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FOR YOUR NOTES

1 [illegible]

1.1 [illegible]

The safety statements presented in this chapter refer to the basic safety information that the operator of the monitor shall pay attention to and abide by. There are additional safety statements in other chapters or sections, which may be the same as or similar to the followings, or specific to the operations.

1.1.3 C]

CA

1.2 Equipment Symbols

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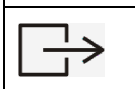	F		
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NOTE

Some symbols may not appear on your equipment.

2 B]

2.1

2.1.1

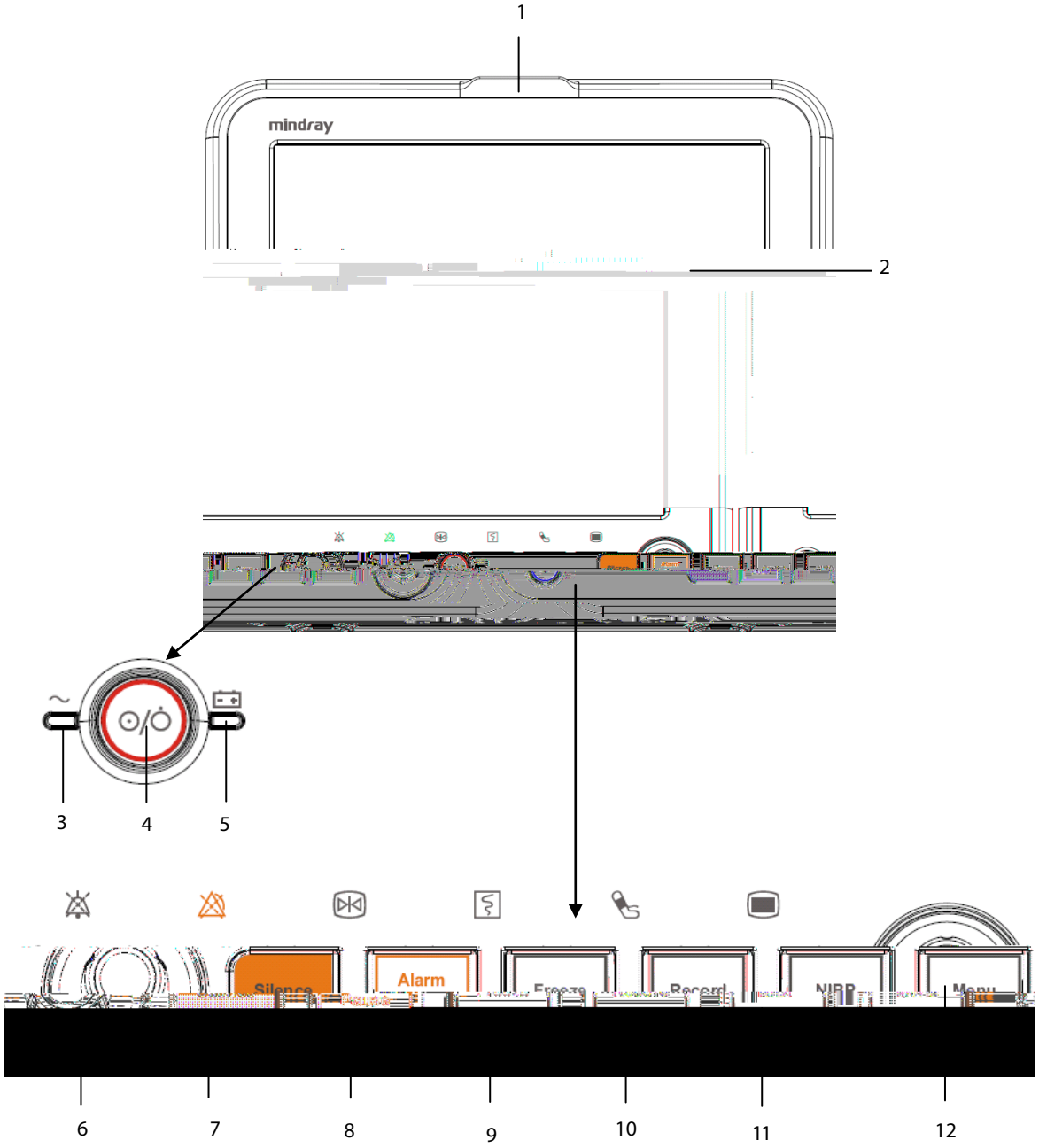
This monitor is intended to be used for monitoring, displaying, reviewing, storing and transferring of multiple physiological parameters including ECG, heart rate (HR), respiration (Resp), temperature (Temp), SpO_2, pulse rate (PR), non-invasive blood pressure (NIBP), invasive blood pressure (IBP), cardiac output (C.O.), carbon dioxide (CO_2), oxygen (O_2), and anesthetic gas (AG).

This monitor is to be used in but not restricted to veterinary institutions.

A

2.2]

2.2.1



1. Alarm lamp

   When a physiological alarm or technical alarm occurs, this lamp will flash as defined below.

   High level alarms: the lamp quickly flashes red.

   Medium level alarms: the lamp slowly flashes yellow.

   Low level alarms: the lamp lights yellow without flashing.

2. Display Screen
3. AC power LED

4. Power On/Off button

   Pressing this button turns the monitor on.

   When the monitor is on, pressing and holding this button turns the monitor off.

   An indicator is built in this button. It turns on when the monitor is on and turns off when the monitor is off.

5. Battery LED

   On: when the battery is installed and the AC source is connected.

   Off: when no battery is installed or the installed battery has a malfunction, or no AC source is connected when the monitor is powered off.

   Flash: when the monitor is operating on battery power.

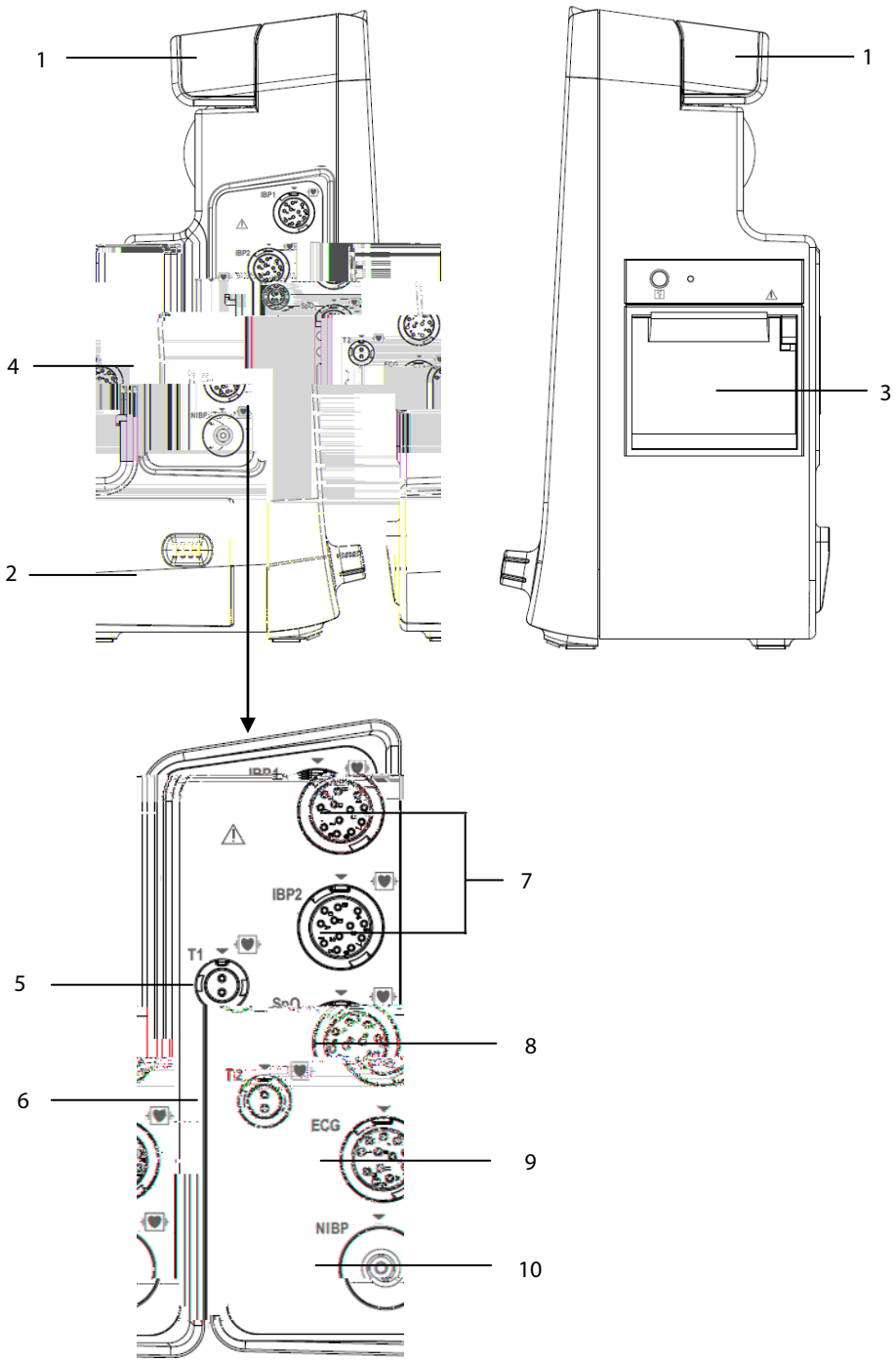
6. Press to silence all alarm sounds.
7. Press to pause or restore alarms.
8. Press to freeze or unfreeze waveforms.
9. Press to start or stop recordings.
10. Press to start or stop NIBP measurements.
11.

    If no menu is displayed on the screen, pressing it will enter the main menu. If there is a menu displayed on the screen, pressing it will close that menu.

12. Knob

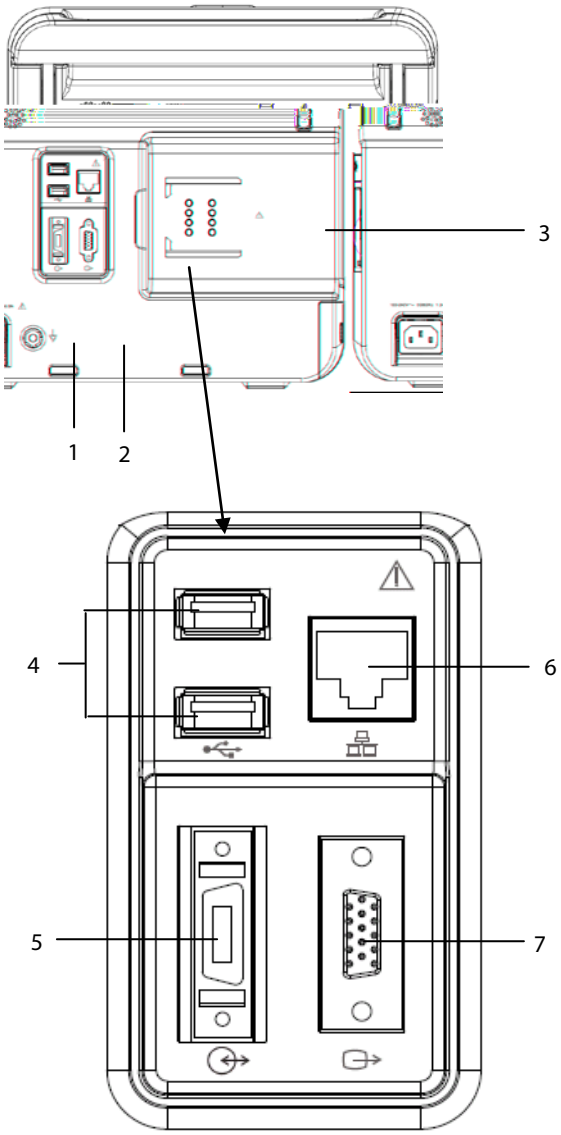
    Rotate the Knob clockwise or counter-clockwise. With each click, the highlight jumps to the neighboring item. When you reach your desired item, press the Knob to select it.

2.2.2



1. Handle
2. Battery compartment
3. Recorder
4. Parameter module slot
5. Connector for Temp probe 1
6. Connector for Temp probe 2
7. Connector for IBP cable
8. Connector for SpO_2 cable
9. Connector for ECG cable
10. Connector for NIBP cuff

2.2.3. [illegible]



1. AC Power Input
2. Equipotential Grounding Terminal

   When the monitor and other devices are to be used together, their equipotential grounding terminals should be connected together, eliminating the potential difference between them.
3. Parameter Module Slot

   Used for connecting the parameter modules.
4. USB Connectors

   It connects a USB drive for data or configuration transfer.
5. Multifunctional Connector

   It outputs defibrillator synchronization signals, nurse call signals and analogy output signals.
6. Network Connector

   It is a standard RJ45 connector which connects the monitor to a CMS or other monitor for remote view. It also connects the monitor to a PC for system upgrade.

7. VGA Connector

It connects a secondary display, which extends the display capability of your monitor. The contents displayed on the secondary display screen accords with those displayed on the monitor screen.

2.3

1.	IBP module:	Contains IBP cable connector
2.	Sidestream CO_2 module:	Contains CO_2 watertrap connector, and CO_2 gas outlet.
3.	Mainstream CO_2 module:	Contains CO_2 transducer connector.
4.	IBP+C.O. module:	Contains IBP cable connector and C.O. cable connector.
5.	IBP+C.O. + sidestream CO_2 module:	Contains IBP cable connector, C.O. cable connector, CO_2 watertrap connector, and CO_2 gas outlet.
6.	IBP+C.O. + microstream CO_2 module:	Contains IBP cable connector, C.O. cable connector, CO_2 sampling line connector, and CO_2 gas outlet.
7.	IBP+C.O.+AG module (with O_2):	Contains IBP cable connector, C.O. cable connector, AG watertrap slot, and AG gas outlet.

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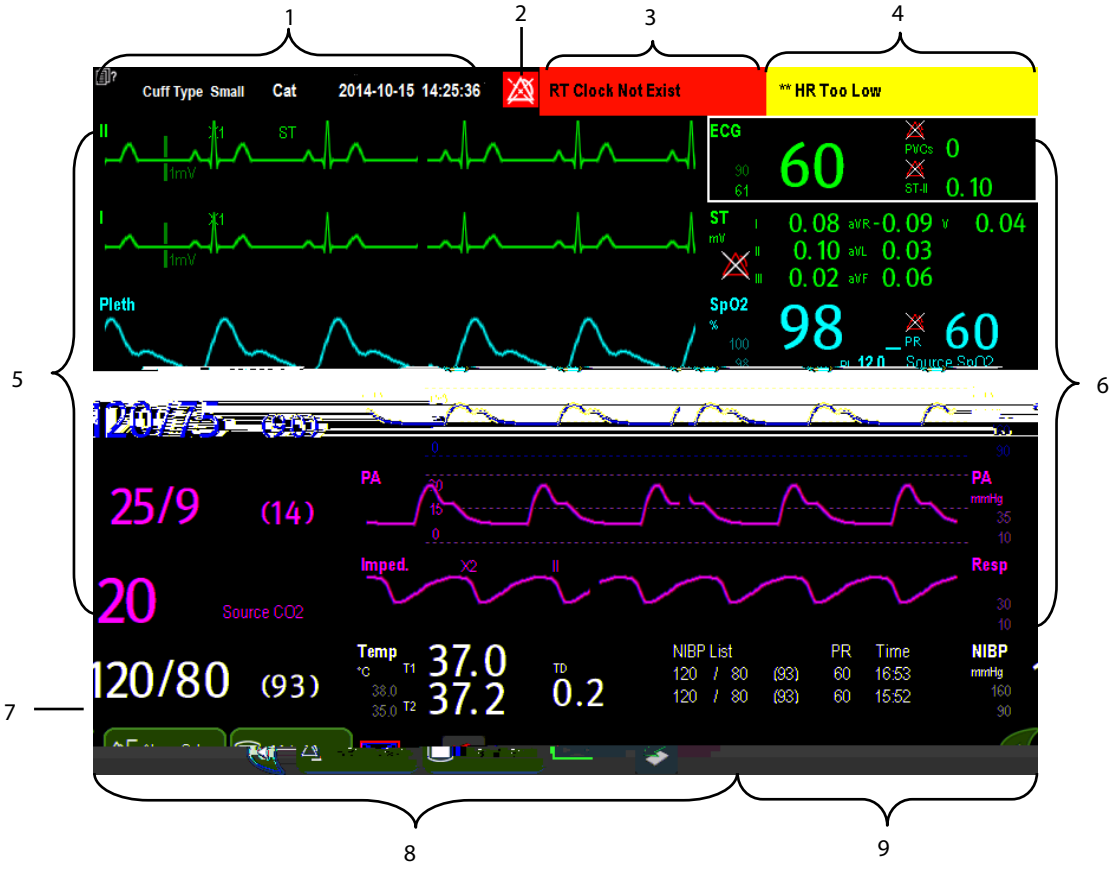
2.4 [illegible]

This monitor adopts a high-resolution LED display to display patient parameters and waveforms. A typical display screen is shown below.



1. Patient Information Area

   This area shows the patient information such as, bed number, patient name and patient category. indicates that no patient is admitted or the patient information is incomplete. If no patient is admitted, selecting this area will enter the [ ].] menu. If a patient has been admitted, selecting this area will enter the [ ].] menu.

2. Alarm Symbols

   indicates alarms are paused.

   indicates alarm sounds are paused.

   indicates alarm sounds are turned off.

   indicates the system is in alarm off status.

3. Technical Alarm Area

   This area shows technical alarm messages and prompt messages. When multiple messages appear, they will be displayed circularly. Select this area and the technical alarm list will be displayed.

4. Physiological Alarm Area

   This area shows physiological alarm messages. When multiple alarms occur, they will be displayed circularly. Select this area and the physiological alarm list will be displayed.

5. Waveform Area

   This area shows measurement waveforms. The waveform name is displayed at the left upper corner of the waveform. Select this area and the corresponding measurement setup menu will be displayed.

6. Parameter Area A

   This area shows measurement parameters. Each monitored parameter has a parameter window and the parameter name is displayed at the upper left corner. The corresponding waveform of each parameter is displayed in the same row in the waveform area. Select this area and the corresponding measurement setup menu will be displayed.

7. Parameter Area B

   For the parameters displayed in this area, their corresponding waveforms are not displayed.

8. Prompt Message Area

   This area shows the current configuration name, prompt messages, network status icons, battery status icons, date and time, etc. For details about battery status symbols, refer to the chapter ***24 Batteries.***

   indicates monitor is connected to a wired network successfully.

   indicates the monitor has failed to connect to a wired network.

   indicates the wireless function is working.

   indicates the wireless function is not working.

   indicates a USB drive is inserted.

9. QuickKeys Area

   This area contains QuickKeys that give you fast access to functions.

2.5 [illegible]

A QuickKey is a configurable graphical key, located at the bottom of the main screen. They give you fast access to functions. Their availability and the order in which they appear on your screen depend on how your monitor is configured.

The following QuickKeys can be displayed on the screen:

Display more QuickKeys.

Hide the QuickKeys.

Enter the main menu

Enter standby mode

Change alarm settings

Review the patient's data

Enter the NIBP measurement menu

Stop all NIBP measurement

Zero IBP

Start the realtime print

Print Setup

Silence all alarm sounds

Pause or restore alarms

Change screen

Enter the patient setup menu

Trigger a manual event

Have a split-screen view of minitrends

Enter the volume setup menu

Default configurations

Start cardiac output procedure

Perform calculations

Have a split-screen view of another patient's data

Have a split-screen view of OxyCRG trends

Enter the interpretation of resting 12-lead ECG screen

Enter the full-screen 7-lead ECG screen

Enter the [Parameters] menu

Start NIBP STAT measurement

Enter the [Unit Setup] menu

Enter the PAWP measurement screen

Enter the CPB mode

Enter the privacy mode

Enter the night mode

View respiratory loops

Intubation mode

You can also select your desired QuickKeys to display on the screen.

1. Select [ ].] [ ].] >>] [ ]], C]. >>] enter the required password [ ].
2. In the [ ]], C].] menu, select [. C .>>].
3. In the pop-up menu, select the desired configuration and then select [ ].
4. In the pop-up menu, select [, , >>].
5. In the [, ,] screen, select your desired QuickKeys and the order of them.

3 B]

3.1

A

B

3.1.2

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. If the equipment is installed in a cabinet, sufficient space in front and behind shall be left for convenient operation, maintenance and repair. Moreover, to maintain good ventilation, the equipment shall be at least 2 inches (5cm) away from around 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 disappears.

CA

AC

3.2

3.2.1 C

AC

To use AC power source, connect one end of the power cord with the AC power input on the equipment's back and the other end with a wall AC mains outlet.

A

AC

.003( )] 1 2.55359 0 0 9 92. 15( )53(A)18(C)-1( )13(_])8( )13(8.73( )-2( )9( )1347 0])12B C 77307.

3.2.2

Once the monitor is installed, you can get ready for monitoring:

1. Before you start to make measurements, check the monitor and plug-in modules for any mechanical damage and make sure that all external cables, plug-ins and accessories are properly connected.
2. Plug the power cord into the AC or DC power source. If you run the monitor on battery power, ensure that the battery is sufficiently charged.
3. Press the power on/off button on the monitor's front.

3.4

The monitor has three types of keys:

Softkey: A softkey is a graphic key on the screen, giving you fast access to certain menus or functions. The monitor has two types of softkeys:

Parameter keys: Each parameter area can be seen as a softkey. You can enter a parameter setup menu by selecting its corresponding parameter area.

QuickKeys: QuickKeys are configurable graphical keys, located at the bottom of the main screen. For details, refer to the section ***QuickKeys.***

Hardkeys: A hardkey is a physical key on a monitoring device, such as the main menu hardkey on the monitor's front.

Pop-Up Keys: Pop-up keys are task-related keys that appear automatically on the monitor screen when required. For example, the Confirm pop-up key appears only when you need to confirm a change.

3.5

Select screen items by pressing them directly on the monitor's screen. You can enable or disable touchscreen operation by pressing and holding the [ ] QuickKey for 3 seconds. A padlock symbol is displayed if touchscreen operation is disabled.

3.6

The onscreen keyboard enables you to enter information.

Use the key to delete the previously entered character.

Use the key to toggle between uppercase and lowercase letters.

Select the key to confirm what you have entered and close the onscreen keyboard.

Select the to access the symbol keyboard.

Select the to exit the symbol keyboard.

3.7

You can enter the [ ] window as shown below by selecting [ ] → [ ] → [ ] >>

3.8

To display the timer in the main screen, follow this procedure:

1. Select [ ]→[>>]→[>>] to access the [ ] window.
2. Select [ ] tab.
3. In Area C, select [ ] from the drop-down list of the desired parameter area. Refer to ***3.7 Setting the Screen*** for Area C.
4. Select to exit the window. The main screen will display the timer.

Select [ ] or [ ] to start or pause the timing.

Select [**C**] to clear current timing result.

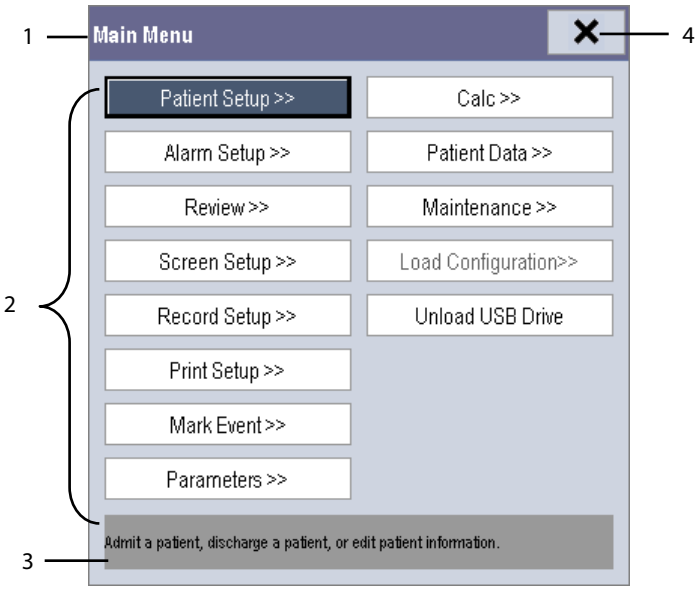
Select [ ] to access the [ ] window, in which you can set the [ ] to [ ] or [ ]. If you select [ ], you should set:

[(:)]: The available time range is 0 to 100 hours, and the default time is 5 minutes.

[ ]: During the last 10 seconds of the countdown, the system issues a reminder tone. The available volume range is 0 to 10. 0 means off, and 10 is the maximum volume.

3.9

To enter the main menu, select the on-screen QuickKey or the hardkey on the monitor's front. Most of the monitor's operations and settings can be performed through the main menu.



Other menus are similar to the main menu and contain the following parts:

1. Heading: gives a sum-up for the current menu.
2. Main body: displays options, buttons, prompt messages, etc. The menu button with ">>" enlarges a secondary window to reveal more options or information.
3. Online help area: displays help information for the highlighted menu item.
4. : select to exit the current menu.

3.10 C]

This chapter covers only general settings such as language, brightness, date and time, etc. Measurement settings and other settings can be referred to in respective sections.

3.10.1

In situations where you install a monitor or change the monitor's application site, you need to setup the monitor as follows:

1. Select [ ]→[ ]→[ ]→enter the required password.
2. In the [ ] menu, select, in turn, [ ], [ ] and [**B** .], and then change their settings.

3.10.2 C]

1. Select [ ]→[ ]→[ ]→enter the required password.
2. In the [ ] menu, select [ ] and then select the desired language.
3. Restart the monitor.

3.10.3 A **B**

1. Select the [ ]→[ ]→[**B**].
2. Select the appropriate setting for the screen brightness. 10 is the brightest, and 1 is the least bright.

If the monitor operates on battery power, using a less bright setting will prolong the battery operating time. When the monitor enters standby mode, the screen will change to the least bright setting automatically.

3.10.4 /

The monitor provides online help information. The user can display or hide the help as required.

1. Select [ ]→[ ]→[ ].
2. Select [ ] and toggle between [ ] and [ ].

3.10.5]

1. Select [ ]→[ ]→[ ]→[ ].
2. Set the date and time.
3. Select [ ] and toggle between [ ], [ ] and [ ].
4. Select [ ] and toggle between [**24**] and [**12**].

If your monitor is connected to a central monitoring system (CMS), the date and time are automatically taken from that CMS. In that case, you cannot change the date and time settings on your monitor.

CA

[ ] [ ] [ ] [ ] [ ] [ ] [ ]

3.10.6 A

A]

1. Select the [ ] QuickKey, or [ ]→[**A]** >>]→[ ].
2. Select [**A**] and then select the appropriate volume: X-10, in which X is the minimum volume, depending on the set minimum alarm volume (refer to the ***Alarms*** chapter), and 10 is the maximum volume.

I

When you press the navigation knob or the touchscreen, or the hardkeys on the panel, the monitor prompts you by making a sound of the key volume you have set.

1. Select the [ ] QuickKey, or [ ]→[p >>].
2. Select [**I**] and then select the appropriate volume. 0 means off, and 10 is the maximum volume.

The QRS tone is derived from either the HR or PR, depending on which is currently selected as the alarm source in [**S**] or [**2**]. When monitoring SpO_2, there is a variable pitch tone which changes as the patient's saturation level changes. The pitch of the tone rises as the saturation level increases and falls as the saturation level decreases. The volume of this tone is user adjustable.

1. Select the [ ] QuickKey, the ECG parameter window→[>>], or the SpO_2 parameter window.
2. Select [ ] or [**B**] and then select the appropriate volume. 0 means off, and 10 is the maximum volume.

3.11]

3.11.1] /

To switch the parameters on or off,

1. Select [ ]→[ ]→[ ]→[ ]→enter the required password→[ ].
2. Configure the [ ] **A**] to [ ] or [ ].

   If [ ] **A**] is configured to [ ], select[ ]→[ ]→[ ]→[ ]→[ ] to switch the parameters on or off.

   If [ ] **A**] is configured to [ ], the parameter switch is password protected. To switch the parameters on or off, select [ ]→[ ]→[ ]→[ ]→enter the required password→[ ]→[ ] >>].

When a parameter is switched off, its corresponding parameter module stops working, and its parameter value and waveform are not shown on the monitor display.

3.11.2 A

Select [ ] from the main menu or select the corresponding parameter area or waveform area to access a parameter setup menu.

3.12

Your monitor has different operating modes. Some are password protected. This section lists the major operating modes.

3.12.1

This is the normal, everyday working mode that you use for monitoring patients. Your monitor automatically enters the monitoring mode after being turned on.

3.12.2

To avoid disturbing the patient, night mode may be used.

To activate the night mode:

1. Select the [ ] QuickKey or [ ]→[>>]→[>>].
2. In the pop-up menu, set the desired brightness, alarm volume, QRS volume, key volume, NIBP end tone, or whether to stop NIBP measurement or not. When [ ] is selected, all the NIBP measurements terminate after entering the night mode.
3. Select the [ ] button.

To cancel the night mode:

1. Select the [ ] QuickKey or [ ]→[>>]→[>>].
2. Select [ ] in the popup.

A

3.12.3

Privacy mode is only available when a patient who is admitted at a monitor is also monitored by the central station.

To activate the privacy mode, select [ ]→[>>]→[ ].

The monitor behaves as follows as soon as the privacy mode is activated:

The screen turns blank and [ ] is displayed.

Monitoring and data storing continue but patient data is only visible at the central station.

Alarms can still be triggered. But all audible alarms are suppressed and the alarm light is deactivated at the monitor.

All system sounds are suppressed, including heart beat tone, pulse tone, all prompt tones, etc.

To cancel the privacy mode, press any key.

The monitor exits the privacy mode automatically in one of the following situations:

The monitor disconnects from the central station.

The alarm [**B**] or [ ] is presented.

The touchscreen is locked automatically in the privacy mode.

A

A

3.12.4

In Demo mode, the monitor can demonstrate its major functions when a patient or patient simulator is not connected. The Demo mode is password protected.

To enter the Demo mode:

1. Select [ ]→[>>].
2. Select [ ].

To exit the Demo mode, select [ ]→[>>]→[ ].

A

3.12.5 , .]

In standby mode, you can temporarily stop monitoringwithout turning off the monitor. To enter the standby mode, select the Standby QuickKey .

4]]

4.1 A]]

The monitor displays physiological data and stores it in the trends as soon as a patient is connected. This allows you to monitor a patient that is not admitted yet. However, it is recommended that you fully admit a patient so that you can clearly identify your patient, on recordings, reports and networking devices.

To admit a patient:

1. Select the [ ] QuickKey, or [ ]→[>>].
2. Select [ ]] to clear any previous patient data. If you do not erase data from the previous patient, the new patient's data will be saved into the data of the previous patient. The monitor makes no distinction between the old and the new patient data.
3. If the [ ]] button appears dimmed, directly select [**A**] and then select:

   [ ] to apply the data saved in the monitor to the new patient, or

   [ ] to clear the data saved in the monitor.
4. In the [ ] menu, enter the demographic details, of which:

   [**C**] determines the way your monitor processes and calculates some measurements, and what safety and alarm limits are applied for your patient.

   [ ] determines whether to show pace pulse marks on the ECG waveform. When the [ ] is set to [ ], pace pulse marks are not shown in the ECG waveform.
5. Select [ ].

A

C

4.2 [ ] A [ ]

Use [A] only if you do not have the time or information to fully admit a patient. Complete the rest of the patient demographic details later. Otherwise, the symbol will always be displayed in the patient information area.

1. Select the [ ] QuickKey, or [ ] → [>>].
2. Select [A]. If a patient has been admitted at present, select [ ] to discharge the current patient.
   If no patient is admitted, you can choose either:

   [ ] to apply the data in your monitor to the new patient, or

   [ ] to clear any previous patient data.
3. Enter the patient category and paced status for the new patient, and then select [ ].

4.3 [ ] [ ] [ ]

The monitor can obtain patient information from HIS through eGateway. To query or obtain patient information from HIS,

1. Select [ ] → [ ] >>] → [ ] >>] → enter the required password → [ ] C >>], and set [A] and [ ]. Set [A] to [ ].
2. Click the patient information area to enter the [ ] menu.
3. Select [ ] >>] to enter the [ ] menu.
4. Input the query condition and then select [ ]. The monitor will display the obtained patient information.
5. Select a patient and then click [ ]. The monitor will update the information of the corresponding patient.
6. Select to exit the [ ] menu.

[ ] A

4.4 A [illegible]

After associating patient information with HIS, the monitor will automatically update patient information if corresponding information in HIS has been changed. The monitor can associate a patient's MRN, first name, last name, date of birth, and gender with HIS.

[illegible]

A [illegible] ***eGateway Integration Manager Installation Guide*** [illegible].

[illegible]

4.5 [illegible]

To edit the patient information after a patient has been admitted, or when the patient information is incomplete, or when you want to change the patient information:

1. Select the [illegible] QuickKey, or [illegible]→[illegible] >>].
2. Select [illegible] and then make the required changes.
3. Select [illegible].

4.6 [illegible]

To discharge a patient:

1. Select the [illegible] QuickKey, or [illegible]→[illegible] >>].
2. Select [illegible]. In the popup menu, you can either:

   Directly select [illegible] to discharge the current patient, or

   Select [illegible] then [illegible]. The monitor enters the standby mode after discharging the current patient, or

   Select [**C**] [illegible] to exit without discharging the patient.

[illegible]

4.7 [illegible]

You can transfer patient data between monitors with a USB drive without re-entering the patient demographic information. Transferring of patient data enables you to understand the patient's historical condition. The patient data that can be transferred includes: patient demographics, trend data, alarm events and parameters alarm limits.

Select [>>] from [ ] menu. In the popup menu, you can set [ ]. The default is [**4**]. You can also set [ ]. The default is [ ].

A [illegible]

[illegible]

A [illegible]

[illegible]

4.7.1 [illegible] B

4.7.1.1 [illegible] B

1. Select [ ]→[>>].
2. Select [ ]. In the popup menu, you can:

   Select [ ] to transfer the patient data, or

   Select [**C**] to exit the menu.
3. Wait until the following message appears: [ ] B .].
4. Remove the USB drive from the monitor.

4.7.1.2 [illegible] B

1. Connect the USB drive to the destination monitor.
2. In the popup menu, you can:

   Select [ ] to transfer the patient data to the monitor, or

   Select [**C**] to cancel the operation of transferring patient data.

   Select [ ] B to not transfer the patient data and to unload the USB drive.
3. After you select [ ], in the popup menu you can further select the patient data contents that need to be transferred. [ ] must be selected. After [ ] is selected, the monitor compares the patient information stored in both the storage medium and monitor and deals with the patient data based on the following.

Different Patients: The monitor erases all the current patient data, transfers the patient data from the storage medium, and loads the configuration according to the patient category.

Same Patient: In the popup dialog box, you can:

Select [ ] to merge the patient data in the monitor and storage medium.

Select [ ] to erase all the current patient data in the monitor and to transfer the patient data from the storage medium.

Wait until the following message appears: [ ].

A

4.8 C] C]

If your monitor is connected to a central monitoring system (CMS):

All patient information, measurement data and settings on the monitor can be transferred to the CMS.

All patient information, measurement data and settings can be displayed simultaneously on the monitor and CMS. For some functions such as editing patient information, admitting a patient, discharging a patient, starting/stopping NIBP measurements, etc., bi-directional control can be achieved between your monitor and the CMS.

For details, refer to the CMS's instructions for use.

5.2

1. Press the hardkey on the monitor's front to enter the main menu.
2. Select [>>]→[>>]. Enter the required password and then select [ ].

5.3

The monitor will load the pre-set default configuration in the following cases.

The monitor restarts 120 seconds later after the power failure.

A patient is admitted.

A patient is discharged.

Patient data is cleared.

Patient category is changed.

To set default configuration:

1. Select [>>] in the [ ] menu.
2. In the [ ] menu, select [ ] or [ ].

When you select [ ], the configuration (Canine, Feline and Other (short for other animals);) to be restored is subject to the patient category. This configuration can be either a factory configuration or a saved user configuration. Take canine as an example, select [ ] and toggle between [ ] or user configuration(s).

---

10).

5.4

Current settings can be saved as a user configuration. Up to 5 user configurations can be saved. To save current settings:

1. Select [>>] in the [ ] menu.
2. In the popup dialog box, enter the configuration name and then select [ ].

5.5 [ ] C [ ]

1. Select [C >>] in the [ ] C] menu.
2. The popup menu shows the existing configurations on the monitor. Selecting [C B >>] will show the existing configurations on the USB drive. Select the desired configuration and then select the [ ] button.
3. Select [A] >>], [>>] or [ ] >>] to enter the corresponding menu in which settings can be changed. The changed items of alarm setup will be marked in red.
4. You can select [ ]] or [ ]] to save the changed configuration. Select [ ]] to overwrite the original configuration. Select [ ]] to save the changed configuration in another name.

5.6 [ ] C [ ]

1. Select [C >>] in the [ ] C] menu.
2. The popup menu shows the existing user configurations on the monitor. Selecting [C B >>] will show the existing user configurations on the USB drive. Select the user configurations you want to delete and then select [ ].
3. Select [ ] in the popup.

5.7] [ ] C [ ]

When installing several monitors with identical user configurations, it is not necessary to set each unit separately. A USB drive may be used to transfer the configuration from monitor to monitor.

To export the current monitor's configuration:

1. Connect the USB drive to the monitor's USB port.
2. Select [C >>] in the [ ] C] menu.
   In the [C .] menu, select the configurations and [ ]] to export. Then select the [ ] button. A status message will report completion of the transfer.

To import the configuration on the USB drive to the monitor:

1. Connect the USB drive to the monitor's USB port.
2. Select [C >>] in the [ ] C] menu.
3. In the [C .] menu, select the configurations and [User Maintenance Settings] to import. Then select the [ ] button. A status message will report completion of the transfer.

5.8] [ ] C [ ]

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 so as to ensure that all the settings are appropriate for your patient.

To load a configuration,

1. Select [ ] >>] from the main menu.
2. The popup menu shows the existing configurations on the monitor. Selecting [>>] will show the existing configurations on the USB drive.
3. Select a desired configuration.
4. Select [ ] to view the configuration details. In the popup menu, you can select [>>], [>>] or [ ] >>] to view the corresponding contents. The alarm setup items which are different than those currently used are marked in red.
5. Select [ ] to load this configuration.

5.9

During operation, you may make changes to some settings. However, these changes may not be saved as user configuration. To prevent the changes from being lost in case of a sudden power failure, the monitor stores the configuration in real time. The saved configuration is the latest configuration.

The monitor restores the latest configuration if it restarts within 60 seconds after the power failure. It will restore the default configuration rather than the latest configuration if it restarts 120 seconds later after the power failure. The monitor may load either the latest configuration or the default configuration if it restarts between 60-120 seconds after the power failure.

5.10

To modify the password for accessing the [ ]] menu,

1. Select [ ] >>] in the [ ]] menu.
2. Input a new password in the popup menu.
3. Select [ ].

6.2

6.2.1

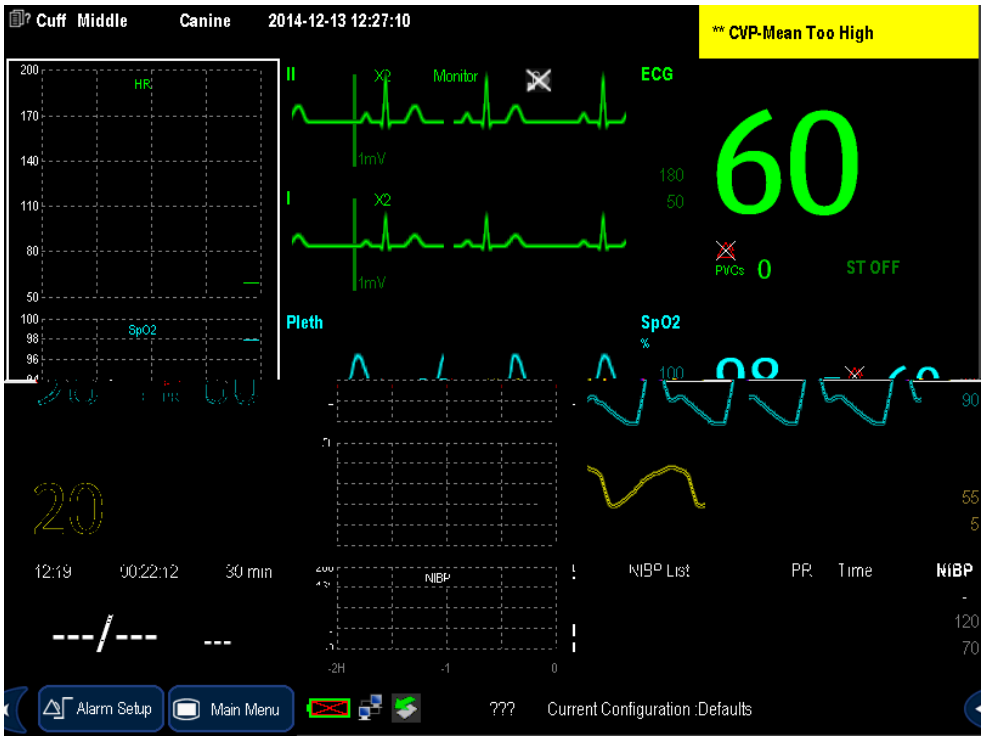
You can split the normal screen so that one part of the screen, on the left hand side, continuously shows graphic minitrends beside waveforms as shown in the figure below.

To have a split-screen view of minitrends, you can:

Select the [ ] QuickKey, or

Select the [ ]→ [ ], or

Select [ ] [ ] >> [ ] >> [ ]→ [ ].



The split

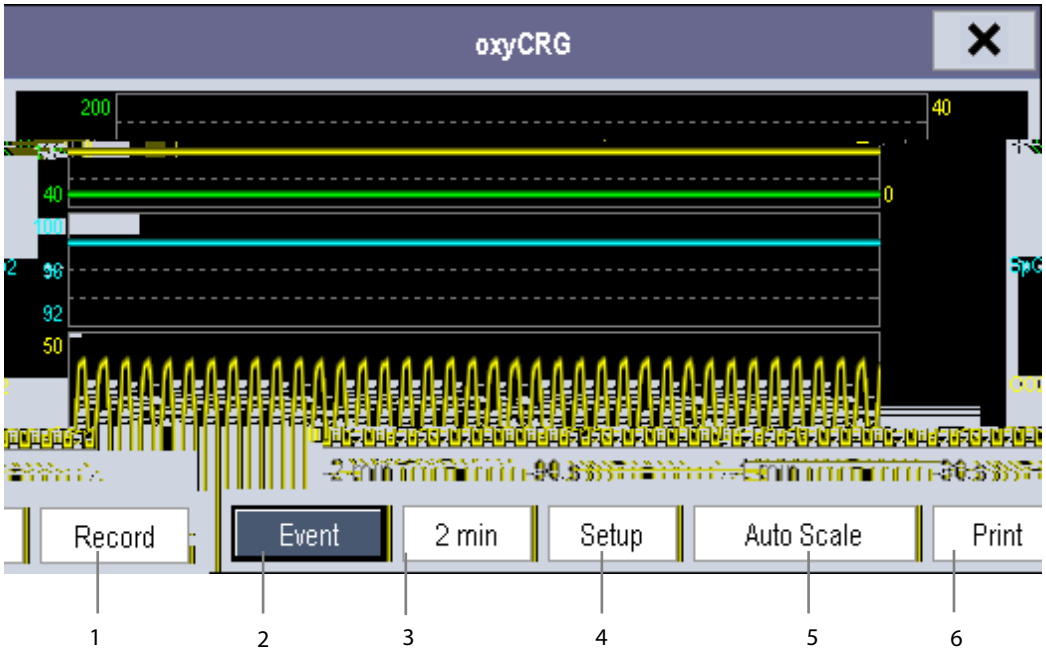
6.3

To have a split screen view of oxyCRG, you can:

Select the [ ] QuickKey, or

Select the [ ] QuickKey [ ]→ [ ], or.

Select [ ]→[ ]→[>>]→[ ]→[>>]→[ ] [ ]→.



The split-screen view covers the lower part of the waveform area and shows HR trend, SpO_2 trend, RR trend, and a compressed wave (Resp wave or CO_2 wave). At the bottom, there are the following controls:

1. OxyCRG Event

   You can enter the [Review] menu by selecting the [ ] button.

2. Trend length list box

   In the trend length list box, you can select [**1**], [**2**], [**4**], or [**8**].

3. Setup

   Select the [ ] button to enter the [ ] menu, in which you can select the parameters for display, the time length to be saved before and after an event, and the scale of the graphic trends and waveform. The trend area can display two parameter trends, e.g. HR trend and RR trend, simultaneously.

4. Auto Scale

   Select the [**A**] button, and the system automatically adjusts the scaling.

5. Print

   Select [ ] to print out the realtime OxyCRG.

6. Record

   With this button, you can print out the currently displayed OxyCRG trends by the recorder.

6.4]

6.4.1 C]

You can place up to 10 monitors (including telemetry) connected to the same central monitoring system into a Care Group. This lets you:

View information on the monitor screen from another bed in the same Care Group.

Be notified of physiological and technical alarm conditions at the other beds in the same Care Group.

To have a Care Group:

1. Open the [ ].] window by:

   Selecting the [ ] QuickKey, or

   Selecting the [[C] [, or

   Selecting [ ] [>>] >> [C] .

2. Select [ ] in the [ ].] window.

3. Select the desired monitors from the [C], and then select the button. The selected monitors constitute a Care Group.

6.4.2 C] B]

The Care Group overview bar is located at the bottom of the [ ].] window. In the overview bar, the department and bed label for any Care Group beds are displayed. For telemetry, # is displayed before the department label. The color in which a Care Group bed appears matches its status:

Red: indicates the bed is giving high-level physiological alarms or the telemetry is giving alarm, such as nurse call or event.

Yellow: indicates the bed is giving medium- or low-level physiological alarms, or medium-level technical alarms.

Blue: indicates the bed is giving low-level technical alarms.

Grey: indicates the bed fails to be networked or is in the standby mode.

You can view a Care Group bed's alarms by selecting it from the care group, or you can select the [ ].] button to view this bed in the [ ].] window.

For more details about Care Group alarms, refer to the ***Alarms*** chapter.

6.5 [ ] B

To enter the big numerics screen:

1. Select the [ ] QuickKey, or [ ]→[>>]→[ ]→[>>].
2. Select [B]→ .

You can select your desired parameters to display in this screen: select the [

7 A]

Alarms, triggered by a vital sign that appears abnormal or by technical problems of the monitor, are indicated to the user by visual and audible alarm indications.

A

A

C

7.1 A] C]

By nature, the monitor's alarms can be classified into three categories: physiological alarms, technical alarms and prompt messages.

1. Physiological alarms

   Physiological alarms, also called patient status alarms, are triggered by a monitored parameter value that violates set alarm limits or an abnormal patient condition. Physiological alarm messages are displayed in the physiological alarm area.

2. Technical alarms

   Technical alarms, also called system status alarms, are triggered by a device malfunction or a patient data distortion due to improper operation or mechanical problems. Technical alarm messages are displayed in the technical alarm area.

3. Prompt messages

   As a matter of fact, prompt messages are not alarm messages. Apart from the physiological and technical alarm messages, the monitor will show some messages telling the system status or patient status. Messages of this kind are included in the prompt message category a5 T15(s)samsateg 6.76 0 Td[(. 0(a)8(5 T15(s)s)2(a)005 o)6(m)-r2 Tc -0.016 Tw 1.24 0 T

7.2 A]

By severity, the monitor's alarms can be classified into three categories: high level, medium level and low level.

	]]]	]]]
	Indicate that your patient is in a life threatening situation, such as Asystole, Vfib/Vtac and so forth, and an emergency treatment is demanded.	Indicate a severe device malfunction or an improper operation, which could make it possible that the monitor cannot detect critical patient status and thus threaten the patient's life, such as low battery.
	Indicate that your patient's vital signs appear abnormal and an immediate treatment is required.	Indicate a device malfunction or an improper operation, which may not threaten the patient's life but may compromise the monitoring of vital physiological parameters.
	Indicate that you patient's vital signs appear abnormal and an immediate treatment may be required.	Indicate a device malfunction or an improper operation, which may compromise a certain monitoring function but will not threaten the patient's life.

7.3 A]

When an alarm occurs, the monitor will indicate it to the user through visual or audible alarm indications.

Alarm lamp

Alarm message

Flashing numeric

Audible alarm tones

7.3.1 A]

If a technical alarm or physiological alarm occurs, the alarm lamp will flash. The flashing color and frequency match the alarm level as follows:

High level alarms: the lamp quickly flashes red.

Medium level alarms: the lamp slowly flashes yellow.

Low level alarms: the lamp turns yellow without flashing.

7.3.2 A]

When an alarm occurs, an alarm message will appear in the technical or physiological alarm area. For physiological alarms, the asterisk symbols (*) before the alarm message match the alarm level as follows:

High level alarms: ***

Medium level alarms: **

Low level alarms: *

Additionally, the alarm message uses different background colors to match the alarm level:

High level alarms: red

Medium level alarms: yellow

Low level alarms: yellow

You can view the alarm messages by selecting the physiological or technical alarm area.

7.3.3]

If an alarm triggered by an alarm limit violation occurs, the numeric of the measurement in alarm will flash every second, and the corresponding alarm limit will also flash at the same frequency indicating the high or low alarm limit is violated.

7.3.4 A A]

The alarm tone is distinct from the heart beat tone, keystroke tone and pulse tone in frequency. This monitor has three choices of alarm tones and patterns: ISO, Mode 1 and Mode 2. For each pattern, the alarm tones identify the alarm levels as follows:

ISO pattern:

High level alarms: triple+double+triple+double beep.

Medium level alarms: triple beep.

Low level alarms: single beep.

Mode 1:

High level alarms: high-pitched single beep.

Medium level alarms: double beep.

Low level alarms: low-pitched single beep.

Mode 2:

High level alarms: high-pitched triple beep.

Medium level alarms: double beep.

Low level alarms: low-pitched single beep.

7.3.5 A]

Apart from the aforementioned alarm indicators, the monitor still uses the following symbols telling the alarm status:

indicates alarms are paused.

indicates alarm sound is silenced.

indicates the alarm sound is turned off.

indicates individual measurement alarms are turned off or the system is in alarm off status.

7.4 A] C]

7.4.1 A]

1. Select [ ]→[ ]→[ ]→enter the required password.
2. Select [**A]** >>] to enter the [**A]**] menu.
3. Select [**A]**] and toggle between 0 and 10.

The minimum alarm volume refers to the minimum value you can set for the alarm volume, which is not affected by user or factory default configurations. The setting of minimum alarm volume remains unchanged when the monitor shuts down and restarts.

7.4.2 C] A]

1. Select the [ ] QuickKey or the [**A]**] QuickKey→[ ], or [ ]→[**A]** >>]→[ ].
2. Select the appropriate volume from [**A**]: X to 10, in which X is the minimum volume, depending on the set minimum alarm volume, and 10 is the maximum volume.
3. Select [**A]**] to set the volume of the high priority alarm as [**A** **+0**], [**A** **+1**] or [**A** **+2**].
4. Select [ ] to set the volume of the reminder tone as], [ ] or [ ].

When alarm volume is set to 0, the alarm sound is turned off and a symbol appears on the screen.

7.4.3 [illegible]

7.4.5

When the alarm volume is set to zero, or the alarm tone is silenced or turned off, the monitor issues a periodical reminder tone. To set the reminder tones:

1. Select [ ]→[ ]→[ ]→enter the required password.
2. Select [**A**] >>] to enter the [**A**] menu.
3. Set the [ ] to [ ], [ ] or [**-]**]. When [**-]**] is selected, the current physiological alarms and technical alarms marked with " √ " will be re-generated after the [ ].

To set the interval between reminder tones, select [ ] and toggle between [**1**], [**2**] and [**3**].

In addition, you can set the volume of alarm reminder tones. To set the volume of alarm reminder tones, select [ ]→[**A**] >>]→[ ] or the [**A**] QuickKey→[ ]. Then, select [ ] and toggle between [ ], [ ] and [ ].

7.5 [ ] A]

Select th 1 T3}>Qu7KeTJ6yT/T1 1 Tf-0.004 T0.90(y)]TJ/a.018 Tm].

7.5.2 A [illegible]

The monitor can automatically adjust alarm limits according to the measured vital signs, using the auto limits function. When auto limits are selected, the monitor calculates safe auto limits based on the latest measured values.

To get accurate auto alarm limits, you need to collect a set of measured vital signs as a baseline. Then, in the main menu, select [**A** [illegible] >>]→[ ] [illegible]→[**A** [illegible]] →[ ]. The monitor will create new alarm limits based on the measured values.

Before applying these automatically created alarm limits, confirm if they are appropriate for your patient in the mass alarm setup menu. If not, you can adjust them manually. These alarm limits will remain unchanged until you select auto limits again or adjust them manually.

The monitor calculates the auto limits based on the following rules.

[illegible]	[illegible]	[illegible]	[illegible]	**A** [illegible]
ECG	HR/PR	(HR – 30) or 90bpm (whichever is greater)	HR + 40) or 200bpm (whichever is smaller)	55 to 225
Resp	RR	(RR – 10) or 30 rpm (whichever is greater)	(RR + 25) or 85 rpm (whichever is smaller)	10 to 90
SpO_2	SpO_2	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
NIBP (Cuff Type: Small)	NIBP-S	(SYS – 15) or 45mmHg (whichever is greater)	(SYS + 15) or 105mmHg (whichever is smaller)	40 to 115
	NIBP-D	(Dia – 15) or 20mmHg (whichever is greater)	(Dia + 15) or 80mmHg (whichever is smaller)	20 to 90
	NIBP-M	Mean – 15) or 35mmHg (whichever is greater)	(Mean + 15) or 95 mmHg (whichever is smaller)	25 to 105
NIBP (Cuff Type: Medium)	NIBP-S	SYS×0.68 + 10mmHg	SYS×0.86 + 38mmHg	45 to 185
	NIBP-D	Dia×0.68 + 6mmHg	Dia×0.86 + 32mmHg	25 to 150
	NIBP-M	Mean×0.68 + 8mmHg	Mean×0.86 + 35mmHg	30 to 165
NIBP (Cuff Type: Big)	NIBP-S	SYS×0.68 + 10mmHg	SYS×0.86 + 38mmHg	45 to 270
	NIBP-D	Dia×0.68 + 6mmHg	Dia×0.86 + 32mmHg	25 to 210
	NIBP-M	Mean×0.68 + 8mmHg	Mean×0.86 + 35mmHg	30 to 230
Temp	T1	(T1 – 0.5)°C	(T1 + 0.5)°C	1 to 49°C
	T2	(T2 – 0.5)°C	(T2 + 0.5)°C	1 to 49°C
	TD	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	(SYS – 15) or 45mmHg (whichever is greater)	(SYS + 15) or 105mmHg (whichever is smaller)	35 to 115
	IBP-D	(Dia – 15) or 20mmHg (whichever is greater)	(Dia + 15) or 80mmHg (whichever is smaller)	20 to 90
	IBP-M	(Mean – 15) or 35mmHg (whichever is greater)	(Mean + 15) or 95mmHg (whichever is smaller)	25 to 105

PA	IBP-S	SYS × 0.75	SYS × 1.25	3 to 120mmHg
	IBP-D	Dia × 0.75	Dia × 1.25	
	IBP-M	Mean × 0.75	Mean × 1.25	
IBP: CVP/ ICP/ LAP/ RAP/ UVP/ P1-P4 (Venous pressure)	IBP-M	Mean × 0.75	Mean × 1.25	3 to 40mmHg
CO_2	$EtCO_2$	0 to 32mmHg: remains the same	0 to 32mmHg: remains the same	Same as the measurement range
		32 to 35mmHg: 29mmHg	32 to 35mmHg: 41mmHg	
		35 to 45mmHg: ($etCO_2$-6) mmHg	35 to 45mmHg: ($etCO_2$+6) mmHg	
		45 to 48mmHg:39 mmHg	45 to 48mmHg:51 mmHg	
		>48mmHg: remains the same	>48mmHg: remains the same	
	$FiCO_2$	N/A	Same as the default alarm limit	Same as the measurement range
	awRR	(awRR – 10) or 30 rpm (whichever is greater)	(awRR+25) or 85 rpm (whichever is smaller)	10 to 90
AG	$EtCO_2$ (AG)	Same as CO_2 module		
	$FiCO_2$ (AG)			
	awRR	awRR – 10 or 30 rpm (whichever is greater)	awRR + 25 or 85 rpm (whichever is smaller)	10 to 90
	FiAA/ EtAA	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
	FiO_2/ $EtCO_2$	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
	FiN_2O/ EtN_2O	Same as the default alarm limit	Same as the default alarm limit	Same as the measurement range
C.O.	BT	(BT－1) ℃	(BT＋1) ℃	Same as the measurement range

7.5.3 [A] [ ] [ ]

You can set the alarm delay time for over-limit alarms of continuously measured parameters. If the alarm-triggered condition disappears within the delay time, the monitor will not give the alarm. You can set the [**A **] in the [ ] window of the [**A **] menu.

Alarm delay is not applied to the following physiological alarms:

Apnea

ST alarms

Arrhythmia alarms

ECG Weak Signal

Resp Artifact

No Pulse

Nellcor SpO_2 over alarm limits

FiO_2 Shortage

Measurements of noncontinuous parameters over alarm limits

HR over alarm limits

Anesthetic Mixture's MAC>3

You can set [**A **] and [**A **] separately in the [ ] window of the [**A **] menu.

7.5.4 [ ] [ ] [ ]

In the CPB mode, all the physiological alarms, technical alarms and prompt messages are switched off. In CPB mode, [**C B**] is displayed in the physiological alarm area with red background color.

To enter CPB mode, select the [**C B**] Quickkey or select [**C B**] in the [ ] window of the [**A**] menu. Then select [ ] in the popup dialog box.

7.5.7 [ ]

When performing intubation during general anesthesia, you can set the monitor to enter intubation mode in order to reduce unnecessary alarms. Intubation mode is available for Resp, CO_2, AG and RM parameters. In the setup menu of these parameters, you can choose the[ ] button to disable respective physiological alarms.

The default intubation time is 2 minutes. You can also change the time by following this procedure:

1. Select [ ] [ ] >>] [ ] >>] enter the required password.
2. Select [**A** >>], and set the [ ] to [**1**], [**2**], [**3**], or [**5**].

7.6 **A**

If you want to temporarily prevent alarms from sounding, you can pause alarms by pressing the hardkey on the monitor's front. When alarms are paused:

No alarm lamps flash and no alarms are sounded.

No numeric and alarm limit flash.

No alarm messages are shown.

The remaining pause time is displayed in the physiological alarm area.

The alarms paused symbol is displayed in the sound symbol area.

If the time interval of the monitor's last shutdown from this starting-up is greater than 2 minutes, the monitor enters into the alarm paused status as soon as it is turned on. The alarm pause time is fixed to be 2 minutes.
When the alarm pause time expires, the alarm paused status is automatically cancelled and the alarm tone will sound.
You can also cancel the alarm paused status by pressing the hardkey.

You can set the alarm pause time to [**1**], [**2**], [**3**], [**5**], [**10**], [**15**], or [ ]. The default alarm pause time is 2 minutes.

1. Select [ ]→[ ] >>]→[ ] >>]→enter the required password.
2. Select [**A** >>]→[**A**] and then select the appropriate setting from the popup list.

7.7 **A A**

If [**A**] is set to [ ], the monitor enters into the alarm off status after the hardkey is pressed. During the alarm off status,

As for physiological alarms, no alarm lamps flash and no alarms are sounded.

As for physiological alarms, no numeric and alarm limit flash.

No physiological alarm messages are shown.

[**A**] is displayed in the physiological alarm area with a red background.

As for technical alarms, no alarms are sounded.

The alarm off symbol is displayed in the sound symbol area.

You can cancel the alarm off status by pressing the hardkey.

A

7.8

You can silence all alarm sounds by pressing the hardkey on the monitor's front. In that case, the alarm lamp flashing and alarm tones are cleared and appears in the sound symbol area. After the physiological alarm is silenced, " √ " appears before the alarm message and the numeric and alarm limit still flash. For the performance after the technical alarm is silenced, please refer to the ***Silencing Technical Alarms***section.

The alarm silenced status will be automatically cancelled if you switch the monitor to other alarm statues or when a new physiological or technical alarm occurs.

7.9

The alarm latching setting for your monitor defines how the alarm indicators behave when you do not acknowledge them. When alarms are set to non-latching, their alarm indications end when the alarm condition ends. If you switch alarm latching on, all visual and audible alarm indications last until you acknowledge the alarms, except that the measurement numeric and violated alarm limit stop flashing as soon as the initial alarm condition goes away.

To set alarms to latching or non-latching:

1. Select [ ]→[ ]→[ ]→enter the required password.
2. Select [**A**].
3. Select [ ] and toggle between [ ], [**&**], [**A**] and [ ]. If you select [ ], only high priority alarms are latched; if you select [**&**], both high priority alarms and medium priority alarms are latched; if you select [**A**], all alarms are latched; if you select [ ], the alarm latching is turned off.

C

7.13 [C] A]

7.13.1 C] A A]

When a Care Group is set up on your monitor, a flashing symbol will appear beside the QuickKeys area if any monitor in your Care Group, which is not currently viewed by your monitor, is alarming. The alarm symbol is shown as below.

The background colors of the alarm symbols indicate alarm levels, and are the same as those of the corresponding alarm messages. If multiple alarms are active in the Care Group, the background color is the same as that of the highest-level alarm message. For more information about the alarm message and background color, see ***7.3.2 Alarm Message*.**

When a monitor in the Care Group is disconnected, the flashing symbol is shown as below.

The bed label of the alarming monitor appear on the symbol. You can enter the [ ] window by pressing this symbol.

7.13.2 C] A

When a monitor in the Care Group issues an alarm, your monitor prompts you by giving an alert tone. To set the alert tone,

1. In the main menu, select [>>]→[ ] >>]→[**C**].
2. In the [**C**] window, select [ ].
3. In the [ ] window, select [>>], and set [**A**] to [ ], [ ] or [ ].

7.13.3 C] A]

You can silence the alarm sound of the currently viewed bed in the [ ] window. This function can be set in the [**A**] menu from the [ ] menu only.

When the alarm silence function for other patients is active and the currently viewed bed is in normal alarm status or alarm sound off status, press the [ ] button in the [ ] window. The currently viewed bed will then enter into the alarm silenced status.

Note that this button is disabled when the currently viewed bed is in alarms off or paused status.

A

8

8.1

The electrocardiogram (ECG) measures the electrical activity of the heart and displays it on the monitor as a waveform and a numeric. This section also tells you about ST monitoring, arrhythmia monitoring. and 12-lead monitoring

8.2

8.3 [illegible]

8.3.1 [illegible]

1. Skin preparation

The quality of ECG waveform displayed on the monitor is a direct result of the quality of the electrical signal received at the crocodile clip. Proper skin preparation is necessary for good signal quality at the crocodile clip. A good signal at the crocodile clip provides the monitor with valid information for processing the ECG data. To ensure enough electrolyte material on the skin of patients, you need to moisten the lead sites with 70% isopropyl alcohol. This will usually be sufficient for ECG monitoring for a short time (30 to 60 minutes).

2. Attach the ECG leadwires to the crocodile clips prior to placement.
3. Place the crocodile clips to the patient in accordance with ***8.3.3 ECG Lead Placements***.
4. Connect the ECG leadwires to the patient cable.
5. Make sure the monitor is turned on and is ready for monitoring.

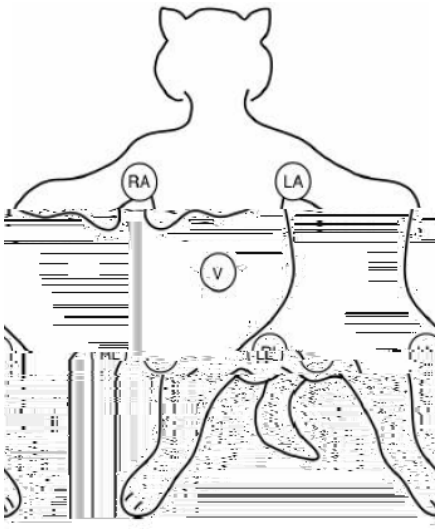
Conne37 0 T24 0 937.68 -2.0671Td(4.1Tw 10 Td56.64 5011(e)TmD 13 -0.00-0.28 >>B/TT Td(4.LeaC /P >>BDC .0671Td(4.)12(e)-t)4(u)16(rn)142

The chart below shows the label used to identify each leadwire. Included also is its associated color code per American (AHA) and European (IEC) standards.

Label	Color	Label	Color
RA	White	R	Red
LA	Black	L	Yellow
LL	Red	F	Green

5-

Following is the configuration per the American standard when using five leadwires: :



RA (right arm) lead: on the right foreleg.

LA (left arm) lead: on the left foreleg.

RL (right leg) lead: on the right hind leg.

LL (left leg) lead: on the left hind leg.

V (precordial) lead: exploring lead.

The chart below shows the label used to identify each leadwire. Included also is its associated color code per American (AHA) and European (IEC) standards.

Label	Color	Label	Color
RA	White	R	Red
LA	Black	L	Yellow
LL	Red	F	Green
RL	Green	N	Black
V	Brown	C	White

12-

12-lead ECG uses 10 electrodes, which are placed on the patient's four limbs and chest. The limb electrodes should be placed on the soft skin and the chest electrodes placed according to the physician's preference.

8.4

Your display may be configured to look slightly different.

1. Lead label of the displayed wave
2. ECG gain
3. ECG filter label
4. Notch filter status

Besides, when a paced signal has been detected, the pace pulse marks "|" are shown on the ECG wave if the [ ] has been set to [Yes].

1. Current heart rate alarm limits
2. Current heart rate
3. Heart beat symbol

8.5 C]

8.5.1 A

By selecting the ECG parameter window or waveform area, you can access the [ ] menu.

8.5.2 C A]

In most cases the HR and PR numerics are identical. In order to avoid simultaneous alarms on HR and PR, the monitor uses either HR or PR as its active alarm source. To change the alarm source, select [A] in the [ ] menu and then select either:

[ ]: if you want the HR to be the alarm source for HR/PR.

[ ]: if you want the PR to be the alarm source for HR/PR.

[A]: If the [A] is set to [A], the monitor will use the heart rate from the ECG measurements as the alarm source whenever a valid heart rate is available. If the heart rate becomes unavailable, for example the ECG module is turned off or becomes disconnected, the monitor will automatically switch to PR as the alarm source.

8.5.3 C]]

In the [ ] menu:

You can select [ ], [1], or [2] to select a lead to view. The waveform of selected lead should have the following characteristics:

The QRS should be either completely above or below the baseline and it should not be biphasic.

The QRS should be tall and narrow.

The P-waves and T-waves should be less than 0.2mV.

If the wave is too small or clipped, you can change its size by selecting an appropriate[ ] setting. If you select [A] from[ ], the monitor will automatically adjust the size of the ECG waves. In normal screen, only the selected ECG wave's size is adjusted. In other screens, all ECG wave sizes are adjusted simultaneously.

You can change the wave sweep speed by selecting [ ] and then selecting the appropriate setting.

8.5.7 [illegible]

The notch filter removes the line frequency interference. Only when [ ] is set to [ ], the [Notch Filter] is adjustable.

1. Select the ECG parameter window or waveform area to enter its setup menu. Then select [>>].
2. Set [Notch Filter] to

   [ ] when there is strong interference (such as spikes) with the waveform.

   [ ] when there is weak interference with the waveform.

   [ ] to turn the notch filter off.

Set notch frequency according to the electric power frequency of your country. Follow this procedure:

1. When [ ] is set on, select [ ]→[ ]→[ ]→[ ]→enter the required password.
2. Select [>>]→[ ] and then select [**50**_] or [**60**_] according to the power line frequency.

8.5.11 A

QRS sounds are produced based on the alarm source. To adjust the QRS volume, select [>>] from the [ ] menu; select [ ] from the popup menu and select the appropriate setting. When a valid SpO_2 measured value is available, the system will adjust the pitch tone of QRS sound based on the SpO_2 value.

8.5.12 A

If a defibrillator is connected, a defibrillator synchronization pulse (100 ms, +5V) is outputted through the Multifunctional Connector every time the monitor detects an R-wave.

A

B

B

A

8.6 A

ST segment analysis calculates ST segment elevations and depressions for individual leads and then displays them as numerics in the ST1 and ST2 areas.

A positive value indicates ST segment elevation; a negative value indicates ST segment depression.

Measurement unit of the ST segment: mV or mm. You can set the unit in the [ ] menu from the [ ] menu.

Measurement range of the ST segment: -2.0 mV to +2.0 mV.

A

8.6.5 C]

Select the ◀ and ▶ arrow keys beside the [**C]** .] to switch between different reference segment groups.

8.6.6]

To delete the current ST reference segment, select [.] in the [**A]**] menu and then select [ ] in the popup.

8.6.7

To record the current ST segment and reference segment, select [ ] in the [**A]** menu.

8.6.8 C] A]

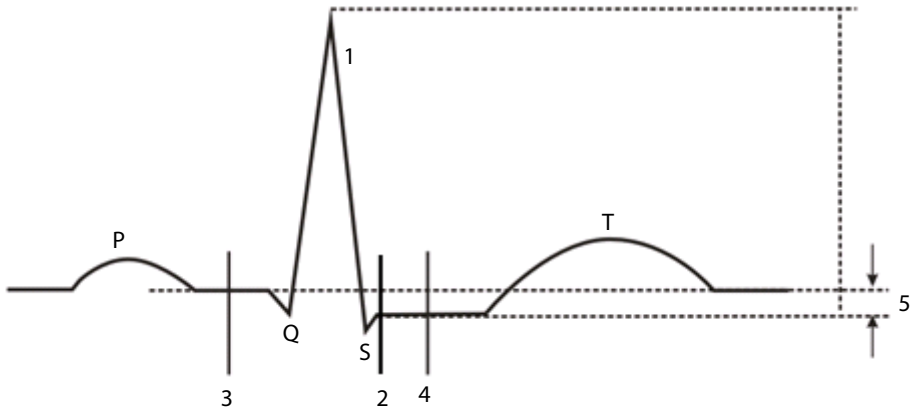
High and low ST alarm limits can be set individually for each ECG lead. Alarm limits can also be set separately for single-lead and multi-lead ST monitoring. You can select [**A]** >>] from the [**A]**] menu and then change the ST alarm settings for each lead.

8.6.9 A]]

You can set the ST alarm delay time from the [ ] window of the [**A]**] menu.

8.6.10 A]

As shown in the figure below, the ST measured for each beat complex is the vertical difference between two measurement points with the R-wave peak as the baseline for the measurement.



1. R-wave peak
2. J point
3. Isoelectric point
4. ST measurement point
5. Difference=ST value

The ISO and ST points need to be adjusted when you start monitoring or the patient's heart rate or ECG morphology changes significantly. Exceptional QRS complexes are not considered for ST segment analysis.

A

A

To adjust the ST measurement points:

1. In the [**A**] menu, select [**A >>**]. In the [**A**] window, three vertical lines represent the ISO, J and ST point positions respectively.
2. Select [] and use the Knob to select an ECG lead with obvious J point and R wave.
3. Select [], [J] or [] and then use the Knob to adjust the position of each point.

   The ISO-point (isoelectric) position is given relative to the R-wave peak. Position the ISO-point in the middle of the flattest part of the baseline (between the P and Q waves).

   The J-point position is given relative to the R-wave peak and helps in locating the ST-point. 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. Move the J-point to position the ST-point at the midpoint of the ST segment. Position the ST-point relative to the J-point at either [J+60/80ms], [J+40ms], [J+60ms] or [J+80ms]. When [J+60/80ms] is selected, the ST-point will be positioned 80 ms (heart rate 120

8.7.3 C] A]

Select the ECG parameter window or waveform area→[**A . A] >>]→[**A], and you can then change threshold settings for some arrhythmia alarms. In case an arrhythmia violates its threshold, an alarm will be triggered. The asystole delay time relates to ECG relearning. When HR is less than 30 bpm, it is recommended to set the asystole delay time to 10 seconds.

A	]	]		
PVCs High	1 to 100	10	1	/min 11 toe

8.7.5. [illegible]

Please refer to the ***Review*** chapter.

8.8. [illegible]

8.8.1 [illegible]

During ECG monitoring, you may need to initiate an ECG relearning when the patient's ECG template changes dramatically. A change in the ECG template could result in:

incorrect arrhythmia alarms

loss of ST measurement, and/or

inaccurate heart rate

ECG relearning allows the monitor to learn the new ECG template so as to correct arrhythmia alarms and HR value, and restore ST measurements. To initiate relearning manually, select the ECG parameter window or waveform area→ [illegible]. When the monitor is learning, the message [illegible] is displayed in the technical alarm area.

⚠CA[illegible]

[illegible]

8.8.2 A[illegible]

ECG relearning is initiated automatically whenever:

The ECG lead or lead label is changed

The ECG lead is re-connected

A new patient is admitted

After ECG calibration is completed and the ECG module switches to normal measurement mode by selecting [illegible] **C**[illegible]

A switch happens between the options of screen type during 5/12-lead ECG monitoring.

The paced status of the patient is changed.

8.9 12-[illegible]

1. Refer to the section ***8.3.3 ECG Lead Placements*** for placing the electrodes.
2. In the [ECG menu], select [[illegible]>>]→[[illegible]]→[**12-Lead**]. Select [[illegible] Quickkey→[**C**[illegible]] →[ECG **12-Lead**][illegible].

There are totally 12 ECG waves and 1 rhythm wave displayed on the screen. The rhythm lead is ECG Ⅰ before entering the 12-lead ECG monitoring screen.

You can select the sequence of ECG waveforms on the 12-lead ECG screen and 12-lead ECG report.

To select the sequence of the ECG waveforms,

1. In the [ECG menu], select [[illegible]>>] to enter the [[illegible]].
2. Set [[illegible]] to [Standard] or [**C**[illegible]].

   [[illegible]]: the sequence is I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6.

   [**C**[illegible]]: the sequence is aVL, I, -aVR, II, aVF, III, V1, V2, V3, V4, V5, V6.

Additionally, the 12-lead ECG monitoring has feature:The [[illegible]] mode is automatically switched to [[illegible]] when the monitor accesses the 12-lead full-screen; the [Filter] mode resumes to the configuration before accessing the 12-lead full screen when the monitor exit the 12-lead full screen.

.

9

9.1

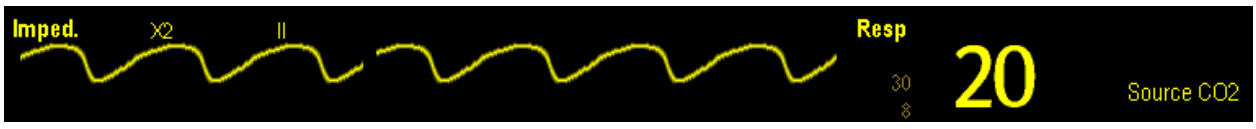
Impedance respiration is measured across the thorax. When the patient is breathing or ventilated, the volume of air changes in the lungs, resulting in impedance changes between the electrodes. Respiration rate (RR) is calculated from these impedance changes, and a respiration waveform appears on the monitor screen.

9.2

A

C 60601-1-2 3 /, 1 /

9.3



By selecting the waveform area or parameter area, you can enter the menu. By selecting the Resp parameter window, you can enter the menu.

9.4]

Since the same leads are used for ECG and respiration monitoring, the lead placement is very important. Some patients, due to their clinical condition, expand their chest laterally, causing a negative intrathoracic pressure. In these cases it is better to place the two crocodile clips used for respiration monitoring laterally in the right axillary and left lateral chest

9.4.3 A] B]

Some patients with restricted movement breathe mainly abdominally. In these cases, you may need to place the left leg electrode on the left abdomen at the point of maximum abdominal expansion to optimise the respiratory wave.

9.4.4] C]

In clinical applications, some patients expand their chests laterally, causing a negative intrathoracic pressure. In these cases, it is better to place the two respiration electrodes in the right midaxillary and the left lateral chest areas at the patient's maximum point of the breathing movement to optimize the respiratory waveform.

9.5 C]

In the [ ] menu, set [ ] to [ ], [ ] or [**A**].

9.6 C] A] A]

The apnea alarm is a high-level alarm used to detect apneas. You can set the apnea alarm delay time after which the monitor alarms if the patient stops breathing. In the [ ] menu, select [**A**]] and then select the appropriate setting. The [**A**]]

Resp rates to detect cardiac overlay. The respiration detection level is automatically set higher to prevent the detection of cardiac overlay as respiration.

In Manual Detection Mode, cardiac overlay can in certain situations trigger the respiration counter. This may lead to a false indication of a high respiration or an undetected apnea condition. If you suspect that cardiac overlay is being registered as breathing activity, raise the detection level above the zone of cardiac overlay. If the Resp wave is so small that raising the detection level is not possible, you may need to optimize the electrode placement as described in the section "Lateral Chest Expansion".

9.8 C]

A

In the [ ] menu, you can:

Select [ ] and then select an appropriate setting. The bigger the gain is, the larger the wave amplitude is.

Select [ ] and then select an appropriate setting. The faster the wave sweeps, the wider the wave is.

9.9

To set RR source:

1. Enter the [ ] menu.
2. Select [ ] and then select a source or [**A**] from the dropdown list.

The dropdown list displays the currently available RR source. When you select [**A**], the system will automatically select the RR source according to the priority. When the current RR source does not have valid measurement, the system will automatically switch the [ ] to [**A**]. RR source switches back to impedance respiration if you press the silence hardkey on the monitor's front during an apnea alarm.

The priority of RR source is (from high to low): CO_2 measurement, and impedance respiration measurement. The [ ] settings of Resp, CO_2, and AG module are linked.
The RR source options and description are shown in the table below.

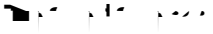
Auto	RR source is automatically selected according to the priority.
CO_2	RR source is from CO_2 measurement.
ECG	RR source is from impedance respiration measurement.

9.10

Select [**A** >>] from the [ ] menu. In the popup menu, you can set alarm properties for this parameter.

9.11 /

To switch Resp measurement on, select [ ] from the [ ] menu. To switch Resp measurement off, select [ ] from the [ ] menu and then select [ ] from the popup dialog box. A line is displayed in the waveform area and no numeric but the [ ] message is displayed in the parameter area.



10

10.1

The pulse numeric counts the arterial pulsations that result from the mechanical activity of the heart. You can display a pulse from any measured SpO

10.3 [A]

In most cases the HR and pulse numerics are identical. In order to avoid simultaneous alarms on HR and Pulse, the monitor uses either HR or Pulse as its active alarm source. To change the alarm source, select [**A**] in the [ ] or [**2**] menu and then select either:

[ ]: The monitor will use the HR as the alarm source for HR/pulse.

[ ]: The monitor will use the PR as the alarm source for HR/pulse.

[**A**]: If the [**A**] is set to [**A**], the monitor will use the heart rate from the ECG measurement as the alarm source whenever the ECG measurement is switched on and a valid heart rate is available. If the heart rate becomes unavailable, for example if leads become disconnected, and a pulse source is switched on and available, the monitor will automatically switch to Pulse as the alarm source. When the Leads Off condition is corrected, the monitor will automatically switch back to the heart rate as the alarm source.

10.4

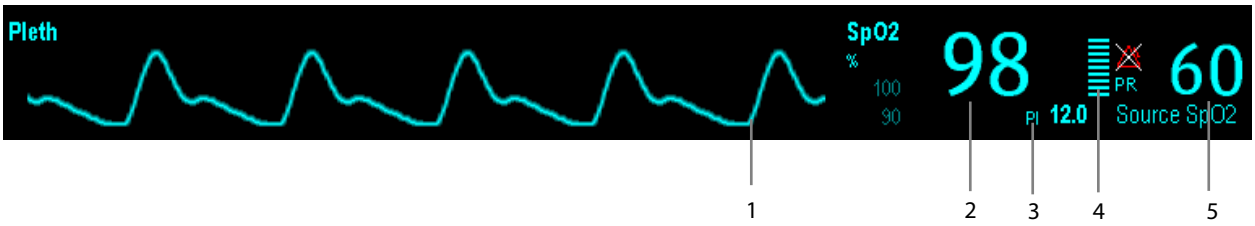
When PR is used as the alarm source, the PR source will be used as a source for the QRS tone. You can change the QRS volume by adjusting [**B**] in the [**2**] menu. When a valid SpO_2 value exists, the system will adjust the pitch tone of QRS volume according to the SpO_2 value.

11 [illegible] 2

11.1 [illegible]

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 probe passes through the tissue and is converted into electrical signals by the photodetector in the probe. The SpO_2 module processes the electrical signal and displays a waveform and digital values for SpO_2 and pulse rate.

This device is calibrated to display functional oxygen saturation. It provides the following measurements:



1. Pleth waveform (Pleth): visual indication of patient's pulse. The waveform is not normalized.
2. Oxygen saturation of arterial blood (SpO_2): percentage of oxygenated hemoglobin in relation to the sum of oxyhemoglobin and deoxyhemoglobin.
3. Perfusion index (PI): gives the numerical value for the pulsatile portion of the measured signal caused by arterial pulsation. PI is an indicator of the pulsatile strength. You can also use it to assess the quality of SpO_2 measurement. Above 1 is optimal, between 0.3 and 1 is acceptable. Below 0.3 indicates low perfusion; reposition the SpO_2 sensor or find a better site. If low perfusion persists, choose another method to measure oxygen saturation if possible.

   PI is available for the Mindray SpO_2 module or the Masimo SpO_2 module.
4. Perfusion indicator: the pulsatile portion of the measured signal caused by arterial pulsation.
5. Pulse rate (derived from pleth wave): detected pulsations per minute.

11.2 [illegible]

A[illegible]

[illegible]

11.3 [illegible] SpO_2 [illegible]

To identify which SpO_2 module is incorporated into your monitor, see the color of the SpO_2 connector and the company logo located at the monitor. The color of the cable connector matches the company as shown below:

Mindray SpO_2 module: a blue connector without logo.

Masimo SpO_2 module: a purple connector with a logo of Masimo SET.

Nellcor SpO_2 module: a grey connector with a logo of Nellcor.

The connectors for these three SpO_2 sensors are mutually exclusive.

[illegible]

[illegible] SpO_2 [illegible] **A**[illegible] [illegible] SpO_2 [illegible] **A**[illegible]

11.4 A[illegible]

1. Select an appropriate sensor and clip according to the module type and patient category..
2. Apply the sensor to the proper site of the patient.
3. Select an appropriate adapter cable according to the connector type and plug this cable into the SpO_2 connector.
4. Connect the sensor cable to the adapter cable.

The preferred sensor site for feline, canine and equine animals is on the tongue, with the optical components of the sensor positioned to the center of the tongue. Alternatively, the sensor and clip may be placed to the toe, lip, ear, vulva or prepuce of the animal.

The process of SpO_2 plethysmogram measurement is generally the same. But the SpO2 sensor selection and placement depend on the patient type. When choosing a site for a sensor, refer to the directions for that sensor.

You can easily place the tongue sensor as shown below.

B

11.5 C

11.5.1 A

By selecting the SpO_2 parameter window or waveform area, you can access the [**2**] menu.

11.5.2 A]. A

The desat alarm is a high level alarm notifying you of potentially life threatening drops in oxygen saturation. Select [**A** >>] from the [**2**] menu. From the popup menu, you can set low alarm limit, alarm switch, and alarm recording for [ ].]. When the SpO_2 value is below the desat alarm limit and the desat alarm switch is set on, the message [**2**]. is displayed.

11.5.3

For the Masimo SpO_2 module, you can set [ ] to [ ] or [ ] in the [**2**] menu. When the [ ] is set to [ ], the monitor is more sensitive to minor signals. When monitoring critically ill patients whose pulsations are very weak, it is strongly recommended that the sensitivity is set to [ ]. When monitoring non-critically ill patients who tend to move a lot, noise or invalid signals may be caused. In this case, it is recommended that the sensitivity is set to [ ] so that the interference caused by motion can be filtered and therefore the measurement stability can be ensured.

11.5.4 C A

The SpO_2 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 oxygen saturation level. Conversely, the longer the averaging time is, the slower the monitor responds to changes in the patient's oxygen saturation level, but the measurement accuracy will be improved. For critically ill patients, selecting a shorter averaging time will help in understanding the patient's state.

To set the averaging time:

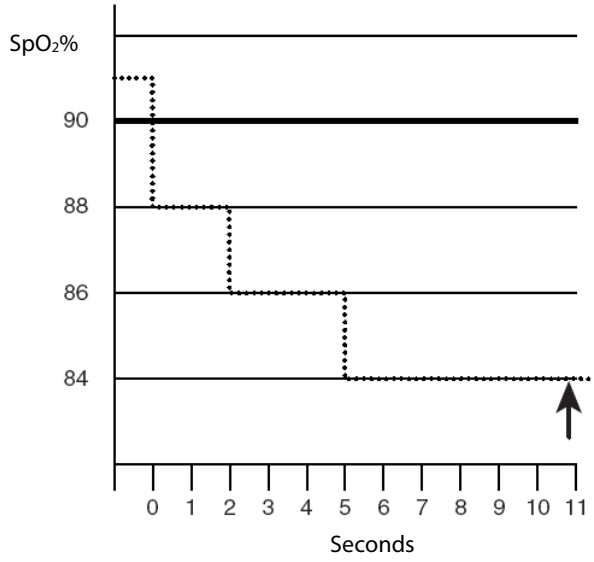
For the Mindray SpO_2 module, select [ ] in the [**2**] menu and then toggle between [ ], [ ] and [ ], which respectively correspond to 7 s, 9 s and 11 s.

For the Masimo SpO_2 module, select [**A**] in the [**2**] menu and then toggle between [**2-4**], [**4-6**], [**8**], [**10**], [**12**], [**14**] and [**16**].

11.5.5 [2] [ ]

When monitoring SpO_2 and NIBP on the same limb simultaneously, you can switch [ ] on in the [**2**] menu to reduce the impact of NIBP measurement on SpO_2 measurement.

5[e4 1 t 3 T c 0 0 3) B ( ) 7 0 0 8 (t] - 4 (o 8 (e) - 3 . 8 9 3 1 > > B D 2 . 6 - 2 8 T a t / T 1 _ 0 1 T f 0 . 1 . 4 5 h) 1 (e) 1 - 7 (u) T - 0 . 1 1 T f - 0 . 1) 1 (n) 3 0 7 1 > > B D 2 . 6 -



Saturation levels may fluctuate rather than remaining steady for a period of several seconds. Often, the patient % SpO_2 may fluctuate above and below an alarm limit, re-entering the non-alarm range several times. During such fluctuation, the monitor integrates the number of % SpO_2 points, both positive and negative, until either the Sat-Seconds limit is reached, or the patient % SpO_2 re-enters the non-alarm range and remains there.

11.5.7 C]

In the [**2**] menu, select [ ] and then select the appropriate setting. The faster the waveform sweeps, the wider the waveform is.

11.5.8 **A]** **2** **A]**

Select [**A ** >>] from the [ ] menu. You can set the [**2** .] in the popup menu.

11.5.9 **2**

Select [>>] from the [ ] menu. In the popup menu, you can set [**2**] as [**1**] or [**2**].

A

] **2**]]]]].

11.6]].

If you doubt the measured SpO_2, check patient vital signs first. Then check the monitor and SpO_2 sensor. The following factors may influence the accuracy of measurement:

Ambient light

Physical movement (patient and imposed motion)

Diagnostic testing

Low perfusion

Electromagnetic interference, such as MRI environment

Electrosurgical units

Dysfunctional hemoglobin, such as carboxyhemoglobin (COHb) and methemoglobin (MetHb)

Presence of certain dyes, such as methylene and indigo carmine

Inappropriate positioning of the SpO_2 sensor, or use of incorrect SpO_2 sensor.

Drop of arterial blood flow to immeasurable level caused by shock, anemia, low temperature or vasoconstrictor.

11.7] . [.].

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11.8 . . . [. .].

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12

12.1

The monitor uses the oscillometric method for measuring non-invasive blood pressure (NIBP). This monitor can be applied to felines, canines and other animals.
Automatic non-invasive blood pressure monitoring uses the oscillometric method of measurement. To understand how this method works, we'll compare it to the auscultative method. With auscultation, the clinician listens to the blood pressure and determines the systolic and diastolic pressures. The mean pressure can then be calculated with reference to these pressures as long as the arterial pressure curve is normal.

Since the monitor cannot hear blood pressure, it measures cuff pressure oscillation amplitudes. Oscillations are caused by blood pressure pulses against the cuff. The oscillation with the greatest amplitude is the mean pressure. This is the most accurate parameter measured by the oscillometric method. Once the mean pressure is determined, the systolic and diastolic pressures are calculated with reference to the mean.

Simply stated, auscultation measures systolic and diastolic pressures and the mean pressure is calculated. The oscillometric method measures the mean pressure and determines the systolic and diastolic pressures.

As specified by IEC 60601-2-30/EN60601-2-30, NIBP measurement can be performed during electro-surgery and discharge of defibrillator.

NIBP diagnostic significance must be decided by the doctor who performs the measurement.

B

A

12.2]

⚠ A

B

B

B

A A

12.3]

Measurements are impossible with heart rate extremes of less than 40bpm or greater than 240bpm, or if the patient is on a heart-lung machine.

The measurement may be inaccurate or impossible:

If a regular arterial pressure pulse is hard to detect

With excessive and continuous patient movement such as shivering or convulsions

With cardiac arrhythmias

With rapid blood pressure changes

With severe shock or hypothermia that reduces blood flow to the peripheries

With obesity, where a thick layer of fat surrounding a limb dampens the oscillations coming from the artery

12.4]

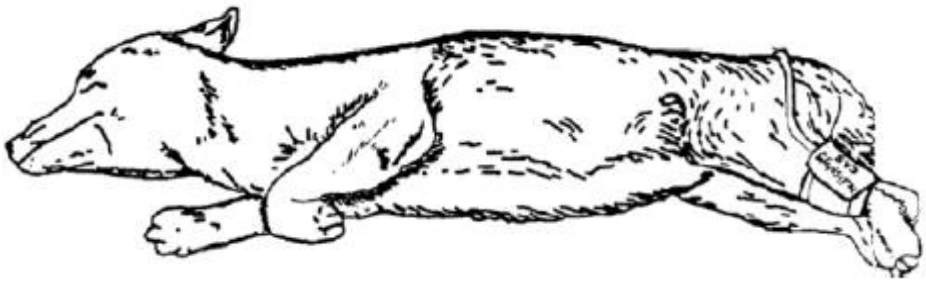
There are three methods of measuring NIBP:

Manual: measurement on demand.

Auto: continually repeated measurements at set intervals.

STAT: continually rapid series of measurements over a five minute period, then return to the previous mode.

The metacarpus, metatarsus and anterior tibial are recommended for the cuff placement. For anesthetized patients, most surgeries are done on the posterior part of the body so the metacarpal area of the forelimb is most convenient. In situations where this is not possible, place the cuff around the metatarsus just proximal to the tarsal pad or around the hind leg next to the hock. For conscious patients, measurements from the coccygeal artery can be used over the tail site.



Canine cuff placement

For larger animals

It is preferable for a large animal, such as a horse or a cow, to be in a stock, standing still. Measurments from the coccygeal artery on the ventral surface may be used by placing the cuff around the base of the tail.

12.5.2

Select the [ ] QuickKey and you can start the desired measurement from the popup menu. You can select the [ ] QuickKey to stop all NIBP measurements. You can also start and stop measurements by using the hardkey on the monitor's front panel.

12.5.3

The cuff should be applied to a limb at the same level as the patient's heart. If the limb is not at the heart level, to the displayed value:

Add 0.75 mmHg (0.10 kPa) for each centimeter higher, or

Deduct 0.75 mmHg (0.10 kPa) for each centimeter lower.

12.5.4

1. Select the NIBP parameter window to enter the [ ] menu.
2. Select [ ] and then select a desired time interval. Selecting [ ] switches to manual mode.
3. Start a measurement manually. The monitor will then automatically repeat NIBP measurements at the set time interval.

In auto mode, you can enable the clock function to synchronize the NIBP automatic measurements with the real time clock.

For example, when the clock is enabled, if [ ] is set to [**20**], and then you start NIBP auto measurement at 14: 03, the next measurement will be taken at 14: 20, and the following measurement time will be 14:40, 15:00, and so on.

To enable the clock, in the [ ] menu, set [**C**] to [ ].

5

12.5.5 [ ] [ ] A [ ]

1. Select the NIBP parameter window to enter the [ ] menu.
2. Select [ ]. The STAT mode initiates 5 minutes of continuous, sequential, automatic NIBP measurements.

A

C]]]

12.7 C]

By selecting the NIBP parameter window, you can enter the [ ] menu.

12.7.1] C]

You can set the initial cuff inflation pressure manually. In the [ ] menu, select [ ] and then select the appropriate setting.

12.7.2 A]

Select [**A** >>] from the [ ] menu. You can set the alarm properties for this parameter in the popup menu.

12.7.3]]

Select the [ ] QuickKey→[ ]. You can set [ ] to be displayed at the bottom area of the screen. Then, multiple sets of the most recent NIBP measurements will be displayed. And PR displayed is derived from NIBP.

You cannot display [ ] in some screens such as the big numerics screen.

12.7.4

Select [>>] from the [ ] menu. In the popup menu, select [ ] and toggle between [ ] and [ ].

12.7.5

The monitor can issue a reminder tone at the completion of NIBP measurement. The NIBP End Tone is off by default. You can switch it on by accessing the [ ] menu.

12.8 A

You can use the NIBP cuff to cause sub-diastolic pressure to block the venous blood vessel and therefore help venous puncture.

1. Select [>>] from the [ ] menu. In the popup menu, verify that the [**C** .] value is appropriate. Change it if necessary.
2. Select [ ].
3. Puncture vein and draw blood sample.
4. Select the hardkey on the monitor's front, or the [**A**] QuickKey to deflate the cuff. The cuff deflates automatically after a set time if you do not deflate it.

During measurement, the NIBP display shows the inflation pressure of the cuff and the remaining time in venous puncture mode.

13

13.1

You can simultaneously monitor two temperature sites using the monitor.

13.2

A

13.3

1. Select an appropriate probe for your patient.
2. If you are using a disposable probe, connect the probe to the temperature cable.
3 Plug the probe or temperature cable to the temperature connector.
4. Attach the probe to the patient correctly.
5. Check that the alarm settings are appropriate for this patient.

13.4 [ ]]

Temperature monitoring is displayed on the monitor as three numerics: T1, T2 and TD. By selecting this area, you can enter the [**A**]] menu.

14

14.1

The monitor can monitor up to 4 invasive blood pressures. The monitorcan display the systolic, diastolic and mean pressures and a waveform for each pressure.

14.2

A

14.3 [redacted]

To avoid inaccurate pressure readings, the monitor requires a valid zero. Zero the transducer in accordance with your hospital policy (at least once per day). Zero whenever:

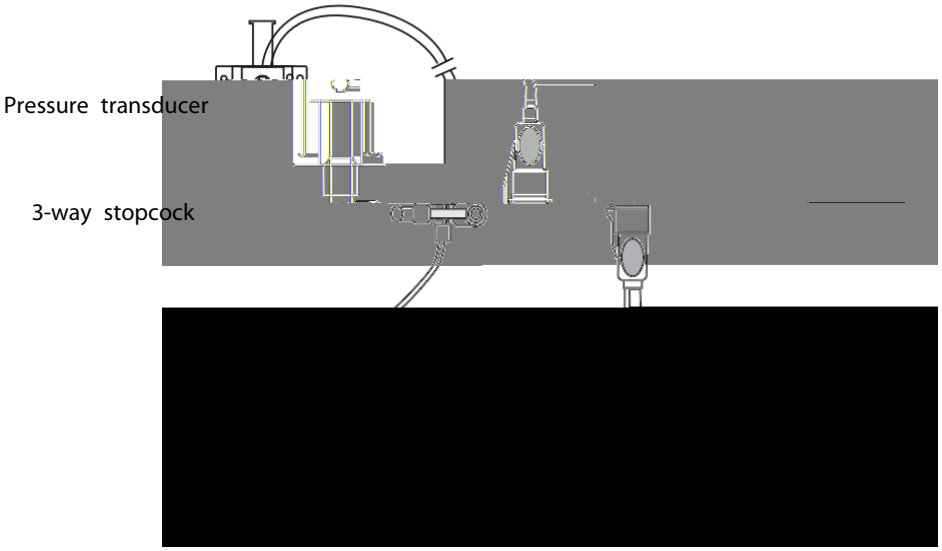
A new transducer or adapter cable is used.

You reconnect the transducer cable to the monitor.

The monitor restarts.

You doubt the readings.

. Turn off the stopcock to the patient.



2. Vent the transducer to the atmospheric pressure by turning on the stopcock to the air.
3. In the setup menu for the pressure (e.g. Art), select [**A** >>]→[ ]. During zero calibration, the [ ] button appears dimmed. It recovers after the zero calibration is completed. To zero all IBP channels, select the [**B**] hotkey, and then select [**A C**]] in the popup menu.
4. After the zero calibration is completed, close the stopcock to the air and open the stopcock to the patient.

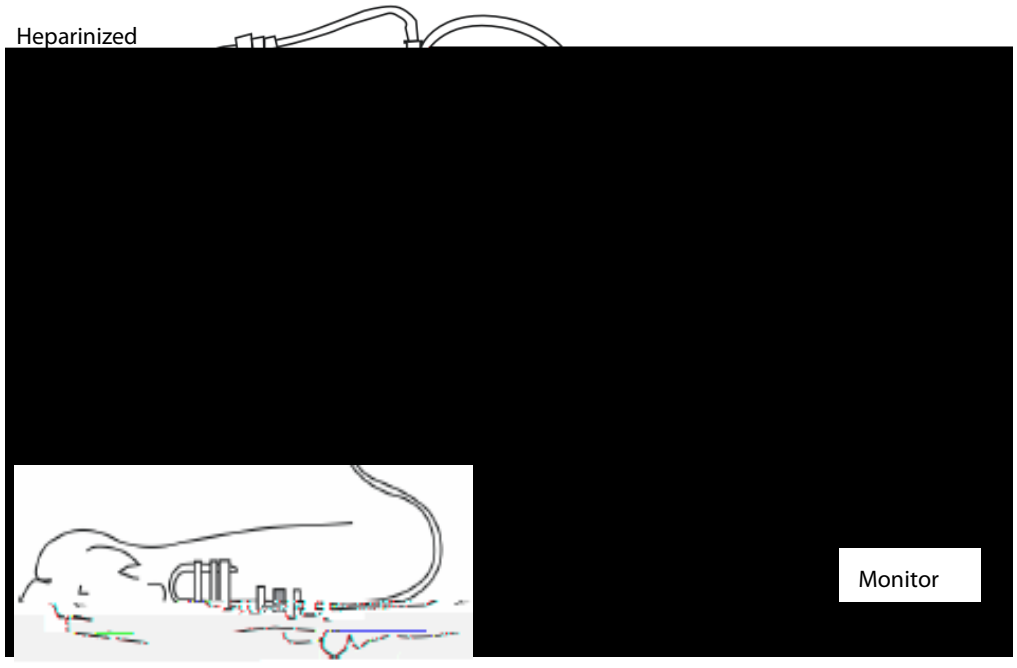
[redacted]

14.4

1. Plug the pressure cable into the IBP connector.
2. Prepare the flush solution.
3. Flush the system to exhaust all air from the tubing. Ensure that the transducer and stopcocks are free of air bubbles.

A

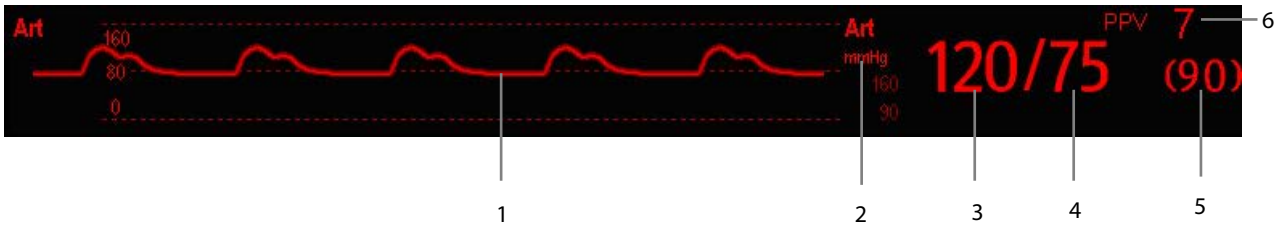
4. Connect the pressure line to the patient catheter.
5. Position the transducer so that it is level with the heart, approximately at the level of the midaxillary line.
6. Select the appropriate label.
7. Zero the transducer. After a successful zeroing, turn off the stopcock to the atmosphere and turn on the stopcock to the patient.



A

14.5 [illegible]

The IBP measurement is displayed on the monitor as a waveform and numeric pressures. The figure below shows the waveform and numerics for the Art pressure. For different pressures, this display may be slightly different.



1. Waveform
2. Pressure unit
3. Systolic pressure
4. Diastolic pressure
5. Mean pressure
6. PPV measurement

For some pressures, the parameter window may show the mean pressure only. For different pressures, their default 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.

14.6 C[illegible]

14.6.1 C[illegible]

1. Select the pressure you want to change to enter its setup menu. In the menu, there is a figure showing the current IBP measurement connector.
2. Select [illegible] and then select your desired label from the list. The already displayed labels cannot be selected.

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

[illegible]

14.6.2

Select [ ] from the parameter setup menu to set the display order of the pressure labels. The default display order is: Art, pArt, CVP, pCVP, ICP, PA, AO, UAP, FAP, BAP, LV, LAP, RAP, UVP, P1, P2, P3, P4. To restore the default setting, you can select [ ] from the [ ] window.

14.6.3

Select [ ] from the parameter setup menu. You can set alarm properties for this parameter in the popup menu.

14.6.4

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. Conversely, the longer the averaging time is, the slower the monitor responds to changes in the patient's blood pressure, but the measurement accuracy will be improved. For critically ill patients, selecting shorter averaging time will help in understanding the patient's state.

To set the averaging time, in the parameter setup menu, select [ ] and toggle between [ ], [ ] and [ ]. The corresponding averaging time is about 1 s, 8 s and 12 s respectively.

14.6.5

In the setup menu for the pressure, you can:

Select [ ] and then select the appropriate setting. The faster the wave sweeps, the wider the wave is.

Select [ ] and then select the appropriate setting. If [ ] is selected, the size of the pressure's waveform will be adjusted automatically.

Select [ ] and then select the desired option.

14.6.6].]]]

PPV indicates pulse pressure variation. To enable PPV measurement, set [ ]] to [ ].

You can select the PPV source when PPV measurement is enabled.

A

8 **8 /** ( ).

CC **CC**

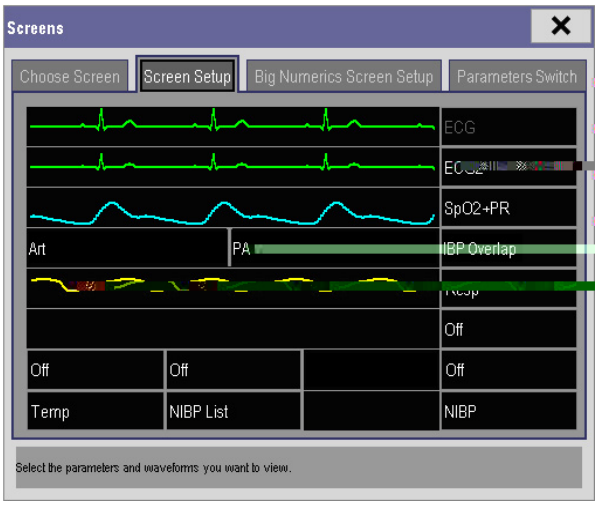
14.6.7 >>]]]]

Select [>>] from the [ ] menu. In the popup menu, select [ ] and toggle between [ ] and [ ]. Select [ ] and toggle between [ ], [ ] and [ ].

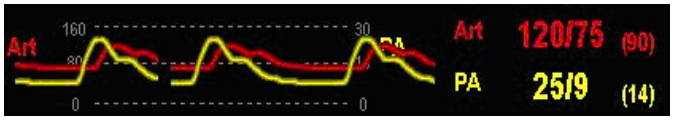
14.7] [ ]

The IBP waveforms can be displayed together. To combine IBP waveforms,

1. Select [ ]→[>>]→[>>] to access the [ ] window.
2. Select the [ ] tab.
3. In Area A, select [ ] from the drop-down list, and then select the IBP waves to be overlapped on the left side of the same line.



4. Select to save the setting and exit the window. The main screen will display the overlapped IBP waves.



Selecting the overlapped IBP waveforms on the main screen pops up the [ ],] menu, where you can:

Set [ ] and [ ] and then set the scales for the overlapped waveforms. The left scale is for Art, LV, Ao, FAP, BAP, UAP, and the arterial waveforms of P1~P4; the right scale is for CVP, ICP, LAP, RAP, UVP, and the venous waveforms of P1~P4.

Set [ ] individually if CVP waveform is combined and CVP unit is different from IBP unit.

Set [ ] individually if PA waveform is combined.

Set [ ] to [ ] or [ ] to show gridlines or not in the overlapped waveform area.

Select [ ] and then set the sweep speed for the overlapped waveforms.

Select [ ] and then set the filter for the overlapped waveforms.

You can also change the above settings from the corresponding IBP setup menu.

14.8 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.

14.8.1 [illegible] A

1. Prepare the same accessories as in the C.O. measurement. Connect the parts such as catheter, syringe, etc. following the C.O. measurement steps and use the balloon inflation port.
2. Connect the PAWP cable into the IBP connector on the monitor. Since PAWP is measured on PA, selecting [**A**] as the IBP label is recommended.
3. Select the PA parameter window or waveform area to enter its setup menu. Then, select [**A**] to enter the PAWP measurement window. You can also enter the PAWP measurement window from the P1-P4 parameter window.

[illegible]

A [illegible] **A** [illegible] **A**] [illegible]

14.8.2 [illegible] A [illegible]

1. Wedge the flotation catheter into the pulmonary artery. Then inflate the balloon and pay attention to PA waveform changes on the screen.
2. After obtaining a stable PAWP waveform, press the [ ] key to freeze the waveform and deflate the balloon.
3. You can adjust the PAWP scale to an appropriate position by adjusting ▲ or ▼ beside the [**A**] button. Press the [**C**] key to save one PAWP measurement.
4. If you need to start a new measurement, select [ ].

⚠ **A**

[illegible]

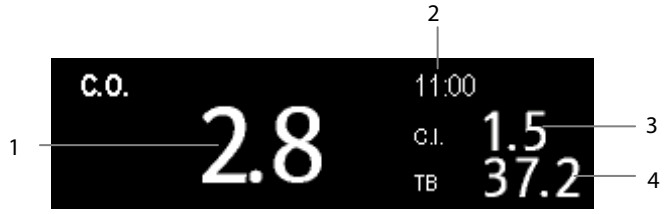
15 C]], (C. .)

15.1

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 in 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.

15.2] C.]

The C.O. measurement is displayed on the monitor as numeric C.O., C.I. and TB in the C.O. parameter window as shown below. To enter the [**C.**] menu, select the C.O. parameter window.



1. Cardiac output
2. Time at which the C.O. average is calculated
3. Cardiac index
4. Blood temperature

15.3],

The factors that affect cardiac output are:

temperature of injectate solution,

volume of injectate solution,

patient's baseline blood temperature,

patient's inspiratory/expiratory cycle,

placement of catheter with relation to proximity of lung field,

the catheter itself,

the patient rhythm and hemodynamic status, and

any other rapid IV solutions which are infused while the C.O. measurement is being performed.

The following are some technique suggestions to obtain accurate C.O.:

Injectate solution must be cooler than the patient's blood.

Inject solution rapidly and smoothly.

Inject at end expiration.

15.4 C.

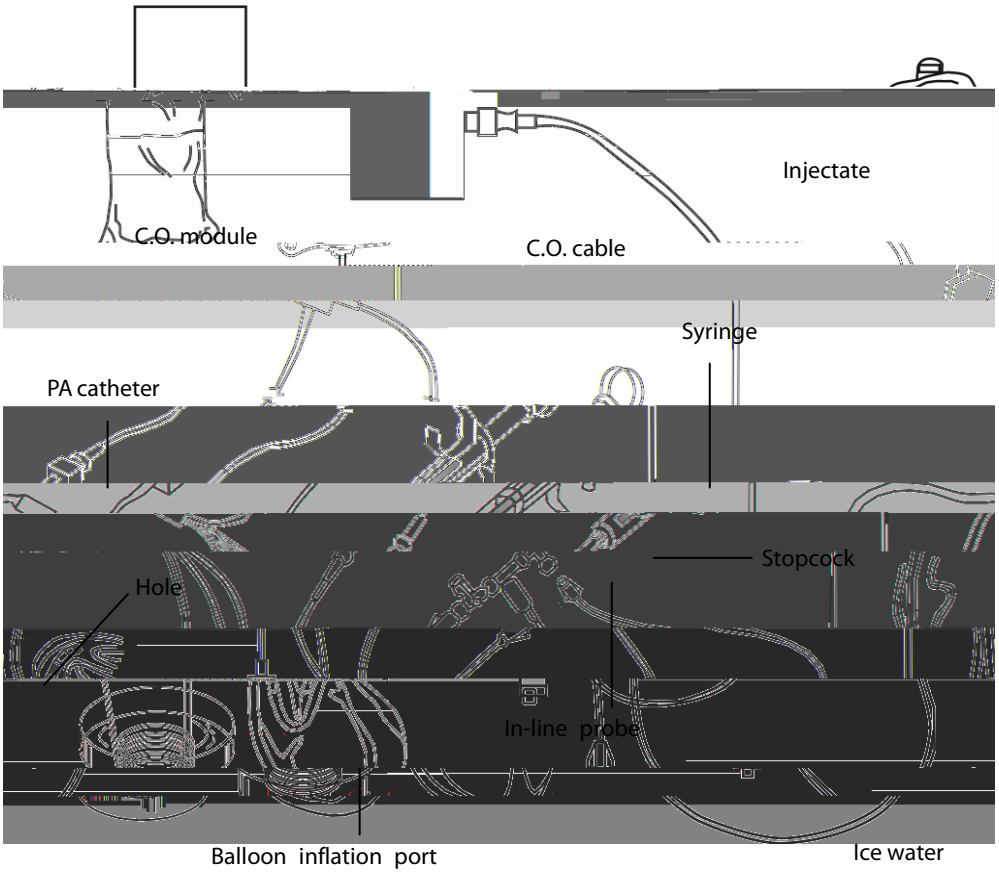
A

1. Connect the C.O. cable to the C.O. connector on the monitor.
2. Interconnect the C.O. module, catheter and syringe as shown below. Make sure that:

   The module is securely inserted.

   The PA catheter is in place in the patient.

   The C.O. cable is properly connected to the module.



6000-10-02079

3. Select the C.O. parameter window to enter the [C. . . .] menu. Check if the height and weight are appropriate for your patient. Change if necessary.

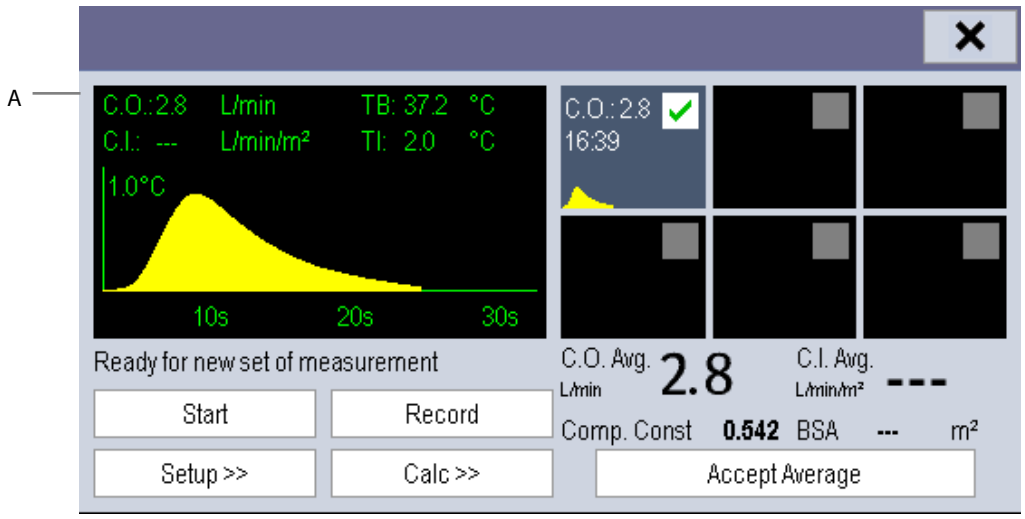
4. In the [C. . . .] menu:

   Check that the correct computation constant is entered. Refer to the Instruction for Use of the pulmonary artery catheter to determine the [C . C] according to the entered injectate volume and temperature. To change the computation constant, select [C . C] and then enter the correct value. When a new catheter is used, the computation constant should be adjusted in accordance with the manufacturer's instructions for use.

   Set the [A . .] to [ ]] or [A .]. If you select [A .], the system automatically detects the injectate temperature, and the [ ] ( )] is disabled. If you select [ ]], you need to enter the injectate temperature at [ ] ( )] manually.

   Set the [ ] . .] to [ ]] or [A .]. In [A .] mode, the monitor automatically takes a C.O. measurement after establishing a baseline blood temperature. In [ ]] mode, you need to click the [.]] button in the C.O. measurements window when the monitor is ready for a new C.O. measurement.

5. Select [. . C. . . .] to enter the C.O. measurements window.



A. Currently measured numeric
B. Currently measured C.O. curve
C. Prompt message area
D. Buttons
E. Averaged values
F. Measurement windows

6. Proceed as follows.

   In [ ]] measure mode, select the [.]] button and then inject the solution quickly when you see the message [ ] . . . .]. 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 windows and the monitor prompts you to wait for a certain period of time before starting a new measurement.

In [**A** ..] measure mode, the monitor consecutively takes C.O. measurements automatically without the need to press the [.] .] button between two measurements. A new thermodilution measurement is possible as soon as the message [**!**] is displayed on the screen. The monitor automatically detects further thermodilution measurements.

7. Consecutively take 3 to 5 single measurements as instructed by Step 6.

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** . . **A** .] button to accept and store the averaged values.

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

In the buttons area, you can:

Select [.] .] to start a C.O. measurement.

Select [. .] to stop the current measurement.

Select [**C]** .] during a measurement to cancel the measurement. Selecting it after a measurement deletes the measured results.

Select [. .] to print out the curves selected for average calculation, numerics and averaged values by the recorder.

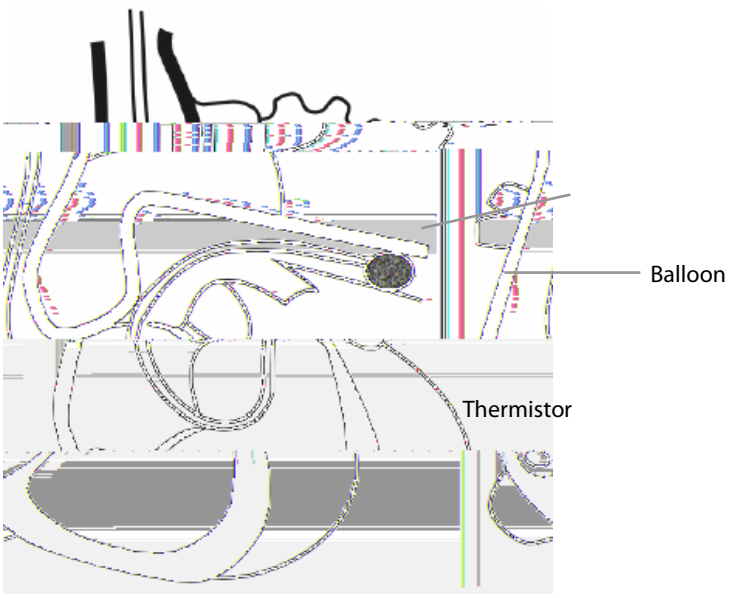
Select [. . >>] to access the [**C.** . . .] menu.

Select [**C]** >>]→[ ] >>] to access the [ ] **C]** .] .] menu.

The system can automatically adjust the X-axis scale range to 30 s or 60 s and the Y-axis scale range to 0.5°C, 1.0°C, or 2.0°C.

15.5] B]

As shown below, the blood temperature is measured with a temperature sensor at the distal end of the catheter in the pulmonary artery. During C.O. measurements, blood temperature alarms are suppressed to avoid false alarms. They will automatically recover as soon as the C.O. measurements are completed.



15.6 C] C

15.6.1]

Select [>>] from the [ ] menu. In the popup menu, select [ ] to toggle between [**C**] and[ ].

15.6.2 A]

Select [**A** >>] from the [**C**] menu. You can set alarm properties for this parameter in the popup menu.

16 C] (C 2)

16.1

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. The 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 is passed through respiratory gas samples, some of the 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.

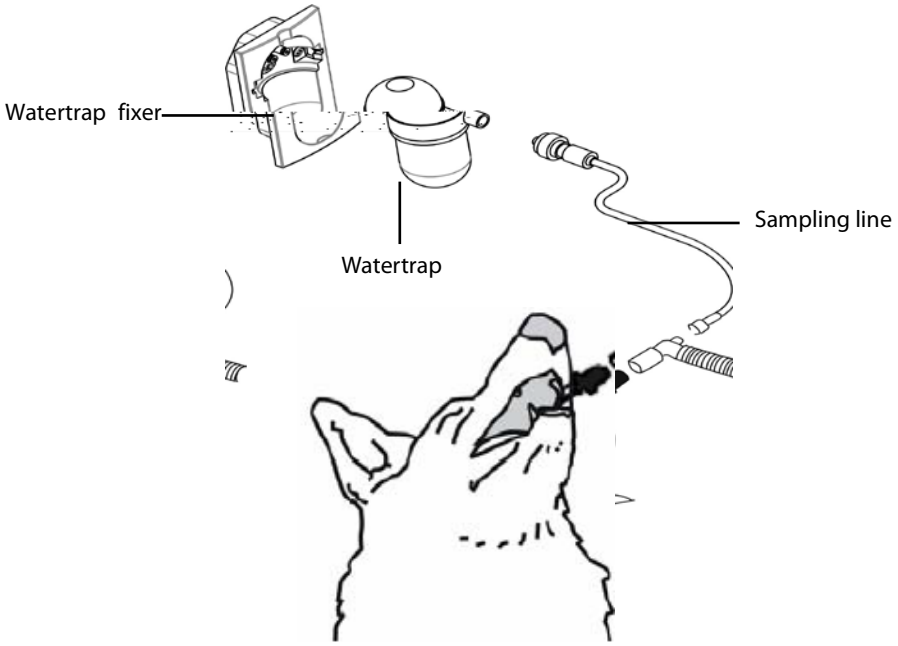
There are two methods for measuring CO_2 in the patient's airway:

1. Mainstream measurement uses a CO_2 sensor attached to an airway adapter directly inserted into the patient's breathing system.
2. Sidestream/Microstream measurement samples expired patient gas at a constant sample flow from the patient's airw0(g3( )-Tw 0Tc 0.0(a)21(mp)201)13(o)Tc34]TJdo

16.2] . . C 2

16.2.1] .] . .] C 2] . .

1. Attach the watertrap to the module and then connect the CO_2 components as shown below.



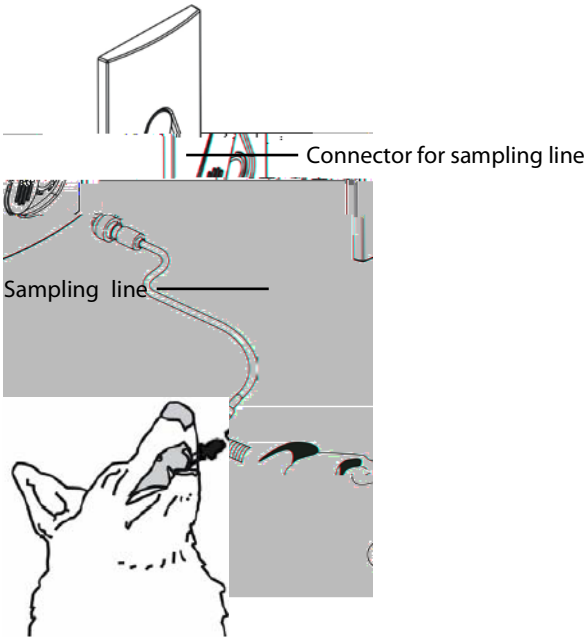
2. The CO_2 module needs time to warm up to reach the operating temperature. The message [C 2 . .] .] is displayed during warm-up. If you perform CO_2 measurements during warm-up, the measurement accuracy may be compromised.
3. After warm-up is finished, you can perform CO_2 measurements.

⚠CA . [

. .] . .], . .] . . . .] . .] . . . . .] . . . . .] . . .

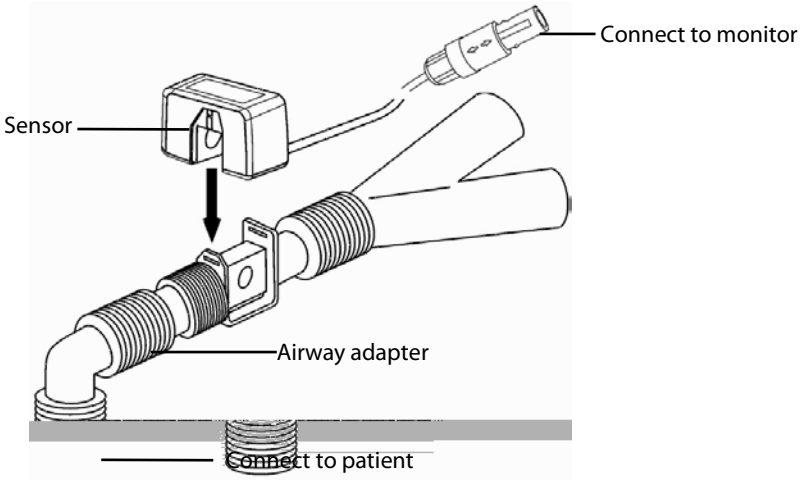
16.2.2]]] C 2] —

Connect the sampling line to the module and then connect the CO_2 components as shown below. After warm-up is finished, you can perform CO_2 measurements.



16.2.3]]] C 2] —

1. Connect the sensor to the module. The message [C 2] —] appears on the screen when the CO_2 module is plugged.
2. After warm-up is finished, connect the transducer to the airway adapter.
3. Perform a zero calibration per the ***Zeroing the Sensor*** section.
4. After the zero calibration is finished, connect the airway as shown below.



5. Make sure there are no leakages in the airway and then start a measurement.

A]]]

16.3 C] C 2

16.3.1 A C 2

By selecting the CO_2 parameter window, you can access the [C 2] menu.

16.3.2]

The standby mode of the CO_2 module relates to the standby mode of the monitor as follows:

If the monitor enters the standby mode, the CO_2 module will also enter the standby mode.

If the monitor exits the standby mode, the CO_2 module will also exit the standby mode.

If the CO_2 module enters or exits the standby mode, it will not affect the monitor.

To enter or exit the standby mode manually, select [ ] in the [C 2] menu and then toggle between [ ] and [ ].

When you set the sidestream CO_2 module to the strandby mode, the CO_2 gas sample intake pump automatically sets the sample flow rate to zero. When exiting the standby mode, the CO_2 module continues to work at the preset sample flow rate.

For the sidestream CO_2 module, you can set the delay time. After the delay time the CO_2 module enters the standby mode if no breath is detected.

For the microstream CO_2 module, you can also set a period of time after which the CO_2 module enters the standby mode if no breath is detected since the CO_2 module is powered on or the CO_2 module switches to the measuring mode or the automatic standby time is re-set. To set the standby time, in the [C 2] menu, select [A] and then select the appropriate setting.

16.3.3 C 2

Select [>>] from the [ ] menu. In the popup menu, select [C 2] and toggle between [ ], [%] and [ ].

16.3.4 [illegible]

A [illegible]

[illegible]

For the sidestream CO_2 module:

1. Select [**C 2**].
2. According to the actual condition, set the concentration required for the following compensations:

   [**2 C**]

   [**2 C**]

   [**C**]

For the microstream CO_2 module, gas compensations are not required.

For the mainstream CO_2 module, in the [**C 2**] menu, respectively select:

[**B**] and toggle between [**A**] and [**2**]. Select [**A**] when air predominates in the ventilation gas mixture and select [**2**] when N_2O predominates in the ventilation gas mixture and select [ ] when He predominates in the ventilation gas mixture.

[**C**] and then select [ ] or an appropriate setting according to the amount of O_2 in the ventilation gas mixture. When the amount of O_2 is less than 30%, you'd better switch this compensation off.

[**A C**] and enter the concentration of anesthetic gas present in the ventilation gas mixture. This could compensate for the effect of AG on the readings.

16.3.5 [illegible] **C**]

Sidestream and microstream CO_2 modules are configured to compensate CO_2 readings for either Body Temperature and Pressure, Saturated Gas (BTPS), to account for humidity in the patient's breath, or Ambient Temperature and Pressure, Dry Gas (ATPD).

1. ATPD: $P_{co2}(mmHg) = CO_2(vol\%) \times P_{amb}/100$

2. BTPS: $P_{CO2}(mmHg) = CO_2(vol\%) \times (P_{amb} - 47)/100$

Where, P_{CO2} = partial pressure, $vol\%$ = CO_2 concentration, P_{amb} = ambient pressure, and unit is mmHg.

As the mainstream CO_2 module has a built-in heating component to prevent water vapour from condensing, setting humidity compensation is not needed. For the sidestream and microstream CO_2 module, you can set the humidity compensation on or off according to the actual condition. To set the humidity compensation:

1. In the [**C 2**] menu, select [**B C**].
2. Select either [ ] for BTPS or [ ] for ATPD, depending on which compensation applies.

16.3.6 [illegible]

In the [C 2] menu, select [A] and then select the appropriate setting. The monitor will alarm if the patient has stopped breathing for longer than the preset apnea time. The [A] of Resp, CO_2, and AG module keeps consistent with each other.

A

[illegible]

16.3.7 C [illegible]

For microstream and mainstream CO_2 modules, you can select a time interval for picking the highest CO_2 as the $EtCO_2$ and the lowest as the $FiCO_2$.

In the [C 2] menu, select [ ] and toggle between [**B**], [**10**], [**20**] and [**30**] (for microstream CO_2 module only)..

[**B**]: $EtCO_2$ and $FiCO_2$ are calculated for every breath.

[**10**], [**20**] or [**30**]: $EtCO_2$ and $FiCO_2$ are calculated using 10, 20 or 30 seconds of data.

16.3.8 [illegible]

For the sidestream CO_2 module, you can change the sampling rate of respiratory gas in the patient's airway by setting the flow rate. To set the flow rate, enter the [C 2] menu and select an appropriate setting from [ ].

A

[illegible]

16.3.9 [illegible] C 2]

In the [C 2] menu, you can:

Select [ ] and toggle between [ ] and [ ]:

[ ]: The CO_2 wave is displayed as a curved line.

[ ]: The CO_2 wave is displayed as a filled area.

Select [ ] and then select the appropriate setting. The faster the wave sweeps, the wider the wave is.

Change the size of the CO_2 waveform by adjusting the wave [ ].

16.4

To set RR source:

1. Enter the [**C 2**] menu.
2. Select [

16.8 [illegible] C 2 [illegible]

When the sampling system of the sidestream CO_2 module works incorrectly, check if the sampling line is kinked. If not, remove it from the watertrap. If the monitor gives a message indicating the airway still works incorrectly, it indicates that the watertrap must have been blocked, and you should replace with a new one. Otherwise, you can determine that the sampling line must have been blocked. Replace with a new sampling line.

16.9 [illegible]

A [illegible]

A [illegible] C 2 [illegible]

To remove the sample gas to a scavenging system, connect an exhaust tube to the gas outlet connector of the module.

16.10 [illegible]

The zero calibration eliminates the effect of baseline drift during CO_2 measurement exerted on the readings and therefore maintains the accuracy of the CO_2 measurements.

16.10.1 [illegible] C 2 [illegible]

For sidestream and microstream CO_2 modules, a zero calibration is carried out automatically when necessary. You can also start a manual zero calibration if necessary.

To manually start a zero calibration:

1. Select [ ]→[ ]>>]→[ ]>>]→enter the required password→[ ] **C 2** >>].
2. Select [**C**]]. **C 2** >>]→[ ] **C**].

Disconnecting the patient airway is not required when performing a zero calibration.

16.10.2 [ ] [ ] C 2

For mainstream CO_2 modules, zero the sensor whenever:

A new adapter is used;

You reconnect the sensor to the module;

You see the message [C 2]. In this case, check the airway adapter for any blockage, e.g. mucus, etc. If a blockage is detected, clear or replace the adapter.

To zero the sensor, follow this procedure:

1. Connect the sensor to the module.
2. In the [C 2] menu, set the [ ] to [ ]. The message [C 2] is displayed.
3. After warm-up is finished, connect the sensor to a clean, dry airway adapter. The adapter should be vented to the air and isolated from CO_2 sources, such as ventilator, the patient's breathing, your own breathing, etc.
4. Select [ ] C] .] in the [C 2] menu. The message [C 2] is displayed.
5. It takes about 15 to 20 seconds. The message disappears when the zero calibration is completed.

A

16.11 C] [ ]

For sidestream or microstream CO_2 modules, a calibration should be performed once every year or when the readings go far beyond the range. For mainstream CO_2 modules, no calibration is required. For details, refer to the chapter ***26 Maintenance.***

16.12

Microstream

This trademark is registered in Israel, Japan, German and America.

The capnography component of this product is covered by one or more of the following US patents: 6,428,483; 6,997,880; 6,437,316; 7,488,229; 7,726,954 and their foreign equivalents. Additional patent applications pending.

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 CO_2 sampling consumable.

17

17.1

17.3 AC]

AC]

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 21647 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.

Minimum alveolar concentration (MAC) values are listed below:

Agent	Des	Iso	Enf	Sev	Hal	N_2O
1 MAC	6%*	1.15%	1.7%	2.1%	0.77%	105%*

* The data is taken from a patient of 25 years old.

AC **A** **40-**

AC

The formula to calculate the MAC value is as follows:

$$MAC = \sum_{i=0}^{N-1} \frac{EtAgent_i}{AgentVol_{age}i}$$

Where N is the number of all agents (including N_2O) that the AG module can measure, EtAgenti is the concentration of each, 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 there are 4% of Des, 0.5% of Hal and 50% of N_2O in this patient's end-tidal gas:

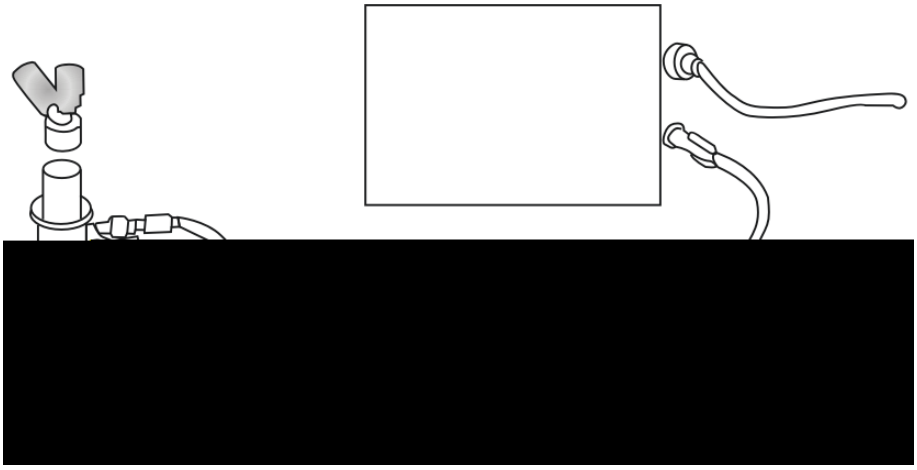
$$MAC = \frac{4.0\%}{6\% \times 0.88} + \frac{0.5\%}{0.77\% \times 0.88} + \frac{50\%}{105\% \times 0.88} = 2.04$$

For example, the AG module measures there are 4% of Des, 0.5% of Hal and 50% of N2O in the patient's end-tidal gas:

$$MAC = \frac{4.0\%}{7.3\%} + \frac{0.5\%}{0.77\%} + \frac{50\%}{105\%} = 1.67$$

17.4] A

1. Select an appropriate watertrap according to patient category and attach it to the module.
2. Connect the gas sample line to the connector of the watertrap.
3. Connect the other end of the gas sampling line to the patient via the airway adapter.
4. Connect the gas outlet to a scavenging system using an exhaust tube.



5. Insert the AG module to the monitor and the monitor will prompt [A]. Then the AG module starts to warmup and at the same time the monitor prompts [A]. After 45 seconds, the AG module enters the iso accuracy mode. After 10 minutes, the module enters the full accuracy mode.

A

]] A]]

17.5 C] A

17.5.1]]

For N2O and AA, the unit of the measured gas is fixed to "%".

Select [>>] from the [ ] menu. In the popup menu, you can select [C 2] or [2] and toggle between [ ], [%] and [ ].

17.5.2 A] A]]

In the [A] menu, select [A]] and select the appropriate setting. The monitor will alarm if the patient has stopped breathing for longer than the preset apnea time.

The [A]] of Resp, CO_2, and AG module keeps consistent with each other.

A

17.5.3 C]]].

In the setup menu for any gas, select [ ] and then choose either:

[ ]: 120 ml/min for neonatal patients.

[ ]: 90 ml/min for neonatal patients.

[ ]: 70 ml/min for neonatal patients.

17.5.4 2C].

If the AG module does not incorporate the O_2 module, you need to manually select [2C] and then select [ ] or an appropriate setting according to the amount of O_2 in the ventilation gas mixture. When the amount of O_2 is less than 30%, you'd better switch this compensation off.

If the AG module incorporates the O_2 module, the system will directly use the O_2 concentration detected by the O_2 module to make compensation. At this time, the [2C] in the setup menu for any gas is fixed to [ ].

17.5.5

For the AG module, the default operating mode is measure. When you set the AG module to the standby mode, the AG gas sample intake pump automatically sets the sample flow rate to zero. When exiting the standby mode, the AG module continues to work at preset sample flow rate with no need to warm up again. After nearly 1 minute, the module enters the full accuracy mode. The standby mode of the AG module relates to the standby mode of the monitor as follows:

If the monitor enters the standby mode, the AG module will also enter the standby mode.

If the monitor exits the standby mode, the AG module will also exit the standby mode.

If the AG module enters or exits the standby mode, it will not affect the monitor.

To enter or exit the standby mode manually, in the agent's setup menu, select [ ] and then toggle between [ ] and [ ]. You can also set a period of time after which the AG module enters the standby mode automatically if no breath is detected since the last detected breath. To set the standby time, in the agent's setup menu, select [ ] and then select the appropriate setting.

17.5.6

In the [ ] menu, you can:

Select [ ] and toggle between [ ] and [ ]:

[ ]: The CO_2 wave is displayed as a curved line.

[ ]: The CO_2 wave is displayed as a filled area.

Select [ ] and then select the appropriate setting. The faster the wave sweeps, the wider the wave is.

Change the size of the waveform by adjusting the scale.

17.5.7

To set RR source:

1. Enter the [ ] menu.
2. Select [ ] and then select a source or [ ] from the dropdown list.

The [ ] settings of Resp, CO_2, and AG module are linked. For details, please refer to the section ***Setting RR Source*** of chapter ***Monitoring Respiration (Resp)***.

17.6 C] A A

When the anesthetic agent used on the patient is changed, the AG module can detect 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 the 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 the primary and secondary anesthetic agents will be exchanged for display.

17.7]]

The following factors may influence the accuracy of measurement:

Leaks or internal venting of sampled gas

Mechanical shock

Cyclic pressure up to 10 kPa (100 cmH_2O)

Other sources of interference, if any

17.8

17.8.1] B

If the gas inlet (including watertrap, sampling line and airway adapter) is occluded by condensed water, the message [**A A]**] will appear.

To remove the occlusion:

Check the airway adapter for an occlusion and replace if necessary.

Check the sampling line for an occlusion or kinking and replace if necessary.

Check the watertrap for a build up of water. Empty the watertrap. If the problem persists, replace the watertrap.

17.8.2]]

Condensed water may enter the module and cause contamination and/or internal occlusions. In this case, the message [**A A]**] will be displayed.

To remove the occlusion:

Check for any occlusion in the gas inlet and/or outlet system.

If the problem persists, internal occlusions may exist. Contact your service personnel.

17.9

A

A

To remove the sample gas to a scavenging system, connect an exhaust tube to the gas outlet connector of the module.

18

During 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. Besides, you can select any frozen waveform for recording.

18.1

1. To freeze waveforms, select the hardkey on the monitor's front.
2. The system closes the displayed menu (if any), and opens the [ ] menu.
3. All displayed waveforms are frozen, i.e. the waveforms stop being refreshed or scrolling.

The freeze feature exerts no effect on the split-screen view of minitrends, OxyCRG and other patients.

18.2

To view the frozen waveforms, you can either:

Select the [ ] button and then rotate the Knob clockwise or counter-clockwise, or

Directly select the ◄ or ► beside the [ ] button using the touchscreen.

The frozen waveforms will scroll left or right accordingly. And meanwhile, at the lower right corner of the bottommost waveform, there is an upward arrow. The freeze time is displayed below the arrow and the initial frozen time is [0 s]. With the waveforms scrolling, the freeze time changes at intervals of 1 second. This change will be applied for all waveforms on the screen.

18.3 [ ] [ ]

To unfreeze the frozen waveforms, you can either:

Select the button at the upper right corner of the [ ] menu,

Select the hardkey on the monitor's front, or

Perform any other action that causes the screen to be readjusted or opens a menu, such as plugging in or out a module, pressing the hardkey, etc.

18.4 [ ] [ ]

1. In the [ ] menu, select, in turn, [**1**], [**2**] and [**3**] and then select your desired waveforms.
2. Select the [ ] button. The selected waveforms and all numerics at the frozen time are printed out by the recorder.

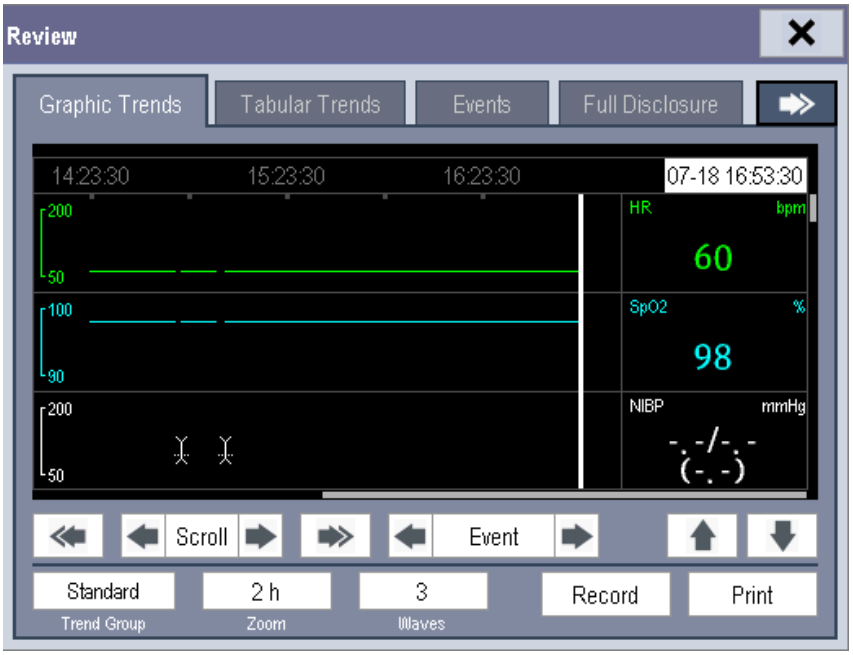
19

19.1 A

1. Select the [ ] QuickKey, or [ ]→[>>].
2. Select[ ], [ ], [ ] or [12-] to access their respective review windows.

19.2.

In the [ ] menu, select[ ],] to access the following window.



1.

To browse the graphic trends, you can either:

Select or beside [Scroll] to move the cursor one step to the left or right to navigate through the graphic trends, or

Select or to move the cursor one page to the left or right to navigate through the graphic trends.

A time indicating your current position is displayed above the parameter area. Numeric measurement values corresponding to the cursor location change as the cursor is moved. The measurement value that triggered high level alarm has red background. The one that triggered medium/low level alarm has yellow background.

By selecting or beside [ ], you can position the cursor to different event time.

By selecting the [ ] button, you can print out the currently displayed graphic trends by the recorder.

By selecting the [ ] button, you can set and print out the graphic trends report by the printer. For how to set the graphic trends report, please refer to the ***Printing*** chapter.

19.3.]

In the [ ] menu, select [ ] to access the the Tabular Trends window..Events are marked with colors in window's top area. Red represents high level alarm event. Yellow represents medium/low level alarm event. Green represents manual event.

In this review window:

Select [ ] and you can select a trend group for viewing in the popup menu. If [**C 1**] or [**C 2**] is selected, you can further select [ ]. Then you can select the parameters for viewing in the popup menu.

You can change the resolution of the trend data by selecting [Interval] and then selecting the appropriate setting:

[**5**] or [**30**]: select to view up to 4 hours of tabular trends at 5- or 30-second resolution.

[**1**], [**5**], [**10**], [**15**], [**30**], [**1**], [**2**] or [**3**]: select to view up to 120 hours of tabular trends at your selected resolution.

[ ]: select to view the tabular trends when NIBP measurements were acquired.

To browse the tabular trends, you can either:

Select or beside [Scroll] to drag the scrollbar left or right to navigate through the trend database, or

Select or to scroll left or right to navigate through the trend database.

The measurement value that triggered high level alarm has red background. The one that triggered medium/low level alarm has yellow background.

By selecting or beside [ ], you can position the cursor to different event time.

By selecting the [ ] button, you can access the [ ] menu and set the start and end time of the tabular trends you want to record. This feature is not available when reviewing a history patient. By further selecting [ ], you can print out the currently displayed tabular trends by the recorder.

By selecting the [ ] button, you can set and print out the tabular trends report by the printer. For how to set the tabular trends report, please refer to the ***Printing*** chapter.

19.4

19.4.1]

During monitoring, some events may exert effects on the patient and as a result change the waveforms or numerics displayed on the monitor. To help analysing the waveforms or numerics at that time, you can mark these events.

Select [ ]→[ ]>>]. In the popup menu, you can select the waves to be stored when a manual event is triggered. You can select [ ]] from the [ ] menu or the [ ]] QuickKey to trigger a manual event and store it at the same time.

When you are reviewing graphic trends, tabular trends or full-disclosure waveforms, the manual event symbol is displayed at the time the event is triggered.

19.4.2

The monitor saves the events in real time. You can review these events.

In the [ ] menu, select [ ] to access the Event window.

The events that can be reviewed include parameter alarm events, arrhythmia alarm events and manual events. When an event occurs, all the measurement numerics at the event trigger time and related waveforms 4 seconds, 8 seconds, or 16 seconds, as per the setting of recording length, respectively before and after the event trigger time are stored.

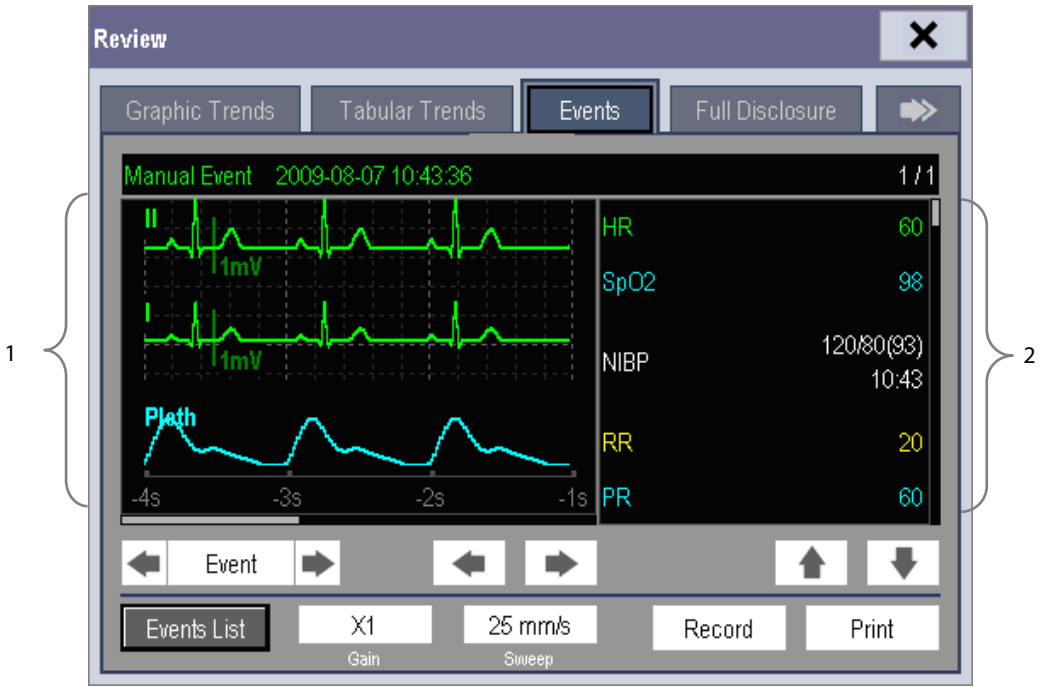
In this window:

You can view the desired events by selecting [Event].

You can view the desired events according to the level by selecting [Level].

After selecting the desired event, you can select [Details] to access the following window. In this window, the waveform area displays the waveforms related to the event, and the parameter area displays the parameter values happened at the event trigger time.

A]]]]



1. Waveform area

2. Parameter area

In this window:

You can select or to navigate through the waveforms.

You can select or beside the [Event] button to switch between events.

You can set the desired [ ] for ECG waveform.

You can set the desired [ ].

By selecting the [ ] button, you can print out the currently displayed alarm events by the recorder.

By selecting the [ ] button, you can print out the currently displayed alarm events by the printer.

By selecting the [ ] button, you can view the events list.

19.5. [illegible]

In the [illegible] menu, select [illegible] to access the Full Disclosure window.

In this review window:

To review full-disclosure waveforms, you need to save waveforms first. Select [illegible >>] and then select the parameters whose waveforms you want to view. To save full-disclosure waveform, your monitor must be equipped with a storage card.

To view the waveforms, you can either:

Select ◄ or ► beside the [illegible] button to move the cursor one step left or right to navigate through the waveforms, or

Select ◄◄ or ►► to move the cursor one page left or right to navigate through the waveforms.

A time indicating your current position is displayed at the top of the waveform area. Numeric measurement values corresponding to the cursor location are displayed in the parameter area, and change as the cursor is moved.

You can change the ECG wave gain by selecting [illegible] and then selecting the appropriate setting.

You can change the waveform sweep speed by selecting [illegible] and then selecting the appropriate setting.

By selecting the [illegible] button, you can print out the first three waveforms and measurement numerics by the recorder.

By selecting ◄ or ► beside the [illegible] button, you can position the cursor between events.

20 C] ,]]..

20.1 [, ,

The calculation feature is available with your monitor. The calculated values, which are not directly measured, are computed based on the values you provide.

Your can perform the following calculations:

Dose calculations

Oxygenation calculations

Ventilation calculations

Hemodynamic calculations

Renal calculations

To perform a calculation, select [ ] ,] → [**C]** , **>>**], or the [**C]** ,]] QuickKey and then select the calculation you want to perform.

⚠ **A [**

A ,]] , , , ,]]]

20.2 [illegible]

20.2.1 [illegible]

To perform a dose calculation:

1. Select [ ]→[**C**]→[>>]→[>>], or select [**C**]] QuickKey→[>>].
2. Select, in turn, [ ] **C**] and [ ] and then select the appropriate settings. The dose calculation program has a library of commonly used drugs, of which Drug A through Drug E are for those not specified in this library.

Drug A, B, C, D, E	Isuprel
Aminophylline	Lidocaine
Dobutamine	Nipride
Dopamine	NItroglycerin
Epinephrine	Pitocin
Heparin	

3. The system gives a set of default values when the above steps are finished. However, these values cannot be used as the calculated values. The user must enter values following the doctor's instructions, and then the calculated values can only be used
4. Enter the patient's weight.
5. Enter other values.
6. Verify if the calculated values are correct.

20.2.2 [illegible]

Each drug has its fixed unit or unit series. Among a unit series, one unit may change to another automatically depending on the entered value.

The units for each drug are as follows:

Drug A, B, C, Aminophylline, Dobutamine, Dopamine, Epinephrine, Isuprel, Lidocaine, Nipride and NItroglycerin use the unit series: g, mg and mcg.

Drug D, Heparin and Pitocin use the unit series: Unit, KU (kilo units) and MU (million units).

Drug E uses the unit: mEq (milli-equivalents).

You must select the proper drug name (A, B, C, D or E) according to the units when you define a drug not listed in this library.

20.2.3]. >>]

To open the titration table, select [ ]. >>] in the [C]] window after the dose calculation is finished.

In the titration table, when you change:

[ ]

[ ]

[ ]

The titrated values change accordingly.

You can also:

Select or , or or beside the vertical scrollbar to view more values.

Select [ ] to print out the currently displayed titrated values by the recorder.

20.2.4 C]]

A]		]
Conc.	g/ml, unit/ml or mEq/ml	Amount / Volume
Dose	Dose/hr, Dose/kg/min	Rate × Conc.
Volume	ml	Rate × Duration
Amount	g, unit, mEq	Rate × Duration
Duration	h	Amount/Dose
Drip Rate	gtt/min	INF Rate × Drop Size / 60

20.3] C]]

20.3.1 C]]

To perform an oxygenation calculation:

1. Select [ ]]→[C]] >>]→[ ] >>], or select [C]]] QuickKey→ [ ] >>].
2. Enter values for calculation.
3. Select the [C]]] button. The system performs a calculation per the current settings and displays the calculated values.

   If a calculated value is outside the range, its background will highlight in yellow. You can select [ ]] to view its normal range in the unit field.

   Invalid values are displayed as [---].

In the [ ]. C]].] window, you can:

Change the pressure unit, Hb unit and oxygen content unit by selecting [ ], [ ] and [C] and then selecting the appropriate settings. The changes take effect automatically.

Trigger a recording by selecting the [ ] button. The currently displayed oxygenation calculations are printed out by the recorder.

Review the previously performed calculations by selecting [ ].

20.3.2]]

A].		
C.O.	L/min	cardiac output
FiO_2	%	percentage fraction of inspired oxygen
PaO_2	mmHg	partial pressure of oxygen in the arteries
$PaCO_2$	mmHg	partial pressure of carbon dioxide in the arteries
SaO_2	%	arterial oxygen saturation
PvO_2	mmHg	partial pressure of oxygen in venous blood
SvO_2	%	venous oxygen saturation
Hb	g/L	hemoglobin
CaO_2	ml/L	arterial oxygen content
CvO_2	ml/L	venous oxygen content
VO_2	ml/min	oxygen consumption
RQ	None	respiratory quotient
ATMP	mmHg	atmospheric pressure
Height	cm	height
Weight	kg	weight

20.3.3 C]].]]]

A].			]
BSA	m^2	body surface area	$Wt^{0.425} \times Ht^{0.725} \times 0.007184$
VO_2 calc	ml/min	oxygen consumption	$C(a\text{-}v)O_2 \times C.O.$
$C(a\text{-}v)O_2$	ml/L	arteriovenous oxygen content difference	$CaO_2 - CvO_2$
O_2ER	%	oxygen extraction ratio	$100 \times C(a\text{-}v)O_2 / CaO_2$
DO_2	ml/min	oxygen transport	$C.O. \times CaO_2$
PAO_2	mmHg	partial pressure of oxygen in the alveoli	$FiO_2 / 100 \times (ATMP - 47) - PaCO_2 \times [FiO_2 /100 + (1 - FiO_2 /100) / RQ]$
$AaDO_2$	mmHg	alveolar-arterial oxygen difference	$PAO_2 - PaO_2$
CcO_2	ml/L	capillary oxygen content	$Hb \times 1.34 + 0.031 \times PAO_2$
Qs/Qt	%	venous admixture	$100 \times [1.34 \times Hb \times (1 - SaO_2 /100) + 0.031 \times (PAO_2 - PaO_2)] / [1.34 \times Hb \times (1 - SvO_2 /100) + 0.031 \times (PAO_2 - PvO_2)]$
C.O. calc	L/min	calculated cardiac output	$VO_2 / (CaO_2 - CvO_2)$

20.4 [ ] C]]

20.4.1 C]]

To perform a ventilation calculation:

1. Select [ ]→[**C]**] >>]→[ ] >>], or select the [**C]**]] QuickKey→ [ ] >>].
2. Enter values for calculation. If the monitor is connected to an anesthesia machine or a ventilator, the system automatically loads the supported parameter values to the [ ] **C]**]] window.
3. Select the [**C]**]] button. The system performs a calculation per the current settings and displays the calculated values.

   If a calculated value is outside the range, its background will highlight in yellow. You can select [ ]] to view its normal range in the unit field.

   Invalid values are displayed as [---].

In the [ ] **C]**]] window, you can:

Change the pressure unit by selecting [ ] and then selecting the appropriate setting. Corresponding pressure values shall convert and update automatically.

Trigger a recording by selecting the [ ] button. The currently displayed ventilation calculations are printed out by the recorder.

Review the previously performed calculations by selecting [ ].

20.4.2]]

A]		
FiO_2	%	percentage fraction of inspired oxygen
RR	rpm	respiration rate
$PeCO_2$	mmHg	partial pressure of mixed expiratory CO2
$PaCO_2$	mmHg	partial pressure of carbon dioxide in the arteries
PaO_2	mmHg	partial pressure of oxygen in the arteries
TV	ml	tidal volume
RQ	None	respiratory quotient
ATMP	mmHg	atmospheric pressure

20.5.2

A		
C.O.	L/min	cardiac output

HR

20.6.] C]].

20.6.1 C]].

To perform a renal calculation:

1. Selecting [ ]→[**C]**]→[>>], or select [**C]**] QuickKey→[>>].
2. Enter values for calculation.
3. Select the [**C]**] button. The system performs a calculation per the current settings and displays the calculated values.

   If a calculated value is outside the range, its background will highlight in yellow. You can select [ ] to view its normal range in the unit field.

   Invalid values are displayed as [**---**].

In the [ ] **C]**] window, you can:

Trigger a recording by selecting the [ ] button. The currently displayed renal calculations are printed out by the recorder.

Review the previously performed calculations by selecting [ ].

20.6.2]]

A]		
URK	mmol/L	urine pstassium
URNa	mmol/L	urinary sodium
Urine	ml/24h	urine
Posm	mOsm/ kgH_2O	plasm osmolality
Uosm	mOsm/ kgH_2O	urine osmolality
SerNa	mmol/L	serum sodium
Cr	μmol/L	creatinine
UCr	μmol/L	urine creatinine
BUN	mmol/L	blood urea nitrogen
Height	cm	height
Weight	kg	weight

20.6.3 C]]]]

A]]			]
URNaEx	mmol/24h	urine sodium excretion	Urine × URNa / 1000
URKEx	mmol/24h	urine potassium excretion	Urine × URK / 1000
Na/K	%	sodium potassium ratio	100 × URNa / URK
CNa	ml/24h	clearance of sodium	URNa × Urine / SerNa
Clcr	ml/min	creatinine clearance rate	Ucr × Urine / Cr / (BSA / 1.73) / 1440
FENa	%	fractional excretion of sodium	100 × (URNa × Cr) / (SerNa × Ucr)
Cosm	ml/min	osmolar clearance	Uosm × Urine / Posm / 1440
CH_2O	ml/h	free water clearance	Urine × (1—Uosm / Posm) / 24
U/P osm	None	urine to plasma osmolality ratio	Uosm / Posm
BUN/Cr	None*	blood urea nitrogen creatinine ratio	1000 × BUN / Cr
U/Cr	None	urine-serum creatinine ratio	Ucr / Cr

*: BUN/Cr is a ratio under the unit of mol.

20.7]

With the review feature, you can review oxygenation, ventilation, hemodynamic and renal calculations. The review window for each calculation is similar. Take the hemodynamic calculations review window for example, you can access it by selecting [ ] in the [ ] C]]] window.

In this review window:

You can select , , or to view more values.

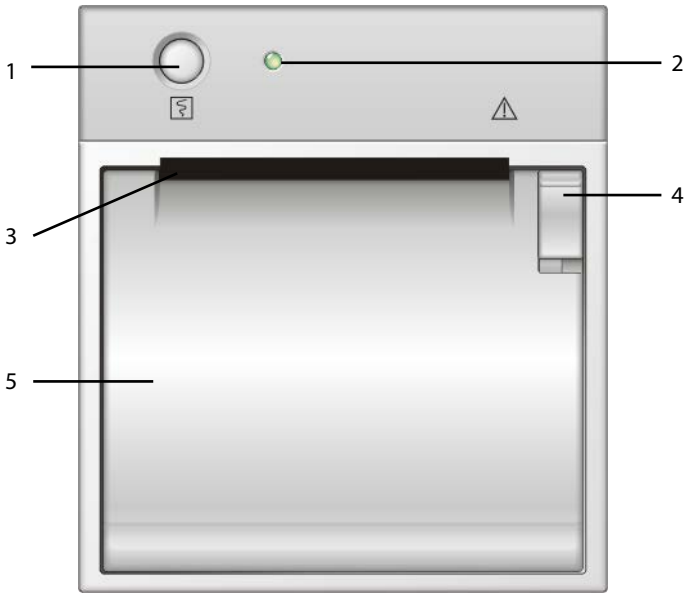
The values that exceed the range are displayed in yellow background. The [ ] field displays parameter units. If some parameter values are outside of their normal ranges, you can view their normal range in the [ ] field by selecting [ ]].

You can review an individual calculation by selecting its corresponding column and then selecting [ ] C]]. You can record the currently displayed calculations or perform another calculation is this window.

21

21.1

The thermal recorder records patient information, measurement numerics, up to three waveforms, etc.



1. Start/Stop key: press to start a recording or stop the current recording.
2. Indicator

   On: when the recorder works correctly.

   Off: when the monitor is switched off.

   Flashes: if an error occurred to the recorder, e.g., the recorder runs out of paper.
3. Paper outlet
4. Latch
5. Recorder door

21.2

By the way recordings are triggered, the recordings can be classified into the following categories:

Manually-triggered realtime recordings.

Timed recordings.

Alarm recordings triggered by an alarm limit violation or an arrhythmia event.

Manually-triggered, task-related recordings.

21.3 [illegible]

To manually start a recording, you can either:

Select the hardkey on the front of either the monitor or the recorder module, or

Select the [illegible] button from the current menu or window.

Automatic recordings will be triggered in the following conditions:

Timed recordings will start automatically at preset intervals.

If both [**A** [illegible]] and [**A** [illegible]] for a measurement are set on, an alarm recording will be triggered automatically as alarms occur.

To manually stop a recording, you can either:

Select the hardkey again, or

Select [**C** [illegible] **A** [illegible]] in the [illegible] menu.

Recordings stop automatically when:

A recording is completed.

The recorder runs out of paper.

When the recorder has an alarm condition.

When a recording is stopped, the following markers will be added:

Automatically stopped recording: print two columns of '*' at the end of the report.

Manually or abnormally stopped recording: print one column of '*' at the end of the report.

21.4 [illegible]

21.4.1 A[illegible]

By selecting [illegible]→[illegible >>], you can access the [illegible] menu.

21.4.2 [illegible]

The recorder can record up to 3 waveforms at a time. You can select, in turn, [illegible **1**], [illegible **2**] and [illegible **3**] in the [illegible] menu, and then select the waveforms you want. You can also turn off a waveform recording by selecting [illegible]. These settings are intended for realtime and scheduled recordings.

21.4.3 [ ]

After starting a realtime recording, the recording time depends on your monitor's settings. In the [ ] menu, select [ ] and toggle between [**8**] and [**C**].

[**8**]: record 4-second waveforms respectively before and after current moment.

[**C**]: record the waveforms from the current moment until stopped manually.

21.4.4 [ ]

Timed recordings start automatically at preset intervals. Each recording lasts 8 seconds. To set the interval between timed recordings: in the [ ] menu, select [ ] and then select the appropriate setting.

21.4.5 C]

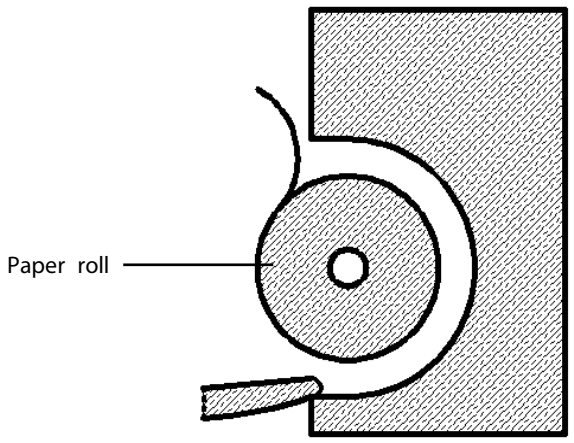
In the [ ] menu, select [ ] and toggle between [**25**] and [**50**]. This setting is for all recordings containing waveforms.

21.4.6 C]

In the [ ] menu, select [**C**] **A**]. All queued recording tasks are cleared and the current recording is stopped.

21.5]

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.
3. Close the recorder door.
4. Check if paper is loaded correctly and the paper end is feeding from the top.



CA

21.6

If the recorder works incorrectly or produces unusual sounds, check if there is a paper jam first. 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.

21.7 C

If the recorder has been used for a long time, deposits of paper debris may collect on the printhead compromising the print quality and shortening the lifetime of the roller. Follow this procedure to clean the printhead:

1. Take measures against the static electricity such as Disposable Wrist Strap for the work.
2. Open the recorder door and take out the paper.
3. Gently wipe around the printhead using cotton swabs dampened with alcohol.
4. After the alcohol has completely been dried, reload the paper and close the recorder door.

CA

22

22.1

The monitor can output patient reports via a connected printer. So far, the monitor supports the following printer:

HP LaserJet 1505n

HP LaserJet P2035n

HP LaserJet P4015n

HP LaserJet Pro 400 M401n

HP LaserJet 600 M602

The specifications of the reports the monitor prints are:

Paper: A4, Letter

Resolution: 300 dpi

For more details about the printer, see the document accompanying the printer. With the upgrading of products, the monitor will support more printers and no prior notice will be given. If you have any doubt about the printer you have purchased, contact our company.

22.2 C]

To print the reports or the trend data of a patient, you can choose either:

the local printer

Connect the printer and the monitor directly with a network cable, and then start printing what you want.

the Central Monitoring System

If your monitor is connected to a central monitoring system, it is recommended to use the central monitoring system for printing.

22.3 ,

To set the printer's properties, select [ ]→[>>]→[>>]. In the [ ] menu, you can:

Select a connected printer

Select [ ] and then select a connected printer as the monitor's printer.

Search for a printer

If your selected printer is not in the list or a new printer is added into the network, you can select the [ ] to re-search for all printers in the network.

Set up the paper

Select [ ] and toggle between [**A4**] and [ ].

22.4 [illegible]

[illegible]	C[illegible]	[illegible]
ECG reports	ECG waveforms and relevant parameter values	Select [ ]; [illegible] >> [illegible] >> [illegible]
Tabular trends	Depend on the selected parameter group, resolution and time period	Select [ ]; [illegible] >> [illegible], or select [ ]; [illegible] >> [illegible]
Graphic trends	Depend on the selected parameter group, resolution and time period	Select [ ]; [illegible] >> [illegible], or select [ ]; [illegible] >> [illegible]
Arrh. alarm review	ECG waveforms and relevant parameter values	Select [illegible] in [A[illegible]
Parameter alarm review	Depend on the selected alarms	Select [ ]; [illegible] >> A[illegible]
Realtime waves	Depend on the selected waveforms	Select [ ]; [illegible] >> [illegible] >> [illegible]

22.5 [illegible]

To stop report printouts, select [illegible]→[illegible]→[illegible].

22.6 [illegible]

22.6.1 [illegible]

You can print out ECG reports only under full-screen, half-screen or 12-lead monitoring screen. To set up ECG reports, select [illegible]→[illegible]→[illegible].

[illegible]: set the amplitude of the ECG waveforms.

[illegible]: set the wave print speed to 25 mm/s or 50 mm/s.

[illegible]: If [illegible] is set to [illegible], the system will automatically adjust the space between waveforms to avoid overlapping.

[illegible]: choose whether to show gridlines.

22.6.2

To set up tabular trends reports, select [ ]→[>>]→[ ]→[>>].

Start time: You can set a time period whose trend data will be printed out by setting [ ] and [**B**]]. For example, if you set [ ] as 2007-4-2 10:00:00 and [**B**]] as [**2**], the outputted data will be from 2007-4-2 08:00:00 to 2007-4-2 10:00:00. In addition, the [**B**]] can be set to either:

[**A**]: If [ ] is set to [ ], the report will be printed by time. If [ ] is set to [ ], the report will be printed by parameters.

[**A**]: If you select [**A**] all trend data will be printed out. In this case, TJ/T(. I)5(f)5([)]TJ/T13(n)1(d)1 >>BDC /C2 7(t)4(i)130 Td

22.7 C]

ECG reports, tabular trends reports, graphic trends reports, NIBP review reports and realtime reports can be set as end case reports. When you discharge a patient, the system will automatically print out all contents that are set as end case reports.

For example, to set ECG report as end case report:

1. select [ ]→[>>]→[>>].
2. select [C]]→[ ] C]] and then select [ ] from the popup dialog box.
3. set as described in the ***22.6.1 Setting Up ECG Reports***.

22.8

22.8.1]

When the printer runs out of paper, the print request will not be responded. If there are too many print jobs that are not responded, a printer error may occur. In these cases, you need to install paper and then re-send the print request. Restart the printer if necessary.

Therefore, you'd better ensure that there is enough paper in the printer before sending a print request.

22.8.2]

If the monitor prompts that selected printer is not available, check that the printer is switched on, correctly connected, and installed with paper.

23

23.1 A

The monitor provides analog output signals to accessory equipment via the multifunctional connector on the rear of the monitor. To obtain analog output signals, connect the accessory equipment such as an oscillograph, etc. to the monitor.

23.2

The monitor stores system status information, including failures, abnormity, and technical alarms, into the log. You can export the log to a USB drive.

To export the log,

1. Connect a USB drive to the monitor's USB connector.
2. Select [ ]→[ ]→[ ]→enter the required password→[ ].
3. Select [ ].

23.3

You can transfer the patient data saved in the monitor to a PC via a crossover network cable or within a LAN for data management, review or print.

23.3.1

You must install the data export system on the intended PC before performing the data transfer operation. Refer to the document accompanying the installation CD-ROM for installation instructions.

The data transfer feature supports patient management, data review, data format conversion, print, etc. in addition to data transfer. Refer to the help file of the system software for more details.

23.3.2]

].] .

].] .]].].].

23.4 C]

The monitor also provides nurse call signals to a nurse call system connected to the monitor via the multifunctional connector. To obtain nurse call signals, connect a nurse call system to the monitor and then follow this procedure:

1. Select [ ]→[ ]→[ ]→[ ]→enter the required password.
2. Select [>>] to access the [ ] menu.
3. Select [C] >>] to change the nurse call settings as follows:

   Select [ ]] and toggle between [ ] and [C].

   [ ]: the nurse call signals are pulse signals and each pulse lasts 1 second. When multiple alarms occur simultaneously, only one pulse signal is outputted. If an alarm occurs but the previous one is not cleared yet, a new pulse signal will also be outputted.

   [C]: the nurse call signal lasts until the alarm ends, i.e. the duration of a nurse call signal equals to that of the alarm condition.

   Select [C]] and toggle between [ ]] and [ ] C].

   [ ]]: select if your hospital's nurse call relay contact is normally open.

   [ ] C]: select if your hospital's nurse call relay contact is normally closed.

   Select [A] and set the alarm level for nurse call-triggering alarms.

   Select [A] C]] and then select the category to which the nurse call-triggering alarms belong.

Alarm conditions are indicated to nurses only when:

The nurse call system is enabled,

An alarm that meets your preset requirements occurs, and

The monitor is not in the alarm paused or silence status.

A

]]]

23.5 C

23.5.1

The monitor supports both wired and wireless network. To set the network type, you can select [ ]→ [ ] >>]→[ ] >>]→enter the required password→[>>].

23.5.2

The monitors can be connected to a wireless network via a built-in Wi-Fi module. To set the wireless network:

1. Select [ ]→[ ] >>]→[ ] >>]→enter the required password→[>>].
2. Set the [ ] to [ ].
3. Select [>>] to access the [ ] menu.
4. Configure the [ ], and [ ].
5. Click [ ] to confirm the setting.

To test the availability of the wireless network, follow this procedure:

1. Select [>>] in the [ ] menu.
2. Enter the [ ] of wireless AP in the [>>] menu.
3. Click [C].

The Wi-Fi device used in the monitor is in compliance with IEEE 802.11b/g/n.

23.5.3

In the [ ] menu, you can set IP address, subnet mask and gateway. You should not change the monitor's IP address randomly. If you want to know details about IP address setup, contact the technical personnel in charge of the CMS.

C 32.

24 B]

24.1

This monitor is designed to operate on rechargeable Lithium-ion battery power during intra-hospital patient transfer or whenever the power supply is interrupted. The battery is charged automatically when the monitor is connected to AC/DC power, no matter the monitor is powered on or not. Whenever the AC/DC power is interrupted during monitoring, the monitor automatically runs power from the internal battery. The monitor is available for up to two batteries.

On-screen battery symbols indicate the battery status as follows:

Indicates that the battery works correctly. The solid portion represents the current charge level of the battery in proportion to its maximum charge level.

Indicates that the battery has low charge level and needs to be charged. In this case, the monitor provides an alarm message.

Indicates that the battery is almost depleted and needs to be charged immediately. Otherwise, the monitor will shut down automatically.

Indicates that no battery is installed.

The capacity of the internal battery is limited. If the battery charge is too low, a technical alarm will be triggered and the message [**B]**] or [**B]**] displayed. At this moment, apply AC/DC power to the monitor. Otherwise, the monitor will power off automatically before the battery is completely depleted.

24.3 B]

Life expectancy of a battery depends on how frequent and how long it is used. For a properly maintained and stored lithium ion battery, its life expectancy is about 3 years. For more aggressive use models, life expectancy can be less. We recommend replacing lithium ion batteries every 3 years.

To get the most out of the battery, observe the following guidelines:

The battery performance test must be performed every two years, before monitor repairs, or whenever the battery is suspected as being the source of the problems.

Condition a battery once when it is used or stored for 3 months, or when its operating time becomes noticeably shorter.

Take out the battery before the monitor is transported or will not be used for more than 3 months.

Remove the battery from the monitor if it is not being used regularly. (Leaving the battery in a monitor that is not in regular use will shorten the life of the battery).

The shelf life of a Lithium Ion battery is about 6 months when the battery is stored with the battery power being 50% of the total power. In 6 months the battery power must be depleted before the Lithium Ion battery is fully charged. Then run the monitor on this fully charged battery .When its battery power becomes 50% of the total power, take out the battery from the monitor and store it.

⚠ **A**

24.4 B]

C] B]

A battery should be conditioned before it is used for the first time. A battery conditioning cycle is one uninterrupted charge of the battery, followed by an uninterrupted battery discharge and charge. Batteries should be conditioned regularly to maintain their useful life.

To condition a battery, follow this procedure:

1. Disconnect the monitor from the patient and stop all monitoring or measuring.
2. Insert the battery in need of conditioning in the battery slot of the monitor.
3. Apply AC/DC power to the monitor and allow the battery to charge uninterrupted for 10 hours.
4. Remove AC/DC power and allow the monitor to run from the battery until it shuts off.
5. Apply AC/DC power again to the monitor and allow the battery to charge uninterrupted for 10 hours.
6. This battery is now conditioned and the monitor can be returned to service.

C] B]

The battery performance test must be performed every two years, before monitor repairs, or whenever the battery is suspected as being the source of the problems. The performance of a rechargeable battery may deteriorate over time. To check the performance of a battery, follow this procedure:

1. Disconnect the monitor from the patient and stop all monitoring or measuring.
2. Apply AC/DC power to the monitor and allow the battery to charge uninterrupted for 10 hours.
3. Remove AC/DC power and allow the monitor to run from the battery until it shuts off.
4. The operating time of battery reflects its performance directly.

Please replace the battery or contact with the maintenance personnel if its operating time is significantly lower than the specified time.

24.5 B]

When a battery has visual signs of damage, or no longer holds a charge, it should be replaced. Remove the old battery from the monitor and recycle it properly. To dispose of the batteries, follow local laws for proper disposal.

A

FOR YOUR NTOES

25 C]] C]

Use only the substances approved by Mindray and methods listed in this chapter to clean or disinfect your equipment. Warranty does not cover damage caused by unapproved substances or methods.
We make no claims regarding the efficacy of the listed chemicals or methods as a means for controlling infection. For the method to control infection, consult your hospital's Infection Control Officer or Epidemiologist.

In this chapter we only describe cleaning and disinfection of the main unit. For the cleaning and disinfection of other reusable accessories, refer to instructions for use of corresponding accessories.

25.1] .

Keep you equipment and accessories free of dust and dirt. To avoid damage to the equipment, follow these rules:

Always dilute according the manufacturer's instructions or use lowest possible concentration.

Do not immerse part of the equipment 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).

A

B

CA

25.2 C]

Your equipment should be cleaned on a regular basis. If there is heavy pollution or lots of dust and sand in your place, the equipment should be cleaned more frequently. Before cleaning the equipment, consult your hospital's regulations for cleaning the equipment.

Recommended cleaning agents are:

Sodium hypochlorite bleach (diluted)

Hydrogen peroxide (3%)

Ethanol (70%)

Isopropanol (70%)

To clean your equipment, follow these rules:

1. Shut down the monitor and disconnect it from the power line.
2. Clean the display screen using a soft, clean cloth dampened with a glass cleaner.
3. Clean the exterior surface of the equipment using a soft cloth dampened with the cleaner.
4. Wipe off all the cleaning solution with a dry cloth after cleaning if necessary.
5. Dry your equipment in a ventilated, cool place.

25.3

Disinfection may cause damage to the equipment and is therefore not recommended for this monitor unless otherwise indicated in your hospital's servicing schedule. Cleaning equipment before disinfecting is recommended.

The recommended disinfectants include: ethanol 70%, isopropanol 70%, Perform® classic concentrate OXY ($KHSO_4$ solution).

CA

26

A

26.1.

Before the first use, after your monitor has been used for 6 to 12 months, or whenever your monitor is repaired or upgraded, a thorough inspection should be performed by qualified service personnel to ensure the reliability.

Follow these guidelines when inspecting the equipment:

Make sure that the environment and power supply meet the requirements.

Inspect the equipment and its accessories for mechanical damage.

Inspect all power cords for damage, and make sure that their insulation is in good condition.

Make sure that only specified accessories are applied.

Inspect if the alarm system functions correctly.

Make sure that the recorder functions correctly and the recorder paper meets the requirements.

Make sure that the batteries meet the performance requirements.

Make sure that the monitor is in good working condition.

In case of any damage or abnormity, do not use the monitor. Contact the hospital's biomedical engineers or your service personnel immediately.

26.2]. .] . .] . . . . . .

The following maintenance and tests, except for visual inspection, power on test, touchscreen calibration, battery check, and recorder check, shall be carried out by the service personnel only. Contact your service personnel if any maintenance is required. Make sure to clean and disinfect the equipment before any test and maintenance.

C. . /]. .] . .		. . . . .
. . . .]. .]. .]		
Visual inspection		When first installed or reinstalled.
NIBP test	Pressure check	1. If the user suspects that the measurement is incorrect. 2. Following any repairs or replacement of relevant module. 3. At least once a year.
	Leakage test	
Sidestream and Microstream CO_2 tests	Leakage test	
	Performance test	
AG tests	Leakage test	
	Performance test	
. . . .]		
ECG verification	Performance test	1. If the user suspects that the measurement is incorrect. 2. Following any repairs or replacement of relevant module. 3. At least once every two years. Note: At least once a year is recommended for NIBP, NMT and CO_2. AG leakage test should be performed before AG measurement.
Resp performance test		
SpO_2 test		
NIBP test	Pressure check	
	Leakage test	
Temp test		
IBP test	Performance test	
C.O. test		
Mainstream CO_2 test		
Sidestream and Microstream CO_2 tests	Leakage test	
	Performance test	
AG test	Leakage test	
	Performance test	
Nurse call relay performance test		If the user suspects that the analog output does not work well.
Analog output performance test		
. . . . .] .]		
Electrical safety tests		At least once every two years.
. . . . .		
Power on test		1. When first installed or reinstalled. 2. Following any maintenance or the replacement of any main unit parts.
Touchscreen calibration		1. When the touchscreen appears abnormal. 2. After the touchscreen is replaced.
Recorder check		Following any repair or replacement of the recorder.
Battery check	Functionality test	1. When first installed.

		2. Whenever a battery is replaced.
	Performance test	Once a year or if the battery run time reduced significantly.

26.3 C

To view the information about system start time, self-test, etc., select [ ]→[ ]→[ ] >>]→[>>]. You can print out the information for the convenience of troubleshooting. The information will not be saved during shut down.

You can also view the information about the monitor configuration and system software version by selecting [ ]→[ ]→[ ] >>]→[ ] >>].

26.4 E

The ECG signal may be inaccurate due to hardware or software problems. As a result, the ECG wave amplitude becomes greater or smaller.

You can print out the square wave and wave scale and then measure the difference between them if necessary. If the difference exceeds 5%, contact your service personnel.

26.5 B

The NIBP leakage test checks the integrity of the system and of the valve. It is required at least once a year or when you doubt the measured NIBP. Contact your service personnel to perform NIBP leakage test.

26.6 B A

The NIBP accuracy test is required at least once a year or when you doubt the measured NIBP. Contact your service personnel to perform NIBP accuracy test.

26.7 C 2

For sidestream and microstream CO_2 modules, a calibration is needed every year or when the measured values have a great deviation. For maintream CO_2 module, no calibration is needed. Contact your service personnel to calibrate CO_2.

26.8 A ,]],

The AG leakage test is required every time before the AG measurement. Follow this procedure to perform the test:

1. Plug the AG module into the module rack.
2. Wait until the AG module warmup is finished, and then use your hand or other objects to completely block the gas inlet of the AG module. An alarm message [A A]] will appear on the screen.
3. Block the gas inlet for 60 s. Select [ ],] [ ],] >>] [ ],] >>] enter the required password [C]], A >>], and check that current flow rate is less than 10ml/min.

If the flow rate is less than 10ml/min and the alarm me<016 ah l 913(is)2(-0.003 Tw 14.213)-8(f8[(l)-8(34 /P 5MCIDay)8(O)2)-1C-0.0/T1-5cc4

27 A

The accessories listed in this chapter comply with the requirements of IEC 60601-1-2 when in use with the monitor.

C].

3- C].					
Clip	AHA	EL6303A	0010-30-42731	1m	Long
		EL6301A	0010-30-42726	0.6m	/
		EL6305A	0010-30-42896	1m	Long
Snap	AHA	EL6301B	0010-30-42734	1m	Long
		EL6311B	040-000146-00	1m	Long

5- C].					
Clip	AHA	EL6501A	0010-30-42727	0.6m	/
		EL6503A	0010-30-42729	1m to 1.4m	Long
Snap	AHA	EL6501B	0010-30-42735	1.4m for RL and LL; 1m for others	Long
12- C].					
Clip	AHA	EL6801A	0010-30-42902	0.8m	Limb
		EL6803A	0010-30-42904	0.6m	Chest
Snap	AHA	EL6801B	0010-30-42906	0.8m	Limb
		EL6803B	0010-30-42908	0.6m	Chest

27.2 A

C].

Nellcor	8 pins	0010-20-42712

The SpO_2 sensor material that patients or other staff will come into contact with has undertaken the bio-compatibility test and is verified to be in compliance with ISO 10993-1.

Reusable	VetSat(V-Sat)	1.1 m	clip	9101-10-58134

The extension cable must be used with the matching SpO_2 sensor.

Wavelength emitted by the sensor14(ne s)2(e)14(n)1(s)15(oETEM)1(6,sn)1(s)15(oETEM)1(6,sn)1(s)15Tf( )Tj/T1 .48 ref106.44 214 <0 Td

27.3 [B A

Reusable	3 m	6200-30-09688
Reusable	3 m	6200-30-11560

	G	B]	]
/	10 to 19	9.2	0683-15-0001-01
/	18 to 26	12.2	0683-15-0002-01
/	25 to 35	15.1	0683-15-0003-01
/	33 to 47	18.3	0683-15-0004-01
/	46 to 66	22.5	0683-15-0005-01
/	25 to 35	/	0683-15-0006-01
/	33 to 47	/	0683-15-0007-01

	G	B]	]
CM1500A	3.1 to 5.7	2.2	00B-30-70692 (20 pcs/box)
CM1500B	4.3 to 8.0	2.9	00B-30-70693 (20 pcs/box)
CM1500C	5.8 to 10.9	3.8	00B-30-70694 (20 pcs/box)
CM1500D	7.1 to 13.1	4.8	4.8

27.4 A

C].

Extension cable (reusable)	MR420B	Applicable to sensor MR411 and MR412	0011-30-37391
TEMP adapter cable (2-pin to audio)	MR421	/	0010-30-43056

	MR401B	Esophageal/Rectal	0011-30-37392
Disposable	MR411	Esophageal/Rectal	0011-30-90446
	MR412	Skin	0011-30-90447

27.5 B /C A

] .]. . . .	A . . . .
Smith Medical (Medex)	MX961Z14 Logical Cable, to be used in connection with the Adapter Cable (0010-20-42795) MX960 Reusable Transducer Kit MX261 Logical Clamp For Transducer Bracket MX262 Logical Clamp For 2 Transducer Mount Plates MX960E6441 Logical Transducer Mounting Plate (More Logical Clamps are available from Medex. For detailed information, contact Medex.)
Braun	IBP Reusable Cable (REF: 5203511), to be used in connection with the Adapter Cable (0010-20-42795) Combitrans Monitoring Set (contact Braun for detailed information) Combitrans Attachment Plate Holder (REF:5215800) Combitrans Attachment Plate (contact Braun for detailed information)
Memscap	*Truck cable (0010-21-43082) SP844 Physiological Pressure Transducer 844-26 Monitoring Line Set 84X-49 Mounting Bracket
Utah	Reusable Blood Pressure Monitor Interface Cable (REF: 650-206) Deltran Disposable Pressure Transducer System (More Deltran sensors are available from Utah. For detailed information, contact Utah.) Pole Mount Unit (ERF: 650-150) Deltran Three Slot Organizer, Attaches to I.V. Pole Mount (REF: 650-100) Deltran Four Slot Organizer, Attaches to I.V. Pole Mount (REF: 650-105)
Edwards	* IBP Truwave Reusable Cable (0010-21-12179) Pressure Monitoring Kit With Truwave Disposable Pressure Transducer. (More Truwave sensors are available from Edwards. For detailed information, contact Edwards.) DTSC IV Pole Clamp for Model DTH4 Backplate Holder DTH4 Disposable Holder for DPT

27.6 C. . A . . .

. .	]. .]	]. . .
CO7702	12Pin C.O. cable.	0010-30-42743
SP4042	TI Sensor	6000-10-02079
SP5045	TI Sensor Housing	6000-10-02080
MX387	12CC Control Syringe W/1CC Stop W/Rotator	6000-10-02081
9850A	Cable kit with TI Sensor	0012-00-1519

27.7 C 2 A

] C 2

]		]
DRYLINE Watertrap	Reusable	9200-10-10530
DRYLINE Watertrap		9200-10-10574
Sampling Line, 2.5m	Disposable	9200-10-10533
Sampling Line, 2.5m		9200-10-10555
Nasal CO_2 Sample Cannula		M02A-10-25937
Nasal CO_2 Sample Cannula		M02A-10-25938
Nasal CO2 Sample Cannula		M02B-10-64509
DRYLINE Airway Adapter	Straight, disposable	9000-10-07486

] C 2

]			]
Airway adapter	6063	Disposable	0010-10-42662
	6421	Disposable, with mouthpiece	0010-10-42663
	7007	Reusable	0010-10-42665
	6312	Disposable	0010-10-42664
	7053	Reusable	0010-10-42666
Mask	9960STD	/	0010-10-42670
	9960LGE	large	0010-10-42669
	9960PED	/	0010-10-42671
Cable management straps	6934-00	/	0010-10-42667
Sensor holding clips	8751	/	0010-10-42668
Sensor	1022386	Reusable	6800-30-50760

27.8 A A

]		]
Watertrap	Reusable	9200-10-10530
		9200-10-10574
Sampling line	Disposable	9200-10-10533
		9200-10-10555
Airway adapter	Disposable, straight	9000-10-07486
	Disposable, elbow	9000-10-07487

27.9

].]	]. . .
Lithium battery	022-000008-00
U.S. power cord	0012-25-0001
Grounding cable	1000-21-00122
Nurse call cable	009-003116-00
Analog output cable	009-003117-00
Synchronization cable	009-003118-00

A

A.1

A.1.1 C

The monitor is classified, according to IEC60601-1:

	Class I, equipment energized from an external and internal electrical power source.
	Type BF defibrillation proof for CO_2 and AG monitoring. Type CF defibrillation proof for ECG, RESP, TEMP, SpO_2, NIBP, IBP and C.O..
	Continuous
	IPX1

A.1.2

Temperature (°C)	0 to 40	-20 to 60
Relative humidity (noncondensing)	15% to 95%	10% to 95%
Barometric (kPa)	57.0 to 107.4	16.0 to 107.4

Temperature (°C)	0 to 40	-20 to 60
Relative humidity (noncondensing)	15% to 95%	10% to 95%
Barometric (kPa)	57.3 to 105.3	57.3 to 105.3

Temperature (°C)	5 to 40	-20 to 60
Relative humidity (noncondensing)	15% to 95%	10% to 95%
Barometric (kPa)	57.3 to 105.3	57.3 to 105.3

Temperature (°C)	0 to 40	-20 to 60
Relative humidity (noncondensing)	15% to 90%	10% to 90%
Barometric (kPa)	57.0 to 107.4	53.3 to 107.4

A		
Temperature (°C)	10 to 40	-20 to 60
Relative humidity (noncondensing)	15% to 95%	10% to 95%
Barometric (kPa)	70 to 107.4	70 to 107.4

12

A.2

AC	
Line voltage	100 to 240 VAC (±10%)
Current	1.3 to 0.5 A
Frequency	50/60 Hz (±3Hz)
B	
Battery Type	Chargeable Lithium-Ion, 11.1DVC, 4.5 Ah
Run time	≥ 4 hours when powered by a new fully-charged battery (25°C, SpO_2, ECG, disconnected from Temp cable, Auto NIBP measurements at intervals of 15 minutes) ≥ 8 hours when powered by two new fully-charged batteries (25°C, SpO_2 sensor and ECG cable connected,, Temp cable not connected,, Auto NIBP measurements at an interval of 15 minutes)
Charge time	Less than 3 hours to 90%, and less than 4 hours to 100% when the monitor is off. Less than 8 hours to 90%, and less than 12 hours to 100% when the monitor is on.
Shutdown delay	at least 20 min (after a low battery alarm first occurs)

A.3

	( )		
12	318mm × 274mm × 128mm	≤4.5 kg	Standard parameters, including touchscreen and recorder, and 2 batteries

A.4 [illegible]

Sensitivity	1V/mV ±5%
PACE rejection/enhancement	Pace enhancement Signal amplitude: Voh≥2.5V Pulse width: 10ms±5% Signal rising and falling time: ≤100μs
[illegible]	
Bandwidth (-3dB; reference frequency:1Hz)	DC to 40 Hz
Max transmission delay	30 ms
Sensitivity	1 V/100 mmHg ±5%
[illegible]	
Amplitude	High level: 3.5 to 5 V, providing a maximum of 10 mA output current; Low level: < 0.5 V, receiving a maximum of 5 mA input current.
Rising and falling time	≤1 ms
[illegible]	
Output impedance	≤100 Ω
Max time delay	35 ms (R-wave peak to leading edge of pulse)
Amplitude	High level: 3.5 to 5 V, 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%
Rising and falling time	≤1 ms
[illegible]	
Alarm delay time from monitor to remote equipment	The alarm delay time from the monitor to remote equipment is ≤2 seconds, measured at the monitor's signal output connector.

A.5 [illegible]

Trends	Trends: 120 hours, at 1 min resolution Mid-length trends: 4 hours, at 5 s resolution Minitrends: 1 hour, at 1 s resolution
Parameter alarms	100 physiological alarms and manual events and related parameter waveforms.
Arrh. events	100 arrhythmia events and relate waveforms and parameters.
NIBP measurements	1000 sets
Full-disclosure waveforms	48 hours at maximum. The specific storage time depends on the waveforms stored and the number of stored waveforms.

A.6 [illegible]

Standards	IEEE 802.11b/g/n, support Wi-Fi

A.7 [illegible]

The adjustable range of alarm limits is the same with the measurement range of signals unless otherwise specified.

A.7.1 [illegible]

[illegible]	
Standards	Meet standards of EC11, EC13, EN60601-2-27/IEC60601-2-27 and IEC60601-2-25
Lead set	3-lead: I, II, III 5-lead: I, II, III, aVR, aVL, aVF, V 12-lead: I, II, III, aVR, aVL, aVF, V1 to V6
ECG standard	AHA, IEC
Display sensitivity	1.25 mm/mV (X0.125), 2.5 mm/mV (X0.25), 5 mm/mV (X0.5), 10 mm/mV (X1), 20 mm/mV (X2), 40 mm/mV (X4) Accuracy: ±5%
Sweep speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s, Accuracy: ±10%
Bandwidth (-3dB)	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
Common mode rejection ratio	Diagnostic mode: >90 dB Monitor mode: >105 dB Surgical mode: >105 dB ST mode: >105 dB
Notch	50/60 Hz
Differential input impedance	≥5 MΩ
Input signal range	±8 mV (peak-to-peak value)
Accuracy of reappearing input signal	Based on EC11 to determine system total error and frequency response.
Electrode offset potential tolerance	±500 mV
Lead-off detection current	Measuring electrode: <0.1 μA Drive electrode: <1 μA
Input offset current	Measuring electrode: ≤0.1 μA Drive electrode: ≤1 μA
Baseline recovery time	<5 s (after defibrillation)
Patient leakage current	<10 uA
Calibration signal	1mV (peak-to-peak value) Accuracy: ±5%
ESU protection	Cut mode: 300 W Coagulate mode: 100 W Recovery time: ≤10 s In compliance with the requirements in clause 4.2.9.14 of ANSI/AAMI EC 13:2002
ESU noise suppression	Based on the test method in clause 5.2.9.14 of EC 13, use ECG lead wires which are in compliance with AAMI. Compared with ECG baseline, the noise of peak to peak value ≤2 mV.

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Pace pulse markers	Pace pulses meeting the following conditions are labelled with a PACE marker: Amplitude: ±2 to ±700 mV Width: 0.1 to 2 ms Rise time: 10 to 100 µs
Pace pulse rejection	When tested in accordance with the ANSI/AAMI EC13: Sections 4.1.4.1, the heart rate meter rejects all pulses meeting the following conditions. Amplitude: ±2 to ±700 mV Width: 0.1 to 2 ms Rise time: 10 to 100 µs
Pacer pulse detector rejection of fast ECG signals	2.9 V/s RTI when measured in accordance with ANSI/AAMI EC13 Section 4.1.4.3.

_-	
Measurement range	15 to 350 bpm
Resolution	1 bpm
Accuracy	±1 bpm or ±1%, whichever is greater.
Sensitivity	200µV (lead II)
HR averaging method	In compliance with the requirements in Clause 4.1.2.1 d)of ANSI/AAMI EC13, the following method is used: If the last 3 consecutive RR intervals are greater than 1200 ms, the 4 most recent RR intervals are averaged to compute the HR. Otherwise, heart rate is computed by subtracting the maximum and minimum ones from the most recent 12 RR intervals and then averaging them. The HR value displayed on the monitor screen is updated every second.
Response to irregular rhythm	In compliance with the requirements in Clause 4.1.2.1 e)of ANSI/AAMI EC13, the heart rate after 20 seconds of stabilization is displayed as follows: Ventricular bigeminy (3a): 80±1 bpm Slow alternating ventricular bigeminy (3b): 60±1 bpm Rapid alternating ventricular bigeminy (3c): 120±1 bpm Bidirectional systoles (3d): 90±2 bpm
Response time to heart rate change	Meets the requirements of ANSI/AAMI EC13: Section 4.1.2.1 f). From 80 to 120 bpm: less than 11 s From 80 to 40 bpm: less than 11 s

Time to alarm9.2856.648 46.8 ref205.2 222.1a4176T86(o)8(a)7

Tall T-wave rejection capability	When the test is performed based on part 4.1.2.1 c)of ANSI/AAMI EC 13-2002, the heart rate meter will reject all 100 ms QRS complexes with less than 1.2 mV of amplitude, and T waves with T-

Standards	Meet standards of ISO9919
*Measurement accuracy verification: The SpO_2 accuracy has been verified in human experiments by comparing with arterial blood sample reference measured with a CO-oximeter. Pulse oximeter measurement are statistically distributed and about two-thirds of the measurements are expected to come within the specified accuracy range compared to CO-oximeter measurements.	
SpO_2 measurement range	0 to 100%
Resolution	1%
Accuracy	70 to 100%: ±3% 0% to 69%: Not specified.
Refreshing rate	1 s
PI measurement range	0.05% to 20%

Standards	Meet standards of ISO9919
SpO_2 measurement range	1 to 100%
Resolution	1%
Accuracy	770 to 100%: ±3% (measured without motion) 70 to 100%: ±3% (measured with motion) 1% to 69%: Not specified.
Refreshing rate	1 s
Low perfusion conditions	Pulse amplitude: >0.02% Light penetration: >5%
Low perfusion SpO_2 accuracy	±2%
PI measurement range	0.02~20 %

Standards	Meet standards of ISO9919
Measurement range	0 to 100%
Resolution	1%
Accuracy	70 to 100%: ±3%0% to 69%: Not specified.

A.7.4

PR High	(low limit +2) to 300	1
PR Low	15 to (high limit-2)	

Measurement range	20 to 254 bpm
Resolution	1 bpm
Accuracy	±3 bpm
Refreshing rate	1 s

Measurement range	25 to 240 bpm
Resolution	1 bpm
Accuracy	±3 bpm (measured without motion) ±5 bpm (measured with motion)
Refreshing rate	1 s
Low perfusion conditions	[redacted]mplitude: >0.02% [redacted]enetration: >5%
Low perfusion PR accuracy	±3 bpm

Accuracy	Max mean error: ±5 mmHg Max standard deviation: 8 mmHg
Resolution	1mmHg
Initial cuff inflation pressure range (mmHg)	60 to 140
Default initial cuff inflation pressure (mmHg)	90
Software overpressure protection	147±3 mmHg
Hardware overpressure protection	≤165 mmHg

Sys High	Big: (low limit+5) to 270 Medium: (low limit+5) to 200 Small: (low limit+5) to 135	5
Sys Low	40 to (high limit-5)	
Mean High	Big: (low limit+5) to 230 Medium: (low limit+5) to 165 Small: (low limit+5) to 110	
Mean Low	20 to (high limit-5)	
Dia High	Big: (low limit+5) to 210 Medium: (low limit+5) to 150 Small: (low limit+5) to 100	
Dia Low	10 to (high limit-5)	

** ,The blood pressure measurements measured with this device are in compliance with the American National Standard for Electronic or Automated Sphymomanometers (ANSI/AAMI SP10-1992 and AAMI/ANSI SP10A-1996) in terms of mean error and stardard deviation by comparing with intra-arterial measurements (depending on the configuration) in a typical patient population.

A.7.6.

Standards	Meet standard of EN12470-4
Technique	Thermal resistance
Measurement range	0 to 50℃ (32 to 122°F)
Resolution	0.1℃
Accuracy	±0.1°

CrBa29eE(u)2(t)-4(i)-8(on)]TJ0 hf-0cc 0.007 Tw 9 0 07 Tw 9 .84 0.48Lw(320

A.7.7 LB

Standards	Meet standard of EN60601-2-34/IEC60601-2-34.
Technique	Direct invasive measurement

A.7.9 C 2

Measurement mode	Sidestream, microstream, mainstream
Technique	Infrared absorption

] C 2

Standard	Meet standard of ISO 21647
CO_2 Measurement range	0 to 99 mmHg
Accuracy*	0 to 40 mmHg: ±2 mmHg 41 to 76 mmHg: ±5% of the reading 77 to 99 mmHg: ±10% of the reading
Accuracy drift	Meet the requirement for measurement accuracy within 6 hours
Resolution	1 mmHg
Sample flowrate	70 ml/min, 100 ml/min
Sample flowrate tolerance	15% or 15 ml/min, whichever is greater.
Warm-up time	Iso accuracy mode: ≤45s Full accuracy mode: ≤10 min
Rise time	Measured with a watertrap and a 2.5-meter sampling line: <400 ms @ 70 ml/min <330 ms @ 100 ml/min <300 ms @ 120 ml/min <240 ms @ 150 ml/min
Gas sampling delay time	Measured with a watertrap and a 2.5-meter sampling line: <4 s @ 100 ml/min <4.5 s @ 70 ml/min
awRR measurement range	0 to 120 rpm
awRR measurement precision	±2 rpm
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

Note: The response time is the sum of the rise time and the delay time.

] C 2]

]	C]. (%)	] *
N_2O	≤60	±1 mmHg
Hal	≤4	
Sev	≤5	
Iso	≤5	
Enf	≤5	
Des	≤15	±2 mmHg

[illegible]	[illegible]	[illegible]
$EtCO_2$ 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	
awRR High	(low limit + 2) to 150 rpm	1 rpm
awRR Low	0 to (high limit - 2) rpm	

[illegible] CO_2 [illegible]

Standard	Meet standard of ISO 21647	
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% of (the reading-38)
Accuracy drift	Meet the requirement for measurement accuracy within 6 hours	
* This accuracy is applied to respiration rate no greater than 80 rpm. For respiration rate greater than 80 rpm and $EtCO_2$ value greater than 18 mmHg, the accuracy is 4 mmHg or ±12% of the reading, whichever is greater. In the presence of interfering gases, the accuracy specification deteriorates by 4% of the above accuracy.		
Resolution	1 mmHg	
Sample flow rate	$50^{-7.5}_{+15}$ ml/min	
Initialization time	30 s (typical)	
Response time	Measured with a FilterLine of standard length: 2.9 s (typical), 4.5 s (Maximum) The response time is the sum of the rise time and the delay time Rise time: <190 ms (10% to 90%) Delay time: 2.7 s (typical)	
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
Apnea alarm time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s	

[illegible]	[illegible]	[illegible]
$EtCO_2$ 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	
awRR High	(low limit + 2) to 150 rpm	1 rpm
awRR Low	0 to (high limit – 2) rpm	

Standard	Meet standard of ISO 21647

A.7.10 A

Standards	Meet standard of ISO 21647		
Technique	Infrared absorption		
Warm-up time	Iso accuracy mode:	≤ 45 s	
	Full accuracy mode:	≤ 10 min	
Sample flow rate	Accuracy:	70, 90, 120 ml/min	
		±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:	1 mmHg	
	awRR:	1 rpm	
Full accuracy	Gases	Range ($\%_{REL}$)	Accuracy ($\%_{ABS}$)
	CO_2	0 to 1	±0.1
		1 to 5	±0.2
		5 to 7	±0.3
		7 to 10	±0.5
		>10	Not specified
	N_2O	0 to 20	±2
		20 to 100	±3
	O_2	0 to 25	±1
		25 to 80	±2
		80 to 100	±3
	Des	0 to 1	±0.15
		1 to 5	±0.2
		5 to 10	±0.4
		10 to 15	±0.6
		15 to 18	±1
		>18	Not specified
	Sev	0 to 1	±0.15
		1 to 5	±0.2
		5 to 8	±0.4
		>8	Not specified
	Enf, Iso, Hal	0 to 1	±0.15
		1 to 5	±0.2
		>5	Not specified
	awRR	2 to 60 rpm	±1 rpm
		>60 rpm	Not specified

Accuracy drift	Meet the requirement for measurement accuracy within 6 hours			
Apnea alarm time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s			
Refreshing rate	1 s			
Response time	Using the DRYLINE™ water trap and DRYLINE™ sampling line (2.5m):			
		120 ml/min	90 ml/min	70 ml/min
	CO_2	≤4S s	≤ 4.5 s	≤5 s
	N_2O	≤4.2 s	≤5 s	≤5.5 s
	O_2	≤4 s	≤5 s	≤6 s
	Hal, Iso, Sev, Enf	≤4.4 s	≤5.2 s	≤6 s
	Des	≤4.4 s	≤5 s	≤6 s
Anesthetic agent limit	Primary anesthetic agent In full accuracy mode: 0.15%,			
	Second anesthetic agent: In full accuracy mode: 0.3% or 5% REL (10% in ISO accuracy mode) of primary agent if primary agent is greater than 10%			

A]	-]	
$EtCO_2$ High	(low limit + 2) to 99 mmHg	1 mmHg
$EtCO_2$ Low	1to (high limit - 2)mmHg	
$FiCO_2$ High	1 to 99 mmHg	
awRR High	(low limit + 2) to 150 rpm	1 rpm
awRR Low	0 to (high limit - 2)rpm	
EtO_2 High	(low limit + 2) to 100 %	0.1%
EtO_2 Low	18 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

B.1

The device meets the requirements of IEC 60601-1-2. All the accessories listed in ***27Accessories*** also meet the requirements of IEC 60601-1-2 when in use with this device.

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.

Radio frequency (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.
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 emissions IEC61000-3-2	Class A	
Voltage Fluctuations/Flicker Emissions IEC 61000-3-3	Complies	

A

[illegible]

[illegible]
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.

[illegible]	**C60601** [illegible]	C [illegible]	[illegible]
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±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, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5 % U_T (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 s	<5 % U_T (>95 % dip in U_T) for 0.5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of 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.
Power frequency (50/60 HZ) magnetic field IEC 61000-4-8	3 A/m	3 A/m	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.			

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.			
	C60601		
Conduced RF IEC61000-4-6	3 Vrms 150 kHz to 80 MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of

A

The device is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the device can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the device as recommended below, according to the maximum output power of the communications equipment.

	150 kHz ~ 80 MHz $d = 1.2\sqrt{P}$	80 MHz ~ 800 MHz $d = 1.2\sqrt{P}$ (Resp: $d = 3.5\sqrt{P}$)	800 MHz ~ 2.5 GHz $d = 2.3\sqrt{P}$ (Resp: $d = 7\sqrt{P}$)
0.01	0.12	0.12 (0.35)	0.23 (0.70)
0.1	0.38	0.38 (1.11)	0.73 (2.22)

B.2.] C]

RF parameters

	802.11	802.11	802.11
Operating Frequency Band (MHz)	2412 - 2472	2412 - 2472	2412 - 2472
Modulation	DSSS and CCK	OFDM	OFDM
Transmitter Output Power (dBm)	<20	<20	<20

The device configured with the WM1010BGN wireless module complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

Operation of this equipment requires the prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

This Wi-Fi device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.

FCC and Industry Canada Radio Compliance of the device configured with WM1010BGN wireless module: 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.

CE

The radio device used in this product is in compliance with the essential requirements and
other relevant provisions of Directive 1999/5/EC (Radio Equipment and Telecommunications Terminal Equipment Directive).

⚠ A

]]]] 20]

C

This chapter lists some of the most important factory default settings in configuration management. You cannot change the factory default configuration itself. However, you can make changes to the settings from the factory default configuration and then save the changed configuration as a user configuration. The last column of the following tables is for your notes and review.

Note: In this chapter, O.M means the monitor's operating mode. Column C refers to the settings that can be changed in configuration management. Column M refers to the settings that can be changed in monitoring mode.

C.1

C.1.1

	C			
Lead Set	*	*	Auto	
Alm Source	*	*	HR	
Alarm	*	*	On	
Alm Lev	*	*	Med	
HR/PR High	*	*	200	
HR/PR Low	*	*	100	
Sweep	*	*	25 mm/s	
Beat Vol	*	*	2	
Paced		*	No	
Notch Filter	*	*	Weak	
Gain	*	*	X1	
Filter	*	*	Monitor	
ECG Display	*	*	Normal	
Pacemaker Rate		*	60	

		C			
VFib/VTac Alarm		*	*	On	
Vtac Alarm		*	*	On	

C.1.3

	C			
Alarm	*	*	On	
Alm Lev	*	*	Med	
HR/PR High	*	*	200	
HR/PR Low	*	*	100	
PR Source	*	*	SpO_2	
Beat Vol	*	*	2 | 1	

C.1.4

	C			
Alarm	*	*	On	
Alm Lev	*	*	Med	
SpO_2 High	*	*	95	
SpO_2 Low	*	*	90	
Desat Limit	*	*	80	
Sweep	*	*	25 mm/s	
NIBP Simul		*	Off	
Sensivity (Mindray)	*	*	Med	
Sensivity (Masimo)	*	*	Normal	
Averaging (Masimo)	*	*	8 s	
Sat-Seconds (Nellcor)	*	*	0 s	
PI Zoom	*	*	No	

C.1.5

	C			
Alarm	*	*	On	
Alm Lev	*	*	Med	
T1/T2 High (°C)	*	*	38.0	
T1/T2 Low (°C)	*	*	35.0	
TD High (°C)	*	*	2.0	

C.1.6 [illegible]B

[illegible]		[illegible] C		[illegible]	[illegible]
Alarm		*	*	On	
Alm Lev		*	*	Med	
Interval		*	*	15 min	
NIBP End Tone		*	*	Off	
Clock		*	*	On	
Cuff Press. (mmHg)	Big	*	*	80	
	Medium			60	
	Small			40	
Initial Pressure (mmHg)	Big	*	*	160	
	Medium			140	
	Small			90	
A [illegible]					
NIBP-S High (mmHg)	Big	*	*	160	
	Medium			120	
	Small			90	
NIBP-S Low (mmHg)	Big	*	*	90	
	Medium			70	
	Small			40	
NIBP-M High (mmHg)	Big	*	*	110	
	Medium			90	
	Small			70	
NIBP-M Low (mmHg)	Big	*	*	60	
	Medium			50	
	Small			25	
NIBP-D High (mmHg)	Big	*	*	90	
	Medium			70	
	Small			60	
NIBP-D Low (mmHg)	Big	*	*	50	
	Medium			40	
	Small			20	

C.1.7 [illegible]B

[illegible]	[illegible] C		[illegible]	[illegible]
IBP 1 Label	*	*	Art	
IBP 2 Label	*	*	CVP	
Alarm	*	*	On	
Alm Lev	*	*	Med	
P1 Measure	*	*	All	
P2 Measure	*	*	All	
P3 Measure	*	*	Mean	

P4 Measure	*	*	Mean	
PPV Measurement	*	*	Off	
PPV Source	*	*	Auto	

C.1.8 C. .

[ ]	. C		]	].
Alarm	*	*	On	
Alm Lev	*	*	Med	
TB High (°C)	*	*	39.0	
TB Low (°C)	*	*	36.0	
Comp. Const	*	*	0.542	
Auto TI	*	*	Auto	
Manual TI (°C)	*	*	2.0	
Measuring mode	*	*	Manual	

C.1.9 C 2

[ ]	. C		]	].
Alarm	*	*	On	
Alm Lev	*	*	Med	
Operating Mode	*	*	Measure	
Sweep	*	*	6.25 mm/s	
Scale (mmHg)	*	*	50	
Apnea Delay	*	*	15	
RR Source		*	Auto	
] C 2,				
Flow Rate	*	*	70 ml/min	
BTPS Compen	*	*	Off	
N_2O Compen	*	*	0	
O_2 Compen	*	*	21	
Des Compen	*	*	0	
] C 2,				
BTPS Compen		*	Off	
Max Hold	*	*	20 s	
Auto Standby (min)	*	*	0	
] C 2,				
Max Hold	*	*	10 s	
O_2 Compen	*	*	Off	
Balance Gas	*	*	Room Air	
AG Compen	*	*	0	
A]				
$EtCO_2$ High (mmHg)	*	*	45	
$EtCO_2$ Low (mmHg)	*	*	30	
$FiCO_2$ High (mmHg)	*	*	4	
RR High	*	*	100	
RR Low	*	*	30	

	C			
FiSev High	*	*	5.0	
FiSev Low	*	*	0.0	
EtDes High	*	*	8.0	
EtDes Low	*	*	0.0	
FiDes High	*	*	6.0	
FiDes Low	*	*	0.0	

C.2.

C.2.1 A

	C			
Alm Volume	*	*	2	
Reminder Vol	*	*	Low	
Recording Length	*	*	16 s	
Apnea Delay	*	*	15 s	
Alarm Delay	*	*	6 s	
ST Alarm Delay	*	*	30 s	

C.2.2

		C			
Choose Screen		*	*	Normal Screen	
Display the ST segments on ECG screen		*	*	Unselected	
Select QuickKeys		*		NIBP Measure→Stop All→Review→Standby	
Select Wave Sequence for Normal Screen	1			ECG1	
	2			ECG2	
	3			SpO_2+PR	
	4	*	*		

C.2.3

Parameter/ Wave Colour	ECG			Green	
	NIBP			White	
	SpO_2			Cyan	
	PR			Cyan	
	TEMP			White	
	Art/Ao/UAP/FAP/BAP/LV/P1~P4 (arterial pressure)			Red	
	PA			Yellow	
	CVP/ICP/P1~P4 (venous pressure)			Blue	
	LAP			Purple	
	RAP		*	Orange	
	UVP			Cyan	
	CO_2			Yellow	
	RESP			Yellow	
	AA			Yellow	
	N_2O			Blue	
	O_2			Green	
	Hal			Red	
	Enf			Orange	
	Iso			Purple	
	Des			Cyan	
	Sev			Yellow	
	C.O.			White	

X represents a waveform label, such as ECG, RESP, CO_2 and so forth. The ECG waveform cannot be set off.

C.2.4

Tabular Trends	Interval	*	*	30 min	
	Trend Group	*	*	Standard	
Graphic Trends	Trend Group	*	*	Standard	
Minitrend Length			*	2 h	
Full Disclosure	Save Waves	*	*	Save ECG1 by default.	

C.2.5

Waveform 1			II	
Waveform 2			I	
Waveform 3			Pleth	

C.2.6

Length			8 s	
Interval			Off	
Paper Speed			25 mm/s	
Alm Rec	X		Off	

X represents a parameter label.

C.2.7

Paper Size			A4	
ECG Reports	Amplitude		10 mm/mV	
	Sweep		25 mm/s	
	Auto Interval		Off	
	12-Lead Format		12X1	
Tabular Trends Reports	Set as End Case Report		Unselected	
	Back		Auto	
	Spacing		Auto	
	Report Layout		Parameter Oriented	
	Currently Displayed Trended Parameters		Selected	
	Standard Parameter Group		Unselected	
	Custom		Unselected	
Graphic Trends Reports	Set as End Case Report		Unselected	
	Back		Auto	
	Zoom		Auto	
Realtime Report	Set as End Case Report		Unselected	
	Sweep		Auto	
	Select Wave		Current	

C.2.8

		C			
Brightness			*	5	
Key Volume			*	2	
View Other Patient	Auto Alarm		*	On	

C.3

		C			
Parameter Switch		*	*	When [ ] , A is set to [ ]: Unselected When [ ] , A is set to [ ]: Selected	
SpO_2 Tone			*	Mode 1	
Signal Type			*	Continuous	
Contact Type			*	Normally Closed	
Nurse Call	Signal Type		**	Continuous	
	Contact Type		*	Normally Closed	
	Alm Lev	*	*	High, Med, Low	
	Alarm Cat.	*	*	Phys., Tech.	

A]

This chapter lists only the most important physiological and technical alarm messages. Some messages appearing on your monitor may not be included.

In this chapter:

The "I" field indicates how alarm indications are cleared: "A" means all alarm indications are cleared after the hardkey is pressed, "B" indicates alarm lamp flashing and alarm tones are cleared and the alarm messages change to prompt messages after the hardkey is pressed, and "C" indicates alarm lamp flashing and alarm tones are cleared and √ appears before the alarm message after the hardkey is pressed.

The "L" field indicates the alarm level: H means high, M means medium and L means low. "*" means the alarm level is user-adjustable.

XX represents a measurement or parameter label, such as ECG, NIBP, HR, ST-I, PVCs, RR, SpO_2, PR, etc.

In the "Cause and Solution" column, corresponding solutions are given instructing you to troubleshoot problems. If the problem persists, contact your service personnel.

.1 A]

]	A]	,	C]
XX	XX Too High	M*	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 Too Low	M*	
ECG	ECG Weak Signal	H	The ECG signal is so weak that the monitor can't perform ECG analysis. Check the patient's condition and the ECG connections.
	Asystole	H	Arrhythmia has occurred to the patient. Check the patient's condition and the ECG connections.
	VFib/VTac	H	
	Vtac	H	
	Vent. Brady	H	
	Extreme Tachy	H	
	Extreme Brady	H	
	R on T	M*	
	VT>2	M*	
	Couplet	M*	
	PVCs/min	M*	
	Bigeminy	M*	
	Trigeminy	M*	
	Tachy	M*	

]	A]	,	C]]
	Brady	M*	
	Missed Beats	M*	
	Irr. Rhythm	M*	
	Vent. Rhythm	M*	
	Multif. PVC	M*	
	Nonsus. Vtac	M*	
	Pause	M*	
	PNP	M*	The pacer appears abnormal. Check the pacer.
	PNC	M*	
Resp	Resp Apnea	H	The respiration signal was so weak that the monitor cannot perform respiration analysis. Check the patient's condition and the Resp connections.
	Resp Artifact	H	The patient's heartbeat has interfered with his respiration. Check the patient's condition and the Resp connections.
SpO_2	SpO_2 Desat	H	The SpO_2 value has fallen below the desaturation alarm limit. Check the patient's condition and check if the alarm limit settings are correct.
	No Pulse	H	The pulse signal was so weak that the monitor cannot perform pulse analysis. Check the patient's condition, SpO_2 sensor and measurement site.
CO_2	CO_2 Apnea	H	The patient stops breathing, or the respiration signal was so weak that the monitor cannot perform respiration analysis. Check the patient's condition and the RM connections.
AG	AG Apnea	H	
	FiO_2 Too Low	H	Check the patient's condition, the ventilated O_2 content and the AG connections.

.2] A]

]	A]	,	]	C]]
XX	XX SelfTest Err	H	C	An error occurred to the XX module, or there is a problem with the communications between the module and the monitor. Re-plug the module and restart the monitor, or plug the module into another monitor.
	XX Init Err	H	A	
	XX Init Err N	H	A	
	N is within 1 to 8			
	XX Comm Err		A	
	XX Comm Stop	H	C	

	Note: YY represents the leadwires, V (V1, V2, V3, V4, V5, V6,), LL, LA, RA, as per AHA standard, or C (C1, C2, C3, C4, C5, C6), F, L and R as per IEC standard.			Check the connections of the electrodes and leadwires.
	ECG Noisy	L	A	The ECG signal is noisy. Check for any possible sources of signal noise around the cable and electrode, and check the

o(k f)1( )l3 0 Td( )-8(s)-6(e)-6(i)5(s)a(s35scn9c (he)aTd9) [(t) -7(al(ou)2J0.00Td(

3 i e

	SpO_2 Interference	L	C	The SpO_2 signal has been interfered. Check for any possible sources of signal noise around the sensor and check the patient for great motion.
	SpO_2 Board Fault	L	C	There is a problem with the SpO_2 measurement board. Do not use the module and contact your service personnel.
NIBP	NIBP Loose Cuff	L	A	The NIBP cuff is not properly connected, or there is a leak in the airway.
	NIBP Air Leak	L	A	
	NIBP Pneumatic Leak	L	A	Check the NIBP cuff and pump for leakages.
	NIBP Cuff Type Wrong	L	A	The cuff type applied mismatches the patient category. Verify the patient category and replace the cuff.
	NIBP Air Pressure Err	L	A	An error occurred to the air pressure. Verify that the monitor application site meets the environmental requirements and check if there is any source that affects the air pressure.
	NIBP Weak Signal	L	A	The patient's pulse is weak or the cuff is loose. Check the patient's condition and change the cuff application site. If the error persists, replace the cuff.
	NIBP Signal Saturated	L	A	The NIBP signal is saturated due to excess motion or other sources.
	NIBP Overrange	L	A	The measured NIBP value is not within the specified range.
	NIBP Excessive Motion	L	A	Check the patient's condition and reduce the patient motion.
	NIBP Cuff Overpress.	L	A	The NIBP airway may be occluded. Check the airway and measure again.
	NIBP Equip Err	H	A	An error occurred during NIBP measurement and therefore the monitor cannot perform analysis correctly. Check the patient's condition and NIBP connections, or replace the cuff.
	NIBP Timeout	L	A	
	NIBP Measure Failed	L	A	
	NIBP Illegally Reset	L	A	An illegal reset occurred during NIBP measurement. Check if the airway is occluded.
IBP	YY Sensor Off	L*	A	Check the sensor connection and reconnect the sensor.
	YY Disconnected	H	C	The liquid way is disconnected from the patient, or the three-way valve is open to the air. Check the connection of the liquid way, or check the valve is open to the patient. If the problem remains, contact the Customer Services Dept. for help.
	YY Non-Pulsatile	L	A	The catheter may be occluded. Please flush the catheter.
	YY represents an IBP label.			
C.O.	TB Sensor Off	L	A	Check the sensor connection and reconnect the sensor.
CO_2	CO_2 Sensor High Temp	L	C	Check, stop using or replace the sensor.
	CO_2 Sensor Low Temp	L	C	Check, stop using or replace the sensor.
	CO_2 Temp Overrange	L	C	The operating temperature of the CO_2 module goes beyond the specified range. After it restores within the specified range, the module will restart automatically.

	CO_2 Airway High Press.	L	C	An error occurred in the airway pressure. Check the patient connection and patient circuit, and then restart the monitor.
	CO_2 Airway Low Press.	L	C	
	CO_2 High Barometric Press.	L	C	Check the CO2 connections, make sure that the monitor application site meets the requirements, and check for special sources that affect the ambient pressure. Restart the monitor.
	CO_2 Low Barometric Press.	L	C	
	CO_2 FilterLine Occluded	L	C	The airway or watertrap was occluded. Check the airway and remove the occlusion.
	CO_2 No Watertrap	L	B	Check the watertrap connections.
	CO_2 Check Adapter	L	A	There is a problem with the airway adapter. Check, clean or replace the adapter.
	CO_2 FilterLine Err	L	C	Check if there is a leak in the CO_2 sample line or the CO_2 sample line has been occluded.
	CO_2 Zero Failed	L	A	Check the CO_2 connections. After the sensor's temperature becomes stabilized, perform a zero calibration again.
	CO_2 System Err	L	A	Re-plug the module or restart the monitor.
	CO_2 Check Cal.	L	C	Perform a calibration.
	CO_2 Check Airway	L	C	An error occurred to the airway.
	CO_2 No Filterline	L	A	Make sure that the filterline is connected.
	CO_2 No Sensor	L	A	Make sure that the sensor is connected.
	CO_2 Main Board Err	H	C	There is a problem with the CO_2 module. Re-plug the module or restart the monitor.
	CO_2 Checking Sensor	L	C	
	CO_2 Replace Scrubber&Pump	L	C	
	CO_2 15V Overrange	H	C	
	CO_2 Hardware Err	H	C	
AG	AG No Watertrap	L	B	Check the connections of the watertrap and re-connect it.
	AG Change Watertrap	L	A	Wait until the change is completed.
	AG Watertrap Type Wrong	L	A	Make sure that a correct watertrap has been used.
	O_2 Accuracy Unspecified	L	A	The measured value has exceeded the specified accuracy range.
	N_2O Accuracy Unspecified	L	A	
	CO_2 Accuracy Unspecified	L	A	
	Enf Accuracy Unspecified	L	A	
	Iso Accuracy Unspecified	L	A	

]	A]	,	¶	C]
	Sev Accuracy Unspecified	L	A	
	Hal Accuracy			

g the module and contact

occlusion.

monitor, and then perform a

n power supply. Restart the

ver source and allow the

	System CMOS Full	H	C	
	System CMOS Err	H	C	
	System FPGA Err	H	C	
	System Err N	H	C	
	N is within 2 to 12.			

FOR YOUR NOTES

The following electrical safety tests are recommended as part of a comprehensive preventive maintenance program. They are a proven means of detecting abnormalities that, if undetected, could prove dangerous to either the patient or the operator. Additional tests may be required according to local regulations.

All tests can be performed by using commercially available safety analyzer test equipment. These procedures assume the use of a 601PROXL International Safety Analyzer or equivalent safety analyzer. Other popular testers complying with IEC 60601-1 used in Europe, such as Fluke, Metron, or Gerb, may require modifications to the procedure. Please follow the instructions of the analyzer manufacturer.

The electrical safety inspection should be periodically performed every two years .The safety analyzer also proves to be an excellent troubleshooting tool to detect abnormalities of line voltage and grounding, as well as total current loads.

.1

The power plug	The power plug pins	No broken or bent pin. No discolored pins.
	The plug body	No physical damage to the plug body.
	The strain relief	No physical damage to the strain relief. No plug warmth for device in use.
	The power plug	No loose connections.
The power cord		No physical damage to the cord. No deterioration to the cord.
		For devices with detachable power cords, inspect the connection at the device.
		For devices with non-detachable power cords, inspect the strain relief at the device.

.2 A

.2.1

The enclosure and accessories	No physical damage to the enclosure and accessories.
	No physical damage to meters, switches, connectors, etc.
	No residue of fluid spillage (e.g., water, coffee, chemicals, etc.).
	No loose or missing parts (e.g., knobs, dials, terminals, etc.).

.2.2 C

The enclosure and accessories	No unusual noises (e.g., a rattle inside the case).
	No unusual smells (e.g., burning or smoky smells, particularly from ventilation holes).
	No taped notes that may suggest device deficiencies or operator concerns.

.3

Check the labels provided by the manufacturer or the healthcare facilities are present and legible.

Main unit label

Integrated warning labels

.4

1. Plug the probes of the analyzer into the device's protective earth terminal and protective earth terminal of the AC power cord.
2. Test the earth resistance with a current of 25 A.
3. Verify the resistance is less than limits.

LIMITS

For all countries, R = 0.2 Ω Maximum

.5

Run an Earth Leakage test on the device being tested before performing any other leakage tests.

The following outlet conditions apply when performing the Earth Leakage test:

normal polarity(Normal Condition),

reverse polarity(Normal Condition),

normal polarity with open neutral(Single Fault Condition),

reverse polarity with open neutral(Single Fault Condition)

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For UL60601-1,

300 µA in Normal Condition

1000 µA in Single Fault Condition

For IEC60601-1,

500 µA in Normal Condition

1000 µA in Single Fault Condition

.6]. . ,]], C . .

Patient leakage currents are measured between a selected applied part and mains earth. All measurements have a true RMS only

The following outlet conditions apply when performing the Patient Leakage Current test.

normal polarity(Normal Condition);

reverse polarity(Normal Condition),

normal polarity with open neutral(Single Fault Condition);

reverse polarity with open neutral(Single Fault Condition).

normal polarity with open earth(Single Fault Condition);

reverse polarity with open earth(Single Fault Condition).

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For CF applied parts

10μA in Normal Condition

50μA in Single Fault Condition

For BF applied parts

100μA in Normal Condition

500μA in Single Fault Condition

.7]. . A, . .].,]],

The Mains on Applied Part test applies a test voltage, which is 110% of the mains voltage, through a limiting resistance, to selected applied part terminals. Current measurements are then taken between the selected applied part and earth. Measurements are taken with the test voltage (110% of mains) to applied parts in the normal and reverse polarity conditions

The following outlet conditions apply when performing the Mains on Applied Part test.

Normal Polarity;

Reversed Polarity

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For CF applied parts: 50 μA

For BF applied parts: 5000 μA

.8]. A]. C .

Patient Auxiliary currents are measured between any selected Applied Part connector and the remaining Applied Part connector s. All measurements may have a true RMS only response.

The following outlet conditions apply when performing the Patient Auxiliary Current test.

normal polarity(Normal Condition);

reverse polarity(Normal Condition),

normal polarity with open neutral(Single Fault Condition);

reverse polarity with open neutral(Single Fault Condition).

normal polarity with open earth(Single Fault Condition);

reverse polarity with open earth(Single Fault Condition).

LIMITS

For CF applied parts,

10μA in Normal Condition

50μA in Single Fault Condition

For BF applied parts,

100μA in Normal Condition

500μA in Single Fault Condition

]]]] **C61010-1.**

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[illegible].1 [illegible]

µA	microampere
µV	microvolt
µs	Microsecond
A	ampere
Ah	ampere hour
bpm	beat per minute
bps	bit per second
ºC	centigrade
cc	cubic centimeter
cm	centimeter
dB	decibel
DS	dyne second
ºF	fahrenheit
g	gram
GHz	gigahertz
GTT	gutta
h	hour
Hz	hertz
in	inch
kg	kilogram
kPa	kilopascal
L	litre
lb	pound
m	meter
mAh	milliampere hour
Mb	mega byte
mcg	microgram
mEq	milli-equivalents
mg	milligram
min	minute
ml	milliliter
mm	millimeter
mmHg	millimeters of mercury
cmH2O	centimeters of water
ms	millisecond
mV	millivolt
mW	milliwatt
MΩ	megaohm
nm	nanometer

rpm	breath per minute
s	second
V	volt
VA	volt ampere
Ω	ohm
W	watt
–	minus, negative
%	percent
/	per; divide; or
+	plus
=	equal to
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
±	plus or minus
×	multiply

F.2 A . . .] . .

$AaDO_2$	alveolar-arterial oxygen gradient
AAMI	Association for Advancement of Medical Instrumentation
AC	alternating current
ACI	acceleration index
AG	anaesthesia gas
AHA	American Heart Association
ANSI	American National Standard Institute
Ao	aortic pressure
Art	arterial
aVF	left foot augmented lead
aVL	left arm augmented lead
aVR	right arm augmented lead
awRR	airway respiratory rate
BAP	brachial arterial pressure
BP	blood pressure
BPSK	binary phase shift keying
BSA	body surface area
BT	blood temperature
BTPS	body temperature and pressure, saturated
C.I.	cardiac index
CCI	Continuous Cardiac Index
C.O.	cardiac output
CCO	Continuous Cardiac Output
CaO_2	arterial oxygen content
CCU	cardiac (coronary) care unit

CE	Conformité Européenne
CFI	cardiac function index
CIS	Clinical Information System
CISPR	International Special Committee on Radio Interference
CMOS	complementary metal oxide semiconductor
CMS	central monitoring system
CO_2	carbon dioxide
COHb	carboxyhemoglobin
CP	cardiopulmonary
CPI	cardiac power index
CPO	Cardiac Power Output
CVP	central venous pressure
DC	direct current
Des	desflurane
Dia	diastolic
DPI	dot per inch
dPmx	left ventricular contractility
DVI	digital video interface
DO_2	oxygen delivery
DO_2I	oxygen delivery index
ECG	electrocardiograph
EDV	end-diastolic volume
EEC	European Economic Community
EEG	electroencephalogram
EMC	electromagnetic compatibility
EMG	electromyography
EMI	electromagnetic interference
Enf	enflurane
ESU	electrosurgical unit
Et	end-tidal
$EtCO_2$	end-tidal carbon dioxide
EtN_2O	end-tidal nitrous oxide
EtO	ethylene oxide
EtO_2	end-tidal oxygen
EVLW	extravascular lung water
ELWI	extravascular lung water index
FAP	femoral arterial pressure
FCC	Federal Communication Commission
FDA	Food and Drug Administration
FEV1.0%	first second forced expiratory volume ratio
Fi	fraction of inspired
$FiCO_2$	fraction of inspired carbon dioxide
FiN_2O	fraction of inspired nitrous oxide
FiO_2	fraction of inspired oxygen
FPGA	field programmable gate array
FV	flow-volume

GEDV	global end diastolic volume
GEDI	global end diastolic volume index
GEF	global ejection fraction
Hal	halothane
Hct	haematocrit
Hb	hemoglobin
Hb-CO	carbon mono-oxide hemoglobin
HbO_2	oxyhemoglobin
HR	heart rate
I:E	inspiratory-expiratory ratio
IBP	invasive brood pressure
ICG	impedance cardiography
ICP	intracranial pressure
ICT/B	intracranial catheter tip pressure transducer
ICU	intensive care unit
ID	identification
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
Ins	inspired minimum
IP	internet protocol
Iso	isoflurane
IT	injectate temperature
ITBI	Intrathoracic Blood Volume Index
ITBV	Intrathoracic Blood Volume
LA	left arm
LAP	left atrial pressure
Lat	lateral
LCD	liquid crystal display
LCW	left cardiac work
LCWI	left cardiac work index
LED	light emitting diode
LL	left leg
LVD	low voltage directive
LVDS	low voltage differential signal
LVET	left ventricular ejection time
LVSW	left ventricular stroke work
LVSWI	left ventricular stroke work index
MAC	minimum alveolar concentration
Art mean	mean arterial pressure
MDD	Medical Device Directive
MetHb	methemoglobin
MRI	magnetic resonance imaging
MVe	expiratory minute volume
MVi	inspiratory minute volume
N/A	not applied
N_2	nitrogen

N_2O	nitrous oxide
NIBP	noninvasive blood pressure
O_2	oxygen
O_2CI	oxygen consumption index
O_2R	oxygen extraction ratio
OR	operating room
OxyCRG	oxygen cardio-respirogram
PA	pulmonary artery
pArt-D	diastolic artery pressure
pArt-M	mean artery pressure
pArt-S	systolic artery pressure
Paw	airway pressure
PAWP	pulmonary artery wedge pressure
PD	photodetector
PEEP	positive end expiratory pressure
PEF	peak expiratory flow
PEP	pre-ejection period
PIF	peak inspiratory flow
PIP	peak inspiratory pressure
Pleth	plethysmogram
Pmean	mean pressure
Pplat	plateau pressure
PPV	Pulse Pressure Variation
PR	pulse rate
PVC	premature ventricular contraction
PVR	pulmonary vascular resistance
PVRI	pulmonary vascular resistance index
PVPI	pulmonary vascular permeability index
pArt	artery pressure
pCVP	central venous pressure
R	right
RA	right arm
RAM	random access memory
RAP	right atrial pressure
Rec	record, recording
Resp	respiration
RHb	reduced hemoglobin
RL	right leg
RM	respiratory mechanics
RR	respiration rate
RSBI	rapid shallow breathing index
SaO_2	arterial oxygen saturation
SEF	spectral edge frequency
Sev	sevoflurane
SFM	self-maintenance
SI	stroke index

SMR	satellite module rack
SpO_2	arterial oxygen saturation from pulse oximetry
SQI	signal quality index
SR	suppression ratio
STR	systolic time ratio
SV	stroke volume
SVI	Stroke Volume Index
SVR	systemic vascular resistance
SVRI	systemic vascular resistance index
SVV	stroke volume variation
SvO_2	mixed venous oxygen saturation
$ScvO_2$	central venous oxygen saturation
Sync	synchronization
Sys	systolic pressure
Taxil	axillary temperature
TB	Blood Temperature
TD	temperature difference
Temp	temperature
TFC	thoracic fluid content
TFI	thoracic fluid index
TFT	thin-film technology
Toral	oral temperature
TP	total power
Trect	rectal temperature
TVe	expiratory tidal volume
TVi	inspiratory tidal volume
UAP	umbilical arterial pressure
UPS	uninterruptible power supply
USB	universal serial bus
UVP	umbilical venous pressure
VAC	volts alternating current
VEPT	volume of electrically participating tissue
VI	velocity index
VO_2	oxygen consumption
VO_2I	oxygen consumption index
WLAN	wireless local area network

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