlapped parameters will be displayed side by side in one numerics area and waveform area.
   - Unoverlap two parameters: select the overlapped parameters from the **Select** column, and then select **Unoverlap**.

Selecting **Default** will restore the trend group settings to factory defaults.

NOTE

- **Trend Groups** and **All** or **Standard** cannot be edited.
- The **HR** parameter and waveform are displayed in the first row on the trend page and cannot be moved to the bottom or overlapped.

Changing the Resolution of Tabular Trend Data

The interval of tabular trends defines the interval of displaying trend data. A short interval is especially suited for neonatal applications, where the clinical situation may change very quickly. In adult monitoring, where the patient's status typically changes more gradually, a longer interval may be more informative.

To change the interval of trend data, follow this procedure:

1. Enter the tabular trends review page.
2. Select **Interval**.
   - **5 s** or **30 s**: select to view up to 4 hours of tabular trends at an interval of 5 seconds or 30 seconds.
   - **1 min**, **2 min**, **5 min**, **10 min**, **15 min**, **30 min**, **60 min**, **2 hours** or **4 hours**: select to view up to 120 hours of tabular trends at selected interval.

- Select parameters, such as NIBP, or C.O., to view the tabular trends when these parameter measurements are acquired.

E

- **C an in , tw nint rva s o snott pi a an t positiono t si r or ursor , pt to roun itto t n ar stint rva ow v r an in int rva sto , s on s or ssw i ov an ursor positio or t an ours a o tot o st ata sst an ours a o**

rintin a a u ar rn s port

To print a tabular trends report, follow this procedure:

1. Enter the tabular trends review page.
2. Select to enter the rint tup dialog.
3. Set the tabular trends report as described in *21.6.3 Configuring Tabular Trends Reports*.
4. Select rint or rint A .
   - rint: the trend data before the above set i , for the above set rio , and at the above set Int rva will be printed.
   - rint A : all the stored trend data will be printed at the review interval.

or in a u ar rn s

To print tabular trends with the recorder, follow this procedure:

1. Enter the tabular trends review page.
2. Select to enter the or tup dialog.
3. Respectively set tart i and En i of the tabular trends data.
4. Select or or or A .
   - or : the trend data between the tart i and En i will be recorded.
   - or A : all the stored trend data at the review interval will be recorded.

Grap i s rn s vi w a

The graphic trends review page displays trend data in a visual format.

Ent rin t Grap i rn s vi w a

Choose one of the following methods to enter the graphic trends review page:

- Select the vi w quick key → select the **Grap i r n s** tab.
- Select the ain nu quick key → from the vi w column select **Grap i r n s**.

C an in t Grap i rn Group

To change the graphic trend group, follow this procedure:

1. Enter the graphic trends review page.
2. Set rn **Group**.

E itin t Grap i rn Group

1. Enter the graphic trends review page.
2. Select and select **Group tup**.
3. Select the desired tab.

For more information, see *17.2.5.3 Editing the Tabular Trend Group* for detail on how to edit the group.

Changing the Resolution of Trend Data

To change the length of trend data displayed on the current screen, follow this procedure:

1. Enter the graphic trends review page.
2. Select **Zoom**.
   - **1 min**: the screen displays 8 minutes of trend data. You can view the most recent one hour of data.
   - **1 hour**: the screen displays 1 hour of trend data. You can view the most recent 8 hours of data.

The number of currently selected events and the total number of events are displayed at the top right corner of the event list. For example, 2/4 indicates that the selected event is the second event in the filtered events and the total number of filtered events is 4. **ota** indicates the total number of events. For example: **ota** : 28 means that there are a total of 28 events.

Con i urin t Fi t r

You can filter events to facilitate event review. To configure the filter, follow this procedure:

1. Enter the **Ev nts** page.
2. Select **Fi t r**. From the drop-down list, select the desired filter item.

You can create up to two sets of custom filter. To do so, follow this procedure:

1. From the **Fi t r** drop-down list, select **Custo** or **Custo** to enter the **Fi t r tup** menu.
2. Select the **a** field to edit the name of the custom filter criterion.
3. Select the desired items.

If you want to review events which happened around certain time, select → set the time → select . The cursor then jumps to the event happened closest to the time entered.

E itin Ev nts

To edit events, follow this procedure:

1. Enter the **Ev nts** page and tick off the desired events.
2. Select to edit the selected events.
   - **o** : manually lock the event. Locked events cannot be deleted.
   - **ot** : enter comments for the event.
   - **na** : allow renaming an event name. Only manual events and arrhythmia events can be renamed if enabled by the hospital's settings. For more information, see *24.6.2 Renaming Events*.

i win Ev nt D tai s

To view waveforms and parameter values at the event time, follow this procedure:

1. Enter the **Ev nts** page.
2. Select **D tai** .

To display beat labels on the first ECG waveform, switch on **B at Anno**. The white beat labels indicate heart beats classification and may explain suspected, missed, or false arrhythmia calls. Heart beats are classified as follows:

- N = Normal
- V = Ventricular ectopic
- S = Supraventricular premature
- P = Paced
- L = Learning
- ? = Insufficient information to classify beat
- I = Inoperative (for example, Lead Off)
- M = Missed beat

If you switch on **B at Anno** on the **Ev nts** page, beat labels will also be displayed on the **Fu Di s osur** page, and vise versa. Beat labels can be printed out.

rintin Ev nt ports

3. Select the desired options.

◆ **rint A Ev nt ist**: print the entire event list.

◆ **rint ist o t Ev nts**: print the list of selected events.

◆ **rint D tai o t Ev nts**: print the details of selected events.

◆ **rint Disp a Ev nt D tai** : print the waveforms and parameters of the currently displayed event.

4. Select **rint**.

or in Ev nt D tai s

To print events details via a recorder, follow this procedure:

1. Enter the events review page.
2. Select the **D tai** button.
3. Select [icon] to print the details of the event.

E

- **n a para t r a is pr i wit t p uss i n on a printout it in i at s t at t atai s ro an t rna vi**

Fu Dis osur vi w a

You can review up to 48 hours of waveform data on the full disclosure review page. You can view both the compressed waveformsand numeric values.

Ent rin t Fu Dis osur vi w a

To enter the full disclosure review page, choose any of the following ways:

- Select the **vi w** quick key → select the **Fu Dis osur** tab.
- Select the **ai n nu** quick key → from the **vi w** column select **Fu Dis osur** .

tin av or s

You can select the waveforms to be displayed and stored. Up to 48 hours of waveforms for all parameters can be stored. When closing the **t av or** dialog, a prompt will inform you of the duration of waveforms that can be saved if the amount is less than 48 hours. To save and display the desired waveforms, follow this procedure:

1. Enter the full disclosure review page.
2. Select **tup** to enter the **t av or** page.
3. Select the **tora** tab and set the desired waveforms to be stored in the monitor. Select the **Disp a a i u** tab and set the desired waveforms to be displayed on the **Fu Dis osur** page.

E

- **ara t r a s ro t rna vi s ar pr i wit t p uss i n**
- **torin or wav or s a s ort n t stora ti to ss t an ours as a ust t wav or s stor wit t is onsi ration**

In case of alarms, the background of the compressed waveform is highlighted with a colored block during the alarm time:

- Red: high alarm priority
- Yellow: medium alarm priority
- Cyan: low alarm priority

Setting the Waveform Duration

To set the length and size of displayed compressed waveforms, follow this procedure:

1. Enter the full disclosure review page.
2. Set the waveforms scale in either of the following ways:
   - Select ••• and select the **Scale** button.
   - Select the waveform label.
3. Select **Duration** to set the length of displayed waveforms.
4. Select the parameter label beside the waveforms to set scale for each parameter.

Viewing Details of Compressed Waveforms

To view the full waveforms and numeric values, follow this procedure:

1. Enter the full disclosure review page.
2. Select **Detail**.

You can perform the following operations on the this page:

- Switch on **Beat Anno**. For more information, see *17.2.7.4 Viewing Event Details*.
- Select ••• and select **Speed**, **ECG Gain**, or **Save As Event**.
- Select **Overview** to switch to the compressed waveform view.

Printing the Full Disclosure Review Report

To print a compressed waveform report, follow this procedure:

1. Enter the full disclosure review page.
2. Select 🖶 to enter the **Print Setup** dialog.
3. Select waveform type you want to print:
   - **Print Review Overview**: compressed waveform of selected period will be printed. This option is only available when printing from the Overview or compressed waveform view.
   - **Print Displayed Detail**: parameter values and all stored waveforms around the cursor time will be printed. This option is only available when printing from the Detail view.
4. Select **Print**.

Recording the Detailed Compressed Waveform

To record a Full Disclosure Detail Record Report, follow this procedure:

1. Enter the **Full Disclosure** page.
2. Select **Detail**.
3. Select 🎞.

OxyCRG Review

You can review up to 48 hours worth of 4 minute trend curves on the OxyCRG review page. The OxyCRG review functionality is available for neonatal monitoring only.

Entering

- OxyCRG review is available only when a neonatal patient category is set.

vi w a

When ST analysis is enabled, the monitor saves ST segments and values at an interval of one minute. You can review the latest 120 hours of ST data.

Ent rin t vi w a

To enter the ST review page, choose either of the following ways:

- Select the **vi w qui** → select the tab.
- Select the **ain nu** quick key → from the **vi w** column select .

ttin t rn

You can set the currently displayed ST as reference. To do so, follow this procedure:

1. Enter the ST review page.
2. Select **t rn** .

E

- **as in isus as r rn , aut**

Dispa in Hi in t rn

To display or hide ST reference, follow this procedure:

1. Enter the ST review page.
2. Select **Dispa rn** or **Hi rn** .

Dispa in Hi in ar rs

To display or hide markers, follow this procedure:

1. Enter the ST review page.
2. Select **Dispa ar r** or **Hi ar r**.

rintin Data

To print ST data, follow this procedure:

1. Enter the ST review page.
2. Select .

vi win Dis ar ati nts

For discharged patients, you can review the trend data in the review page.

C in t Data o a Dis ar ati nt

1. Access the **Dis ar ati nts** dialog box by either of the following ways:
   - Select the **Dis ar ati nts** quick key. If viewing discharged patients is password protected, input the user name and password (the user password saved in the MLDAP server).
   - Select the **ain nu** quick key → from the **ati nt ana nt** column select **Dis ar ati nts**. If viewing discharged patients is password protected, input the user name and password (the user password saved in the MLDAP server).
2. From the patient list select the desired patient.
3. Select **D tai** . If reviewing patient data is password protected, input the monitor's clinical password (local password).

Obtaining Information of Discharged Patients

1. Access the **Discharged Patients** dialog box by either of the following ways:
   - Select the **Discharged Patients** quick key. If viewing discharged patients is password protected, input the user name and password (the user password saved in the MLDAP server).
   - Select the **Main Menu** quick key → from the **Patient Management** column select **Discharged Patients**. If viewing discharged patients is password protected, input the user name and password (the user password saved in the MLDAP server).
2. From the patient list select the desired patient.
3. Select **Detail**. If reviewing patient data is password protected, input the monitor's clinical password (local password).
4. Select  to enter the **Patient Management** dialog box.

Cini a Assistiv Appi ations CAA

The Clinical Assistive Applications (CAA) function integrates some commonly used clinical guidelines and tools into the monitor. It puts the currently monitoring parameter measurements together and provides comprehensive analysis results.

CAA is not intended to replace the competent judgment of a clinician. It must be used in conjunction with observation of clinical signs and symptoms.

C in otwar i ns s

A licenses is required to run Early Warning Score (EWS) in the monitor:

To check the licenses, select the **ain nu** quick key → select **i ns** → **o a**.

To install the licenses, follow this procedure:

1. Connect the USB drive with the licenses in to the monitor's USB connector.
2. Select the **ain nu** quick key →select **i ns** → select **E t rna**.
3. Select **Insta**.

Ear arnin or E

The Early Warning Scores (EWS) can help you recognize the early sign of deterioration in patients based on vital signs and clinical observations. It is based on the "Royal College of Physicians (2015) National Early Warning Score (NEWS2): Standardizing the assessment of acute illness severity in the NHS, Report of a Working Party. RCP, London. Depending on the score calculated, appropriate recommendations are displayed.

The monitor supports the following scores:

- MEWS (Modified Early Warning Score)
- NEWS (National Early Warning Score)
- NEWS2 (National Early Warning Score 2)
- Custom Score

A subscore is given for each parameter based on the measured or entered value. When all the required parameters are entered or measured, the subscores are added together to calculate the total early warning score. Each subscore has a color coding to indicate associated level of risk, When the total score is outside of the thresholds, actions are recommended. MEWS, NEWS and NEWS2 can give total scores.

Custom Score is based on user-defined parameters.

MEWS, NEWS and NEWS2 are intended for adult patients only. The patient category applied to the Custom Score is defined by Mindray Clinical Score Configuration Tool. For more information, see *Mindray Clinical Scoring Config Tool Instruction for Use (P/N: 046-012986-00)*.

A I G

- **E un tion is not int n or p iatri an n onata pati nts**
- **E s ou not us as t so asis or ia nosis or t rap isions It is not int n to r pa t o p t nt u nt o a ini ian E s or s an r o n ations ust us in on un tion wit o s rvation o ini a si ns an s pto s**
- **E an E ar int n or a u t pati nts on E is not appi a to pr nant wo an an C D C roni stru tiv u onar Dis as pati nts**

E

- **E s or s o s not tri r an a ar s an annot us or ontinuous onitorin**

Displaying the EWS Numerics Area

To display the EWS numerics area, follow this procedure:

1. Access the **Layout** in either of the following ways:
   - Select the **Configuration** quick key → select the **Layout** tab.
   - Select the **Main Menu** quick key → from the **Display** column select **Layout**.
2. Select the parameter area where you want to display the EWS score, and then from the popup list select **EWS**.

(1) EWS protocol label

(2) Scoring countdown: time to the next scoring.

(3) Scoring interval

(4) The current scoring time

(5) Single parameter whose score reaches 3

(6) Risk level indicator. The level of risk increases from top down. The current level is enclosed by a white square frame.

(7) History total score. The rightmost one is the latest history score.

(8) Total score. The color of the circle indicates the level of risk.

Assigning EWS

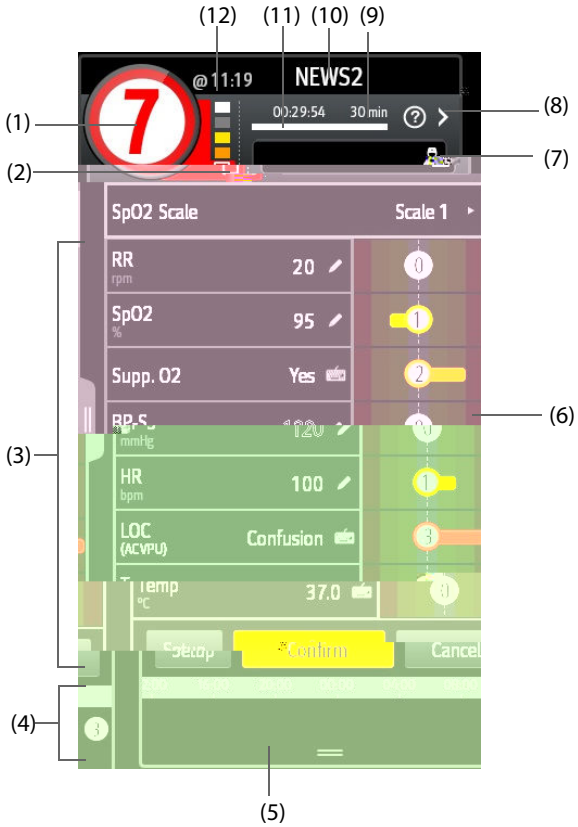
Access the EWS window in any of the following ways:

- Select the EWS parameter area
- Select the **EWS** quick key.
- Select the **Configuration** quick key → select the **Choose Screen** tab → select **EWS**.
- Select the **Main Menu** quick key → from the **CAA** column select **EWS**.

When the EWS screen is hidden as , you can also choose one of the following methods to quickly enter the EWS screen.

- Swipe left or right across the touchscreen with two fingers until you switch to the EWS screen.
- Swipe right across the touchscreen with a single finger,
- Select the button.

Take NEWS2 as an example, the EWS screen is shown as follows. Your screen may be slightly different due to the configuration.



(1) Total score. The color of the circle indicates the level of risk.

(2) Risk level indicator. The level of risk increases from top down. The current level is enclosed by a white frame.

(3) Parameter area: displays the subscore and parameter value of each parameter. The keyboard symbol indicates that the parameter value is manually entered.

(4) History total scores area: selecting this area or swiping up with one finger can review the trends of total score and each subscore.

(5) Selecting this button expands the History Total Scores area where your can review the trends of the total score and each subscore.

(6) Selecting this button or swiping right across the screen with one finger displays the trends of total score and parameter values for scoring.

(7) Clinician ID (displays only when the Clinician ID is enabled): allows inputing the Clinician ID to associate with the EWS score. For more information, see *24.4.1 Enabling Inputing the Clinician ID*.

(8) Select this button to see the clinical response to the current score

(9) Scoring interval

(10) EWS protocol label

(11) Scoring countdown: time to the next scoring.

(12) The scoring time

r or in E . . ori n

To perform scoring, follow this procedure:

1. Select s t to clear the previous score and update values of currently monitored parameters and relevant subscores.
2. For NEWS2, set the p . a .
   - a . : for patient without hypercapnic respiratory failure.
   - a : for patients with a prescribed oxygen saturation requirement of 88–92% (for example, in patients with hypercapnic respiratory failure).
3. Measure or manually enter other required parameters and observations.
4. If the clinician ID is enabled, input the clinician information by selecting , and then manually entering the information, or by scanning the clinician's barcode.
5. Select Ca u at to get the total score.
6. If or Conir ation is enabled, select Conir to save current scoring, or select Can to give up current scoring. Refer to section *18.2.4.2 Setting the Scoring Confirmation Switch* for more information.

CA . I

- isiontous a ot p a s ou , a , a o p t nt ini a isi on a r an s ou , r or iht pati nts ini a not s

. E

- B or a uatin t s or s t st to art pr viouss or
- . . oar s o att ni to t para t rvau in i at st att va u is anua nt r
- You an tt s or on w n a r quir para t rs av , n asur or nt r
- n a pati nt is is ar ort onitoris turn o t ini ian IDis ar

C an in E . . ttin s

C an in t . ori n roto o

The monitor is configured with a default scoring protocol. To change the scoring protocol, follow this procedure:

1. From the EWS page select . tup.
2. Set . or .

. ttin t . ori n Conir ation wit

To select if confirmation is required before saving score, follow this procedure:

1. From the EWS page select . tup.
2. Set . or Conir ation switch.
   - : the monitor automatically saves the scoring result after the scoring is completed.
   - n: you need to confirm that whether the scoring result is saved or not after the scoring is completed.

. ttin t anua Data i out

The manually input parameter data can be configured to become invalid after a preset time. To set the timeout period for the input data, follow this procedure:

1. From the EWS screen select . tup.
2. From the anua Data i out area, select a desired parameter and set its timeout period.

Glasgow Coma Scale (GCS)

The Glasgow Coma Scale (GCS) function is based on Teasdale's *Assessment of Coma and Impaired Consciousness-A Practical Scale (Lancet, 1974)*. Three aspects of behavior are independently measured: eye opening, verbal response, and motor response. The scores are added together to indicate that patient's level of consciousness.

GCS is intended for adults and pediatric patients.

CAUTION

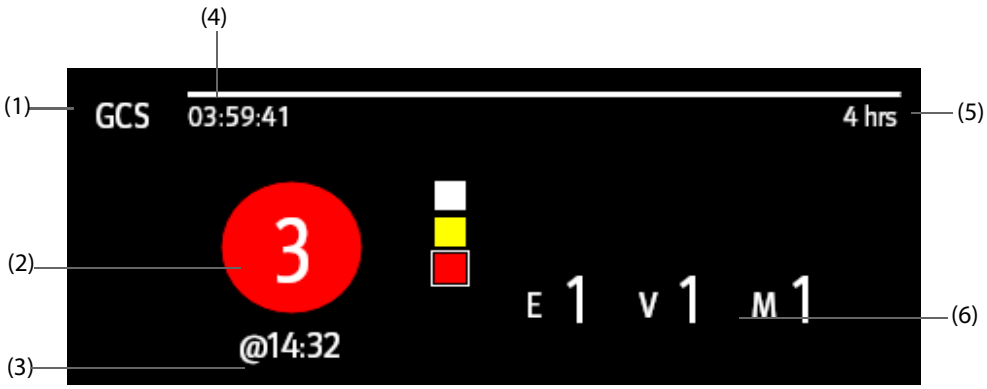
- **GCS is intended as an aid during patient assessment and must be used in conjunction with observation of clinical signs and symptoms**
- **GCS is not applicable to patients that are sedated or have an artificial airway, or are in status epilepticus**
- **Care must be taken when applying GCS to hospitalized patients**
- **Not applicable to children under the age of four years or those who cannot follow GCS commands**

Displaying the GCS Parameter Area

To display the GCS parameter area, follow this procedure:

1. Access the **Layout** in either of the following ways:
   - Select the **Main Setup** quick key → select the **Layout** tab.
   - Select the **Main Menu** quick key → from the **Display** column select **Layout**.
2. Select the parameter area where you want to display the GCS score, and then from the popup list select **GCS**.

The following figure shows the GCS parameter area. The display may be configured to look slightly different.



(1) GCS label

(2) Total score and level of consciousness. The color of the circle indicates the level of risk.

(3) Scoring time

(4) Scoring countdown: time to the next scoring

(5) Scoring interval

(6) Subscores

- E: eye opening
- V: verbal response
- M: motor response

Assistant GCS Dialog

Enter the GCS dialog in any of the following ways:

- Select the GCS parameter area.
- Select the **GC**

ECG 24h Summary

The ECG 24h Summary provides ECG statistics of the current

tin pi a ECG trips

Taking V-Tach as an example, to select typical V-Tach waveform, select the currently displayed V-Tach waveform, from the popup list select the desired waveform as typical V-Tach waveform.

If no V-Tach occurs to the patient within 24 hours, an add symbol is displayed in the V-Tach area. You can select the add symbol to display a typical ECG waveform of other event in this area.

ttin t tatisti a Durationo t ECG u ar

You can view a maximum of 24 hours of ECG statistics through the ECG 24h Summary. To select the statistical duration, select **Zoo** .

vi win t ECG u ar

Selecting any of the statistic area can access corresponding trends and events review. Selecting **Fu Dis osur** can review ECG full disclosure waveforms. For more information, see *15.2.8 Full Disclosure Review Page*.

C GE pan r n

The OxyCRG Expand screen displays the following information:

- Realtime values and waveforms of ECG, Resp, and SpO_2.
- Realtime OxyCRG
- A timer
- SpO_2 statistics

The OxyCRG Expand screen facilitates viewing the result of neonatal monitoring.

E

- **C GE pan s r nis notint n ora utan p iatri pati nts**

A ssin t C GE pan r n

Access the OxyCRG Expand screen in any of the following ways:

- Select the OxyCRG Expand quick key.
- Select the **r n tup** quick key → select the **C oos r n** tab → select OxyCRG Expand.
- Select the **ain nu** quick key → from the **CAA** column select OxyCRG Expand.

The following figure shows the OxyCRG Expand screen

(3) SpO_2 statistics area: for more information, see *4.4.4 Setting Parameter Statistics*.

(4) The printer icon: select it to print the OxyCRG Expand report.

(5) OxyCRG: for more information, see *4.3 The OxyCRG Screen*.

Changing Parameter Settings

To change parameter settings, select corresponding parameter numerics or waveform area.

Starting the Timer

A timer is used to record the neonatal monitoring time.The monitoring time is 90 minutes by default. For more information on changing the timer settings, see *22.3 Setting the Timer*.

To start the timer, from the Timer area select **Start**.

Printing the OxyCRG Report

After the neonatal monitoring is finished, select the **Print** icon at the top right corner of the OxyCRG to preview or print the monitoring report.

Reviewing the OxyCRG Events

To review the OxyCRG Expand events, select the ABD events area of the OxyCRG to enter the OxyCRG review page.

For more information on OxyCRG review, see *17.2.9 OxyCRG Review Page*.

Ca u ation

Ca uation v rvi w

The monitor provides calculation functions. The calculated values, which are not directly measured, are computed based on the values you provide. The calculation function is independent of other monitoring functions and can therefore be used for patients being monitored by other monitors. Any operation in a calculation dialog does not affect the patient monitored by the current monitor.

You can perform the following calculations:

- Drug calculations
- Hemodynamic calculations
- Oxygenation calculations
- Ventilation calculations
- Renal calculations

Ca uation a t In or ation

A I G

- **D isions ont oi an osa o ru sa inist r topati nts ust a was a a t p si ianin ar ru a uationsar as ont va u sinput it o s not t pausi it o t a uationp r or**
- **C t att nt r va u sar orr tan t a u at va u sar appropriat in ra assu s nor sponsi it oran ons qu n s aus a wron ntri san i prop r op rations**

Dru Ca uations

r or in Dru Ca uations

To perform drug calculations, follow this procedure:

1. Access the drug calculator by either of the following ways:
   - Select the **Ca uations** quick key → select the **Dru** tab.
   - Select the **ain nu** quick key → from the **Ca uations** column select **Dru** .
2. Set **Dru a** and **ati nt Cat or** If the dose of drug is weight dependent, you must input the patient's weight. The dose calculation program has a library of commonly used drugs, while Drug A through Drug E are user defined.
3. Enter the known values, for example **Dru A ount** and **o ution o u**
4. Select **Ca u at** . The calculated values are indicated by red arrows.

E

- **l avai a t pati nt at or an wi tro t ati nt ana nt ia o ar auto ati a nt r w n ou irst a ss ru a uation You an an t pati nt at or an wi t is wi not an t pati nt at or an wi t stor in t pati nt o rap i in or ation**

Using the titration table

The titration table shows information on the currently used drugs. Use the titration table to see what dose of a drug your patient will receive at different infusion rates. To access the titration table, follow this procedure:

1. Access drug calculator by either of the following ways:
   - Select the **Calculations** quick key.
   - Select the **Main Menu** quick key → from the **Calculations** column

H o na i Ca u ations

The monitor provides the hemodynamic calculation function and can save the results of up to 10 calculations, which are displayed in groups.

r or in H o na i Ca u ations

To perform hemodynamic calculation, follow this procedure:

1. Access hemodynamic calculation by either of the following ways:
   - Select the **Ca u ations** quick key → **H o na i s** tab.
   - Select the **ain nu** quick key → from the **Ca u ations** column select **H o na i s**.
2. Enter the known values. For a patient who is being monitored, the currently measured values are automatically entered.
3. Select **Ca u at** .

   A calculated value greater than the normal upper limit is indicated by an up arrow "↑". A calculated value lower than the normal lower limit is indicated by a down arrow "↓".

You can select **an** to show the normal range of each parameter.

Input ara t rs or H o na i Ca u ations

Input ara t r	a ,	nit
cardiac output	C.O.	L/min
heart rate	HR	bpm
pulmonary artery wedge pressure	PAWP	mmHg
artery mean pressure	PMAP	mmHg
pulmonary artery mean pressure	PA Mean	mmHg
central venous pressure	CVP	mmHg
end-diastolic volume	EDV	ml
height	Height	cm
weight	Weight	kg

E

- **I ou na , s AD as A AD va u wi , us tor pa A va u or o na i a uation For or in or ation r to , ttn t s , AD s, A , t**

Ca u at ara t rs an For u as or H o na i Ca u ations

Ca u at ara t rs	a ,	nit	For u a
cardiac index	C.I.	L/min/m^2	C.I. (L/min/m^2) = C.O. (L/min)/BSA (m^2)
body surface area	BSA	m^2	BSA (m^2) = $Wt^{0.425}$ (kg) × $Ht^{0.725}$ (cm) × 0.007184
stroke volume	SV	ml	SV (ml) = 1000× C.O. (L/min)/HR (bpm)
stroke index	SVI	ml/m^2	SVI (ml/m^2) = SV (ml)/BSA (m^2)
systemic vascular resistance	SVR	DS/cm^5	SVR (DS/cm^5) = 79.96 × [PAMAP (mmHg) - CVP (mmHg)]/C.O. (L/min)
systemic vascular resistance index	SVRI	DS•m^2/cm^5	SVRI (DS•m^2/cm^5) = SVR (DS/cm^5) × BSA (m^2)

Ca u at _ ara t rs	a ,	nit	For u a
pulmonary vascular resistance	PVR	DS/cm^5	P VR (DS/cm^5) = 79.96 × [PAMAP (mmHg) - PAWP (mmHg)]/C.O. (L/min)
pulmonary vascular resistance index	PVRI	DS•m^2/cm^5	PVRI (DS•m^2/cm^5) = PVR (DS/cm^5)× BSA (m^2)
left cardiac work	LCW	kg•m	LCW (kg•m) = 0.0136 × PAMAP (mmHg) × C.O. (L/min)
left cardiac work index	LCWI	kg•m/m^2	LCWI (kg•m/m^2) = LCW (kg•m)/BSA (m^2)
left ventricular stroke work	LVSW	g•m	LVSW (g•m) = 0.0136 × PAMAP (mmHg) × SV (ml)
left ventricular stroke work index	LVSWI	g•m/m^2	LVSWI (g•m/m^2) = LVSW (g.m)/BSA (m^2)
right cardiac work	RCW	kg•m	R CW (kg•m) = 0.0136 × PAMAP (mmHg) × C.O. (L/min)
right cardiac work index	RCWI	kg•m/m^2	R CWI (kg•m/m^2) = RCW (kg.m)/BSA (m^2)
right ventricular stroke work	RVSW	g•m	R VSW (g•m) = 0.0136 × PAMAP (mmHg) × SV (ml)
right ventricular stroke work index	RVSWI	g•m/m^2	R VSWI (g•m/m^2) = RVSW (g•m)/BSA (m^2)
ejection fraction	EF	%	EF (%) = 100 × SV (ml)/EDV (ml)
End-diastolic volume index	EDVI	ml/m2	EDVI (ml/m^2) = EDV (ml)/BSA (m^2)
End-systolic Volume	ESV	ml	ESV (ml) = EDV (ml) –SV (ml)
End-systolic Volume index	ESVI	ml/m^2	ESVI (ml/m^2) = ESV (ml)/BSA (m^2)

, , nation Ca u ations

The monitor provides the oxygenation calculation function and can save the results of up to 10 calculations, which are displayed in groups.

, , _ r or in , nation Ca u ations

To perform oxygenation calculations, follow this procedure:

1. Access oxygenation calculation by either of the following ways:
   - Select the **Ca u ations** quick key → , **nation** tab.
   - Select the **ain nu** quick key → from the **Ca u ations** column select , **nation**.
2. Enter the known values. For a patient who is being monitored, the currently measured values are automatically entered.
3. Select **Ca u at** .

   A calculated value greater than the normal upper limit is indicated by an up arrow "↑". A calculated value lower than the normal lower limit is indicated by a down arrow "↓".

In the , **nation** page, you can also perform the following operations:

- Select , **Cont nit**, **H , nit**, and _ **r ssur nit**. Then corresponding parameter values will be automatically converted and updated accordingly.
- Select **an** to show the normal range of each parameter.

Input Parameters for Oxygenation Calculations

Input Parameter	Label	Unit
cardiac output	C.O.	L/min
percentage fraction of inspired oxygen	FiO_2	%
partial pressure of oxygen in the arteries	PaO_2	mmHg, kPa
partial pressure of carbon dioxide in the arteries	$PaCO_2$	mmHg, kPa
arterial oxygen saturation	SaO_2	%
partial pressure of oxygen in venous blood	PvO_2	mmHg, kPa
venous oxygen saturation	SvO_2	%
hemoglobin	Hb	g/L, g/dl, mmol/L
respiratory quotient	RQ	None
atmospheric pressure	ATMP	mmHg, kPa
height	Height	cm, inch
weight	Weight	kg, lb

Calculated Parameters and Formulas for Oxygenation Calculations

nti ati on Ca u ati ons

The monitor provides the ventilation calculation function and can save the results of up to 10 calculations, which are displayed in groups.

r or in nti ati on Ca u ati ons

To perform ventilation calculations, follow this procedure:

1. Access ventilation calculation by either of the following ways:
   - Select the **Ca u ati ons** quick key → **nti ati on** tab.
   - Select the **ain nu** quick key → from the **Ca u ati ons** column select **nti ati on**.
2. Enter the known values. For a patient who is being monitored, the currently measured values are automatically taken. If the anesthesia machine or ventilator is connected, measured values for ventilation calculation are also automatically entered.
3. Select **Ca u at** .

A calculated value greater than the normal upper limit is indicated by an up arrow "↑". A calculated value lower than the normal lower limit is indicated by a down arrow "↓".

On the **nti ati on** page, you can also perform the following operations:

- Select **r ssur nit**. Then corresponding parameter values will be automatically converted and updated accordingly.
- Select **an** to show the normal range of each parameter.

Input ara t rs or nti ati on Ca u ati ons

Input ara t r	a ,	nit
percentage fraction of inspired oxygen	FiO_2	%
respiration rate	RR	rpm
partial pressure of mixed expiratory CO2	$PeCO_2$	mmHg, kPa
partial pressure of carbon dioxide in the arteries	$PaCO_2$	mmHg, kPa
partial pressure of oxygen in the arteries	PaO_2	mmHg, kPa
tidal volume	TV	ml
respiratory quotient	RQ	None
atmospheric pressure	ATMP	mmHg, kPa

Ca u at ara t rs an For u as or nti ati on Ca u ati ons

Ca u at ara t rs	a ,	nit	For u a
partial pressure of oxygen in the alveoli	PAO_2	mmHg, kPa	PAO_2 (mmHg) = [ATMP (mmHg) - 47 mmHg] × FiO_2 (%)/100 - $PaCO_2$ (mmHg) × [FiO_2(%)/100 + (1 - FiO_2 (%)/100)/RQ]
alveolar-arterial oxygen difference	$AaDO_2$	mmHg, kPa	$AaDO_2$ (mmHg) = PAO_2 (mmHg) - PaO_2 (mmHg)
oxygenation ratio	Pa/FiO_2	mmHg, kPa	Pa/FiO_2(mmHg) = 100 × PaO_2 (mmHg)/FiO_2 (%)
arterial to alveolar oxygen ratio	a/AO_2	%	a/AO_2 (%) = 100 × PaO_2 (mmHg)/PAO_2 (mmHg)
minute volume	MV	L/min	MV (L/min) = [TV (ml) × RR (rpm)]/1000

Ca u at _ ara t rs	a ,	nit	For u a
volume of physiological dead space	Vd	ml	Vd (ml) = TV (ml) × [1 - $PeCO_2$ (mmHg)/$PaCO_2$ (mmHg)]
physiologic dead space in percent of tidal volume	Vd/Vt	%	Vd/Vt (%) = 100 × Vd (ml)/TV (ml)
alveolar volume	VA	L/min	VA (L/min) =[TV (ml) - Vd (ml)] × RR (rpm)/1000

na Ca u ations

The monitor provides the renal calculation function and can save the results of up to 10 calculations, which are displayed in groups.

r or in na Ca u ations

To perform renal calculations, follow this procedure:

1. Access renal calculation by either of the following ways:
   - Select the **Ca u ations** quick key → select the **na** tab.
   - Select the **ain nu** quick key → from the **Ca u ations** column select **na** .
2. Enter the known values.
3. Select **Ca u at** .

A calculated value greater than the normal upper limit is indicated by an up arrow "↑". A calculated value lower than the normal lower limit is indicated by a down arrow "↓".

You can select **an** to show the normal range of each parameter.

Ca u at _ ara t rs an For u as or na Ca u ations

Input ara t r	a ,	nit
urine pstassium	URK	mmol/L
urinary sodium	URNa	mmol/L
urine	Urine	ml/24 hrs
plasm osmolality	Posm	mOsm/kgH_2O
urine osmolality	Uosm	mOsm/kgH_2O
serum sodium	SerNa	mmol/L
creatinine	Cr	µmol/L
urine creatinine	UCr	µmol/L
blood urea nitrogen	BUN	mmol/L
height	Height	cm
weight	Weight	kg

Calculation Parameters and Formulations

Calculation Parameters	Label	Unit	Formula
urine sodium excretion	URNaEx	mmol/24 hrs	URNaEx (mmol/24 hrs) = Urine (ml/24 hrs) × URNa (mmol/L)/1000
urine potassium excretion	URKEx	mmol/24 hrs	URKEx (mmol/24 hrs) = Urine (ml/24 hrs) × URK (mmol/L)/1000
sodium potassium ratio	Na/K	%	Na/K (%) = 100 × URNa (mmol/L)/URK (mmol/L)
clearance of sodium	CNa	ml/24 hrs	CNa (ml/24 hrs) = URNa (mmol/L) × Urine (ml/24 hrs)/SerNa (mmol/L)
creatinine clearance rate	Clcr	ml/min	Clcr (ml/min) = Ucr (μmol/L) × Urine (ml/24 hrs)/[Cr (μmol/L) × (BSA (m^2)/1.73) × 1440]
fractional excretion of sodium	FENa	%	FENa (%) = 100 × URNa (mmol/L) × Cr (μmol/L)/[SerNa (mmol/L) × Ucr (μmol/L)]
osmolar clearance	Cosm	ml/min	Cosm (ml/min) = Uosm (mOsm/kgH_2O) × Urine (ml/24 hrs)/(Posm (mOsm/kgH_2O) × 1440)
free water clearance	CH2O	ml/hr	CH2O (ml/hr) = Urine (ml/24 hrs) × [1 - Uosm (mOsm/kgH_2O)/Posm (mOsm/kgH_2O)]/24
urine to plasma osmolality ratio	U/P osm	None	U/P osm = Uosm (mOsm/kgH_2O)/Posm (mOsm/kgH_2O)
blood urea nitrogen creatinine ratio	BUN/Cr*	Mmol/L	BUN/Cr = 1000 × BUN (mmol/L)/Cr (μmol/L)
urine-serum creatinine ratio	U/Cr	None	U/Cr (mmol/L) = Ucr (μmol/L)/Cr (μmol/L)

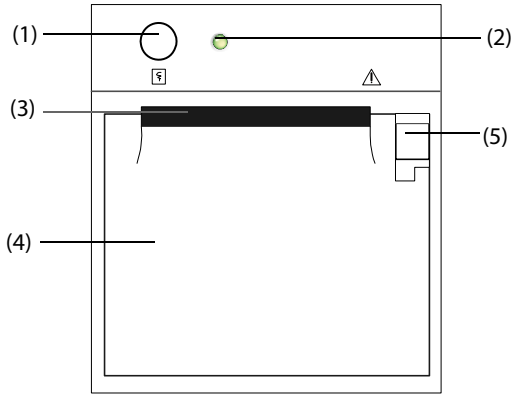
*: BUN/Cr is a ratio under the unit of mol.

or in

or r

The thermal recorder records patient information, measurement data, and up to three waveforms.

The monitor can be configured with a built-in recorder.



(1) Start/Stop key: press to start a recording or stop the current recording.

(2) Module status indicator

- On: when the recorder works correctly.
- Off: when the monitor is switched off.
- Flashes: if an error occurred to the recorder.

(3) Paper outlet

(4) Recorder door

(5) Latch: pull it backward to open the recorder door.

tarti n or in s

Recordings can be started manually or automatically.

anua tarti n or in s

To manually start a recording, you can either:

- Press the hardkey on the front of the recorder to start a Realtime Segment Waveform Recording.
- Select on the current dialog to start a recording corresponding to that dialog or page.

Auto ati or in s

In the following conditions, you can set the recorder to automatically start recording:

- At a preset interval. For more information, see *20.5 Setting Up the Recorder*.
- When a parameter alarm is triggered. For more information, see *24.3.9.2 Enabling Automatic Recordings on an Alarm*.

Stopping Recordings

Recordings can be stopped manually or automatically.

Stopping Recordings Manually

To manually stop a recording, press the hardkey while the recorder is creating a strip or select **Clear All Recordings** in the **Recorder Setup** menu.

Stopping Recordings Automatically

Recordings stop automatically in the following conditions:

- The recording is completed.
- The recorder runs out of paper.
- The recorder has an alarm condition.
- The monitor is turned off.

Recording Formats

You can find the following flags on the recording reports:

- For automatically stopped recordings, there are two columns of asterisks "*" at the end of the report.
- For manually or abnormally stopped recordings, there is one column of asterisks "*" at the end of the report.
- If the parameter data is from external devices connected to the monitor, the parameter label is prefixed with the plus sign "+".

Setting Waveform Recorder

To configure the recorder for waveforms and printing intervals, follow this procedure:

1. Select the **Main Menu** quick key → from the **Report** column select **Recorder Setup**.
2. In the **Recorder Setup** dialog, select the desired waveform for **Wave Recorder 1**, **Wave Recorder 2** and **Wave Recorder 3** in turn. The recorder can record up to 3 waveforms at a time.
3. Switch on or off **IBP Overlap** to enable or disable IBP recordings in the overlapping format.
   - When the **IBP Overlap** is enabled: If two or more waveforms in the selected waveforms for recording are IBP waveforms, the IBP waveforms will be recorded in the overlapping format.
   - When the **IBP Overlap** is disabled: IBP waveforms will be recorded without overlap.
4. Select **Recording Duration** to set the duration of real-time recording.
5. Select **Interval** to set the time interval for automatic recording.
6. Select **Recorder Speed** to set the speed for recording waveforms.

Clearing Recording Tasks

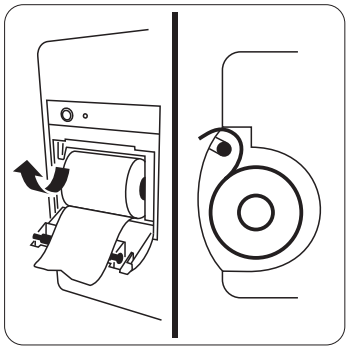
To clear recording tasks, follow this procedure:

1. Select the **Main Menu** quick key → from the **Report** column select **Recorder Setup**.
2. In the **Recorder Setup** dialog, select **Clear All Recordings**. This clears all queued recording tasks and stops the current recording.

oa in _ ap r

To load paper, follow this procedure:

1. Use the latch at the upper right of the recorder door to pull the door open.
2. Insert a new roll into the compartment as shown below. Feed the paper through and pull some paper out from the top of the roller.
3. Close the recorder door.



CA I

- **s on sp ii t r a pap r t rwis it a aus a a tot r or r sprint a t r or r a a una a to print or poor print quait a r sut**
- **v rpu t r or r pap r wit or w nar or in isin pro ss t rwis it a aus a a tot r or r**
- **Do not av t r or r oor op n un ss ou ar r oa in pap r or an in a pap r a**

ovin _ ap r Ja

If the recorder works incorrectly or produces unusual sounds, check if there is a paper jam. If a paper jam is detected, follow this procedure to remove it:

1. Open the recorder door.
2. Take out the paper and tear off the draped part.
3. Reload the paper and close the recorder door.

ist o or in ports

The recorder can output the following reports:

- Realtime reports
  - Realtime Segment Waveform Record
  - Realtime Continuous Waveform Record
  - Auto Realtime Record
  - ST Record
  - QT Record
  - Record on Alarm Report
- History reports
  - Event Detail
  - Full Disclosure Detail Record
  - ST Review Record
  - Tabular Trend Report
  - Graphic Trend Report

rintin

upport rint r

The monitor can output patient reports via a connected network printer. The monitor supports the following printers:

- HP LaserJet Pro M202dw
- HP LaserJet Pro 400 M401n
- HP LaserJet P4015n
- HP LaserJet 600 M602
- HP LaserJet Enterprise M605
- HP LaserJet Enterprise M608n

E

- **For or tai sa outt print r r rtot ou nta o pan in t print r it pro u t up ra s t onitor a supporta itiona print rs wit out prior noti l ou av an ou ts a outt o pati jit o t print rus wit t is onitor onta t in ra**

En Cas ports

rintin t En Cas port

To print the end case report, choose one of the following ways:

- Select **rint** from the **En Cas port** menu.
- Select **rint En Cas port** when you discharge a patient.
- Select the **En Cas port** quick key.

ttin a port as An En Cas port

The following reports can be set as end case reports:

- Tabular Trends Report
- Graphic Trends Report
- Event Report
- Alarm Limits Report
- Realtime Report
- ECG Report

To set a report as an end case report, follow this procedure:

1. Select the **ain nu** quick key → from the **port** column select **En Cas port**.
2. From the **t ports** page, select the desired report tab, for example **ECG port**.

Configuring End Case Reports

To configure end case reports, follow this procedure:

1. Select the **Main Menu** quick key → from the **Report** column select **End Case Report**.
2. From the **Report Setup** page, set the following end case reports:
   - Select the **Manual Reports**, **Graphic Reports**, **Trend Table** and **ECG Report** tab, and set these end case report by referring to section *21.6 Configuring Reports*.
   - Select the **Event Report** tab, and select the event that needs to be printed.

Setting the End Case Report Print Period

To set the end case report print period, follow this procedure:

1. Select the **Main Menu** quick key → from the **Report** column select **End Case Report**.
2. From the **Report Settings** page, set the **Print Period**.

NOTE

- **End case report print period is automatically set to patient discharge during admission.**
- **Print period setting is applied to all end case reports.**

Manual Starting a Printing Task

This section describes different methods for manually printing a report.

Printing from Toolbar

The button will be shown at the top of dialogs that have associated reports. If the button is gray, then there is not enough information to begin the report, or the printer has not been set up.

When the icon is white, pressing it opens a **Print Setup** dialog or starts printing a report. If the **Print Setup** dialog is entered, configure the report and press **Print** to start printing.

Printing Trend Reports

Select the **Print** quick key to print a realtime report. You can also print a realtime report from the **Report Setup** dialog. For more information, see *21.3.3 Printing Most Common Reports*.

Printing Most Common Reports

The following most common reports can be printed:

- ECG Report
- Realtime Report
- Tabular Trends Report
- Graphic Trend Report.

To print these reports, follow this procedure:

1. Select the **Main Menu** quick key → from the **Report** column select **Report Setup**.
2. Select the desired report tab.
3. Check the settings.
4. Select **Print**.

Auto ati a rinti n ports

When a parameter alarm switch is set to on and an alarm is triggered for this parameter, you can set the monitor to automatically print a Print on Alarm Report.

To do so, follow this procedure:

1. Access alarm related tabs such as the **A ar** tab for a parameter in one of the following ways:
   - Select the **A ar tup** quick key.
   - Select the parameter or waveform area of the desired parameter → select the **A ar** tab.
   - Select the **ara t rs tup** quick key → select the desired parameter → select the **A ar** tab.
   - Select the **ain nu** quick key → from the **ara t rs** column select **tup**→ select the desired parameter → select the **A ar** tab.
2. Switch on **A ar utputs** for desired parameters.

toppin a rinti n as

To stop a printing task, follow this procedure:

1. Select the **ain nu** quick key →from the **port** column select **rint u u** .
2. Select desired printing tasks and then select **D t** . Alternately, select **D t A** to stop all the printing tasks.

Coni urin ports

This section focuses on how to configure ECG reports, realtime reports, tabular trends reports, and graphic trends reports.

Coni urin ECG ports

To configure ECG reports, follow this procedure:

1. Select the **ain nu** quick key → from the **port** column select **port tup**.
2. Select the **ECG port** tab.
3. Set the desired options. The following table explains some of the less familiar options.

nuit	Fun tion	D s ription
Speed	Set the print speed of ECG waveforms	25 mm/sec: prints 25 mm of ECG waveform per second. 50 mm/sec: prints 50 mm of ECG waveform per second.

E

- **n ECG a tiss tto a t ECG r port annot a, print**

Coni urin ati ports

To configure tabular realtime reports, follow this procedure:

1. Select the **ain nu** quick key → from the **port** column select **port tup**.
1. Select the **ati port** tab.
2. Set the desired options. The following table explains some of the options.

Configuring tabular trends reports

To configure tabular trends reports, follow this procedure:

i win _ rint r tatus

You can view the status of the most recent ten printing tasks in the_ rint u u

- End Case Report -ECG Report
- End Case Report - Tabular Trends Report
- End Case Report - Graphic Trends Report

sin t n r n i rs

The monitor has a Timer function to notify you when a preset time period is expired or how much time has elapsed. You can simultaneously display up to four timers.

Disp a in i rs

To display a timer, follow this procedure:

1. Access i a out in either of the following ways:
   - Select the r n tup quick key → select the i a out tab.
   - Select the ain nu quick key → from the Disp a column select i a out.
2. Click the numeric tile area where the timer is to be displayed, and then select a timer from the popup list.

Contro in t i r

The timer provides the following controls, depending on the state and settings of the timer:

- tart: starts the timer.
- aus : pauses the timer.
- su : resumes the timer.
- s t: clears the timer.

tin t i r

You can set each timer independently. To set the timer, follow this procedure:

1. Select the timer area to enter the i r tup dialog.
2. Set i r p :
   - or a : The timer has a single and defined run time, and stops with a notification beep when the run time is reached.
   - A van : The timer has a single and defined run time. When the run time is reached, the timer makes a notification beep and continuously displays the time beyond the end of run time.
   - C : The timer has a single and defined run time. When the run time is reached, the timer makes a notification beep and restarts automatically. The number of elapsed cycles is also displayed on the left of the Timer tile.
   - ni it : The timer displays the time elapsed since the timer was started.
   - Co : The timer displays the system time.
3. Set Dir tion.
   - p: the timer counts up, from zero to Run Time.
   - Down: the timer counts down, from Run Time to zero.
4. Set un i .
5. Set in r ou .

   A progress bar is shown with the run time. When the remaining time is 10 seconds, the monitor issues a reminder tone and the timer flashes in red, prompting you that the run time is about to expire.

E

- You annot an ti rs ttin s ot rt an in r ou w nati ris runnin
- You an st Dir tion un i an in r ou on or nor a a van an ti rs

This page intentionally left blank.

ana in Con i urati ons

Con i uration Intro u tion

When performing continuous monitoring on a patient, the clinical professional often needs to adjust the monitor's settings according to the patient's condition. The collection of all these settings is called a configuration. The system configuration items can be classified as: parameter configuration items, conventional configuration items, and user maintenance items. Allowing you to configure the monitor more efficiently, the monitor provides different sets of configurations to accommodate the varying patient categories and departments. You can change some settings from a certain set of configuration and then save the changed configuration as a user configuration.

The default configurations provided for your monitor are department-oriented. You can choose either from:

- General
- OR
- ICU
- Neonatology
- CCU

Each department has three different sets of configurations tailored for adult, pediatric and neonatal patients respectively.

A I G

- **on i uration ana nt un tionis passwor prot t on i uration ana nt tas s ust a, p r or a, ini a pro ssiona s**

C an in t D part nt

If the current department configuration is not the one you want to view, you can change the department by following this procedure:

1. Select the **ain nu** quick key → from the **Con i uration** column select **ana** → input the required password → select ↵.
2. Select **C an D part nt**.
3. Select a department.
4. Select .

CA l

- **C an in t part nt wi t a urr nt us r on i urations**

tin D au t ati nt Cat or

To set the default patient category when admitting a new patient, follow this procedure:

1. Select the **ain nu** quick key → from the **Con i uration** column select **ana** → input the required password → select ↵.
2. Set **D au t ati nt Cat or** .

ttin D aut Coni uration

The monitor will load the pre-set default configuration in the following cases:

- A patient is admitted.
- A patient is discharged.
- Patient category is changed.

To set the default configuration, follow this procedure:

1. Select the **ain nu** quick key → from the **Coni uration** column select **ana** → input the required password → Select ↵.
2. Select **t D aut Coni** .
3. Select **oa t at st Coni** or **oa p ii Coni** .
   - When you select **oa t at st Coni** , the latest configuration is loaded when the monitor is started or a patient is admitted.
   - When you select **oa p ii Coni** , the selected configuration of **D aut A ut Coni** , **D aut Coni** , or **D aut o Coni** is loaded when the monitor is started or a patient is admitted. The specified configuration can be the factory default configuration, the age segments configuration, or a saved user defined configuration. As an example, select **D aut o Coni** and then select **Fa tor D aut**, **o GA nts**, or a user configuration. For more information on defining age segments, see *23.5 Defining Age Segments*.

D inin A nts

You must define age segments for any patient category you want to load configurations based on the patient's age. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **Coni uration** column select **ana** → input the required password → Select ↵.
2. Select **t D aut Coni** .
3. Respectively select the edit icons followed by **Custo i Coni urations or A ut A nts**, **Custo i Coni urations or A nts**, **Custo i Coni urations or o G stationa A nts** to define the age segments for each patient category. The age segment of the neonatal patient is based on the baby's gestational age.

avin Curr nt ttin s

Current settings can be saved as a user configuration. Up to 25 user configurations can be saved.

To save current settings, follow this procedure:

1. Select the **ain nu** quick key → from the **Coni uration** column select **ana** → input the required password → Select ↵.
2. Select **av Curr nt ttin s**.
3. Input the configuration name.
4. Select to save current settings as a user configuration.

D tin a Coni uration

To delete a configuration, follow this procedure:

1. Select the **ain nu** quick key → from the **Coni uration** column select **ana** → input the required password → Select ↵.
2. Select **D t Coni uration**.
3. Select the configuration you want to delete:
   - In the **D t Coni uration** dialog, selecting **o a** tab shows the existing user configurations on the monitor.

- In the **D t Con i uration** dialog, selecting **B Driv** tab shows the existing user configurations on the USB drive.

4. Select **D t** .
5. Select .

rans rin a Con i uration

When installing several monitors with identical user configurations, it is not necessary to set each unit separately. Use a USB drive to transfer the configuration from monitor to monitor.

E portin a Con i uration

To export the current monitor's configuration, follow this procedure:

1. Connect the USB drive to the monitor's USB port.
2. Select the **ain nu** quick key → from the **Con i uration** column select **ana** → input the required password → Select .
3. Select **E port Con i uration**.
4. Select the configurations and **s r aint nan tin s** to export.
5. Select **E port**.

I portin a Con i uration

To import the configuration from the USB drive to the monitor, follow this procedure:

1. Connect the USB drive to the monitor's USB port.
2. Select the **ain nu** quick key → from the **Con i uration** column select **ana** → input the required password → Select .
3. Select **I port Con i uration**.
4. Select the configurations and **s r aint nan tin s** to import.
5. Select **I port**.

oa in a Con i uration

You may make changes to some settings during operation. However, these changes or the pre-selected configuration may not be appropriate for the newly admitted patient. Therefore, the monitor allows you to load a desired configuration to ensure that all the settings are appropriate for your patient.

To load a configuration, follow this procedure:

1. Select the **ain nu** quick key → from the **Con i uration** column select **oa** .
2. Select the desired configuration.
   - Select the configuration on this monitor in the **o a** page.
   - Select the configuration on the USB drive in the **B Driv** page.
3. Select **oa** .

E

- **onitor a oni ur so stin s, aut w n ou oa a oni uration o i r nt so twar v rsion wit t urr nt oni uration**

rinting Configurations

To print both factory configurations and user configurations, follow this procedure:

1. Select the **ain nu** quick key →from the **Con i uration** column select **ana** → input the required password → select ↵.
2. Select **rint Con i uration**.
3. Select desired configurations.
4. Select **rint**.

o i in Configuration asswor

To modify the configuration password, follow this procedure:

1. Select the **ain nu** quick key → from the **Con i uration** column select **ana** → input the required password → Select ↵.
2. Select **o i asswor** .
3. Respectively input the old password and new password.
4. Select .

asswor prot t s r tti n s

C an in _ ati nt ana nt tin s

tin Disp a _ ati nt In or ation

You can define which items can be displayed and edited from the _ ati nt ana nt tab. To do so, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select .
2. Select the _ ati nt ana nt tab→ select the Fi tab.
3. Select the fields you want to display in the _ ati nt ana nt dialog.
4. If necessary, select the customized fields and input names for these fields.

E

- I t onitoris onn t wit t C t pati ntin or ationit san usto i i sar oa ro t C

tin t an o Fin in a_ ati nt

You can configure which patient can be found in the CMS or the ADT server. To do so, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select .
2. Select the _ ati nt ana nt tab→ select Fin _ ati nt tab.
3. Select Fin _ ati nt.
   - A _ ati nts: search from all patients in the CMS or ADT server.
   - Curr nt D part nt_ ati nts: only searches from the current department in the CMS or ADT server.

Auto Dis ar in a_ ati nt a t r onitor_ ow r

You can let the monitor automatically discharge after the monitor has been switched off for a period of time.

To set the time period of discharging a patient, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select .
2. Select the _ ati nt ana nt tab→ select the Dis ar tab.
3. Select a time for Auto Dis ar n_ ow r

Configuring Discharged Patient Data

To configure discharged patient data, follow this procedure:

1. Select the **Main Menu** quick key → from the **Patient** column select **Patient Management** → input the required password → select .
2. Select the **Patient Management** tab → **Discharge** tab.
3. Switch on **Include Patient Demographics in Exported Patient Data** if you want to include patient demographics when exporting the patient data.
4. Select **Auto Delete Patient Data after Discharge** to specify whether patient data is deleted when the patient is discharged.
   - **Auto**: patient data is not deleted when the patient is discharged. The oldest discharged patient data will be deleted when the storage space of the monitor is full.
   - **Right Now**: deletes patient data as soon as the patient is discharged.
   - **Days**: deletes discharged patient data seven days after the patient was discharged.
   - **Month**: deletes discharged patient data one month after the patient was discharged.

Clearing All Patient Data

You can delete all patient information and data in the monitor. To do so, follow this procedure:

1. Select the **Main Menu** quick key → from the **Patient** column select **Patient Management** → input the required password → select .
2. Select the **Patient Management** tab→ select the **Discharge** tab.
3. Select **Clear All Patient Data**.
4. Select . Select again for confirmation until a message indicating you that all data is cleared.

CAUTION

- **Clearing patient data will discharge the current patient and suspend patient monitoring. Proceed only if you are ready to do so.**

Setting Query Criteria for Searching Patients in ADT Server

You can define which criteria can be used to search patients in the ADT server. To do so, follow this procedure:

1. Select the **Main Menu** quick key → from the **Patient** column select **Patient Management** → input the required password → select .
2. Select the **Patient Management** tab → select the **ADT Query** tab.
3. Select the query criteria as desired.

Setting Patient Location Options for Discharge Rules

To set options for patient location, follow this procedure:

1. Select the **Main Menu** quick key → from the **Patient** column select **Patient Management** → input the required password → select .
2. Select the **Patient Management** tab → select the **Location** tab.
3. Input or edit patient location options.

Hiding Patient Data

To hide patient name on specific screens, follow this procedure:

1. Select the **Main Menu** quick key → from the **Patient** column select **Patient Management** → input the required password → select .
2. Select the **Patient Management** tab → select the **Display** tab.
3. Set the following switches as desired:

- Switch off **Primary Name Display Function**: does not display patient name in the patient information area on the primary display.
- Switch off **Local View Display Function**: does not display patient name in the patient information area on the remote monitors when this monitor is viewed by other monitors.
- Switch off **Local View Bed List Display Function**: does not display patient name in bed list on the remote monitors when this monitor is viewed by other monitors.

Configuring Alarm Settings

Setting Alarm Properties

Setting the Minimum Alarm Volume

To set the minimum alarm volume, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab → select the **Audio** tab.
3. Set **Minimum Alarm Volume**.

Setting the Audio Alarm Tone Pattern

You can distinguishes the heart beat tone, pulse tone, and keystroke tone by frequency. For more information, see *7.3.3 Alarm Indicators*.

To set the alarm tone pattern, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab → select the **Audio** tab.
3. Set **Alarm Sound**.

Setting the Interval between Alarm Sounds

If you choose the ISO pattern, you can change the interval between alarm tones. To change the interval between alarm tones, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab → select the **Audio** tab.
3. Set **High Alarm Interval**, **Med Alarm Interval**, and **Low Alarm Interval**.

Setting Alarm Volume Escalation

The monitor provides the function of automatically escalating the alarm tone volume. When this function is enabled, if an alarm is not reset within the designated delay time after the alarm occurs, the volume of the alarm tone increases automatically.

To set the alarm volume escalation, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab → select the **Audio** tab.
3. Set **Auto Increase Volume**.
   - **Steps**: if an alarm is not reset within the designated delay time after the alarm occurs, the alarm volume automatically increases by two levels.

- **t p**: if an alarm is not reset within the designated delay time after the alarm occurs, the alarm volume automatically increases by one level.
- : if an alarm is not reset within the designated delay time after the alarm occurs, the volume of the alarm tone does not change.

4. Select **In r as ou D a** to set the delay time of alarm volume escalation.

E

- **a ar vo u s a ation un tion is not appi to t at a ar s**

tin A ar aus in an s tin rop rti s

D inin t aus Fun tion

You can either pause alarms or pause alarm tones. This depends on the pause setting. To set the pause function, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **aus s t** tab.
3. Set **aus** to **A ar aus** or **Au io aus** .

tin t A ar aus i A ar on aus i

The alarm pause time or alarm tone pause time can be set to **in**, **in**, **in**, or **r an nt**. The default audio pause time is two minutes.

To set the alarm tone pause time, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **aus s t** tab.
3. Set **aus i** .

tin t rioritto Au io aus A ar s

To select alarm of what priority can be paused or alarm sound of what priority can be paused, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **aus s t** tab.
3. Set **aus rioritt** .
   - **A** : pressing the **A ar aus** quick key pauses all alarms.
   - **ow**: pressing the **A ar aus** quick key pauses alarms of medium and low priority. The high priority alarms will not be paused.
   - **Disa** : the **A ar aus** quick key is disabled.

Disa in t ptions o roon in A ar aus i A ar on aus i

To disable specific options for the clinician when prolonging alarm pause time or the alarm tone pause time, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **aus s t** tab.
3. Switch off **aus in**, **aus in**, or **aus in**.

tti n A ar i t tatus on A ar s t

When the alarm system is reset, the monitor presents th

4. Set guard limits for the selected patient category:
   - **Disa,** : if this switch is on, corresponding alarm cannot be switched off.
   - **Hi st**: the high alarm limit cannot be higher than this setting.
   - **ow st**: the low alarm limit cannot be lower than this setting.
   - **ri ori t**: the alarm priority cannot be lower than this setting.

Selecting **C ar** restores default guard limits.

A I G

- **For t a Arr p D sat an Apn a a ar s t aut s tti n o t Disa, swit is on l ou s tt Disa, swit to t a arr t ia a ar s p D sat a ar an apn a a ar an , swit o ust onitor o s not pr s nt t orr spon in a ar w n an a ar on ition o urs is a r sutin a a ar to t pati nt pt pati nt un r os surv i an**

C an in ot A ar tti n s

s tti n A ar s or ot D vi s

You can reset the alarms occurring on the remote devices that are viewed on the **ot i w** screen of the monitor. To enable this function, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select .
2. Select the **A ar** tab → select the **ot i w** tab.
3. Switch on **s t ot B A ar s**. Then the **A ar s t** button appears on the bottom left of the **ot i w** screen.

To reset any remote device alarms, the clinician may now select the **A ar s t** button at the bottom of the **ot i w** screen.

E

- **You an r s t r ot vi a ar son i t A ar s t B t r B swit is on att r ot vi s an a ar s ar o urrin ont r ot vi**

Aut ori in t A ar s tto t r D vi s

Alarms on your monitor can be reset by remote devices if you enable this function. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select .
2. Select the **A ar** tab → select the **ot i w** tab.
3. Switch on **A ar s t B t r B** .

tin t A ar in r or ot D vi s

You can configure what alarm indicators are necessary for Mcarm Rese.60807(o(t)669)13.lset br R Td[.0117006 Tw[(scr)13.656(i)

- **isi , n** : the monitor only provides visual alarm indication.

r s ntin A ar oun or ot D vi sasp r A ar _ ri ori t

You can configure what priority of remote device alarms are presented for audible notification. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the st column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **ot i w** tab.
3. Select **A ar _ ri ori t** :
   - **A** : the monitor sounds if an alarm occurs.
   - **Hi** : the monitor sounds if a high or medium priority alarm occurs.
   - **Hi n** : the monitor sounds only if a high priority alarm occurs.

ttin t on _ att rn or A ar s ro ot D vi s

The monitor provides the same alarm tone pattern for the remote device alarms as those for your monitor alarms. For more information on alarm tone pattern, see *7.3.3 Alarm Indicators*.

To set the alarm tone pattern for the remote device alarms, follow this procedure:

1. Select the **ain nu** quick key → from the st column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **ot i w** tab.
3. Set **A ar oun** .

wit in t ot D vi Dis onn tion A ar

The monitor can provide an alarm if remote devices, for example, a bedside monitor or a telemetry, are disconnected. By default, the function is enabled. To disable the alarm, follow this procedure:

1. Select the **ain nu** quick key → from the st column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **ot i w** tab.

Switch off **ot Dis onn t A ar** .

ttin urs Ca _ rop rti s

tin A ar s to , nt to t urs Ca st

To set the type and priority of alarms that are sent to the nurse call system, follow this procedure:

1. Select the **ain nu** quick key → from the st column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **urs Ca** tab.
3. Select **i na p**
   - **_ u s** : the nurse call signal is a pulse signal and each pulse lasts one second. When multiple alarms simultaneously occur, only one pulse signal is outputted. If an alarm occurs but the previous one is not cleared, a new pulse signal will also be outputted.
   - **Continuous**: the nurse call signal lasts until the alarm ends. That is to say the duration of a nurse call signal is equal to that of the alarm condition.
4. Select **Conta t p** to set the work mode of the nurse call relay.
5. Select **A ar _ ri ori t** to set the priority of alarms sent to the nurse call system.
6. Select **A ar p** to set the type of alarms sent to the nurse call system.

Disabling the Receiving Call for Help Function

If a monitor in the same department calls for help, you can receive the calling signal. This function is enabled by default. To disable this function, follow this procedure:

1. Select the **Main Menu** quick key →from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab → select the **Nurse Call** tab.
3. Switch off **Receive Call for Help**.

Setting the Monitor to Receive Calling for Help Signals

You can choose which calling for help signals the monitor can receive. To do so, follow this procedure:

1. Select the **Main Menu** quick key →from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab → **Nurse Call** tab.
3. Set the switch of **Only Receive Bedside Monitor Call for Help**
   - **On**: The monitor can only receive the calling for help signals from the remote monitors being viewed.
   - : The monitor can receive the calling for help signals from all the monitors in the same department.

Changing Alarm Priority Settings

Setting the Priority of the ECG Lead Off Alarm

To set the priority of the ECG lead off alarm, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab→ select the **Parameter** tab.
3. Set the priority of **ECG Lead Off**.

Setting the Priority of the SpO_2 Sensor Off Alarm

To set the priority of the SpO_2 sensor off alarm, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab→ select the **Parameter** tab.
3. Set the priority of **SpO2 Sensor Off**.

Setting the Priority of the IBP No Sensor Alarm

To set the priority of the IBP no sensor alarm, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab→ select the **Parameter** tab.
3. Set the priority of **IBP No Sensor**.

Setting Whether to Issue an Alarm When the CMS/eGateway Disconnection Alarm

You can choose whether to issue an alarm when the monitor is not connected or disconnected from the CMS/eGateway. To do so, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Alarm** tab → select the **Parameter** tab.

3. In the Other block, switch on or off **C . . G Dis onn t A ar** . If **C . . G Dis onn t A ar** is switched off, the **in .** alarm is not presented when the monitor is not connected or disconnected from the CMS/eGateway.

. ttin t ri ori t o t Int rat D vi Dis onn t A ar

To set the priority of the alarm when the external device is disconnected, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab→ select the **t r** tab.
3. Set the priority of **Int rat D vi Dis onn t** .

. ttin t ri ori t o t C an Gat wa Dis onn tion A ar

To set the priority of the CMS and eGateway disconnection alarm, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **t r** tab.
3. Set **C . . G Dis onn t** .

C an in A ar D a . ttin s

. ttin t A ar D a i

For continuously measured parameters, you can set the alarm delay time. If the alarm condition is resolved within the delay time, the monitor does not present the alarm.

The setting of **A ar D a** is not applied to the apnea alarms and the ST alarms. You can set **Apn a D a** and **. . A ar D a** separately.

To set the alarm delay time, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **t r** tab.
3. Set **A ar D a** .
   - : an alarm is presented as soon as the alarm condition occurs.
   - **. s ~ . s** : for continuously measured parameters, an alarm is not presented if the alarm condition is resolved within the designated delay time.

A I G

- **. aar a ti an a, s ttoa ai u o . s on s C an in t iss ttin to an inappropriat v ou r sutina a ar to t pati nt**

. ttin t . . A ar D a i

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab → select the **t r** tab.
3. Set **. . A ar D a** .

C an in t r A ar . ttin s

ttin t Intu ation i

The default intubation time is 2 minutes. To change the intubation time, following this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the A ar tab → select the t r tab.
3. Set the Intu ation o rio .

Ena in Auto ati or in s on an A ar

rint on A ar is set to rint r by default. To enable automatic recording via recorder when a parameter alarm is triggered, set rint on A ar to or r. To do so, follow this procedure:

1. Select the ain nu quick key → from the st o u n select aint nan → input the required password → select ↵.
2. Select the A ar tab → select the t r tab.
3. Set rint on A ar to or r.

ttin Arr t ia A ar i out rio

The arrhythmia algorithm can disable alarm light and alarm tone for designated period of time when certain arrhythmia alarms are detected.

To set the arrhythmia alarm timeout period, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the A ar tab→ select the t r tab.
3. From the t r block, set Arr i i .

E

- For t o owin a ar s a ar i tan a ar ton annot a isa , H i H ow a ar ia Bra ar ia Ai a, En Irr t En
- arr t ia a ar ti out p rio is on appi to t iu priorit ains an atria i ation ain For t a ar sint i priorit ain a ar ton an a ar i tar pr s nt as soon as t a ar on itionis t t r to , *Arr t A r C ns* or or in or ation on t arr t ia a ar ain
- A ar in iation ru s or a ar sint atria i ation ain ar t sa wit t os ort iu priorit ains

ttin t i t o wit

You can enable or disable the night mode function. To do so, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the A ar tab→ select the t r tab.
3. From the t r block, set Disa i t o .
   - n: the night mode function is not available.
   - : the night mode function is available.

ttin t oti A ar ttin C an wit

The monitor can give an prompt when alarm settings, including alarm limits, alarm priorities, and alarm switches, are changed from the CMS. This function is disabled by default. To enable this funciton, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **A ar** tab→ select the **t r** tab.
3. From the **t r** block, switch on **oti A ar ttin C an** .

When this switch is turned on, the monitor gives the prompt "Alarm Limits/Level/Switch is changed by CMS" if alarm settings are changed from the CMS.

C an in CAA ttin s

Ena in Inputtin t Cini ian ID

To display the clinician ID on the EWS screen, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **CAA** tab → select the **E** tab.
3. Switch on **Cini ian ID**.
4. Select **Cini ian ID i out** to set how long the clinician ID will remain valid.

E

- **E ta ison ava ia i ns or E isinsta int onitor**
- **n apati nt is is ar or t onitoris turn o t ini a ID is ar v ni t ti out is not r a**

tin t D au t. orin oo

To set the default scoring tool for different patient category, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **CAA** tab → select **E** tab.
3. From the **t D au t or** area, set **D au t A u t or** , **D au t or** , and **D au t o or** .

ana in t orin oo s

To manage the scoring tool, follow this procedure:

1. Select the **ain nu** quick key →from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **CAA** tab → select the **E** tab.
3. Select the **ana or** button.
   - Delete local scoring tools: from the **o a** page, delete any unnecessary scoring tools.
   - Import the desired scoring tools to the monitor: from the USB drive page, select the scoring tools on the USB drive, and then select **I port**.

E

- **onitor provi s E an E a au t You annot t t**

ttin GC r s o or Ea Cons iousn ss v

You can configure the threshold and color of each consciousness level. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **CAA** tab → select the **GC** tab.

3. Set high limit, low limit for each level.

C an in o u tin s

tin t ECG tan ar

Select the ECG standard according to the leadwires you are using. To select the ECG standard, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **ECG** tab.
3. Set **ECG tan ar** to **AHA** or **IEC**.

C an in t For ua

The monitor uses the Hodges correction formula by default to correct the QT interval for heart rate. To select the QTc formula, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **ECG** tab.
3. Set **For ua**.

   - Hodges: $QTc = QT + 1.75 \times (HeartRate - 60)$
   - Bazett: $QTc = QT \times \left(\frac{HeartRate}{60}\right)^{\frac{1}{2}}$
   - Fridericia: $QTc = QT \times \left(\frac{HeartRate}{60}\right)^{\frac{1}{3}}$
   - Framingham: $QTc = QT + 154 \times \left(1 - \frac{60}{HeartRate}\right)$

Cai ration ECG

The ECG signal may be inaccurate due to hardware or software problems. As a result, the ECG waveform amplitude becomes greater or smaller. In that case, you need to calibrate the ECG module. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **ECG** tab.
3. From the bottom left corner of the dialog select **Cai rat** .

anua Z roin t C o u

To zero the CO_2 module, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **C** tab.
3. From the bottom left corner of the dialog select **Z ro**.

Hi in t Invai Dispa a t r Z roin t C o u

After the zero calibration is completed, the CO_2 module reacquires the CO_2 readings. During the reacquisition period, "**Z ro ov in** " is displayed in the CO_2 numeric area. Valid data will reappear 30 seconds after the zero calibration is started.

To hide the display of the "**Z ro ov rin** " message, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **C** tab.
3. Switch off **Z ro ov r or s**.

Selecting **D au ts** from the bottom of the dialog can restore this setting to the factory default.

anua Z roin t AG o u

To zero the AG module, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **AG** tab.
3. From the bottom left corner of the dialog select **Z ro**.

Hi in t Invai Dispa a t r Z roin t AG o u

After the zero calibration is completed, the AG module reacquires the AG readings. During the reacquisition period, "**Z ro ov rin** " is displayed in the AG numeric area. Valid data will reappear 30 seconds after the zero calibration is started.

To hide the display of the "**Z ro ov rin** " message, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **AG** tab.
3. Switch off **Z ro ov r or s**.

Selecting **D au ts** from the bottom of the dialog can restore this setting to the factory default.

tin t Gas p or asur nt

You can select what gases are detected by the monitor. To do so, follow this procedure:

1. Ensure that the AG module is inserted in the monitor.
2. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
3. Select the **o u** tab → select the **AG** tab.
4. Set **p s o Gas asur nt**. Any gas that is not selected, will not be displayed or used for calculating the MAC value. When the concentration of any unselected gas is equal to or greater than 1%, you will be prompted to select the gas and enable the measurement (**t XX asur nt to n**.

Selecting **D au ts** from the bottom of the dialog can restore this setting.

tin IB Fi t r

To set IBP filter, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **o u** tab → select the **t r** tab.
3. Set **IB Fi t r**.

tin ara t r asur nt i out

NIBP measurements become outline fonts after a preset time. This feature prevents older values being misinterpreted as current measurements. To adjust the timeout period for PAWP and NIBP, follow this procedure:

1. Select the **Main Menu** quick key → from the **Last** column select **Maintenance** → input the required password → select **OK**.
2. Select the **Config** tab → select the **Timer** tab.
3. Set the timeout period for PAWP, C.O., and NIBP.

Setting Flow Rate

When you are using the sidestream CO_2 module to monitor a neonatal patient, you can select flow rate. To do so, follow this procedure:

1. Ensure that the sidestream module is inserted in the monitor.
2. Select the **Main Menu** quick key → from the **Last** column select **Maintenance** → input the required password → select **OK**.
3. Select the **Config** tab → select the **Timer** tab.
4. Set **CO2 Flow Rate** for **Neo**.

Cancel and View Settings

Hiding Review Pages

If you do not need to review some items, you can hide them. To do so, follow this procedure:

1. Select the **Main Menu** quick key → from the **Last** column select **Maintenance** → input the required password → select **OK**.
2. Select the **View** tab.
3. From the **Trends** page, **Event** page or **Arrhythmia** page deselect those not need to be available to clinicians during review.

Renaming Events

You can rename manual events and arrhythmia events. To do so, follow this procedure:

1. Select the **Main Menu** quick key → from the **Last** column select **Maintenance** → input the required password → select **OK**.
2. Select the **View** tab.
3. Switch on **Name Event**.

Exporting Patient Data

To export data of the current and discharged patients, follow this procedure:

1. Connect the USB drive to the monitor's USB connector.
2. Select the **Main Menu** quick key → from the **Last** column select **Maintenance** → input the required password → select **OK**.
3. Select the **View** tab → select the **Export** tab.
4. Select **Export Patient Data**.
5. From the patient list select desired patients.
6. Select **Export Patient Data**.

Setting the Printer

Setting the Printer Properties

To set a network printer, follow this procedure:

1. Select the **Main Menu** quick key → from the **Last** column select **Maintenance** → input the required password → select **OK**.

2. Select the **Print** tab.
3. In the **Printer** tab, select **Connection Type** to choose whether you want to output patient reports via the print server or a network printer.
4. If you set **Connection Type** to **Print Server**, perform the following settings:
   - **Print Server Address**: select to input the printer server name or IP address.
   - **Port**: selects to input the printer server port. If the CMS is used as the printer server, set **Port** to [illegible].
   - Set the report type in the **Report Type** area. For more information, see section *24.7.2 Setting the Report Type*.
5. If you set **Connection Type** to **Printer**, perform the following settings:
   - Select **Printer IP Address**. Select to input the IP address of the desired network printer.
   - Select **Paper Size**.
   - Select **Resolution**.

After finishing configurations, you can select the **Print Test Page** button to verify that the printer works properly.

24.7.2 Setting the Report Type

If the **Connection Type** is set to **Print Server**, you need to set the report type:

1. Select the **Main Menu** quick key → from the **System** column select **Maintenance** → input the required password → select .
2. Select the **Print** tab.
3. Set **Connection Type** to **Print Server**.
4. Select the report you intend to set, for example, **General Report**.
5. Set the **Print Action**:
   - **Paper**: outputs paper report.
   - **PDF**: outputs the electronic report in PDF format.
   - **Paper And PDF**: outputs both the paper report and the PDF report.
6. For paper report, respectively select **Printer** and **Printer Resolution** to set the default printer and the resolution for the default printer.
7. For PDF report, select the **PDF Resolution** to set the resolution.

NOTE

- **General reports refer to the reports other than the End Case Report and Realtime Alarm Report**

24.7.3 Setting the Report Layout

To set the patient information you want to display on general reports, follow this procedure:

1. Select the **Main Menu** quick key → from the **System** column select **Maintenance** → input the required password → select .
2. Select the **Print** tab → select the **Report Layout** tab.
3. Select the desired items under **Report Layout**. **N/A** indicates that this item is not displayed on a report.

24.7.4 Configuring the Name of PDF Files

If you use the Print Server to output patient reports, you can use the PDF printer to output PDF format reports. To configure the name of PDF files, follow this procedure:

1. Select the **Main Menu** quick key → from the **System** column select **Maintenance** → input the required password → select .
2. Select the **Print** tab → select the **PDF File Name** tab.
3. Select the desired items and their sequence under **PDF File Name**. **N/A** refers to no information.

owin t on ar

To set whether you want to show second marks on the report output by the printer, follow this procedure.

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the rint tab → select the t r tab.
3. Enable or disable on ar rint r.

ttin t Arr t ia ln or ation to utput , t or r

To set whether you want to include arrhythmia thresholds and QRS thresholds in the report output by the recorder, follow this procedure.

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the rint tab → select the t r tab.
3. Enable or disable Arr ttin s or r.

ttin ara t r nit

To set parameter unit, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the nit tab.
3. Set unit for each parameter.

ttin t i

ttin t i n ron i ation

If the NTP Time Synchronization function is enabled, the monitor can automatically synchronize its time with a time server on which NTP (Network Time Protocol) is implemented. If there are many monitors connected within one network, you can enable the time synchronization to synchronize the time, and make it unnecessary to manually set the time for individual monitors.

Ena in i n ron i ation

To enable the NTP Time Synchronization function, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the i tab → select the i n ron i ation tab.
3. Switch on tart i n .

ttin t i rv r A r ss

To set the DNS name of the time server address, follow this procedure:

1. Select the ain nu quick key → from the st column select aint nan → input the required password → select ↵.
2. Select the i tab → select the i n ron i ation tab.
3. Input the domain name or IP address of the time server.

After configuring the NTP time server, select twor st to verify that the NTP server is properly connected.

tti n t i n ronizati on Int rva

To set the time synchronization interval, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select .
2. Select the **i** tab → select the **i n ronizati on** tab.
3. Set

Establishing the Relationship between Patient Demographics and 2D Barcode for Fixed-port Mindray Custom 2D Barcode Scanner

To configure 2D barcode reader, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Scanner** tab → select the **2D Barcode** tab.
3. Establish the relationship between the monitor data and hospital's barcode data for selectable patient demographics. For example, the monitor has an option of for patient category. In your hospital barcode, the text may read as **Patient**. So input **Patient** for the field to establish their relationship.

Setting the Barcode Reader Information

To set the barcode reader information, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Scanner** tab → select the **Scanner Info** tab.
3. Set **Scanner Type**:
   - **1D Scanner**: select this option when using a 1D scanner or a 2D scanner other than the Mindray custom 2D scanner.
   - **2D Scanner**: select this option when using the Mindray custom scanner.

NOTE

- **You must set Scanner Type to 2D Scanner before setting Data Encoding and Data Delimiters. You do not need to set this setting.**

Identifying the Barcode Reader from Non-Mindray Custom 2D Barcode Scanner

When you are using barcode readers other than the JADAK Flexpoint HS-1R or HS-1M, you should select the barcode reader from the USB device list, so that the monitor can identify the barcode reader. To do so, follow this procedure:

1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Scanner** tab → select the **Identify Scanner** tab.
3. From the USB device list, select the barcode reader you are using.

Setting Patient Information Read by the Barcode Reader for Fixed-port Mindray Custom 2D Barcode Scanner

To select desired patient information that will be read by the barcode reader, follow this procedure:

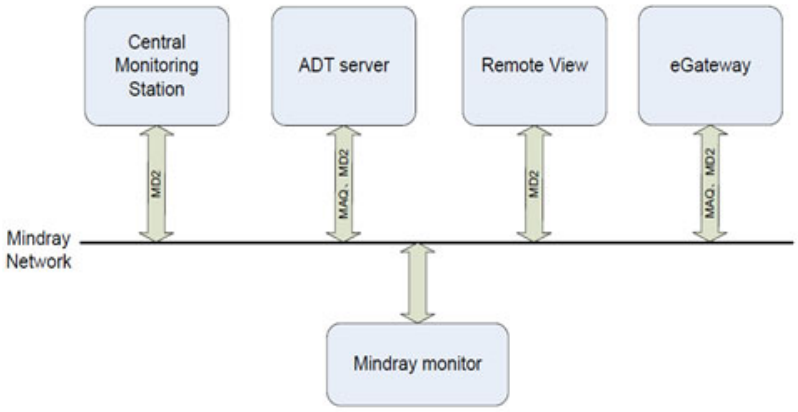
1. Select the **Main Menu** quick key → from the **List** column select **Maintenance** → input the required password → select ↵.
2. Select the **Scanner** tab → select the **Fixed** tab.
3. Select the patient information. The selected information can be read by the barcode reader.

NOTE

- **The patient information read by barcode reader is dependent on the patient information in hospital's barcode.**

Configuring Network

You can connect the monitor to the central monitoring system (CMS), eGateway, and other monitors through wired LAN or wireless LAN.



twor a t In or ation

CA I

- ir ssn twor sin po nt au in an aint nan s ou , ut , in ra s rvi p rsonn or aut ori t ni ians
- A was po t wir ssn twor a or in to o a wir ssr u ations
- sin G r qu n an isr o n w n v rpossi , r ar or int r r n sour s in G r qu n an
- rivat A san wir ssrout rsar nota ow s vi s a aus raioint r r n an r su tin onitoran C ata oss
- Data o uni ation ust p r or wit ina os n twor orwit inavirtua iso at n twor provi a, a ospita ora n twor un tions ospita isr sponsi , or nsurin t s urit o t virtua iso at n twor
- A an A Ent rpris v ri i ationan n r ptions ou , us i possi , t rwis t quip nt a not , a , towor orpati ntin or ation a , ivu A Ent rpris an a on passwor ar r o n
- pn twor aut nti ationin or ation or a p passwor s sa toprot t t n twor ro ,in a ss , unaut ori us rs
- Donot onn tnon i a vi stot onitorn twor
- I wir ssn twor si na ispoor t r a , ari o C stin ata oss
- ai u nu , ro onitors onn t toasin A is oo an onitors onn t tot sa A a r su tinn twor is onn tion
- Fint r r n a r su tinwir ssn twor is onn tion
- Dis onn tin ro t n twor a r su tinC stin ata ossan un tion ai ur C t pati ntin as o n twor is onn tionan so v t n twor pro , as soon as possi ,
- Ensur t att onitorl a r sss ttin is orr t C an in t n twor s ttin s a r su tin n twor is onn tion Conta t our s rvi p rsonn i t r ar an pro , swit t l a r ss
- I t vi r ainsins rvi o owin t n o support t rs urit ris s or n us rs an , p t toin r as ov rti
- twor is onn tion o snot av ani pa ton o a onitorin un tions
- Conta t in ra s rvi p rsonn i rs urit pro , so ur

tin a twor p

To select network type, follow this procedure:

1. Select the **ain nu** quick key → from the st column select **aint nan** → input the required password → select ↵.

2. Select the **twor** **tup** tab→ select the **twor** **p** tab.
3. Set **onitor** to **Auto**, **A** **l** , or **A** according to your network type. The default is **Auto**, which means the monitor will automatically use LAN1 IP when detected and the available WLAN when LAN1 IP is not detected.

ttin t ir twor

To set the wired network, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **twor** **tup** tab→ select the **A** **l** tab.
3. Select how to get the IP address.
   - **tain l A r ss Auto ati a** : the monitor automatically gets the IP address.
   - **s t o owin A r ss**: you need to input the **l A r ss**, **u n t as** , and **Gat wa** .
4. Select how to get the DNS address:
   - **tain D A r ss Auto ati a** : the monitor automatically gets the DNS address.
   - **s t o owin D A r ss**: you need to input the IP address of **r rr D rv r** and **A t rnat D rv r**.

tting t ir ss twor

To set the wireless network, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **twor** **tup** tab → select the **A** tab.
3. Select **A** **A** . In the popup dialog, input network name, SSID, and password. Set **uri t** .
4. Select the **A** **l** tab and select how to get the IP address and DNS address.
   - **tain l A r ss Auto ati a** : the monitor automatically gets the IP address.
   - **s t Fo owin A r ss**: you need to input the **l A r ss**, **u n t as** , and **Gat wa** .
   - **tain D A r ss Auto ati a** : the monitor automatically gets the DNS address.
   - **s t o owin D A r ss**: you need to input the IP address of **r rr D rv r** and **A t rnat D rv r**.
5. Select **A** **tup** tab and set WLAN band and channels. The default is **Auto**, which means the monitor can automatically identify the WLAN band.

After configuring the wireless network, select **twor** **st** to verify that the wireless network can be properly connected.

If you need to change network settings, select beside the desired wireless network. Selecting deletes the wireless network.

ana in C rti i ations

You can delete certifications from the monitor, or import certifications from the USB memory device. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **twor** **tup** tab → select the **A** tab.
3. Select the **C rti i at ana nt** button from the bottom left corner of the dialog.
   - From the **o a** tab, select certifications you want to delete from the monitor, and then select **D t** .
   - From the **B Driv** tab, select certifications you want to import from the USB memory device, and then select **l port**.

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **twor tup** tab → select the **AD** tab.
3. Select **rv r A r ss** to input the host name or IP address of the ADT gateway.
4. Select **ort** to input the port of the ADT gateway.

   AD ur is switched off by default. You can load patient information to the monitor from the ADT server only when this function is enabled.

After configuring the ADT gateway, select **twor st** to verify that the ADT server is properly connected.

n in ati Data av or san A ar s via H roto o

You can send realtime data, waveforms, and/or alarms from the monitor to the hospital information system via HL7 protocol. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **twor tup** tab → select the **H Con i uration** tab.
3. Select **twor o** respectively form the **Data av or s** area and **A ar s** area to set network mode for sending realtime data, waveforms, and/or alarms.
   - **Ci nt o** : the monitor works as a client to connect the hospital information system. In this mode, set **rv r A r ss** by inputting the name or IP address of the hospital server for receiving realtime data, waveform, and/or alarm data. Set **ort** as well.
   - **ist nin o** : the monitor works as a server. The hospital information system can connect the monitor to receive realtime data, waveform, and/or alarm data.
4. Switch on **n Data n av or** and /or **n A ar s** as needed.
5. Set **Data Int rva** .
6. From the **Co pati i it** area, set **H roto o rsion**.

From this page, you can also check the server connection status.

tin Data En r ption p

To set data encryption type, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **twor tup** tab → select the **In or ation uni t** tab.
3. Select **En r ption Conn tion p** to set data encryption type when connecting devices:
   - **n rivat En r ption**: Mindray private encryption is used to encrypt the transmitted data. You cannot connect devices supporting SSL (secure sockets layer) encryption.
   - **En r ption ri orit** : for devices supporting SSL encryption, SSL encryption is used when connecting the devices. For devices not supporting SSL encryption, private encryption is used when connecting the devices.

Disa in t Broa asti ati nt D o rap i s Fun tion

When viewing other patients, device location and patient information of remote devices are displayed in the remote device list by default. To protect patient privacy, you can disable the broadcasting of patient demographics function to prevent the monitor from sending patient information via broadcast. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select **twor tup** tab → select the **In or ation uni t** tab.
3. Switch off **Broa ast ati nt D o rap i s**.

Thus, patient information will not display in the remote device list.

- **o a_ asswor** : the monitor's password for accessing the **aint nan** dialog is required.
- **s r_ asswor** : the user name and password saved in the MLDAP server are required.

4. From the **Cini a ttin** area, set passwords for **A ar tup**, **Arr t ia**, **i w Dis ar _ati nts**, and **i win _ati nt vi w Data**.
   - **o_ asswor** : changing alarm settings and arrhythmia settings, reviewing data of the current patient and discharged patients are not password protected.
   - **o a_ asswor** : changing alarm settings, arrhythmia settings, and reviewing data of the current patient are password protected. The clinical password is required.
   - **s r_ asswor** : changing alarm settings, arrhythmia settings, and reviewing data of discharged patients are password protected. The user name and password saved in the MLDAP server are required.

From the **aint nan** area, selecting **o i o a_ asswor** can change the monitor's password for accessing the **aint nan** dialog.

From the **Cini a ttin** area, selecting **o i o a_ asswor** can change the monitor's password for accessing alarm settings and arrhythmia settings, and reviewing data of the current patient and discharged patients.

ttin t _ asswor i out rio

If you use the password saved in the MLDAP server to access the **aint nan** dialog, alarm settings and arrhythmia settings, you can set the password timeout period. Once the timeout period is reached, you will need to re-enter the password. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **Aut ori ation tup** tab.
3. Set **Auto ati o out i** .

D inin t r Fun tions

ttin ot Fi t r Fr qu n

Set notch filter frequency according to the power line frequency of your country. To set notch filter frequency, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **t r** tab.
3. Set **ot Fr qu n** to **H** or **H** according to the power line frequency.

ttin ous nsitivit

The mouse sensitivity is adjustable. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **t r** tab.
3. Set **ous nsitivit** .

ttin t anua Ev nt E it wit

You can set whether selecting and editing the name of a manual event is allowed. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select ↵.
2. Select the **t r** tab.
3. Switch on or off **anua Ev nt E it**.

tting the Tone Mode of SpO2

The monitor adjusts the QRS tone (pitch tone) according to the SpO_2 values. To set the SpO_2 tone mode, follow this procedure:

1. Select the **Main Menu** quick key → from the **Set** column select **Maintenance** → input the required password → select .
2. Select the **Alarm** tab.
3. Set **Pulse Tone**

E

- **n a para t ris anua swit o an t orr spon in para t r ou isp u in ou annot onitor t is para t r**

ttin l ttin ara t r wit sis rot t

You can set whether setting parameter switches is password protected. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select .
2. Select the **t r** tab.
3. Switch on or off **ara t rs n rot t** .

ttin l ara t r wit isIn u n Con i uration

You can set if the settings of parameter switches are influenced by loading a configuration. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select .
2. Select the **t r** tab.
3. Switch on or off **ara t rs n Con i In u n** .

ttin ara t r utput rop rti s

The monitor can output the parameter measurements, alarm limit settings, and alarm status to external devices via the DIAP protocol (Datascope Improved ASCII Protocol). You should configure the DIAP protocol to establish communications between the monitor and the third party device. To do so, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select .
2. Select the **t r** tab.
3. Select **ara t r utput tup**.
4. Set **Bau at , ait o , Data Bits** and **top Bits**.

Brows in st o

To browse the system log, follow this procedure:

1. Select the **ain nu** quick key → from the **st** column select **aint nan** → input the required password → select .
2. Select the **t r** tab.
3. Select **Brows st o**

This page intentionally left blank.

Batt r

Batt r Intro u tion

This monitor is designed to operate on battery power when the mains power is not available. The monitor uses mains power as primary power source. In case of mains power failure, the monitor automatically runs on the battery power.

E

- I t ainspow r ais an t onitorruns on att r pow r t ispa ri tn ss auto ati a ow rsto t va u o Bri tn sson Batt r s tin r n tup → Dispa You an anua a ustt ispa ri tn ss asr quir

Batt r a t In or ation

A I G

- p att ri sout o t r a o i r n
- s on in ra sp ii att ri s s o a i r nt att r a pr s ntaris o ir or posion
- pt att ri sint iror i ina pa a unti ouar r a tous t
- Do not pos att ri sto iqui
- Do not rus rop orpun tur t att r ani a a us an a toint rna a a an int rna s ort ir uits l a att r as n ropp or an a ainsta ar sur a w t r a a is t rna visi or not r ov t att r ro us an ispos o itprop r
- I t att r s owssi nso a a orsi nso a a rpa iti iat s autionin r ovin t att r Avoi onta tin t a a
- Batt ri ss ou ar on int is onitor
- E tr i a i ntt p ratur a aus att r ov r atprot tion r sutin in onitor s ut own
- it iu ion att r asas rvi i o t r ars pa t att r w nitra st n oitss rvi i Fai ur torpa t att r a aus s rious a a tot quip nt ro att r ov r atin
- Do not op n att ri s at att ri sa ov C in in rat att ri s ors ort att r t r inas a i nit po a or atup ausin p rsona in ur

CA l

- ov t att r a or s ippin t onitor orw nitwi not a us or an t n p rio o ti

Install Battery

No battery is installed when the monitor leaves the factory. The battery must only be installed by service personnel trained and authorized by Mindray. To install the battery, contact your service personnel.

To install the battery, follow this procedure:

1. Turn off the monitor. Disconnect the power cable and other cables.
2. Open the battery door as indicated below.

3. Turn the latch aside.

4. Insert the battery into the battery compartment with the battery terminal inwards.
5. Turn the latch back to the middle position.
6. Close the battery door.

Battery Indications

The battery LED, on-screen battery symbols and related alarm messages indicate the battery status.

Battery LED

The battery LED indications are as follows:

- Green: the battery is fully charged.
- Yellow: the battery is being charged.
- Flashing green: the monitor is running on battery power.
- Off: no battery is installed, or the battery malfunctioned, or the AC mains is not connected when the monitor is powered off.

Battery Symbols

The on-screen battery symbols indicate the battery status as follows:

-  indicates that the battery is working correctly. The green portion represents the remaining charge.
-  indicates that the battery power is low and needs to be charged.
-  indicates that the battery is almost depleted and needs to be charged immediately. Otherwise, the monitor will automatically shut down soon.
-  indicates that the battery is being charged.
-  indicates that no battery is installed or the battery has failed.

Batt r r at A ar s

The capacity of the battery is limited. When the battery level is low, the monitor presents the **ow Batt r** alarm, the alarm lamp flashes, and the monitor produces an alarm sound.

If the battery is almost depleted, the monitor presents the **Criti a ow Batt r** alarm. In this case, immediately connect the AC mains to power the monitor and charge the battery. Otherwise, the monitor will automatically shut down soon.

For more information on battery-related alarms, see Appendix *D Alarm Messages*.

C ar in t Batt r

The battery is recharged automatically when the monitor is connected to AC mains power.

aintainin t Batt r

Conitionin t Batt r

The performance of batteries deteriorates over time. You should condition the batteries periodically or when you notice a degradation in performance. If the battery is not conditioned for a prolonged time, its charge indication may not be accurate and you may wrongly evaluate the remaining battery runtime.

To condition a battery, follow this procedure:

1. Disconnect the monitor from the patient and stop all monitoring and measuring procedures.
2. Turn off the monitor, and connect the monitor to the AC mains power.
3. Allow the battery to be charged uninterruptedly until it is fully charged.
4. Disconnect the monitor from the AC mains power, and turn on the monitor.
5. Allow the monitor to run on the battery until the battery is completely depleted and the monitor automatically shuts down.
6. Fully charge the battery again for use or charge it to 40 - 60% for storage.

E

- **Do not us t onitor to onitor a pati nt urin attr on itionin**
- **Do not int rupt attr on itionin Int rruptin attr on itionin to us t onitor wi pr v nt o p tion o t on itionin an r quir r p atin t on itionin pro ss o p t to prop r on ition t attr**

C in Batt r r or an

The performance of a rechargeable battery deteriorates over time. You should check the battery performance periodically or if you are concerned that the battery may fail.

See steps 1 to 3 of *25.6.1 Conditioning the Battery* to check battery performance. The operating time of the batteries reflects their performance directly. If the operating time of a battery is noticeably shorter than that stated in the specifications, the battery may have reached its service life or be malfunctioning. If the battery performance meets the requirement, fully charge the battery again for use or charge it to 40 - 60% for storage.

E

- **Batt r op ratin ti p n son quip nt oni uration an op ration For a p i isp a i tn ssor asurin IB r p at wi s ort nt attr op ratin ti**

torin Batt ri s

When storing batteries, make sure that the battery terminals do not come into contact with metallic objects. If batteries are stored for an extended period of time, place the batteries in a cool place with a partial charge of 40% to 60% capacity.

Condition the stored batteries every three months. For more information, see *25.6.1 Conditioning the Battery*.

E

- **ov t attr ro t quip nti t quip nti s not us or a pro on ti or a p s v ra w s t rwis t attr a ov r is ar**
- **tor in attr ri s at i t p ratur or an t n p rio o ti wi si ni i ant s ort nt ir i p tan**
- **attr stora t p ratur is a tw n Can C tor in attr ri s in a oo p a an s ow t a in pro ss l a t attr ri ss ou a stor at C**

in Batt ri s

Discard a battery in the following situations:

- The battery has visual signs of damage.
- The battery fails.
- The battery is aged and its runtime significantly less than the specification.
- The battery service life is reached.

Properly dispose of batteries according to local regulations.

Car an C anin

Car an C anin Intro u tion

In this chapter we only describe cleaning and disinfection of the main unit, modules and certain accessories. For the cleaning and disinfection of other reusable accessories, refer to their instructions for use of the corresponding accessories.

Keep your equipment and accessories clean. To avoid damage to the equipment, follow these guidelines:

- Always follow the manufacturer's instructions for each cleaning / disinfecting agent.
- Do not immerse any part of the equipment or accessories into liquid.
- Do not pour liquid onto the equipment or accessories.
- Do not allow liquid to enter the case.
- Never use abrasive materials (such as steel wool or silver polish), or erosive cleaners (such as acetone or acetone-based cleaners).

Car an C anin a t In or ation

A I G

- **B sur toturno t st an is onn ta pow r a , s ro t out ts , or anin t quip nt**

CA I

- **I ouspi iqui ont quip ntora ssori s onta t in ra or ours rvi p rsonn**
- **Avoi w ttin t pinsan ta partso t quip nt ountin itsora ssori s urin anin an isin tion**
- **s on in ra approv an rsan isin tantsan t o sist int is apt rto anor isin t our quip nt arrant o snot ov r a aus , unapprov su stan sor t o s**
- **a no ai sr arin t i a o t ist i asor t o sasa ans or ontro in in tion For t t o to ontro in tion onsu t our ospita sIn tion Contro i rorEpi io o ist**
- **B sur toturno t st an is onn ta pow r a , s ro t out ts , or anin t quip nt**
- **r sponsi , ospita orinstitutions a arr outa anin an isin tionpro ur s sp ii int is apt r**
- **rtot r sp tiv instru tions orus o t anin a ntsan isin tants**
- **Donot i isin tin so utions su as , a an a onia as a ar ous as s a r sut**

E

- **o anor isin tr usa , a ssori s r rtot instru tions iv r wit t a ssori s**

Cleaning and Disinfecting Equipment and Accessories

Use approved cleaning and disinfecting agents for cleaning or disinfecting the main unit and parameter modules.

Approved Cleaning and Disinfecting Agents

The following table lists approved cleaning and disinfecting agents:

Agent	Agent type	Active Ingredients
Sodium hypochlorite bleach	Liquid Powder	Sodium hypochlorite bleach 0.5%
Hydrogen peroxide		Hydrogen peroxide 3%
Isopropanol		Isopropanol 70%
1-Propanol		1-Propanol 50%
Metrex CaviCide1™		Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride 0.28%, Isopropanol 17.2%
Virex® II 256 (1:256)		Didecyl dimethyl ammonium chloride 8.704%, n-Alkydimethyl benzyl ammonium chloride 8.190%
Virex® TB		n-Alkyl dimethyl benzyl ammonium chlorides 0.105%, n-Alkyl dimethyl ethylbenzyl ammonium chlorides 0.105%
Rely+OnTM Virkon® High Level Surface Disinfectant		

E

- **For quip ntwit t s o a t ist anin an isin tin a ntsar avai a , or**

Approved Accessories Cleaning and Disinfecting Agents

The following table lists approved NIBP air hose cleaning and disinfecting agents:

Agent	Group	Active Ingredients
Isopropanol	Liquid Powder	Isopropanol 70%
1-Propanol		1-Propanol 50%
Metrex CaviCide1™		Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride 0.28%, Isopropanol 17.2%
Virex® TB		n-Alkyl dimethyl benzyl ammonium chlorides 0.105%, n-Alkyl dimethyl ethylbenzyl ammonium chlorides 0.105%
Rely+OnTM Virkon® High Level Surface Disinfectant		Used as 1% solution Biocidal active: Pentapotassium bis (peroxymonosulphate) bis (sulphate)(500g/kg), Contains dipotassium peroxodisulphate.
Alpet® D2 Surface Sanitizing Wipes	Wipes	Isopropyl Alcohol 58.6000%, Octyl Decyl Dimethyl Ammonium chloride 0.0075%, Dioctyl Dimethyl Ammonium Chloride 0.0030%
Clorox Dispatch® Hospital Cleaner Disinfectant Towels with Bleach		Sodium Hypochlorite 0.65%
Metrex CaviWipes™		Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride 0.28%, Isopropanol 17.2%
PDI Sani-Cloth® AF3 Germicidal Disposable Wipe		n-Alkyl dimethyl ethylbenzyl ammonium chlorides 0.14%, n-Alkyl dimethyl benzyl ammonium chlorides 0.14%
PDI Sani-Cloth® Plus Germicidal Disposable Cloth		n-Alkyl dimethyl ethylbenzyl ammonium chlorides 0.125%, n-Alky dimethyl benzyl ammonium chlorides 0.125%
PDI Super Sani-Cloth® Germicidal Disposable Wipe		n-Alkyl dimethyl ethylbenzyl ammonium chlorides 0.25%, n-Alkyl dimethyl benzyl ammonium chlorides 0.25%, Isopropyl Alcohol 55.0%
VIRAGUARD Hospital Surface Disinfectant Towelettle		Isopropanol 70%, Other ingredients 30%

The following table lists approved Masimo SpO_2 cable cleaning and disinfecting agents:

Agent	Group	Active Ingredients
Isopropanol	Liquid	Isopropanol 70%

The following table lists approved Nellcor SpO_2 cable cleaning and disinfecting agents:

_ro u t a	_ro u t p	A tiv In r i nts
Sodium hypochlorite bleach	Liquid Powder	Sodium hypochlorite bleach 0.5%
Isopropanol		Isopropanol 70%
1-Propanol		1-Propanol 50%
Virex® TB		n-Alkyl dimethyl benzyl ammonium chlorides 0.105%, n-Alkyl dimethyl ethylbenzyl ammonium chlorides 0.105%
Rely+OnTM Virkon® High Level Surface Disinfectant		Used as 1% solution Biocidal active: Pentapotassium bis (peroxymonosulphate) bis (sulphate)(500g/kg), Contains dipotassium peroxodisulphate.
Clorox Dispatch® Hospital Cleaner Disinfectant Towels with Bleach	Wipes	Sodium Hypochlorite 0.65%
Clorox Healthcare® Bleach Germicidal Wipes		Sodium Hypochlorite 0.55%
Clorox Healthcare® Hydrogen Peroxide Cleaner Disinfectant Wipes		Hydrogen Peroxide 1.4%
Diversey Oxivir® TB Wipes		Hydrogen Peroxide 0.5%
PDI Super Sani-Cloth® Germicidal Disposable Wipe		n-Alkyl dimethyl ethylbenzyl ammonium chlorides 0.25%, n-Alkyl dimethyl benzyl ammonium chlorides 0.25%, Isopropyl Alcohol 55.0%
VIRAGUARD Hospital Surface Disinfectant Towelettle		Isopropanol 70%, Other ingredients 30%

C anin t A ssori s

You should clean the accessories (NIBP air hose, Masimo SpO_2 cable and Nellcor SpO_2 cable) on a regular basis. Before cleaning the accessories, consult your hospital's regulations for cleaning the accessories.

To clean the accessories (NIBP air hose, Masimo SpO_2 cable and Nellcor SpO_2 cable), follow this procedure:

1. Clean the accessories with wipes or a soft cloth moistened with one of the cleaning agents listed in *26.3.1 Approved Cleaning and Disinfecting Agents* only.
2. Wipe off all the cleaning agent residue with a dry cloth.
3. Allow the accessories to air dry.

Disin tin t A ssori s

We recommend that the accessories (NIBP air hose, Masimo SpO_2 cable and Nellcor SpO_2 cable) should be disinfected only when necessary as determined by your hospital's policy, to avoid long term damage to the accessories. Cleaning the accessories before disinfecting is recommended.

t ri i ation

Sterilization is not recommended for this equipment, related products, accessories, or supplies unless otherwise indicated in the Instructions for Use that accompany the products, accessories or supplies.

aint nan

aint nan Intro u tion

Regular maintenance is essential to ensure that the equipment continues to function properly. This chapter contains information on periodic testing and maintenance.

aint nan a t In or ation

A I G

- o avoi tri s o stopusin t quip nti ou in t ousin is a an onta t t s rvi p rsonn
- Fai ur ont part o t r sponsi , in ivi ua ospita orinstitutionusin t is quip nt to i p ntar o n aint nan s u a aus un u quip nt ai ur an possi , at a ar s
- o oii ationo t is quip nt isa ow
- is quip nt ontainsno us rs rvi a , parts
- sa t sor aint nan invo vin an isass , o t quip nts ou , p r or , pro ssiona s rvi p rsonn t rwis un u quip nt ai ur an possi , at a ar s ou r su t
- Do not op n att ri s at att ri sto a ov C in in rat att ri s ors ort t att r t r ina s Batt ri s a i nit po a or atup ausin p rsona in ur
- s rvi p rsonn ust , prop r quaii an t orou a iiarwit t op rationo t

aint nan an sti u

Follow the maintenance and testing schedule or local regulations to perform testing and maintenance such as defined in section *27.5 Testing Methods and Procedures*. Follow your hospital policy on cleaning and disinfecting the equipment before testing and maintenance.

The following table lists the maintenance and testing schedule:

Prior to Visual Inspection

Visually inspect the equipment before its first use every day. If you find any signs of damage, remove the monitor from use and contact the service personnel.

Verify that the equipment meets the following requirements:

- Environment and power supply specifications are met.
- The monitor housing and display screen are free from cracks or other damage.
- The power cord is not damaged and the insulation is in good condition.
- Connectors, plugs, and cables are not damaged or kinked.
- Power cord and patient cables are securely connected to the equipment and modules.

Prior to Power-on Test

The monitor automatically performs a power-on test at startup. Verify the following items for the power-on test:

- The equipment powers on properly.
- The alarm system works properly, denoted by alarm sounds and display of all 3 alarm light colors.
- The monitor displays properly.

Testing the Recorder

To test the recorder, follow this procedure:

1. Start a recording task to print waveforms and reports.
2. Check that the recorder functions correctly.
3. Check that the printout is clear without missing dots.

Testing the Network Printer

To check the printer, follow this procedure:

1. Start a printing task to print waveforms and reports.
2. Check that the printer is properly connected and functions correctly.
3. Check that the printout is clear without missing information.

Checking the Battery

For information on battery check, see *25.6.2 Checking Battery Performance*.

NIBP Maintenance

NIBP Leakage Test

The NIBP leakage test checks the integrity of the system and of the valve. The NIBP leakage test should be performed once every two years or when you doubt the NIBP measurements. The NIBP leakage test should be performed by Mindray-qualified service personnel only.

NIBP Accuracy Test

The NIBP accuracy test should be performed once every two years or when you doubt the NIBP measurements. The NIBP accuracy test should be performed by Mindray-qualified service personnel only.

Disposing of the monitor

Dispose of the monitor and its accessories when its service life is reached. Follow local regulations regarding the disposal of such products.

WARNING

- **For disposal of parts and accessories which are not otherwise specified in the following regulations or are in disposal of hospital waste**

A ssori s

The accessories listed in this chapter comply with the requirements of IEC 60601-1-2 when in use with the patient monitor. The accessory material that contacts the patients has undertaken the bio-compatibility test and is verified to be in compliance with ISO 10993-1. For details about the accessories, refer to the instructions for use provided with the accessory.

A I G

- s a ssori s sp ii int is apt r sin ot ra ssori s a aus a a tot pati nt onitor or not tt ai sp ii ations
- in us a ssori s ar not si n to , r us us a aus ar is o onta ination an a tt asur nt a ura

CA I

- a ssori s a not tt pr or an sp ii ationsi stor or us outsi t sp ii t p ratur an u i it ran s l a ssor pr or an is ra u toa in or nviron nta on itions onta t ours rvi p rsonn
- C t a ssori s an t irpa a s or an si no a a Do not us t i an a a is t t
- s t a ssori s , or t piration at i an piration at isin i at
- Dis ar isposa , a ssori s a or in to ospita r uations

E

- is anua s ri , sa t a ssori st atar vai at or us ot a a ssori s ar avai a , in v r ar t

ECG A ssori s

ECG E tro s Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
31499224	0010-10-12304	Electrode, Kendall, pkg of 10	Disposable	Adult
1050NPSMKittycat	0681-00-0098-01	NEO pre-wired electrode radio Opaque, pkg of 100	Disposable	Neonate
1051NPSMKittycat	0681-00-0098-02	NEO pre-wired electrode radio Translucent, pkg of 100	Disposable	Neonate

ECG E tro s A so Co pati ,

o	art o	D s ription	sa	Appi a , pati nt
2245-50	9000-10-07469	ECG electrode, 3M, pkg of 50	Disposable	Pediatric
H124SG	900E-10-04880	Neonatal ECG electrode (kendall, package of 50)	Disposable	Neonate

3-in-run Cables Available for Use

No.	Part No.	Description	Usage	Applied Part
EV6201	0010-30-42719	12Pin 3/5-Lead ECG trunk cable, defibrillation-proof	Reusable	Adult/Pediatric
EV6211	0010-30-42723	12Pin 3/5-Lead ECG trunk cable, ESU-proof	Reusable	Adult/Pediatric
EV6222	040-000754-00	12Pin 3-Lead trunk cable, defibrillation-proof, DIN Conn	Reusable	Pediatric/Neonate
EV6206	009-005266-00	ECG cable, 10' (3.1 m), defibrillation-proof, for N/T	Reusable	Adult/Pediatric
EV6207	009-005267-00	ECG cable, 20' (6.2 m), defibrillation-proof, for N/T	Reusable	Adult/Pediatric
EV6216	009-005268-00	ECG cable, 10' (3.1 m), ESU-proof, for N/T	Reusable	Adult/Pediatric
EV6217	009-005269-00	ECG cable, 20' (6.2 m), ESU-Proof, for N/T	Reusable	Adult/Pediatric

5-lead ECG cables Available for Use

No.	Part No.	Description	Usage	Applied Part
EY6316B	009-004765-00	3-Lead, N/T, AHA, snap, 24"	Reusable	Adult/Pediatric
EY6305B	009-004766-00	3-Lead, N/T, AHA, snap, 36"	Reusable	Adult/Pediatric
EY6316A	009-004771-00	3-Lead, N/T, AHA, clip, 24"	Reusable	Adult/Pediatric
EY6305A	009-004772-00	3-Lead, N/T, AHA, clip, 36"	Reusable	Adult/Pediatric
EY6310B	009-004777-00	3-Lead, N/T, AHA, snap, 24"	Disposable	Adult/Pediatric
EY6310B	115-032954-00	3-Lead, N/T, AHA, snap, 24", pkg of 20	Disposable	Adult/Pediatric

3-lead ECG cables Also Compatible

No.	Part No.	Description	Usage	Applied Part
EL6303A	0010-30-42731	3-Lead leadset, AHA, clip, Long	Reusable	Adult/Pediatric
EL6301B	0010-30-42734	3-Lead leadset, AHA, snap	Reusable	Adult/Pediatric
EL6311B	040-000146-00	3-Lead leadset, AHA, snap	Disposable	Pediatric/Neonate
EL6311A	040-000148-00	3-Lead leadset, AHA, clip	Disposable	Pediatric/Neonate

5-lead ECG cables Available for Use

No.	Part No.	Description	Usage	Applied Part
EY6511B	009-004782-00	5-Lead, N/T, AHA, snap, 24"	Reusable	Adult/Pediatric
EY6512B	009-004783-00	5-Lead, N/T, AHA, snap, 36"	Reusable	Adult/Pediatric
EY6511A	009-004786-00	5-Lead, N/T, AHA, pinch, 24"	Reusable	Adult/Pediatric
EY6512A	009-004787-00	5-Lead, N/T, AHA, pinch, 36"	Reusable	Adult/Pediatric
EY6507B	009-004790-00	5-Lead, N/T, AHA, snap, 24"	Disposable	Adult/Pediatric
EY6507B	115-032955-00	5-Lead, N/T, AHA, snap, 24", pkg of 20	Disposable	Adult/Pediatric

a ECG a wir s A so Co pati ,

o	art o	D s ription	sa	Appi a , pati nt
EL6503A	0010-30-42729	5-Lead leadset, AHA, clip, Long	Reusable	Adult/Pediatric
EL6501B	0010-30-42735	5-Lead leadset, AHA, snap	Reusable	Adult/Pediatric
EL6501A	0010-30-42727	5-Lead leadset, AHA, clip	Reusable	Adult/Pediatric

p A ssori s

Wavelength emitted by the sensors is between 600 nm and 1000 nm. The maximum photic output consumption of the sensor is less than 18 mW.

The information about the wavelength range and maximum photic output consumption can be especially useful to clinicians, for example, when photodynamic therapy is performed.

E t nsi on Ca , s an A apt r Ca , s Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
572A	0010-20-42712	8-pin SpO2 extension cable, Nellcor	Reusable	/
583A	040-003310-00	8-pin, RD SET, Masimo	Reusable	/
4089	040-003381-00	RD to LNCS adapter cable, Masimo	Reusable	/
4092	040-003426-00	LNCS to RD adapter, Masimo	Reusable	/

E t nsi on Ca , s an A apt r Ca , s A so Co pati ,

o	art o	D s ription	sa	Appi a , pati nt
582A	115-020768-00	8-pin SpO2 extension cable, Masimo	Reusable	/

asi o p D t nsors Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
4050	040-003376-00	SpO2 sensor, RD SET DCI	Reusable	Adult (> 30 kg)
4051	040-003377-00	SpO2 sensor, RD SET DCI	Reusable	Pediatric (10-50 kg)
4053	040-003380-00	SpO2 sensor, RD Set TC-I, tip-clip ear sensor, 3ft	Reusable	Adult (> 30 kg)
4000	040-003382-00	SpO2 sensor, RD SET Adt, adhesive, pkg of 20	Disposable	Adult (> 30 kg)
4001	040-003383-00	SpO2 sensor, RD SET PDT, adhesive, pkg of 20	Disposable	Pediatric (10 to 50 kg)
4002	040-003384-00	SpO2 sensor, RD Set Inf, adhesive, pkg of 20	Disposable	Infant (3 to 20 kg)
4003	040-003385-00	SpO2 sensor, RD Set Neo, adhesive, pkg of 20	Disposable	Neonatal /Adult (<3Kg or >40Kg)
4004	040-003386-00	SpO2 sensor, RD Set NeoPt, adhesive, pkg of 20	Disposable	Neonate (<1 kg)
4005	040-003387-00	SpO2 sensor, RD Set NeoPt-500, non-adhesive, pkg of 20	Disposable	Neonate (<1 kg)

asi o p C nsors A so Co pati ,

o	art o	D s ription	sa	Appi a , pati nt
LNCS Adtx	0600-00-0121	SpO2 sensor, finger-clip, 20 pcs/box	Disposable	Adult (>30 kg)
LNCS Pdtx	0600-00-0122	SpO2 sensor, finger-clip, 20 pcs/box	Disposable	Pediatric (10-50 kg)
LNCS DCI	0600-00-0126	SpO2 sensor, finger-clip	Reusable	Adult (>30 kg)
LNCS DCIP	0600-00-0127	SpO2 sensor, finger-clip	Reusable	Pediatric (10-50 kg)
LNCS NeoPt	0600-00-0156	SpO2 sensor, finger-clip	Disposable	Neonate (<1Kg)
LNCS Neo-L	0600-00-0157	SpO2 sensor, 20 pcs/box	Disposable	Neonate /Adult (<3 kg or > 40 kg)
LNCS Inf	0600-00-0158	SpO2 sensor, 20 pcs/box	Disposable	Infant (3-20 kg)

or p nsors A so Co pati ,

o	art o	D s ription	sa	Appi a , pati nt
DS100A	9000-10-05161	SpO2 sensor, finger-clip	Reusable	Adult
D-YS	0010-10-12476	SpO2 sensor, with wraps	Reusable	/
OXI-P/I	9000-10-07308	SpO2 sensor, finger, band	Reusable	Pediatric/Infant
OXI-A/N	9000-10-07336	SpO2 sensor, finger/foot, band	Reusable	Adult/Neonate
MAX-AI	0010-10-12202	SpO2 sensor, 24 pcs/box	Disposable	Adult (>30 kg)
MAX-PI	0010-10-12203	SpO2 sensor, 24 pcs/box	Disposable	Pediatric (10-50 Kg)
MAX-II	0010-10-12204	SpO2 sensor, 24 pcs/box	Disposable	Infant (3-20 kg)
MAX-NI	0010-10-12205	SpO2 sensor, 24 pcs/box	Disposable	Adult/Neonate (<3 kg or >40 kg)

p A ssori s

p Ca , Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
MR420B	040-001235-00	2-pin Temperature adapter cable	Reusable	/

p ro , s Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
MR401B	0011-30-37392	Temperature probe, endocavity	Reusable	Adult
MR402B	0011-30-37394	Temperature probe, endocavity	Reusable	Pediatric/Infant
MR403B	0011-30-37393	Temperature probe, skin surface	Reusable	Adult
MR404B	0011-30-37395	Temperature probe, skin surface	Reusable	Pediatric/Infant
MR411	040-003292-00	Temperature probe, esophageal/ rectal, 9FR	Disposable	Adult/Pediatric
MR411	040-003294-00	Temperature probe, esophageal/ rectal, 9FR, pkg of 20	Disposable	Adult/Pediatric
MR412	040-003293-00	Temp probe, skin surface	Disposable	All

o	_ art o	D s ription	sa	Appi a , pati nt
MR412	040-003295-00	Temp probe, skin surface, pkg of 20	Disposable	All
ES400-12	0206-03-0112-02	PROBE,D TEMP,ES400-12 (box of 20)	Disposable	Adult
ES400-18	0206-03-0118-02	PROBE,D TEMP,ES400-18 (box of 20)	Disposable	Adult
ER400-9	0206-03-0209-02	PROBE,D TEMP,ER 400-9 (box of 20)	Disposable	Adult
ER400-12	0206-03-0212-02	PROBE,D TEMP,ER400-12 (box of 20)	Disposable	Adult
STS-400	0206-03-0300-02	PROBE,D TEMP,STS-400 (box of 20)	Disposable	Adult

IB A sson i s

IB Hos s Avai a , or_ ur , as

o	_ art o	D s ription	sa	Appi a , pati nt
CM1901	6200-30-11560	NIBP hose, inbuilt connector, 3m	Reusable	Neonate

IB Hos s A so Co pati ,

o	_ art o	D s ription	sa	Appi a , pati nt
CM1903	6200-30-09688	NIBP hose, inbuilt connector, 3m	Reusable	Adult/Pediatric/ Neonate

Cu s Avai a , or_ ur , as

o	_ art o	D s ription	sa	Appi a , pati nt
CM1301	115-027713-00	Cuff, 10-19 cm, bladderless	Reusable	Infant
CM1302	115-027714-00	Cuff, 18-26 cm, bladderless	Reusable	Small Adult
CM1303	115-027715-00	Cuff, 25-35 cm, bladderless	Reusable	Adult
CM1304	115-027716-00	Cuff, 33-47 cm, bladderless	Reusable	Adult
CM1305	115-027717-00	Cuff, 46-66 cm, bladderless	Reusable	Adult thigh
CM1306	115-027718-00	Cuff, 24-35 cm, bladderless	Reusable	Adult
CM1307	115-027719-00	Cuff, 33-47 cm, bladderless	Reusable	Adult
CM1501	115-027563-00	Cuff, 10-19 cm, bladderless, pkg of 10	Disposable	Child
CM1502	115-027564-00	Cuff, 18-26 cm, bladderless, pkg of 10	Disposable	Small adult
CM1503	115-027565-00	Cuff, 25-35 cm, bladderless, pkg of 10	Disposable	Adult
CM1504	115-027566-00	Cuff, 33-47 cm, bladderless, pkg of 10	Disposable	Large adult
CM1505	115-027567-00	Cuff, 46-66 cm, bladderless, pkg of 5	Disposable	Adult thigh
CM1506	115-027568-00	Cuff, 25-35 cm, bladderless, pkg of 10, long	Disposable	Adult
CM1507	115-027569-00	Cuff, 33-47 cm, bladderless, pkg of 10, long	Disposable	Large adult
CM1500A	125-000051-00	Cuff, 3.1-5.7 cm, pkg of 20	Disposable	Neonate
CM1500B	125-000052-00	Cuff, 4.3-8.0 cm, pkg of 20	Disposable	Neonate
CM1500C	125-000053-00	Cuff, 5.8-10.9 cm, pkg of 20	Disposable	Neonate

o	art o	D s ription	sa	Appi a , pati nt
CM1500D	125-000054-00	Cuff, 7.1-13.1 cm, pkg of 20	Disposable	Neonate
/	115-031807-00	Cuff starter kit, bladderless	Reusable	Child/Small adult/ Adult/Adult thigh

IB A ssori s

IB A ssori s Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
IM2202	001C-30-70757	12 Pin IBP cable, Argon	Reusable	/
IM2201	001C-30-70759	12 Pin IBP cable, ICU Medical	Reusable	/
/	125-000123-00	12 Pin IBP cable, Edwards (not for transportation)	Reusable	/

IC A ssori s Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
82-6653	040-002336-00	Codman ICP sensor kit, Johnson & Johnson, pkg of 1	Disposable	/
/	115-025257-00	Camino ICP cable kit	Reusable	/
CP12601	009-005460-00	12 Pin ICP Cable	Reusable	/

C A ssori s Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
CO7702	0010-30-42743	12Pin C.O. cable, Edwards	Reusable	/
9850A	0012-00-1519	C.O. cable kit with TI sensor	Reusable	/
SP4042	6000-10-02079	In-line injection temperature sensor, BD	Reusable	/
SP5045	6000-10-02080	In-line injection temperature sensor housing, BD, pkg of 25	Disposable	/
MX387	6000-10-02081	12cc control syringe w/Rotator (MEDEX MX387), pkg of 20	Disposable	/
93522	0012-00-1520	In-line inject temperature probe	Reusable	/

C 2 A ssori s

i str a C A ssori s Avai a , or ur as

o	art o	D s ription	sa	Appi a , pati nt
4000	115-043001-00	CO2 Nasal sample cannula, 7" line, pkg of 25	Disposable	Adult
4100	115-043002-00	CO2 Nasal sample cannula, 7" line, pkg of 25	Disposable	Pediatric

o	art o	D s ription	sa	Appi a, pati nt
4200	115-043003-00	CO2 Nasal sample cannula, 7" line, pkg of 25	Disposable	Neonatal
60-15200-00	115-043017-00	Sampling line, 2.5 m, pkg of 25	Disposable	Adult/Pediatric
60-15300-00	115-043018-00	Sampling line, 2.5 m, pkg of 25	Disposable	Neonatal
60-14100-00	115-043020-00	Dryline airway adapter, straight, pkg of 10	Disposable	Adu/Ped
040-001187-00	115-043019-00	Airway Adapter pkg of 10	Disposable	Neonatal
60-14200-00	115-043021-00	Dryline airway adapter, elbow pkg of 10	Disposable	/
100-000080-00	115-058733-00	Watertrap, DRYLINE II, pkg of 10	Reusable	Adult/Pediatric
100-000081-00	115-058734-00	Watertrap, DRYLINE II, pkg of 10	Reusable	Neonatal
4707	125-000365-00	CO2 Nasal cannula,with O_2, pkg of 25	Disposable	Adult
4703	125-000366-00	CO2 Nasal cannula,with O_2, pkg of 25	Disposable	Pediatric
4700	125-000367-00	CO2 Nasal cannula,with O_2, pkg of 25	Disposable	Neonatal

i rostr a C A ssori s A so Co pati ,

o	art o	D s ription	sa	Appi a, pati nt
MVAI	0010-10-42560	Adult-Pediatric Intubated CO2 FilterLine	Disposable	Adult, pediatric
MVAIH	0010-10-42561	Adult-Pediatric Intubated CO2 FilterLine	Disposable	Adult, pediatric
MVIIH	0010-10-42562	Neonatal-Infant Intubated CO2 FilterLine	Disposable	Neonate
MVAIL	0010-10-42563	Adult-Pediatric Intubated CO2 FilterLine	Disposable	Adult, pediatric
MVAIHL	0010-10-42564	Adult-Pediatric Intubated CO2 FilterLine	Disposable	Adult, pediatric
MVIIHL	0010-10-42565	Neonatal-Infant Intubated CO2 FilterLine	Disposable	Neonate
MVA	0010-10-42566	Adt Oral-Nasal CO2 FilterLine	Disposable	Adult
MVP	0010-10-42567	Ped Oral-Nasal CO2 FilterLine	Disposable	Pediatric
MVAO	0010-10-42568	Adt Oral-Nasal CO2 FilterLine w/O2	Disposable	Adult
MVPO	0010-10-42569	Ped Oral-Nasal CO2 FilterLine w/O2	Disposable	Pediatric
MVAOL	0010-10-42570	Adt Oral-Nasal CO2 FilterLine w/O2 L	Disposable	Adult
MVPOL	0010-10-42571	Ped Oral-Nasal CO2 FilterLine w/O2 L	Disposable	Pediatric
MVANH	0010-10-42572	Adult Nasal CO2 FilterLine	Disposable	Adult
MVINH	0010-10-42574	Neo-Inf Nasal CO2 FilterLine H	Disposable	Neonate
MVANOH	0010-10-42575	Adt Nasal CO2 FilterLine w/O2 H	Disposable	Adult
MVPNOH	0010-10-42576	Ped Nasal CO2 FilterLine w/O2 H	Disposable	Pediatric
MVAN	0010-10-42577	Adult Nasal CO2 FilterLine	Disposable	Adult
MVPN	0010-10-42578	Pediatric Nasal CO2 FilterLine	Disposable	Pediatric

AG A ssori s

o	art o	D s ription	sa	Appi a, pati nt
60-15200-00	115-043017-00	Sampling line, 2.5 m, pkg of 25	Disposable	Adult/Pediatric

o	art o	D s ription	sa	Appi a, pati nt
60-15300-00	115-043018-00	Sampling line, DRYLINE, 2.5m, pkg of 25	Disposable	Neonate
60-14100-00	115-043020-00	DRYLINE airway adapter, straight, pkg of 10	Disposable	Adult/Pediatric
60-14200-00	115-043021-00	DRYLINE airway adapter, elbow, pkg of 10	Disposable	Adult/Pediatric
100-000080-00	115-058733-00	DRYLINE II water trap	Reusable	Adult/Pediatric
100-000081-00	115-058734-00	DRYLINE II water trap	Reusable	Neonate
115-052162-00	115-052162-00	Generic scavenging line	Reusable	/

E t rna o u s

o u	art o	Co nts
C.O. module	115-047275-00	Supports C.O. monitoring
IBP module	115-047274-00	Supports IBP monitoring
Microstream CO_2 module	120-023072-00	Supports CO_2 monitoring
Sidestream CO_2 module	115-048924-00	Supports CO_2 monitoring
AG module	120-021994-00	Supports AG monitoring, integrates O_2 (paramagnetic) monitoring

ount an ountin A sson s

art o	D s ription
045-002148-00	Passport12 wall mount (VHM)
045-003428-00	Rolling stand with quick release mount
045-004267-00	Rolling stand
045-003424-00	Quick release mount for rolling stand and wall mount
045-003427-00	M series wall mount with quick release mount
045-002935-00	Disinfectant wipes mount
045-002877-00	VS600/VS900 new value stand
045-002960-00	VS600/900 Rolling stand
045-002936-00	No handle basket pack
8000-30-90170	Bedrail clamp
045-003255-00	N12 roll stands (With iPM/iMEC adapter)
8000-30-90169	Bedrail hook
034-000666-00	Barcode reader holder (for JADAK Barcode reader)
042-007382-00	Cable management hook

is an ous A sson i s

art o	D s ri pti on
DA8K-10-14452	Power cord, USA
115-065140-00	Lithium-ion battery, 10.95 V, 4500 mAh, LI23S002A
023-000218-00	USB flash drive, 8 GB, USB2.0
1000-21-00122	Grounding cable
023-000247-00	Keyboard, wired USB connector, black
023-000248-00	Mouse, wired USB connector, black
023-000524-00	Wireless keyboard and mouse set
023-000525-00	Wired keyboard and mouse set
023-001566-00	HP LaserJet Enterprise M608n, black and white
023-001286-00	2D Barcode reader, HS-1M, JADAK
023-001288-00	2D Barcode reader, HS-1R, JADAK
115-045643-00	Remote controller
115-056983-00	Clinical Scoring Custom CD
009-003116-00	Nurse call cable
009-003117-00	Analog output cable
009-003118-00	Synchronization cable
A30-000001---	Recording paper, 50 mm*20 m
009-003648-00	Cable protecting tube, 20cm&40cm
009-003903-00	Accessories management tape
009-009117-00	Serial port cable

A ro u t p ii ations

A onitor a t p ii ations

The monitor is classified, according to IEC 60601-1:

Degree of protection against electrical shock	Type CF defibrillation proof for ECG, Resp, SpO_2, NIBP, Temp, IBP, C.O. Type BF defibrillation proof for CO_2, AG
Type of protection against electrical shock	Class I
Degree of protection against harmful ingress of water	IPX1
Degree of safety of application in the presence of flammable anesthetic mixture with air or with oxygen or nitrous oxide	The equipment is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide
Mode of operation	Continuous

A si a p ii ations

It	ai u i t	H D	Co nts
ePM 10M main unit	4.5(standard configuration and recorder, excluding battery, accessories and modules)	269 × 252 × 159	4.0 kg (standard configuration, excluding battery, accessories, modules and recorder)
ePM 12M main unit	5.5(standard configuration and recorder, excluding battery, accessories and modules)	310 × 289 × 169	4.8 kg (standard configuration, excluding battery, accessories, modules and recorder)
IBP module	0.26	136.5 × 40 × 102	/
C.O. module	0.25	136.5 × 40 × 102	/
Microstream CO_2 module	0.38	136.5 × 40 × 102	/
Sidestream CO_2 module	0.54	136.5 × 40 × 102	/
AG module	1.03	136.5 × 80.5 × 102	With built-in O_2 module

A Environ nta p ii ations

A I G

- onitor a not tt pr or an sp ii ationsi stor orus outsi t sp ii t pratur an u i it ran s l t pr or an o t quip nt is ra u toa in or nviron nta on itions onta t ours rvi p rsonn
- nt onitoran r at pro u ts av i rin nviron nta sp ii ations t tiv ran ort o in pro u tsist atran wi i is o ontot sp ii ations ora pro u ts

E

- nviron nta sp ii ationo unsp ii para t r o u sar t sa ast os o t ainunit

ain nit			
lt	p ratur C	ativ u i it non on nsin	Baro tri
p ratin Con ition	0 to 40 (0 to 35 configured with AG module)	15 to 95	427.5 to 805.5 mmHg (57 to 107.4 kPa)
tora Con ition	-20 to 60	10 to 95	120 to 805.5 mmHg (16 to 107.4 kPa)
i rostr a C o u			
lt	p ratur C	ativ u i it non on nsin	Baro tri
p ratin Con ition	0 to 40	15 to 95	430 to 790 mmHg (57.3 to 105.3 kPa)
tora Con ition	-20 to 60	10 to 95	430 to 790 mmHg (57.3 to 105.3 kPa)
i str a C o u			
lt	p ratur C	ativ u i it non on nsin	Baro tri
p ratin Con ition	5 to 40	15 to 95	430 to 790 mmHg (57.3 to 105.3 kPa)
tora Con ition	-20 to 60	10 to 95	430 to 790 mmHg (57.3 to 105.3 kPa)
AG o u			
lt	p ratur C	ativ u i it non on nsin	Baro tri
p ratin Con ition	10 to 40	15 to 95	525 to 805.5 mmHg (70 to 107.4 kPa)
tora Con ition	-20 to 60	10 to 95	525 to 805.5 mmHg (70 to 107.4 kPa)

A ow r upp p ii ations

A Б t rna ow r upp p ii ations

AC ow r	
Line voltage	100 to 240 VAC (±10%)
Input current	2.0 to 0.9 A
Frequency	50/60 Hz (± 3 Hz)

A Batt r p ii ati ons

Battery type	Rechargeable lithium-Ion battery (non-smart battery)
Battery voltage	10.95V
Battery capacity	4500 mAh
Maximum number of batteries configured	only one battery can be connected.
Run time	≥ 4 hours when the monitor is powered by a new fully-charged battery at 25 ºC±5 ºC with 5-lead ECG and SpO_2 cable connected, auto NIBP measurements at an interval of 15 minutes, and screen brightness set to 1. Shutdown delay: at least 15 minutes after the low battery alarm first occurs.
Charge time	• No more than 5 hours to 90% when the monitor is off • No more than 10 hours to 90% when the monitor is on

A Disp a p ii ati ons

Screen type	Capacitive, multi-point color touchscreen	
Screen Size (diagonal)	ePM 12M:	12.1 inches
	ePM 10M:	10.1 inches
Resolution	ePM 12M:	1280 x 800 pixels
	ePM 10M:	1280 x 800 pixels

A or r p ii ati ons

Method	Thermal dot array
Horizontal resolution	16 dots/mm (25 mm/s paper speed)
Vertical resolution	8 dots/mm
Paper width	50 mm±1mm
Paper length	20 m
Paper speed	25 mm/s, 50 mm/s Accuracy: ±5%
Number of waveform channels	A maximum of 3

A EDs

Alarm lamp	1 or 2 (three color-coded: red, yellow, and cyan)
Power-on LED	1 (green)
AC power LED	1 (green)
Battery LED	1 (two color-coded: yellow and green)

A. Audio Indicator

Speaker	Give alarm tones (45 to 85 dB), reminder tones, key tones, QRS tones; support PITCH TONE and multi-level tone modulation; alarm tones comply with IEC 60601-1-8.
Audio signal	Alarm tone: ISO mode with frequency of 600 Hz QRS tone: short beep with frequency of 650 Hz Key tone: short beep with frequency of 1000 Hz

A. Monitor Interface Specifications

AC power input	1
Network connector	1, standard RJ45 connectors, 100 Base-TX, IEEE 802.3
USB connector	2, USB 2.0
Module rack	1
Multifunctional connector	1
Video output connector	1, 15-pin D-sub
Equipotential grounding terminal	1

A. Signal Outputs Specifications

Auxiliary Output	
Standard	Meets the requirements of IEC 60601-1 for short-circuit protection and leakage current
ECG Analog Output	
Bandwidth (-3dB; reference frequency: 10Hz)	Diagnostic mode: 0.05 to 150 Hz Monitor mode: 0.5 to 40 Hz Surgical mode: 1 to 20 Hz ST mode: 0.05 to 40 Hz
Maximum QRS delay	25 ms (in diagnostic mode, and non-paced)
Gain (reference frequency 10Hz)	1V/mV (±5%)
Pace enhancement	Signal amplitude: V_{oh}≥2.5V Pulse width: 10ms±5% Signal rising and falling time: ≤100μs
IBP Analog Output	
Bandwidth (-3dB; reference frequency:1Hz)	0 to 40 Hz
Maximum transmission delay	30 ms
Gain (reference frequency 1 Hz)	1 V/100 mmHg, ±5%
Nurse Call Signal	
Amplitude	High level: 3.5 to 5 V, ±5%, providing a minimum of 10 mA output current; Low level: < 0.5 V, receiving a minimum of 5 mA input current.
Rising and falling time	≤1 ms
Digital Signal	

Output impedance	≤100 Ω
Maximum time delay	35 ms (R-wave peak to leading edge of pulse)
Amplitude	High level: 3.5 to 5 V, ±5%, providing a maximum of 10 mA output current; Low level: < 0.5 V, receiving a maximum of 5 mA input current.
Pulse width	100 ms ±10%
maximum rising and falling time	1 ms
A ar utput	
Alarm delay time from the monitor to remote equipment	The alarm delay time from the monitor to remote equipment is ≤2 seconds, measured at the monitor signal output connector.
Alarm signal sound pressure level range	45 db(A) to 85 db(A) within a range of one meter

A Data tora

Trends	• Standard-capacity memory card: up to 120 hours of trend data with the resolution no less than 1 minute, or up to 1200 hours of trend data with the resolution no less than 10 minutes. • High-capacity memory card: up to 240 hours of trend data with the resolution no less than 1 minute, or up to 2400 hours of trend data with the resolution no less than 10 minutes.
Events	• Standard-capacity memory card: 1000 events, including parameter alarms, arrhythmia events, technical alarms, and so on. • High-capacity memory card: 2000 events, including parameter alarms, arrhythmia events, technical alarms, and so on.
NIBP measurements	• Standard-capacity memory card: 1000 sets. • High-capacity memory card: 3000 sets.
Full-disclosure waveforms	• Standard-capacity memory card: up to 48 hours for one waveform. The specific storage time depends on the waveforms stored and the number of stored waveforms. • High-capacity memory card: up to 48 hours for all parameter waveforms.
ST view	A maximum of 120 hours of ST segment waveforms. One group of ST segment waveforms is stored every minute.
OxyCRG view	A maximum of 48 hours of OxyCRG events.

A i Fi p ii ations

A i Fi ni a p ii ations D

Protocol	IEEE 802.11a/b/g/n
Modulation mode	BPSK, QPSK, 16QAM, 64QAM
Operating frequency	2.4 GHz to 2.495 GHz 5.15 GHz to 5.25 GHz, 5.725 GHz to 5.85 GHz
Channel spacing	IEEE 802.11b/g: 5 MHz IEEE 802.11n (at 2.4 GHz): 5 MHz IEEE802.11a: 20 MHz IEEE802.11n (at 5 GHz): 20 MHz
Wireless baud rate	IEEE 802.11b: 1 Mbps to 11 Mbps IEEE 802.11g: 6 Mbps to 54 Mbps IEEE 802.11n: 6.5 Mbps to 72.2 Mbps (MCS0-MCS7) IEEE 802.11a: 6 Mbps to 54 Mbps

Output power	<20dBm (CE requirement, detection mode: RMS) <30dBm (FCC requirement: detection mode: peak power)
Operating mode	As station, access AP for data transmission
Data security	Standards: WPA-PSK AES, WPA2-PSK, WPA-Enterprise, WPA2-Enterprise, CCKM AES EAP method: EAP-FAST, EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP- MSCHAPv2, PEAP-TLS, LEAP Encryption: AES

A i Fi ni a p i i ations X D AC

Protocol	IEEE 802.11a/b/g/n
Modulation mode	BPSK, QPSK, 16QAM, 64QAM
Operating frequency	2412 MHz to 2462 MHz 5180 MHz to 5320 MHz, 5500 MHz to 5700 MHz, 5745 MHz to 5825 MHz **A IG X D AC supports t DF ann s n usin t DF ann s i Fi p r or an sta it an roa in ti an un r in u to avoi in int r rin wit a ars st s DF ann s ar isa au t an not r o n op rator s ou o pr nsiv ass ss t ris or usin t DF ann s**
Channel spacing	IEEE 802.11b/g: 5 MHz IEEE 802.11n (at 2.4 GHz): 5 MHz IEEE802.11a: 20 MHz IEEE802.11n (at 5 GHz): 20 MHz
Wireless baud rate	IEEE 802.11b: 1 Mbps to 11 Mbps IEEE 802.11g: 6 Mbps to 54 Mbps IEEE 802.11n: MCS0 - MCS7 IEEE 802.11a: 6 Mbps to 54 Mbps
Output power	<20 dBm (CE requirements, detection mode: RMS) <30 dBm (FCC requirements, detection mode: peak power)
Operating mode	As station, access AP for data transmission
Data security	Standards: WPA-PSK AES, WPA2-PSK, WPA-Enterprise, WPA2-Enterprise, CCKM AES EAP method: EAP-FAST, EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, PEAP-TLS, LEAP Encryption: AES

A i Fi r or an p i i ations

A I G

- **A n twor un tion o ata o uni ation ar si n to op rat on a privat n twor**

A st Capa i t

Number of the monitors supported by a single AP: ≤ 16.

- Each monitor can communicate with the CMS.
- Two monitors are used to view other monitors.
- Only one monitor can transmit history data.
- The weakest strength of the AP signal where the monitor is located can not be less than -65 dBm.

A.x.x.x Distance to Interfering Devices

The distance between the interfering devices and the monitor is greater than 20 cm. A Wi-Fi interference (no greater than -85 dBm) in the same channel and a Wi-Fi interference (no greater than -50 dBm) in an adjacent-channel are presented synchronously. The interfering devices include, but are not limited to, 2.4 GHz wireless devices, cellular mobile networks, microwave ovens, interphones, cordless phones, and ESU equipment. The interfering devices do not include Wi-Fi devices.

The monitoring network must support the following requirements:

- All the monitors do not encounter communication loss.
- The total delay of data transmission from the monitor to the CMS: ≤ 2 seconds.
- The delay for monitor-related settings configured at the CMS to be effective: ≤ 2 seconds.
- The total delay of data transmission from one monitor to the other: ≤ 2 seconds.
- The delay for the monitor to reset alarms of another to be effective: ≤ 2 seconds.

A.x.x.x Wi-Fi Network Data Loss Rate

The ratio of the communication data loss on the CMS from any monitor does not exceed 0.1% over a 24-hour period.

Testing conditions are as follows:

- Number of the monitors supported by a single AP: ≤ 16.
- 12 of the 16 monitors connected to the network roam for 30 times.
- Each monitor can communicate with the CMS.
- Two monitors are used to view other monitors.
- Only one monitor can transmit history data.
- The weakest strength of the AP signal where the monitor is located cannot be less than -65 dBm.

A.x.x.x Line of Sight Distance

The line of sight distance between the monitor and the AP is no less than to 50 meters.

A.x Measurement Specifications

The adjustable range of alarm limits is the same with the measurement range of signals unless otherwise specified.

A.x ECG Specifications

ECG		
Standards	Meet standards of IEC 60601-2-27: 2011 and IEC 60601-2-25: 2011	
Lead set	3-lead: 5-lead:	I, II, III I, II, III, aVR, aVL, aVF, V
ECG standard	AHA, IEC	
Display sensitivity	1.25 mm/mV (×0.125), 2.5 mm/mV (×0.25), 5 mm/mV (×0.5), 10 mm/mV (×1), 20 mm/mV (×2), 40 mm/mV (×4), Auto, less than 5% error	
Sweep speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s, less than 5% error	
Bandwidth (-3dB)	Diagnostic mode: Monitor mode: Surgical mode: ST mode:	0.05 to 150 Hz 0.5 to 40 Hz 1 to 20 Hz 0.05 to 40 Hz

Common mode rejection ratio	Diagnostic mode:	>90 dB
	Monitor mode:	>105 dB (with notch filter on)
	Surgical mode:	>105 dB (with notch filter on)
	ST mode:	>105 dB (with notch filter on)
Notch filter	50/60 Hz Monitor, surgical, and ST mode: notch filter turns on automatically Diagnostic mode: notch filter is turned on/off manually	
Differential input impedance	≥5 MΩ	
Input signal range	±8mV (peak-to-peak value)	
Accuracy of signal reproduction	Use A and D methods based on IEC 60601-2-25 to determine frequency response.	
Electrode offset potential tolerance	±500 mV	
Lead-off detection current	Measuring electrode: <0.1 μA Drive electrode: <1 μA	
Input off928276 7(el)(p6822887206se		

e requirements in Clause 201.7.9.2.9.101 b) 3) of IEC
ing method is used:

e RR intervals are greater than 1200 ms, the 4 most
averaged to compute the HR. Otherwise, heart rate is
ing the maximum and minimum ones from the most
and then averaging them.

d on the monitor screen is updated no more than one

e requirements in Clause 201.7.9.2.9.101 b) 4) of IEC
rate after 20 seconds of stabilization is displayed as

waveform A1): 80±1 bpm

icular bigeminy (waveform A2): 60±1 bpm

ricular bigeminy (waveform A3): 120±1 bpm

waveform A4): 90±2 bpm

ts of IEC 60601-2-27: Clause 201.7.9.2.9.101 b) 5).

less than 11 s

less than 11 s

ts in Clause 201.7.9.2.9.101 b) 6) of IEC 60601-2-27.

<11 s

<11 s

<11 s

<11 s

<11 s

<11 s

rmed based on Clause 201.12.1.101.17 of IEC 60601-2-
ulation is not affected for QRS of 1 mV amplitude and
ve duration of 180 ms and amplitude lower than 1.2
350 ms.

V-Tach, Vent Brady, Extreme Tachy, Extreme Brady,
n, Pauses/min, Couplet, Bigeminy, Trigeminy, R on T,
Brady, Missed Beats, Pacer Not Pacing, Pacer Not
C, Noce,nsu4.88342(2.s06(-)0s)70326(nt)8.8097706(t,0.04(v)7J[illegible]06.5872( )

ST High	(low limit + 0.2 mV) to 2.0 mV (ST alarm mode: Absolute) 0 mV to 2.0 mV (ST alarm mode: Relative)	0.05 mV
ST Low	-2.0 mV to (high limit - 0.2 mV) (ST alarm mode: Absolute) -2.0 mV to 0 mV (ST alarm mode: Relative)	
QTc High	200 to 800 ms	10 ms
ΔQTc High	30 to 200 ms	

A. . sp. p i i ations

Technique	Trans-thoracic impedance
Lead	Options are lead I, II and Auto.
Respiration excitation waveform	<300 µA RMS, 62.8 kHz (±10%)
Minimum respiration impedance threshold	

A. . . p 2. p i i ations

Refer to Appendix *F SpO$_2$ Sensor Accuracy* for the clinical study results of SpO$_2$ sensor accuracy.

asi o. p 2 o u

Standards	Meets the requirements of ISO 80601-2-61: 2011
Measurement range	1 to 100%
Resolution	1%
Response time	≤20 s (normal perfusion, no disturbance, SpO2 value sudden changes from 70% to 100%)
Accuracy[1]	70 to 100%: ±2%ABS (measured without motion in adult/pediatric mode) 70 to 100%: ±3%ABS (measured without motion in neonate mode) 70 to 100%: ±3%ABS (measured with motion) 1% to 69%: Not specified.
Refresh rate	≤ 1 s
SpO2 averaging time	2-4 s, 4-6 s, 8 s, 10 s, 12 s, 14 s, 16 s
Low perfusion conditions	Pulse amplitude: >0.02% Light penetration: >5%
Low perfusion SpO2 accuracy[2]	±2%
PI measurement range	0.02 to 20%
[1] The Masimo pulse oximeter with sensors have been validated for no motion accuracy in human blood studies on healthy adult volunteers in induced hypoxia studies in the range of 70% to 100% SpO2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population. One percent was added to the accuracies for neonatal sensors to account for accuracy variation due to properties of fetal hemoglobin. The Masimo pulse oximeter with 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 induced hypoxia studies in the range of 70% to 100% SpO2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population. [2] The Masimo pulse oximeter has been validated for low perfusion accuracy in bench top testing against a Biotek Index 2 simulator and Masimo's simulator with signal strengths of greater than 0.02% and a % transmission of greater than 5% for saturations ranging from 70 to 100%. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.	

or p 2 o u

Measurement range	0 to 100%
Resolution	1%
Refreshing rate	≤1 s
Response time	≤30 s (normal perfusion, no disturbance, SpO2 value sudden change from 70% to 100%)
Accuracy	70 to 100%: ±2%ABS (adult/pediatric) 70 to 100%: ±3%ABS (neonate) 0% to 69%: Not specified.
When the SpO_2 sensor is applied for neonatal patients as indicated, the specified accuracy range is increased by ±1%, to compensate for the theoretical effect on oximeter measurements of fetal hemoglobin in neonatal blood.	

A , - - p i i ations

A ar i it	an	t p
PR High	PR≤40bpm: (low limit + 2 bpm) to 40 bpm PR > 40 bpm: (low limit + 5 bpm) to 295 bpm	PR≤40: 1 bpm PR>40: 5 bpm
PR Low	PR≤40bpm: 16 bpm to (high limit - 2 bpm) PR > 40 bpm: 40 bpm to (high limit - 5 bpm)	

- ro as o p 2

Measurement range	25 to 240 bpm
Resolution	1 bpm
Response time	≤20 s (with normal perfusion, no disturbance, and a PR value transition from 25 to 220 bpm)
Accuracy	±3 bpm (measured without motion) ±5 bpm (measured with motion)
Refresh rate	≤1 s

ro or p 2 ou

Measurement range	20 to 300 bpm
Resolution	1 bpm
Response time	≤30 s (normal perfusion, no disturbance, PR value sudden change from 25 to 250 bpm)
Accuracy	20 to 250 bpm: ±3 bpm 251 to 300 bpm, not specified
Refreshing rate	≤1 s

ro IB ou

Measurement range	25 to 350 bpm
Resolution	1 bpm
Accuracy	±1 bpm or ±1%, whichever is greater

A p p ii ations

Standard	Meet the standard of ISO 80601-2-56: 2017	
Technique	Thermal resistance	
Operating mode	Direct mode	
Measurement range	0 to 50 °C (32 to 122 °F)	
Resolution	0.1°C	
Accuracy	±0.1 °C or ±0.2 °F (excluding probe error)	
Refreshing rate	≤1 s	
Minimum time for accurate measurement	Body surface: <100 s Body cavity: <80 s	
A ar i it	**an**	**t p**
TXX High (XX refers to temperature site)	(low limit +1.0) to 50.0 °C (low limit +2.0) to 122.0 °F	0.1 °C 0.1 °F
TXX Low (XX refers to temperature site)	0.1 to (high limit - 1.0) °C 32.2 to (high limit - 2.0) °F	
ΔT High	0.1 to 50.0 °C 0.2 to 90.0 °F	

A IB p ii ations

Standard	Meet standard of IEC 80601-2-30: 2018
Technique	Oscillometry

Mode of operation	Manual, Auto, STAT, Sequence			
Auto mode repetition intervals	1, 2, 2.5, 3, 5, 10, 15, 20, 30, 60, 90, 120, 180, 240 or 480 min			
STAT mode cycle time	5 min			
Max measurement time	Adult, Pediatric: 180 s Neonate: 90 s			
Heart rate range	30 to 300 bpm			
Measurement ranges (mmHg)		Adult	Pediatric	Neonate
	Systolic:	25 to 290	25 to 240	25 to 140
	Diastolic:	10 to 250	10 to 200	10 to 115
	Mean:	15 to 260	15 to 215	15 to 125
Accuracy	Max mean error: ±5 mmHg Max standard deviation: 8 mmHg			
Resolution	1mmHg			
Initial cuff inflation pressure range (mmHg)				

NIBP-S Extreme High	NIBP-S high limit < 50 Adult: (NIBP-S high limit + 1) to 290 Pediatric: (NIBP-S high limit + 1) to 240 Neonate: (NIBP-S high limit + 1) to 140 NIBP-S high limit ≥ 50 Adult: (NIBP-S high limit + 5) to 290 Pediatric: (NIBP-S high limit + 5) to 240 Neonate: (NIBP-S high limit + 5) to 140	NIBP ≤ 50: 1 NIBP > 50: 5
NIBP-S Extreme Low	NIBP-S low limit ≤ 50 25 to (NIBP-S low limit - 1) NIBP-S low limit > 50 25 to (NIBP-S low limit - 5)	
NIBP-M Extreme High	NIBP-M high limit < 50 Adult: (NIBP-M high limit + 1) to 260 Pediatric: (NIBP-M high limit + 1) to 215 Neonate: (NIBP-M high limit + 1) to 125 NIBP-M high limit ≥ 50 Adult: (NIBP-M high limit + 5) to 260 Pediatric: (NIBP-M high limit + 5) to 215 Neonate: (NIBP-M high limit + 5) to 125	
NIBP-M Extreme Low	NIBP-M low limit ≤ 50 15 to (NIBP-M low limit - 1) NIBP-M low limit > 50 15 to (NIBP-M low limit - 5)	
NIBP-D Extreme High	NIBP-D high limit < 50 Adult: (NIBP-D high limit + 1) to 250 Pediatric: (NIBP-D high limit + 1) to 200 Neonate: (NIBP-D high limit + 1) to 115 NIBP-D high limit ≥ 50 Adult: (NIBP-D high limit + 5) to 250 Pediatric: (NIBP-D high limit + 5) to 200 Neonate: (NIBP-D high limit + 5) to 115	NIBP ≤ 50: 1 NIBP > 50: 5
NIBP-D Extreme Low	NIBP-D low limit ≤ 50 10 to (NIBP-D low limit - 1) NIBP-D low limit > 50 10 to (NIBP-D low limit - 5)	

*Measurement accuracy verification: In adult and pediatric modes, the blood pressure measurements measured with this device are in compliance with the Standard for Non-invasive sphygmomanometers (ISO 81060-2)in terms of mean error and standard deviation by comparing with intra-arterial or auscultatory measurements (depending on the configuration) in a typical patient population. For auscultatory reference, the 5th Korotkoff sound was used to determine the diastolic pressure.

In neonatal mode, the blood pressure measurements measured with this device are in compliance with the American National Standard for Non-invasive sphygmomanometers (ISO 81060-2) in terms of mean error and standard deviation by comparing with intra-arterial measurements (depending on the configuration) in a typical patient population.

A. IBP Specifications

Standard	Meet the standard of IEC 60601-2-34: 2011
Technique	Direct invasive measurement
IB	
Measurement range	-50 to 300 mmHg
Resolution	1 mmHg
Accuracy	±2% or ±1 mmHg, whichever is greater (excluding sensor error)

Refreshing rate	≤1 s
_ _	
Measurement range	0% ~ 50%
_ **r ssur trans u r**	
Excitement voltage	5 VDC, ±2%
Sensitivity	5 μV/V/mmHg
Zero adjustment range	±200 mmHg

A. C. p ii ati ons

Standard	Meet the standard of ISO 80601-2-56: 2017	
Measurement method	Thermodilution method	
Measurement range	C.O.: 0.1 to 20 L/min TB: 23 to 43 °C TI: 0 to 27 °C	
Resolution	C.O.: 0.1 L/min TB, TI: 0.1 °C	
Accuracy	C.O.: ±5% or ±0.1 L /min, whichever is greater TB, TI: ±0.1 °C (without sensor)	
Repeatability	C.O.: ±2% or ±0.1 L/min, whichever is greater	
TB Operating mode	Direct mode	
Minimum time for accurate TB measurement	10 s	
Alarm range	TB:	23 to 43 °C
A ar i it	**an**	**t p**
TB High	(low limit + 1) to 43 °C (low limit + 2) to 109.4 °F	0.1 °C 0.1 °F
TB Low	23 to (high limit - 1) °C 73.4 to (high limit - 2) °F	

A. C$_2$ p ii ati ons

Measurement mode	Sidestream, microstream	
Technique	Infrared absorption	
Apnea delay	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s	
A ar i it	**an**	**t p**
$EtCO_2$ High	(low limit + 2) to 99 mmHg	1 mmHg
$EtCO_2$ Low	1 to (high limit - 2)mmHg	
$FiCO_2$ High	1 to 99 mmHg	

i str a C$_2$ o u

Standard	Meet the standard of ISO 80601-2-55: 2011
CO_2 Measurement range	0 to 150 mmHg
CO_2 absolute accuracy*	Full accuracy mode: 0 to 40 mmHg: ± 2 mmHg 41 to 76 mmHg: ±5% of reading 77 to 99 mmHg: ±10% of reading 100 to 150 mmHg: ±(3 mmHg + 8% of reading) ISO accuracy mode:mmHg

Sample flowrate	Connected a DRYLINE II watertrap for adult and pediatric patient: 120 ml/min Connected a DRYLINE II watertrap for neonatal patient: 90 ml/min or 70 ml/min
Sample flowrate tolerance	±15% or ±15 ml/min, whichever is greater.
Start-up time	Maximum: 90 s Typically: 20 s
Response time	Measured with a DRYLINE II neonatal watertrap and a 2.5-meter neonatal sampling line: ≤5.0 s @ 70 ml/min ≤4.5 s @ 90 ml/min Measured with a DRYLINE II adult watertrap and a 2.5-meter adult sampling line: ≤5.0 s @ 120 ml/min
Rise time	Measured with a DRYLINE II neonatal watertrap and a 2.5-meter neonatal sampling line: ≤250 ms@70 ml/min. ≤250 ms@90 ml/min. Measured with a DRYLINE II adult watertrap and a 2.5-meter adult sampling line: ≤300 ms@120 ml/min
awRR measurement range	0 to 150 rpm
awRR measurement precision	≤60 rpm: ±1 61 to 150 rpm: ±2
awRR resolution	1 rpm
Data sample rate	50 Hz

E to int r r n as s on C $_2$ asur nts		
Gas	**Con ntration**	**uanti tati v t**
N_2O	≤60	±1 mmHg
Hal	≤4	
Sev	≤5	
Iso	≤5	
Enf	≤5	
Des	≤15	±2 mmHg
*: means an extra error should be added in case of gas interference when CO_2 measurements are performed between 0 to 40mmHg.		

i rostr a C $_2$ o u

Standard	Meet the standard of ISO 80601-2-55: 2011
CO_2 Measurement range	0 to 99 mmHg
Accuracy*	0 to 38 mmHg: ±2 mmHg 39 to 99 mmHg: ±5% of the reading (0.08% increased in error for every 1 mmHg if the reading is more than 38 mmHg)
Accuracy drift	Meet the requirement for measurement accuracy within 6 hours
* Accuracy applies for respiration rate up to 80 rpm. For respiration rate above 80 rpm and $EtCO_2$ exceeding 18 mmHg, the accuracy is 4 mmHg or ±12% of the reading, whichever is greater. For respiration rate above 60 rpm, the above accuracy can be achieved by using the FilterLine H Set for Infant/Neonatal (Model: 006324). In the presence of interfering gases, the above accuracy is maintained to within 4%.	

Resolution	1 mmHg
Sample flow rate	$50^{+15}_{-7.5}$ ml/min
Initialization time	30 s (typical) 180 s (maximum)
Response time	4.3 s (with any 2-meter FilterLine) 5.5 s (with any 4-meter FilterLine)
Rise time	190 msec (with any 2-meter FilterLine) 210 msec (with any 4-meter FilterLine)
awRR measurement range	0 to 150 rpm
awRR measurement accuracy	0 to 70 rpm: ±1 rpm 71 to 120 rpm: ±2 rpm 121 to 150 rpm: ±3 rpm
awRR resolution	1 rpm
Data sample rate	40 Hz

A . . AG p i i ati ons

Standard	Meet the standard of ISO 80601-2-55: 2011
Technique	Infrared absorption, paramagnetic properties for O_2 monitoring
Warm-up time	Iso accuracy mode: 45 s Full accuracy mode: 10 min
Sample flow rate	Adult, Pediatric: 200 ml/min Neonate: 120 ml/min Accuracy: ±10 ml/min or ±10%, whichever is greater
Measurement range	CO_2: 0 to 30% O_2: 0 to 100% N_2O: 0 to 100% Des: 0 to 30% Sev: 0 to 30% Enf: 0 to 30% Iso: 0 to 30% Hal: 0 to 30% awRR: 2 to 100 rpm
Resolution	CO_2: 0.1% O_2: 1% N_2O: 1% Des: 0.1% Sev: 0.1% Enf: 0.1% Iso: 0.1% Hal: 0.1% awRR: 1 rpm
Iso accuracy	As full accuracy specifications, but derated as follows: Add $\pm 0.3\%_{ABS}$ to accuracy for CO_2 Add $\pm 8\%_{REL}$ to accuracy for all anesthetic gases N_2O accuracy is $\pm(8\%_{REL}+2\%_{ABS})$

Full accuracy	Gases	Range (%REL)[1]	Accuracy (%ABS)
	CO_2	$0 \le CO_2 \le 1$	±0.1
		$1 < CO_2 \le 5$	±0.2
		$5 < CO_2 \le 7$	±0.3
		$7 < CO_2 \le 10$	±0.5
		$CO_2 > 10$	Not specified
	N_2O	0 - 20	±2
		20 - 100 (excluding 20)	±3
	O_2	0 - 25	±1
		25 - 80 (excluding 25)	±2
		80 - 100 (excluding 80)	±3
	Des	0 - 1	±0.15
		1 - 5 (excluding 1)	±0.2
		5 - 10 (excluding 5)	±0.4
		10 - 15 (excluding 10)	±0.6
		15 - 18 (excluding 15)	±1
		>18	Not specified
	Sev	0 - 1	±0.15
		1 - 5 (excluding 1)	±0.2
		5 - 8 (excluding 5)	±0.4
		>8	Not specified
	Enf, Iso, Hal	0 - 1	±0.15
		1 - 5 (excluding 1)	±0.2
		>5	Not specified
awRR	2 to 60 rpm		±1 rpm
	>60 rpm		Not specified

Note[1]: The highest GAS LEVEL for a single halogenated anaesthetic gas in a gas mixture that is concealed when the anaesthetic concentration falls is 0.15/0.3% (Full/ISO accuracy).

Response time	Measured with a DRYLINE II neonatal watertrap and a 2.5-meter neonatal sampling line: 120 ml/min: CO_2: ≤4 s N_2O: ≤4.2 s O_2: ≤4 s Hal, Iso, Sev, Des, Enf: ≤4.4 s
	Measured with a DRYLINE II adult watertrap and a 2.5-meter adult sampling line: 200 ml/min: CO_2: ≤4.2s N_2O: ≤4.3s Hal, Iso, Sev, Des, Enf: ≤4.5s O_2: ≤4s
Anesthetic agent limit	Primary anesthetic agent In full accuracy mode: 0.15%,
	Secondary anesthetic agent: In full accuracy mode: 5% of primary agent if primary agent is greater than 10%, 0.3% if primary agent is less than or equal to 10%.
Data sample rate	25 Hz

Inaccuracy specifications are affected by the breath rate and I:E change. The end-tidal gas reading is within specification for breath rate below 15BPM and I:E ratio smaller than 1:1 relative to the gas readings without breath; Add ±6%REL to inaccuracy for HAL and O_2 for breath rate larger than 15 BPM; Add ±6%REL to inaccuracy for all gases for breath rate larger than 30 BPM (inaccuracy for HAL and O_2 are unspecified in this case); inaccuracy is unspecified for breath rate larger than 60 BPM.

E to int r rn as s on AG asur nts

Gas	**Con ntrati on**	**uanti tati v t AB**			
		C 2	2	**A nt**	2
CO_2	/	/	0.1	0	0.2
N_2O	/	0.1	/	0.1	0.2
Agent [1) 2)]	/	0.1	0.1	0.1	1
Xenon	<100%	0.1	0	0	0.5
Helium	<50%	0.1	0	0	0.5
Ethanol	<0.1%	0	0	0	0.5
Acetone	<1%	0.1	0.1	0	0.5
Methane	<1%	0.1	0.1	0	0.5
Saturated Isopropanol vapour	/	0.1	0	0	0.5
Metered dose inhaler propellants,	/	Unspecifie d	Unspecifie d	Unspecifie d	Unspecifie d
O_2	/	0.2	0.2	1.0	/

1) Agent represents one of Des, Iso, Enf, Sev, and Hal.

2) Multiple agent interference on CO_2, N_2O and O_2 is typically the same as single agent interference.

3) For CO_2, N_2O and Agents, maximum interference from each gas at concentrations within specified accuracy ranges for each gas. The total interference of all gases is never larger than 5%REL.

A ar i it	**an**	**t p**

$EtCO_2$ High	(low limit + 2) to 99 mmHg	1 mmHg
$EtCO_2$ Low	1 to (high limit - 2) mmHg	
$FiCO_2$ High	1 to 99 mmHg	
EtO_2 High	(low limit + 2%) to 100%	1%
EtO_2 Low	0% to (high limit - 2)%	
FiO_2 High	(low limit + 2%) to 100%	
FiO_2 Low	18% to (high limit - 2)%	
EtN_2O High	(low limit + 2) to 100%	1%
EtN_2O Low	0 to (high limit - 2)%	
FiN_2O High	(low limit + 2) to 100%	
FiN_2O Low	0 to (high limit - 2)%	
EtHal/Enf/Iso High	(low limit + 0.2) to 5.0%	0.1%
EtHal/Enf/Iso Low	0 to (high limit - 0.2)%	
FiHal/Enf/Iso High	(low limit + 0.2) to 5.0%	
FiHal/Enf/Iso Low	0 to (high limit - 0.2)%	
EtSev High	(low limit + 0.2) to 8.0%	0.1%
EtSev Low	0 to (high limit - 0.2)%	
FiSev High	(low limit + 0.2) to 8.0%	
FiSev Low	0 to (high limit - 0.2)%	
EtDes High	(low limit + 0.2) to 18.0%	0.1%
EtDes Low	0 to (high limit - 0.2)%	
FiDes High	(low limit + 0.2) to 18.0%	
FiDes Low	0 to (high limit - 0.2)%	

B E Can aio uator Co pian

B E C

The device meets the requirements of IEC 60601-1-2: 2014.

A I G

- s o a ssori s trans u rsan a, sot rt ant os sp ii orprovi a, t anua tur ro t is quip nt ou r sutinin r as tro a n ti issionsor r as tro a n ti i unit o t is quip nt an r sutini prop rop ration
- non EE l E l E t atisa parto an E Y E a a, isrupt a, t tro a n ti intr r n o n ar a, quip nt lt a a, n ssar tota iti ation asur s su, asr ori ntin orr o atin t non EE l E ors i in t o ation
- s o t is quip nt a a nttoorsta wit ot r quip nts ou a, avoi a, aus it ou r sutini prop rop ration l su, us isn ssar t is quip nt an t ot r quip nt s ou a, o a, s rv tov ri t att ar op ratin nor a
- is vi isint n orus inpro ssiona at ar aiit nviron nt an o at ar nviron nt l itisus insp ia nviron nt su, as a n ti r sonan i a in nviron nt t quip nt s st a a, isrupt a, t op ration o n ar a, quip nt
- orta a, F o uni ations quip nt in u in p rip ra ssu, asant nna a a, san t rna ant nnas s ou a, us no os r t an in, s toan part o t t is vi in u in a a, ssp ii a, t anua tur r t rwis l ra tion o t p r or an o t is quip nt ou r sut
- quip nt s st a a, isrupt a, t tro a n ti intr r n o n ar a, i a quip nt su, as Cl roup i a quip nt o iat r a n ti r sonan i a in an i rowav t rap lt a a, n ssar tota iti ation asur s su, asr ori ntin r o atin ors i in t o ation
- l t quip nt s st is us in FID nviron nt su, as FID ar in a, t st ar o a, FID r a ran oor ontro s st it a a, isrupt a, t op ration o n ar a, FID quip nt lt a a, n ssar tota iti ation asur s su, asr ori ntin orr o atin t quip nt s st awa ro FID quip nt

Gui an an D aration E tro a n ti E issions		
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.		
E issiont sts	**Co pian**	**E tro a n ti nviron nt ui an**
Conducted and radiated RF EMISSIONS CISPR 11	Group 1	The device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Conducted and radiated RF EMISSIONS CISPR 11	Class A	The device 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 distortion EMISSIONS IEC61000-3-2	Class A	
Voltage Fluctuations/Flicker EMISSIONS IEC 61000-3-3	Complies	

If the system is operated within the electromagnetic environment listed in Table Guidance and Declaration - Electromagnetic Immunity, the system will remain safe and provide the following essential performance:

- Operating mode
- Accuracy

- Function
- Accessories identification
- Data stored
- Alarm
- Detect for connection

E

- **It ssntia pr or an is ostor ra it a n ssar tota iti ation asur s su asr ori ntin orr o atin t EE l E or E.Y E ors i in t o ation or stoppin usin t onitor an onta tt s rvi p rsonn**
- **vi n ssp ia pr autions r ar in E Can n sto instа an put into s rvi a or in tot E Cin or ation provi ow**
- **t r vi s a intr r wit t is vi v nt ou t tt r quir nts o Cl**
- **nt inputt si nais ow t ini u a pitu provi int ni a sp ii ations rron ous asur nts ou r sut**
- **E l ara t risti so t is vi a itsuita or us inin ustri ar asan ospita s Cl assA litis us in ar si ntia nviron nt or wi Cl assB is nor a r quir t is vi i tnoto ra quat prot tion to ra io r qu n o uni ation s rvi s us r i tn tota iti ation asur s su asr o atin orr ori ntin t vi**

Gui an an D aration E tro a n ti l unit			
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.			
I unit t st	**IEC t st v**	**Co pian v**	**E tro a n ti nviron nt ui an**
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±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	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±1 kV line(s) to line(s) ±2 kV line(s) to earth	
Voltage dips and voltage interruptions IEC 61000-4-11	0% U_T for 0.5 cycle: at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0% U_T for 1 cycle and 70% U_T for 25/30 cycles: at 0° 0% U_T for 250/300 cycle	0% U_T for 0.5 cycle: at 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315° 0% U_T for 1 cycle and 70% U_T for 25/30 cycles: at 0° 0% U_T for 250/300 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of our product requires continued operation during power mains interruptions, it is recommended that our product be powered from an uninterruptible power supply or a battery.
RATED power frequency magnetic fields IEC 61000-4-8	30 A/m 50 Hz/60 Hz	30 A/m 50 Hz/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.			

Guidance and Declaration - Electromagnetic Immunity

The device is intended for use in the specified electromagnetic environment. The customer or the user of the device should assure that it is used in such an environment as described below.

Immunity test	IEC test level	Compliance level	Electromagnetic environment guidance
Conducted disturbances induced by RF fields IEC61000-4-6	3 Vrms 150 kHz to 80 MHz 80% AM at 1 kHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the system, including cables, than the recommended separation distance calculated from the equation appropriate for the frequency of the transmitter. Recommended separation distances:
	6 Vrms in ISM bands between 0.15 MHz and 80 MHz 80% AM at 1 kHz	6 Vrms	
Radiated RF EM fields IEC61000-4-3	3 V/m 80 MHz to 2,7 GHz 80% AM at 1 kHz	3V/m	Recommended separation distances: 80 MHz to 800 MHz: 800MHz - 2.7GHz: 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)[b]. Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a] should be less than the compliance level in each frequency range[b]. Interference may occur in the vicinity of equipment marked with the following symbol:
Proximity fields from RF wireless communications equipment IEC61000-4-3	27 V/m 385 MHz	27 V/m	
	28 V/m 810 MHz, 870 MHz, 930 MHz, 1720 MHz, 1845 MHz, 1970 MHz, 2450 MHz (pulse modulation)	28 V/m	
	28V/m 450 MHz (FM modulation)	28 V/m	
	9V /m 710 MHz, 745 MHz, 780 MHz, 5240 MHz, 5500 MHz, 5785 MHz	9 V/m	

Note 1 At 80 MHz to 800 MHz, the separation distance for the higher frequency range applies.

Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a]: Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur 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 **EEG** or **EMG** is used exceeds the applicable RF compliance level above, the **EEG** or **EMG** should be observed to verify normal operation. If abnormal performance is observed, additional 3[(V/0127984 T39 Tf8 0 0 8 063)-7.[(en)16.0104(h)0.60[(8842(s)-6.47 TcMonito995s.2119(975 T7.493(p)-6.5y

A l G

- vi is oni ur wit a wir ssn twor onn tor tor iv wir ssi na t r vi s a int r r wit t is vi v nt ou t tt r quir nts o Cl

B a io uator Co pian

This device complies with Part 15 of the FCC Rules and RSS-210 of Industry Canada. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications to this equipment not expressly approved by Mindray may cause harmful radio frequency interference and void your authority to operate this equipment.

The maximum antenna gain permitted complies with the e.i.r.p. limits as stated in RSS-210.

The maximum antenna gain permitted complies with the e.i.r.p. limits specified for point-to-point operation, as stated in RSS-210.

A l G

- C an sor o i i ations not pr ss approv a t part r spons i a o pian ou voi t us r s aut ori t to op rat t qui p nt

C Default Settings

C.1 ECG, Arrhythmia, and Default Settings

C.1.1 ECG Default Settings

Item		Default Setting
HR/PR	Alarm switch	On
	High limit	Adult: 120 bpm Pediatric: 160 bpm Neonate: 200 bpm
	Low limit	Adult: 50 bpm Pediatric: 75 bpm Neonate: 100 bpm
	Priority	Med
	Alarm Outputs	Off
Alarm Source		Auto
ECG1		II
ECG2 (5-lead)		V
ECG Gain		×1
Speed		25 mm/sec
Filter		OR: Surgery CCU: Diagnostic Other departments: Monitor
Notch Filter		On
Lead Set		Auto
Smart Lead		On
QRS Volume		General, OR: 2 Other department: 0
QRS Threshold		0.16 mV
Paced		Adult: Unspecified Pediatric/Neonate: No
Pacer Reject		Off

C.1 Arrhythmia Default Settings

C.1.1 Arrhythmia Alarm Default Settings

Item	Alarm Switch	Priority	Alarm Outputs
Asystole	On	High, unadjustable	Off
V-Fib/V-Tach	On	High, unadjustable	Off
V-Tach	On	High, unadjustable	Off
Vent Brady	On	High, unadjustable	Off
Extreme Tachy	On	High, unadjustable	Off
Extreme Brady	On	High, unadjustable	Off
R on T	CCU: On Other departments: Off	Med	Off
Run PVCs	Off	Low	Off
Couplet	Off	Prompt	Off
Multiform PVC	Off	Med	Off
PVC	Off	Prompt	Off
Bigeminy	CCU: On Other departments: Off	Med	Off
Trigeminy	CCU: On Other departments: Off	Med	Off
Tachy	Off	Med	Off
Brady	Off	Med	Off
Pacer Not Capture	Off	Prompt	Off
Pacer Not Pacing	Off	Prompt	Off
Missed Beat	Off	Prompt	Off
Nonsus V-Tach	CCU: On Other departments: Off	Med	Off
Vent Rhythm	CCU: On Other departments: Off	Med	Off
Pause	Off	Low	Off
Irr Rhythm	Off	Prompt	Off
A-Fib	Off	Prompt	Off
PVCs/min	CCU: On Other departments: Off	Med	Off
Pauses/min	CCU: On Other departments: Off	Med	Off

C.11 Arrhythmia Alarms Default Settings

Item	Adult	Pediatric	Neonatal
Asystole Delay	5 sec	5 sec	3 sec
Tachy	120 bpm	160 bpm	200 bpm
Brady	50 bpm	75 bpm	100 bpm
Extreme Tachy	160 bpm	180 bpm	220 bpm
Extreme Brady	35 bpm	50 bpm	80 bpm
Multif PVCs Window	15 beats	15 beats	15 beats
PVCs/min	10	10	5
Pause/min	8	8	8
Pause Threshold	2.0 sec	2.0 sec	1.5 sec
AF/Irr Rhy End Time	2 min	2 min	2 min
V-Tach Rate	130 bpm	130 bpm	150 bpm
V Brady Rate	40 bpm	40 bpm	60 bpm
V-Tach PVCs	6	6	5
V-Brady PVCs	5	5	3

C.12 ST Default Settings

Item		Default Setting
ST Alarm Mode		Absolute
ST Alarm Mode set to **Absolute** ST-I, ST-II, ST-III, ST-aVR, ST-aVL, ST-aVF, ST-V1, ST-V2, ST-V3, ST-V4, ST-V5,ST-V6, ST-Va, ST-Vb	Alarm switch	Off
	High limit	0.2 mV
	Low limit	-0.2 mV
	Priority	Med
	Alarm Outputs	Off
ST Alarm Mode set to **Relative** ST Single, ST Dual	Alarm switch	Off
	High limit	0.1 mV
	Low limit	-0.1 mV
	Priority	Med
	Alarm Outputs	Off
ST Analysis		Off
ST Segment		Auto
Show Markers		Off
ST Point		J+60 ms
Auto Adjust		On
J		48
ISO		-80

C . . D au t. tti n s

It		D au t. tti n
QTc	Alarm switch	Off
	High limit	Adult: 500 Pediatric: 480 Neonate: 460
	Priority	Med
	Alarm Outputs	Off
ΔQTc	Alarm switch	Off
	High limit	60
	Priority	Med
	Alarm Outputs	Off
QT Analysis		Off
QT Leads		All

C spiration D au t. tti n s

It		D au t. tti n
RR	Alarm switch	On
	High limit	Adult: 30 Pediatric: 30 Neonate: 100
	Low limit	Adult: 8 Pediatric: 8 Neonate: 30
	Priority	Med
	Alarm Outputs	Off
Apnea	Alarm switch	On
	Priority	High, unadjustable
	Alarm Outputs	Off
Apnea Delay		Adult: 20 sec Pediatric: 20 sec Neonate: 15 sec
RR Source		Auto
Resp Lead		Adult: Auto Pediatric: Auto Neonate: II
Gain		×2
Speed		6.25 mm/s
Auto Threshold Detection		On

C , p 2 D au t tin s

It		D au t tin
SpO_2	Alarm switch	On
	High limit	Adult: 100% Pediatric: 100% Neonate: 95%
	Low limit	90%
	Priority	Med
	Alarm Outputs	Off
SpO_2 Desat	Alarm switch	On
	Low limit	80%
	Priority	High
	Alarm Outputs	Off
Sat-Second (for Nellcor SpO_2)		Off
NIBP Simul		Off
FastSAT (for Masimo SpO_2)		Off
Display SIQ (for Masimo SpO_2)		Off
Sensitivity (for Masimo SpO_2)		APOD
Averaging (for Masimo SpO_2)		8s
Display PI (for MasimoSpO_2)		Off
Speed		25 mm/s
PR	Alarm switch	On
	High limit	Adult: 120 Pediatric: 160 Neonate: 200
	Low limit	Adult: 50 Pediatric: 75 Neonate: 100
	Priority	Med
	Alarm Outputs	Off
	Alarm Source	Auto
	PR Source	Auto
	QRS Volume	General, OR: 2 Other departments: 0
	Display PR	Off

C p ratur D au t ttin s

It		D au t ttin
TXX (XX refers to temperature site)	Alarm switch	On
	High limit	38.0 °C
	Low limit	35.0 °C
	Priority	Med
	Alarm Outputs	Off
ΔT	Alarm switch	On
	High limit	2.0 °C
	Priority	Med
	Alarm Outputs	Off

C IB D au t ttin s

It		D au t ttin
NIBP-S	Alarm switch	On
	High limit	Adult: 160 mmHg Pediatric: 120 mmHg Neonate: 90 mmHg
	Low limit	Adult: 90 mmHg Pediatric: 70 mmHg Neonate: 40 mmHg
	Priority	Med
	Alarm Outputs	Off
NIBP-D	Alarm switch	On
	High limit	Adult: 90 mmHg Pediatric: 70 mmHg Neonate: 60 mmHg
	Low limit	Adult: 50 mmHg Pediatric: 40 mmHg Neonate: 20 mmHg
	Priority	Med
	Alarm Outputs	Off
NIBP-M	Alarm switch	On
	High limit	Adult: 110 mmHg Pediatric: 90 mmHg Neonate: 70 mmHg
	Low limit	Adult: 60 mmHg Pediatric: 50 mmHg Neonate: 25 mmHg
	Priority	Med
	Alarm Outputs	Off

Item		Default Setting
NIBP-S Extreme	Alarm switch	On
	High limit	Adult: 175 mmHg Pediatric: 130 mmHg Neonate: 95 mmHg
	Low limit	Adult: 75 mmHg Pediatric: 60 mmHg Neonate: 35 mmHg
	Priority	High
	Alarm Outputs	Off
NIBP-D Extreme	Alarm switch	On
	High limit	Adult: 105 mmHg Pediatric: 80 mmHg Neonate: 65 mmHg
	Low limit	Adult: 35 mmHg Pediatric: 30 mmHg Neonate: 15 mmHg
	Priority	High
	Alarm Outputs	Off
NIBP-M Extreme	Alarm switch	On
	High limit	Adult: 125 mmHg Pediatric: 100 mmHg Neonate: 75 mmHg
	Low limit	Adult: 45 mmHg Pediatric: 40 mmHg Neonate: 20 mmHg
	Priority	High
	Alarm Outputs	Off
Initial Pressure		Adult: 160 mmHg Pediatric: 140 mmHg Neonate: 90 mmHg
Interval		OR: 5 min NICU: 30 min Other departments: 15 min
Start Mode		Clock
NIBP End Tone		Off
Venipuncture Pressure		Auto
Display Format		Sys/Dia (Mean)
Display Alarm Limits		Off
Display PR		Off

C IBP Default Settings

Item		Default Setting
IBP-S	Alarm switch	On
	High limit	■ Art/Ao/UAP/BAP/FAP/LV/P1/P2 arterial pressure Adult: 160 mmHg Pediatric: 120 mmHg Neonate: 90 mmHg ■ PA Adult: 35 mmHg Pediatric, Neonate: 60 mmHg
	Low limit	■ Art/Ao/UAP/BAP/FAP/LV/P1/P2 arterial pressure Adult: 90 mmHg Pediatric: 70 mmHg Neonate: 55 mmHg ■ PA Adult: 10 mmHg Pediatric, Neonate: 24 mmHg
	Priority	Med
	Alarm Outputs	Off
IBP-D	Alarm switch	On
	High limit	■ Art/Ao/UAP/BAP/FAP/LV/P1/P2 arterial pressure Adult: 90 mmHg Pediatric: 70 mmHg Neonate: 60 mmHg ■ PA Adult: 16 mmHg Pediatric, Neonate: 4 mmHg
	Low limit	■ Art/Ao/UAP/BAP/FAP/LV/P1/P2 arterial pressure Adult: 50 mmHg Pediatric: 40 mmHg Neonate: 20 mmHg ■ PA Adult: 0 mmHg Pediatric, Neonate: -4 mmHg
	Priority	Med
	Alarm Outputs	Off

IBP-M	Alarm switch	On	
	High limit	■	Art/Ao/UAP/BAP/FAP/LV/P1/P2 arterial pressure Adult: 110 mmHg Pediatric: 90 mmHg Neonate: 70 mmHg
		■	PA Adult: 20 mmHg Pediatric, Neonate: 26 mmHg
		■	ICP/RAP/LAP/UVP/P3-P4 venous pressure Adult: 10 mmHg Pediatric, Neonate: 4 mmHg
		■	CVP Adult: 14 cmH_2O Pediatric, Neonate: 5 cmH_2O
	Low limit	■	Art/Ao/UAP/BAP/FAP/LV/P1/P2 arterial pressure Adult: 70 mmHg Pediatric: 50 mmHg Neonate: 35 mmHg
		■	PA

Art-M Extreme	Alarm switch	Off
	High limit	Adult: 125 mmHg

It	D aut tin
Display Format	Sys/Dia (Mean)
Display Alarm Limit	Off
Use PA-D as PAWP	Off

C C D aut tin s

It		D aut tin
TB	Alarm switch	On
	High limit	39.0 ℃
	Low limit	36.0 ℃
	Priority	Med
	Alarm Outputs	Off
Comp Const		0.542
Auto Start		On
Auto TI		On

C C $_2$ D aut tin s

C G n ra tin s

It		D aut tin
$EtCO_2$	Alarm switch	On
	High limit	Adult, Pediatric: 50 mmHg Neonate: 45 mmHg
	Low limit	Adult, Pediatric: 25mmHg Neonate: 30mmHg
	Priority	Med
	Alarm Outputs	Off
$FiCO_2$	Alarm switch	On
	High limit	4 mmHg
	Priority	Med
	Alarm Outputs	Off
Apnea Delay		Adult, Pediatric: 20 s Neonate: 15 s
RR Source		Auto
Speed		6.25 mm/s
Scale		50 mmHg
Waveform Type		Draw

C. i str a C D aut. tti n s

It	D aut. tti n
BTPS Compensation	Off
AG Compensation	0%
N_2O Compenation	0%
Auto Standby	60 min
Operating Mode	Measure

C. i rostr a C D aut. tti n s

It	D aut. tti n
BTPS Compensation	Off
Maximum Hold	20 sec
Auto Standby	Off
Operating Mode	Measure

C. Gas D aut. tti n s

It		D aut. tti n
$EtCO_2$	Alarm switch	On
	High limit	Adult, Pediatric: 50 mmHg Neonate: 45 mmHg
	Low limit	Adult, Pediatric: 25mmHg Neonate: 30mmHg
	Priority	Med
	Alarm Outputs	Off
$FiCO_2$	Alarm switch	On
	High limit	4 mmHg
	Priority	Med
	Alarm Outputs	Off
EtO_2	Alarm switch	On
	High limit	88%
	Low limit	18%
	Priority	Med
	Alarm Outputs	Off
FiO_2	Alarm switch	On
	High limit	Adult, Pediatric: 100% Neonate: 90%
	Low limit	18%
	Priority	Med
	Alarm Outputs	Off

It		D au t tin
EtN_2O	Alarm switch	On
	High limit	55%
	Low limit	0%
	Priority	Med
	Alarm Outputs	Off
FiN_2O	Alarm switch	On
	High limit	53%
	Low limit	0%
	Priority	Med
	Alarm Outputs	Off
EtAA/FiAA	Alarm switch	On
	High limit	30%
	Low limit	0.0%
	Priority	Med
	Alarm Outputs	Off
EtHal/EtEnf/EtIso	Alarm switch	On
	High limit	3.0%
	Low limit	0.0%
	Priority	Med
	Alarm Outputs	Off
FiHal/FiEnf/FiIso	Alarm switch	On
	High limit	2.0%
	Low limit	0.0%
	Priority	Med
	Alarm Outputs	Off
EtSev	Alarm switch	On
	High limit	6.0%
	Low limit	0.0%
	Priority	Med
	Alarm Outputs	Off
FiSev	Alarm switch	On
	High limit	5.0%
	Low limit	0.0%
	Priority	Med
	Alarm Outputs	Off

Item		Default setting
EtDes	Alarm switch	On
	High limit	8.0%
	Low limit	0.0%
	Priority	Med
	Alarm Outputs	Off
FiDes	Alarm switch	On
	High limit	6.0%
	Low limit	0.0%
	Priority	Med
	Alarm Outputs	Off
Apnea Delay		Adult, Pediatric: 20 sec Neonate: 15 sec
RR Source		Auto
Operating Mode		Measure
Auto Standby		Off
Speed		6.25 mm/sec
Scale		O_2: 400 mmHg CO_2: 50 mmHg N_2O: 50% Hal, Enf, and Iso: 2.5% Sev: 4.0% AA and Des: 9.0%
Waveform Type		Draw (for CO_2 only)
O_2 compensation		OR: 100% Other departments: Off

C. Aar Dautin s

Item	Default setting
Alarm Volume	2
High Alarm Volume	Alarm Volume + 3
Reminder Volume	2
Apnea Delay	Adult: 20 sec Pediatric: 20 sec Neonate: 15 sec
Printing Duration On Alarm	20 sec
Auto Limits for New Patient	On

C.3 Display Settings

Item		Default Setting
Primary Screen	Choose Screen	Normal Screen
Display	Screen Lock Duration	General, CCU: Permanent Other departments: 10s
	Brightness	5
	Brightness On Battery	1
Night Mode	Brightness	1
	Alarm Volume	2
	QRS Volume	1
	Key Volume	0
	NIBP End Tone	Off
	Stop NIBP	Off

This page intentionally left blank.

D A ar ssa s

This chapter lists only the physiological and technical alarm messages. Some messages appearing on your monitor may not be included. In the "Cause and solution" column, corresponding solutions are given instructing you to troubleshoot problems. If the problem persists, contact your service personnel.

E

- **as ana ris not an apn a onitor sa t an tiv n sso t r spiration asur nt t o int t tion o apn a parti u ar t apn ao pr aturit an apn ao in an as not a, n sta, is**

D sioo i a Aar ssa s

D G n ra sioo i a Aar ssa s

A ar ssa s	D au t priorit	Caus an so ution
XX High	Med	XX value has risen above the high alarm limit or fallen below the low alarm limit. Check the patient's condition and check if the patient category and alarm limit settings are correct.
XX Low	Med	

ot XX r pr s nts a asur nt or para t r a, su as H IB Cs p an so on

D Arr t ia Aar ssa s

A ar ssa	D au t priorit
Asystole	High
V-Fib/V-Tach	High
V-Tach	High
Vent Brady	High
Extreme Tachy	High
Extreme Brady	High
R on T	Med
Run PVCs	Low
Couplet	Prompt
Multiform PVC	Med
PVC	Prompt
Bigeminy	Med
Trigeminy	Med
Tachy	Med
Brady	Med
Pacer Not Pacing	Prompt
Pacer Not Capture	Prompt
Missed Beats	Prompt

D. [illegible] sio o i a A ar ssa s

D. IB [illegible] sio o i a A ar ssa s

D. IB [illegible] sio o i a A ar ssa s

D. AG [illegible] sio o i a A ar ssa s

D [illegible] ni a A ar ssa s

This section lists technical alarms, their default priority, responses on alarm reset, and the actions that can be taken when an alarm occurs. Some of alarms may not be included.

Various technical alarms respond differently when the alarm system is reset. For easy clarification, in this section the technical alarms are classified into three categories of response when the alarm system is reset:

- A: technical alarms are cleared. The monitor gives no alarm indications.
- B: technical alarms are changed to the prompt messages.
- C: the alarm is silenced and a check mark appears before the alarm message.

In the following tables we will use A, B, and C are used to refer to the responses on alarm reset.

D G n ra ni a A ar ssa s

A ar ssa	D au t pri ori t	In i ation on a ar r s t	Caus an so uti on
XX Module Error	High	C	XX module does not work properly. Replug the module, if the alarm persists, contact your service personnel.

ot XX r pr s nts a asur nt or para t r a su as H   p EtC an so on

D ECG ni a A ar ssa s

D u A ri ant In i ss a ti o n o n w ar rs t	Caus an so uti on B w Ca s an		
ECG Noisy	Low/Prompt	A	The ECG signal is noisy. Check for any possible sources of signal noise around the cable and electrode, and check the patient for excessive motion.
ECG Amplitude Too Small	Low	C	The ECG amplitude does not reach the detected threshold. Check for any possible source of interference around the cable and electrode.
ECG XX Lead Off	Low	B	The electrode has become detached from the patient or the lead wire has become disconnected from the adapter cable. Check the connections of the electrodes and leadwires.
ECG Lead Off (YY hrs YY min YYsec)	L 0.0ound .0359(i2)-7.50521(L9.960(ul .0e EC)26.674 el)-5.018 7(ec0.0892121(t016 TL961(ode 19461702081(s]TJ		

ot a ar pri ori t o ECG XX a p n s on w t r H va u is avai a I H va u is avai a t pri ori t o ECG XX a is ow I H va u is not avai a t pri ori t o ECG XX a is in t s tti n o ECG a ro t ai nt nan nu For or in or ations tt n t r or t o t ECG A r

ot XX r pr s nts ECG a na or a p a an so on

ot YY rs YY in YY s r pr s nts t p rio o ti t at t ECG a a ar asts

D sp ni a A ar ssa s

D p 2 ni a Aar ssa s

Aar ssa	D aut priorit	In i ation on aar r s t	Caus an so ution
SpO2 Sensor Off	Adjustable	B	The SpO_2 sensor has become detached from the patient or the module. Check the sensor connection. If the alarm persists, replace the sensor.
SpO2 No Sensor	Low	A	The SpO_2 extension cable is detached from the SpO_2 module, or the SpO_2 sensor is detached from the SpO_2 extension cable. Check the SpO_2 cable and the sensor connection. If the alarm persists, replace the sensor.
SpO2 Excess Light	Low	C	Ambient light is too strong. Move the sensor to a place with lower level of ambient light or cover the sensor to minimize the ambient light.
SpO2 No Pulse	Low	C	The SpO_2 sensor failed to obtain pulse signal. Check the patient's condition and replace the sensor application site. If the alarm persists, replace the sensor.
SpO2 Sensor Incompatible	Low	C	Incompatible or an unspecified SpO_2 sensor is used. Use specified sensors.
SpO2 Low Signal Quality	Low	C	1. Check the sensor and sensor position. 2. Make sure the patient is not shivering or moving. 3. The patient's pulse may be too low to be measured.
SpO2 Interference	Low	C	The SpO_2 signal has been interfered. Check for any possible sources of signal noise and check the patient for excessive motion.
SpO2 Sensor Error	Low	C	Replace the sensor and measure again.
SpO2 Searching Pulse	Prompt	/	SpO_2 is searching for pulse.
SpO2 Low Perfusion	Prompt	/	The SpO_2 sensor is not properly placed or the patient's perfusion index is too low. 1. Check the sensor and sensor position. 2. Reposition the sensor if necessary.

D p ni a Aar ssa s

Aar ssa	D aut priorit	In i ation on aar r s t	Caus an so ution
T XX Sensor Off	Low	A	Check the sensor connection and reconnect the sensor.

ot XX r pr s nts at p ratur sit or a p s in or ai an so on

D IB ni a Aar ssa s

Aar ssa	D aut priorit	In i ation on aar r s t	Caus an so ution
NIBP Cuff Loose	Low	A	There is a leak in the cuff or air tubing. Use a cuff of correct type based on the patient size. Apply the cuff and connect the air tubing as instructed in the manual.

Aar ssa	D au t priorit	In i ation on aar r s t	Caus an so ution
NIBP Cuff or Airway Leak	Low	A	Check the NIBP cuff and pump for leakages.
NIBP Airway Error	Low	A	The air tubing may be occluded. Check the air tubing for an occlusion or kinking. If the alarm persists, contact your service personnel.
NIBP Weak Signal	Low	A	The patient's pulse is weak or the cuff is loose. Check the patient's condition and replace the cuff application site.
NIBP Overrange	Low	A	The measured NIBP value exceeds the module measurement range. Check the patient's condition.
NIBP Excessive Motion	Low	A	Check the patient's condition and reduce patient motion.
NIBP Cuff Overpressure	Low	A	The NIBP airway may be occluded. Check the airway and measure again. If the alarm persists, contact your service personnel.
NIBP Timeout	Low	A	The measurement time exceeds 120 seconds in the adult or pediatric mode, or exceeds 90 seconds in the neonatal mode, and the BP value cannot be obtained. Check the patient's condition and NIBP connections, or replace the cuff and measure again.
NIBP Cuff and Patient Mismatch	Low	A	The cuff type mismatches the patient category. Verify the patient category or replace the cuff if necessary. If patient catergory is correct, check that the tubing is not bent and the airway is not occluded.
NIBP Airway Leak	Low	A	Airway leakage is found during the NIBP leakage test. Check the NIBP cuff and pump for leakages.

D IB ni a Aar ssa s

Aar ssa	D au t priorit	In i ation on aar r s t	Caus an so ution
XX Sensor Error	Med	C	The IBP sensor fails. Replace the sensor.
XX No Sensor	Med	A	The IBP patient cable and/or corresponding IBP sensor is not connected or detached. Check the cable and sensor connection.
XX No Pulse	Low	A	The catheter may be occluded. Please flush the catheter.
XX Disconnected	High	C	The tubing is disconnected from the patient, or the three-way valve is open to the air. Check the connection of the tubing, or check the valve is open to the patient. If the alarm persists, contact your service personnel.

ot XX r pr s nts an IB a , or a p A C FA an so on

D C ni a Aar ssa s

Aar ssa	D au t priorit	In i ation on aar r s t	Caus an so ution
TB Sensor Off	Low	A	Check the sensor connection and reconnect the sensor.

Aarssa	Dautpriorit	Initiationon aarrst	Causanso utiton
TI Sensor Off	Low	A	Check the sensor connection and reconnect the sensor.

D | ' C 2· ₂ ni a Aarssas

Aarssa	Dautpriorit	Initiationon aarrst	Causanso utiton
CO2 Module High Temp	Low	C	Ambient temperature is too high or there is a module failure. 1. Lower the operating temperature. 2. Replug the module. 3. If the alarm persists, the CO_2 module may fail, contact your service personnel.
CO2 Module Low Temp	Low	C	Ambient temperature is too low or there is a module failure. 1. Raise the operating temperature. 2. Replug the module. 3. If the alarm persists, the CO_2 module may fail, contact your service personnel.
CO2 Zero Failed	Low	C	Replug the module. If the alarm persists, contact your service personnel.
CO2 No Watertrap	Low	B	Check the watertrap connections.
CO2 High Airway Pressure	Low	C	1. Check the airway pressure settings of the ventilator/anesthesia machine. 2. Disconnect the module from the ventilator/ anesthesia machine. 3. Replug the module. 4. If the alarm persists, contact your service personnel.
CO2 Low Airway Pressure	Low	C	1. Check the airway pressure settings of the ventilator/anesthesia machine. 2. Disconnect the module from the ventilator/ anesthesia machine. 3. Replug the module. 4. If the alarm persists, contact your service personnel.
High Barometric	Low	C	The ambient pressure exceeds the operating pressure range or CO_2 module fails. 1. Make sure that the ambient pressure meets the specifications, and check for sources that affect the ambient pressure. 2. Replug the module. 3. If the alarm persists, contact your service personnel.
Low Barometric	Low	C	The ambient pressure exceeds the operating pressure range or CO_2 module fails. 1. Make sure that the ambient pressure meets the specifications, and check for sources that affect the ambient pressure. 2. Replug the module. 3. If the alarm persists, contact your service personnel.

CO2 Airway Occluded	Low	C	1. Check if the sample line is kinked or occluded. 2. Replace the sample line. 3. Replug the module. 4. If the alarm persists, contact your service personnel.
CO2 No Filterline	Low	A	Make sure that the filterline is connected.
CO2 Calibration Required	Low	C	Perform a calibration.
CO2 Airway Error	Low	C	1. Check if the sample line is kinked or occluded. 2. Replace the sample line. 3. Replug the module. 4. If the alarm persists, contact your service personnel.
CO2 Adapter Error	Low	A	Check, clean or replace the airway adapter. Perform a zero calibration.
CO2 No Sensor	Low	A	Make sure that the CO_2 transducer is connected.

D AG ni a Ar ssa s

D E ni a Aar s

Aarssa	Dautpriorit	Iniationon aarrst	Causan soution
EWS score needs to be confirmed	Low	A	Confirm to save or give up current score.

XXrprsnts ppupp pB.H.Consiousnss Boouarrin utput Cattrain or ain EtC Fi Airwa.lor Custo r in para t r

Dow r upp ni a Aarssas

Aarssa	Dautpriorit	Iniationon aarrst	Causan soution
Low Battery	Med	C	Connect the monitor to the external power supply and allow the batteries to charge.
Critically Low Battery	High	C	Connect the monitor to the external power supply and allow the batteries to charge.
Power Board Comm Error	High	C	Restart the monitor. If the alarm persists, contact your service personnel.
Battery Error	High	C	The battery may fail. Contact your service personnel.
RT Clock Need Reset	High	C	Contact your service personnel.
RT Clock Not Exist	High	C	Contact your service personnel.
XX V Too High	High	C	There is a problem with the system power supply. Restart the monitor.
XX V Too Low	High	C	

ot XXrprsnts or

Dor r ni a Aarssas

Aarssa	Dautpriorit	Iniationon aarrst	Causan soution
Recorder Init Error	Low	A	An error occurred during the recorder initialization. If the alarm persists, contact your service personnel.
Recorder Comm Error	Low	A	Restart the monitor if not solved. If the alarm persists, contact your service personnel.
Recorder Head Hot: Please Wait	Low	C	The recorder has been working for too long time. Stop the recording and resume the recording till the recorder's print head cools down.
Recorder Initializing	Prompt	/	Wait until the recorder initialization is completed.
Recorder Out Of Paper	Prompt	/	The recorder paper is not loaded or the recorder door is not closed. Check the recorder, load the recorder paper or close the recorder door.
Recorder Busy	Prompt	/	The buffer queue for recording is full.

D ri nt r ni a A ar ssa s

A ar ssa	D au t pri ori t	In i ati on on a ar r s t

D ni a A ar ssa s at to twor onitorin

ot XX r rs to t part nt na YY r rs to t roo nu r an ZZ r rs to t nu r

D t r st ni a Aar ssa s

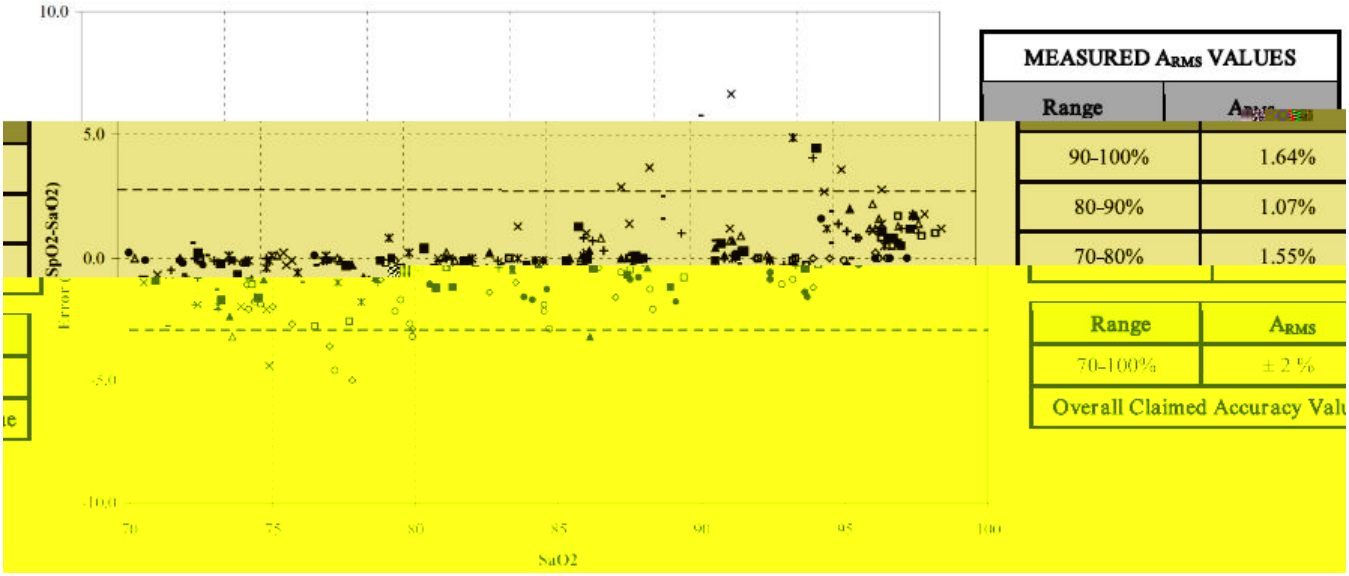
Aar ssa	D au t pri ori t	In i ati on on aar r s t	Caus an so uti on
XX: Disconnected (XX refers to the name of the external device)	High	A	Corresponding external device is disconnected. Check the connection between the monitor and the external device.
Storage Error	High	C	The storage card fails or files are damaged. Restart the monitor to format the storage card. If the alarm persists, contact your service personnel.
Loading Default Config Failed	Low	A	The default configuration was not correctly loaded. The monitor will restore to the factory default configuration for the current patient category.
XX Conflicts (XX refers to the module label)	Prompt	/	The same type of corresponding module being used exceeds the supported number. Remove the conflict module.
XX Measurement has been closed (XX refers to the module label)	Prompt	/	The parameter module is disabled. Switch on the module if you want to use it. For more information, see *3.9.1 Switching On or Off a Parameter*.
The display setup for XX is disabled. (XX refers to the parameter label)	Prompt	/	The parameter of the newly inserted module is not displayed on the screen. Select a desired area to display the parameter numerics and waveforms. For more information, see *3.9.2 Displaying Parameter Numerics and Waveforms*.
The patient data storage space is nearly full. Please delete some discharged patients.	Med	B	The storage space of the monitor is full. Delete unnecessary earlier discharged patient.

E p nsor A ura

E A ura o asi o p nsors

Table information for the plots below show A_{RMS} values measured with Masimo SET Oximetry Technology in a clinical study.

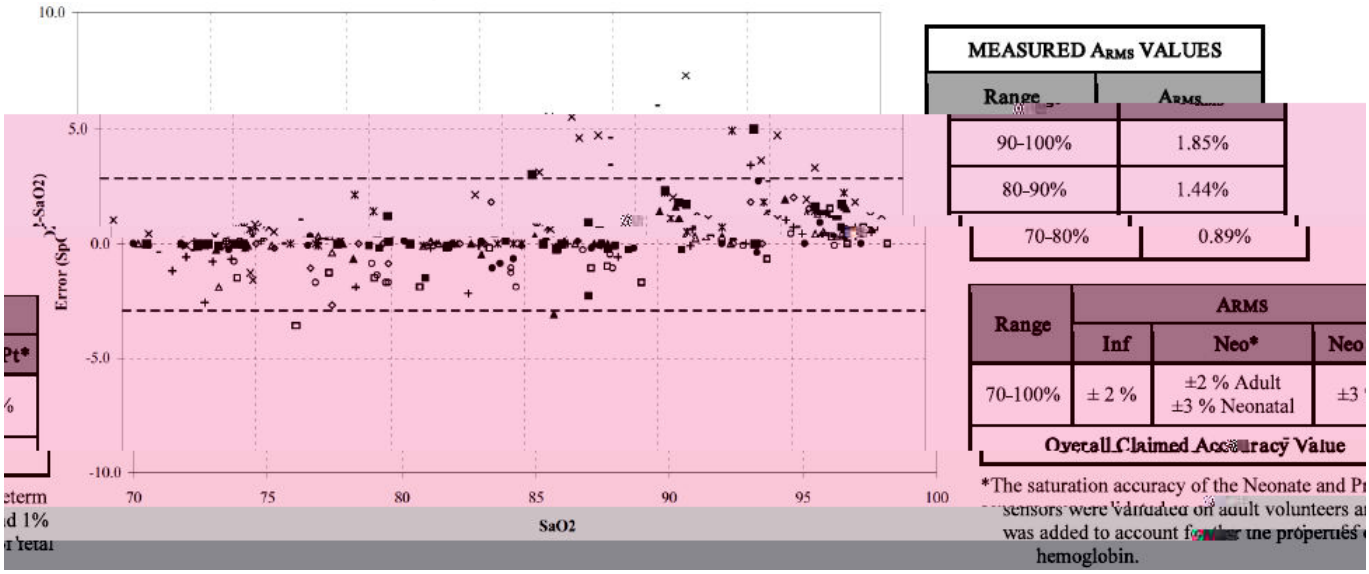
A t t



MEASURED A_{RMS} VALUES	
Range	A
90-100%	1.64%
80-90%	1.07%
70-80%	1.55%

Range	A_{RMS}
70-100%	± 2 %
Overall Claimed Accuracy Valu	

In o o t

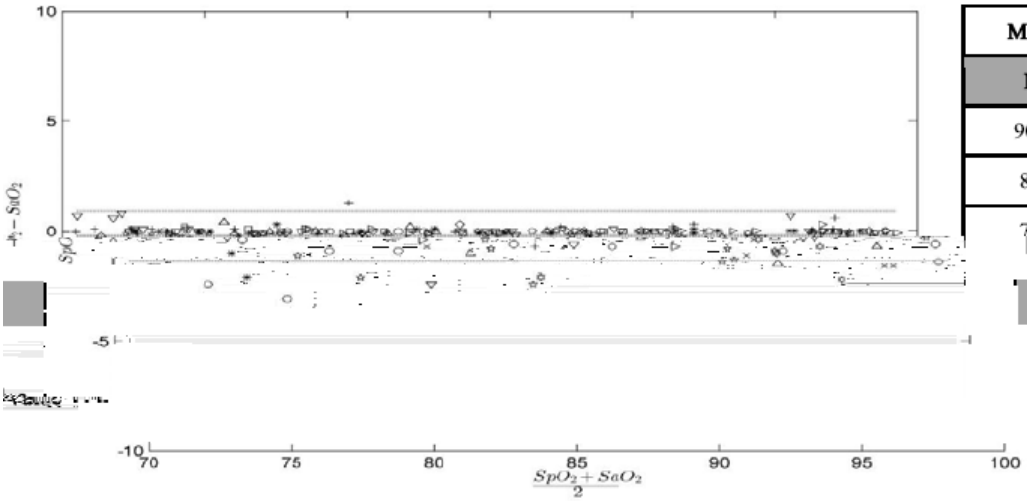


MEASURED A_{RMS} VALUES	
Range	A
90-100%	1.85%
80-90%	1.44%
70-80%	0.89%

Range	ARMS		
	Inf	Neo*	Neo
70-100%	± 2 %	±2 % Adult ±3 % Neonatal	±3
Overall Claimed Accuracy Value			

*The saturation accuracy of the Neonate and Pr
sensors were validated on adult volunteers a
was added to account f the properties
hemoglobin.

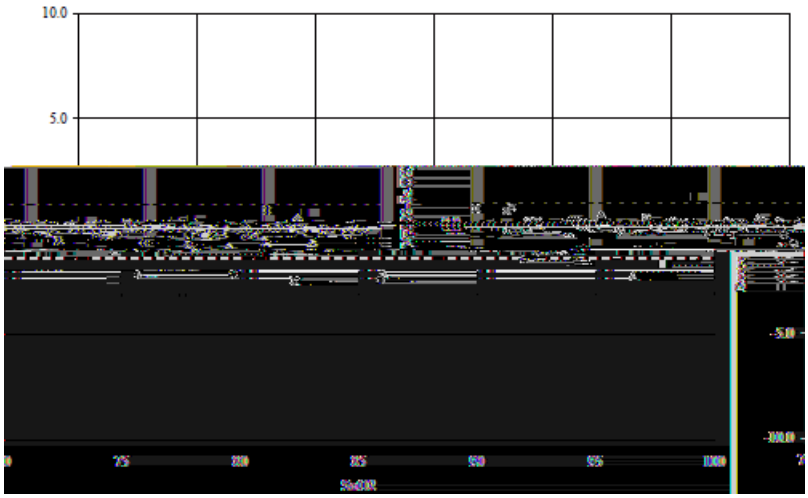
DCI DCI



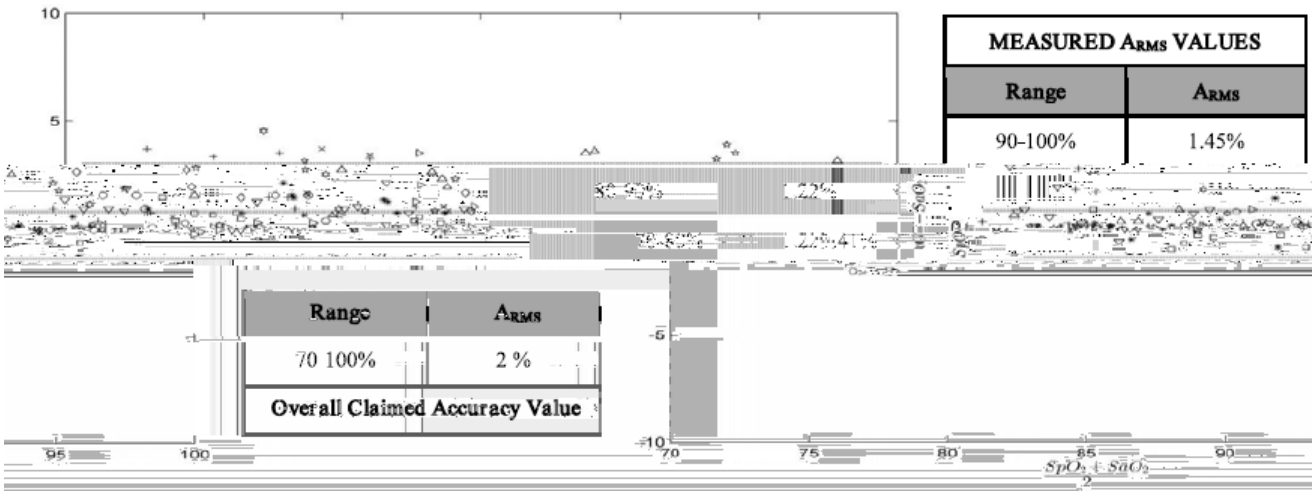
MEASURED ARMS VALUES	
Range	ARMS
90-100%	0.60%
80-90%	0.54%
70-80%	0.67%

Range	ARMS
70 100%	2 %

C YI



MEASURED ARMS VALUES	
RANGE	ARMS
90-100%	0.6%
80-90%	0.5%



MEASURED ARMS VALUES	
Range	ARMS
90-100%	1.45%

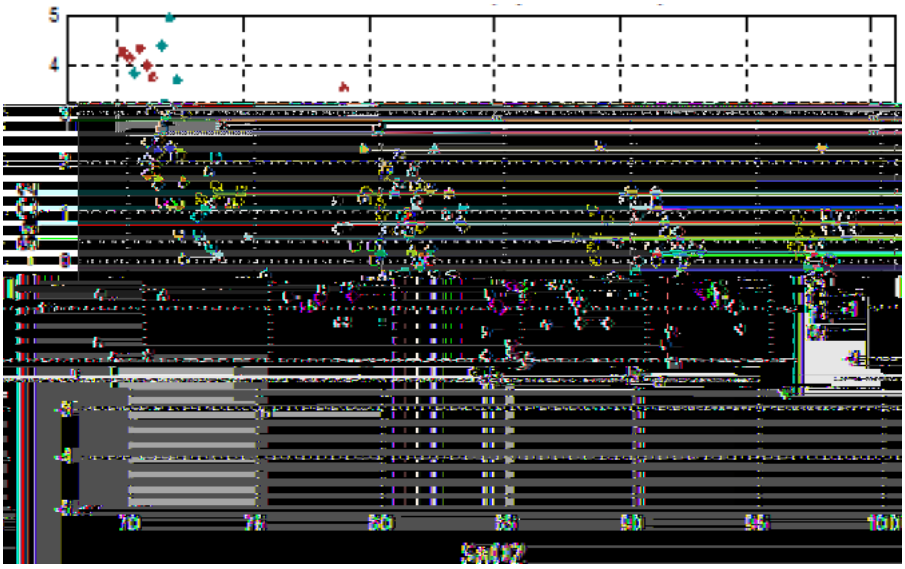
Range	ARMS
70 100%	2 %
Overall Claimed Accuracy Value	

E A ura o or p nsors

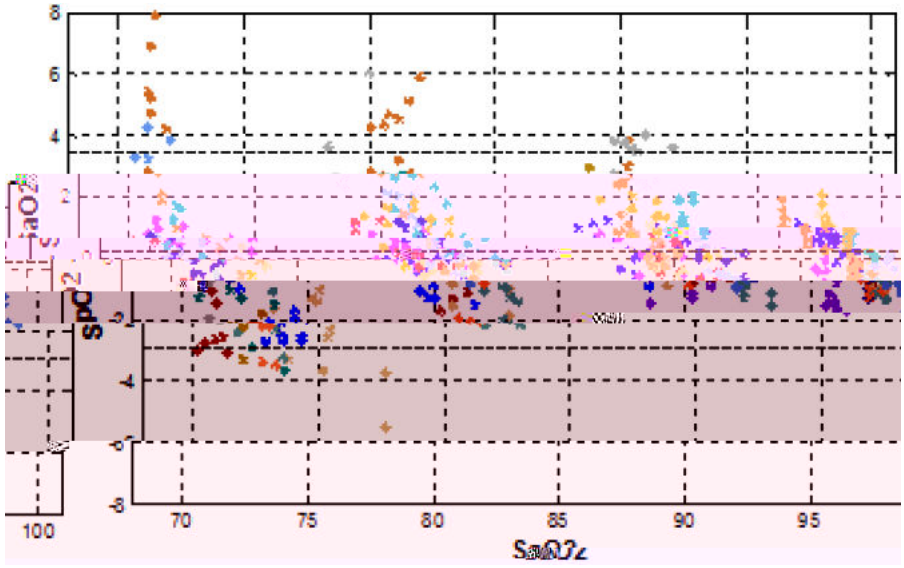
p A ura or or nsors vs Co i t rs Ar s

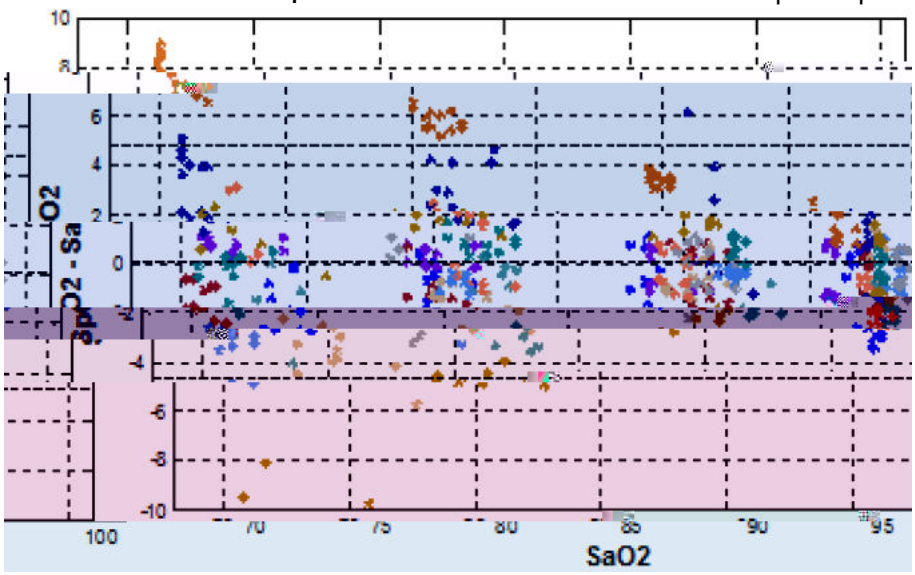
p an	to	to	to	to
DS-100A	1.64%	1.16%	1.67%	2.25%
D-YS, OXI-P/I, OXI-A/N	2.41%	1.38%	2.50%	3.60%
MAXAI, MAXPI, MAXII	1.62%	1.49%	1.57%	2.50%
MAXNI	1.85%	1.71%	1.51%	1.59%

o i i B an A t an or p AXAI AX I AXII AX I nsors p a vs a



o i i B an A t an or p D A nsors p a vs a




10
8
6
4
2
0
-2
-4
-6
-8
-10
100
70
75
80
85
90
95
SaO2

F nits o s an A r viations

F nits

A r viation	In Fu
µA	microampere
µV	microvolt
µs	microsecond
A	Ampere
Ah	Ampere hour
bpm	beat per minute
bps	bits per second
°C	Celsius
cc	cubic centimeter
cm	centimeter
dB	decibel
DS	dyne second
°F	Fahrenheit
g	gram
GHz	gigahertz
GTT	gutta
h	hour
Hz	hertz
in	inch
k	kilo
kg	kilogram
kPa	kilopascal
L	litre
lb	pound
m	meter
mAh	milliampere hour
mcg	microgram
mEq	milli-equivalents
mg	milligram
min	minute
ml	milliliter
mm	millimeter
mmHg	millimeters of mercury

Abbreviation	In Full
cmH2O	centimeters of water
ms	millisecond
mV	millivolt
mW	milliwatt
MΩ	megaohm
nm	nanometer
rpm	breaths per minute
s	second
V	volt
VA	volt ampere
Ω	ohm
W	watt

F | Symbols

Symbol	Explanation
–	negative, minus
%	percent
/	per; divide; or
~	to
+	plus
=	equal to
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
±	plus or minus
×	multiply
©	copyright

F Abbreviations

Abbreviation	In Full
$AaDO_2$	alveolar-arterial oxygen gradient
AC	alternating current
Adu	adult
AG	anaesthesia gas
AHA	American Heart Association
Ao	aortic pressure
Art	arterial
ATMP	barometric pressure
aVF	left foot augmented lead
aVL	left arm augmented lead
aVR	right arm augmented lead
awRR	airway respiratory rate
BSA	body surface area
BT	blood temperature
BTPS	body temperature and pressure, saturated
CAA	Clinical Assistive Application
CaO_2	arterial oxygen content
CCU	cardiac (coronary) care unit
CE	Conformité Européenne
C.I.	cardiac index
CIS	clinical information system
CISPR	International Special Committee on Radio Interference
CMS	central monitoring system
C.O.	cardiac output
CO_2	carbon dioxide
COHb	carboxyhemoglobin
COPD	chronic obstructive pulmonary disease
CVP	central venous pressure
DC	direct current
Des	desflurane
Dia	diastolic
dpi	dot per inch
DVI	digital video interface
ECG	electrocardiograph
EDV	end-diastolic volume
EEC	European Economic Community
EMC	electromagnetic compatibility

Abbreviation	In Full
EMI	electromagnetic interference
Enf	enflurane
ESV	end systolic volume
ESVI	end systolic volume index
ESU	electrosurgical unit
Et	end-tidal
EtAA	end-tidal anesthetic agent
EtDes	end-tidal anesthetic agent
EtEnf	
EtHal	
EtIso	
EtSev	
$EtCO_2$	end-tidal carbon dioxide
EtN_2O	end-tidal nitrous oxide
EtO_2	end-tidal oxygen
EWS	Early Warning Score
FAP	femoral arterial pressure
FCC	Federal Communication Commission
FDA	Food and Drug Administration
Fi	fraction of inspired
FiAA	inspired anesthetic agent
FiDes	inspired anesthetic agent
FiEnf	
FiHal	
FiIso	
FiSev	
FiCO2	fraction of inspired carbon oxygen
FiN_2O	fraction of inspired nitrous oxide
FiO_2	fraction of inspired oxygen
GCS	Glasgow Coma Scale
GEDV	global end diastolic volume
GEDI	global end diastolic volume index
GEF	global ejection fraction
Hal	halothane
HIS	hospital information system
HR	heart rate
IBP	invasive blood pressure
ICP	intracranial pressure
ICU	intensive care unit

ID	identification
I:E	inspiratory time: expiratory time ratio
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
IP	internet protocol
Iso	isoflurane
LA	left arm
LAP	left atrial pressure
LCD	liquid crystal display
LDAP	Lightweight Directory Access Protocol
LED	light emitting diode
LL	left leg
LVSW	left ventricular stroke work
LVSWI	left ventricular stroke work index
MAC	minimum alveolar concentration
MetHb	methemoglobin
MEWS	Modified Early Warning Score
MLDAP	Mindray LDAP, Mindray lightweight directory access protocol
MRI	magnetic resonance imaging
N/A	not applied
N2O	nitrous oxide
Neo	neonate
NEWS	National Early Warning Score
NIBP	noninvasive blood pressure
O_2	oxygen
O_2%	oxygen concentration
OR	operating room

Abbreviation	In Full
Resp	respiration
RL	right leg
RR	respiration rate
SEF	spectral edge frequency
Sev	sevoflurane
SI	stroke index
SpO_2	arterial oxygen saturation from pulse oximetry
SQI	signal quality index
SR	suppression ratio
SV	stroke volume
SVI	stroke volume index
SVR	systemic vascular resistance
SVRI	systemic vascular resistance index
Sync	synchronization
Sys	systolic pressure
TB	blood temperature
TD	temperature difference
Temp	temperature
TFC	thoracic fluid content
TI	injectate temperature
TP	total power
TV	tidal volume
UAP	umbilical arterial pressure
USB	universal serial bus
UVP	umbilical venous pressure
VAC	volts alternating current

P/N: 046-019798-00(9.0)