Table 7. Display Symbols

Symbols	Description	Symbols	Description
	Patient type: Adult		Audio alarm paused
	Patient type: Pediatric		Audio alarm off
	Patient type: Neonatal		HR/PR icon
	CMS status (Exchange)		HR/PR status icon (Pacer on)
	CMS status (no connect)		HR/PR status icon (Pacer off)
	CMS status (receive)		SpO_2 SatSeconds status (Off)
	CMS status (Send)		SpO_2 SatSeconds status (fill, 1/8)
	Network status icon (WiFi)		SpO_2 SatSeconds status (fill, 2/8)
	Volume indicator		SpO_2 SatSeconds status (fill, 3/8)
	Battery status indicator Ⅰ		SpO_2 SatSeconds status (fill, 4/8)
	Battery status indicator Ⅱ		SpO_2 SatSeconds status (fill, 5/8)
	AC input		SpO_2 SatSeconds status (fill, 6/8)
	DC input		SpO_2 SatSeconds status (fill, 7/8)
	Message list status icon		SpO_2 SatSeconds status (fill, 8/8)
	Alarm active		

Operating the Defibrillator/Monitor

User can operate the cursor by rotating the ***Multi function knob***

1. Move the cursor by rotating the ***Multi function knob***.
2. Press the ***Multi function knob*** when the cursor is located on the desired position.
3. User can set ***Parameter menu*** by pressing the ***Multi function knob*** when the cursor is located on each parameter of Numeric area.

Software Menu Area

Defibrillator/Monitor provides various functions via button of software menu area. Software menu provides different function according to the mode.

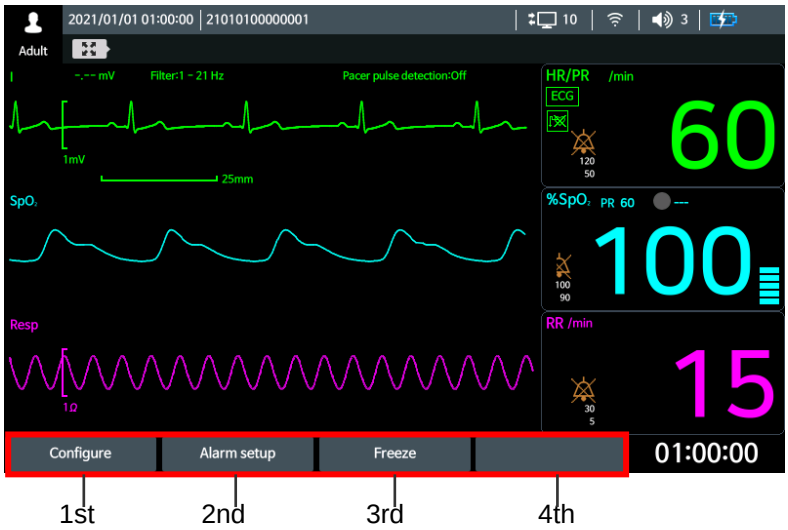


Figure 13. Software menu area (Monitor mode)

Followings are software menus activated according to each mode.

Manual mode

1st	2nd	3rd	4th
Manual mode, charging			
Configure / Home	Alarm setup	N/A	N/A
Advisory mode, no charging			
Configure / Home	Alarm setup	Pause for CPR / Resume analyzing	Manual mode
Disarm			
Configure / Home	Alarm setup	N/A	Disarm

Note: Advisory mode is provided to help determine whether defibrillation is carried out in manual mode. Advisory mode can be activated by pressing the ECG button.

AED mode

1st	2nd	3rd	4th
No charging			
Configure / Home	Alarm setup	Grayscale / Full color	Pause for CPR / Resume analyzing
Charging			
Configure / Home	Alarm setup	Grayscale / Full color	Disarm

Pacing mode

1st	2nd	3rd	4th
Configure / Home	Alarm setup	Pacing setup	Resume / Pause pacing

Monitor mode

1st	2nd	3rd	4th
Configure / Home	Alarm setup	Freeze	N/A

Configure
User may confirm and set the information of Display, Sound, Waveform, Parameter, Alarm setup, Patient, Printer, Review, Service setting and Others via ***Configure button*** on the ***Software Menu Area***. Refer to the ***Configure*** section for details.

Home
User may exit the menu window via ***Home button*** on the ***Software Menu Area***.

Alarm setup
User may confirm and set the alarm setting via ***Alarm Setup button*** on the ***Software Menu Area***. The other method is entering ***Alarm menu*** or ***Alarm Limits menu*** on ***Configure menu***. Refer to the ***Alarms and Limits*** section for details.

Pause for CPR
User may stop analyzing and performs CPR.

Resume analyzing
User may resume analyzing.

Manual mode
User may change the screen to the manual mode screen.

Disarm
User may disarm the charged energy to the internal resistance.

Grayscale/Full Color
User may change the color filter setting.

Pacing setup
User may set demand/fixed mode, pacing rate and pacing current. Refer to the ***Pacing mode*** section for details.

Resume/Pause Pacing
User may resume or pause pacing output.

Freeze
User may change the screen to the Freeze screen.

Configure

User may confirm and set the information of Display, Sound, Waveform, Parameter, Alarm setup, Patient, Printer, Review, Service setting and Others via ***Configure button*** on the ***Software Menu Area***.

When user opens ***Configure menu***, Configure button on the Software Menu Area is changed to ***Home button***. Menu window is closed when the ***Home button*** is pressed.

The title of menu is shown as 'Previous menu title / Current menu title' on the top of Configure Menu window when the sub menu is selected. User can navigate the menu with Back Button.

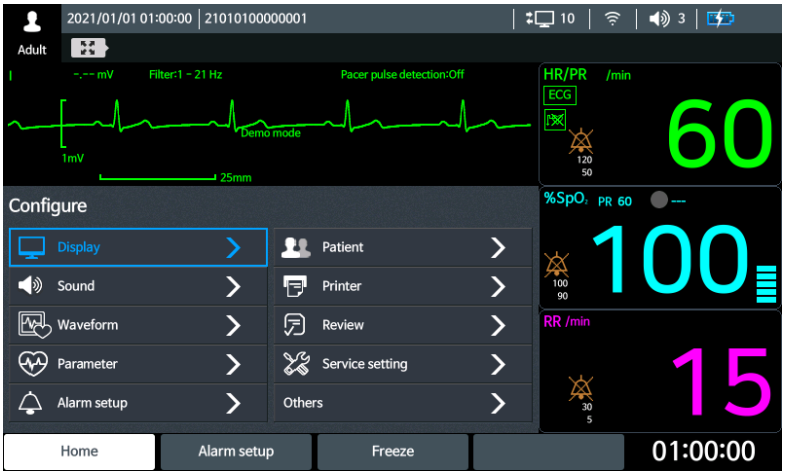


Figure 14. Configure window

Display

In the Display menu, users may set the monitor display: Display patient information, Brightness, Menu timeout, color filter and Parameter color.

Table 8. Display menu

Level 1 Menu	Level 2 Menu or Response
DISPLAY MENU	
Display patient information	ID, Name, None
Brightness	1, 2, 3, 4, 5
Menu timeout	Off, 10 sec, 20 sec, 30 sec
Color filter	Full color/Grayscale
Parameter color	Color 1~17 for each parameter

Display patient information
Select the type of patient information to display on patient information area. Refer to ***Patient*** section to create patient information.

Brightness
Adjust the brightness of display.

Menu timeout
If no user input during the set-time when the defibrillator/monitor displays Menu window, Menu window is automatically closed. Whenever there is user input, count down stars again.

Color filter
Change the color of display.

Parameter color
Select the color of ECG, SpO_2, and RESP.

Sound

In the Sound menu, users may set the defibrillator/monitor sound: Alarm volume, HR/PR tone volume, Key beep volume, Defibrillator sound volume, Voice prompt volume and other sound volume.

Table 9. Sound menu

Level 1 Menu	Level 2 Menu or Response
SOUND MENU	
Alarm volume	1, 2, 3, 4, 5
HR/PR tone volume	Off, 1, 2, 3, 4, 5
Key beep volume	Off, 1, 2, 3, 4, 5
Defibrillator sound volume	1, 2, 3, 4, 5
Voice prompt volume	1, 2, 3, 4, 5
Other sound volume	Off, 1, 2, 3, 4, 5

Alarm volume
Set the volume of alarm generated by the defibrillator/monitor.

HR/PR tone volume
Set the volume of HR/PR tone generated by the defibrillator/monitor.

Key beep volume
Set the volume of key beep generated by the defibrillator/monitor.

Defibrillator sound volume
Set the volume of Defibrillator generated by the defibrillator/monitor.

Voice prompt volume
Set the volume of Voice prompt generated by the defibrillator/monitor.

Other sound volume
Set the volume of other sound generated by the defibrillator/monitor.

Waveform

In the Waveform menu, users may set the waveform setting: ECG 4mV, Waveform 1~3, ECG, Respiration and SpO_2.

Table 10. Waveform menu

Level 1 Menu	Level 2 Menu or Response
WAVEFORM MENU	
Waveform setting	ECG 4mV, Waveform 1~3
ECG	Grid, Sweep speed, Size, Pacer pulse detection, ST level measurement position, Filter mode
Respiration	Sweep speed, Size
SpO_2	Sweep speed

Waveform setting
Set ECG 4mV and select the waveforms to be displayed on the screen.
When ECG 4mV is selected, waveforms are displayed using the 2 waveform areas on the screen, and the number of waveforms for each mode is shown below.

Table 11. The number of ECG 4mV waveform (Full option)

Mode	4mV Off	4mV On
AED/Manual	N/A	
Monitor	3	2
Pacing	2	1

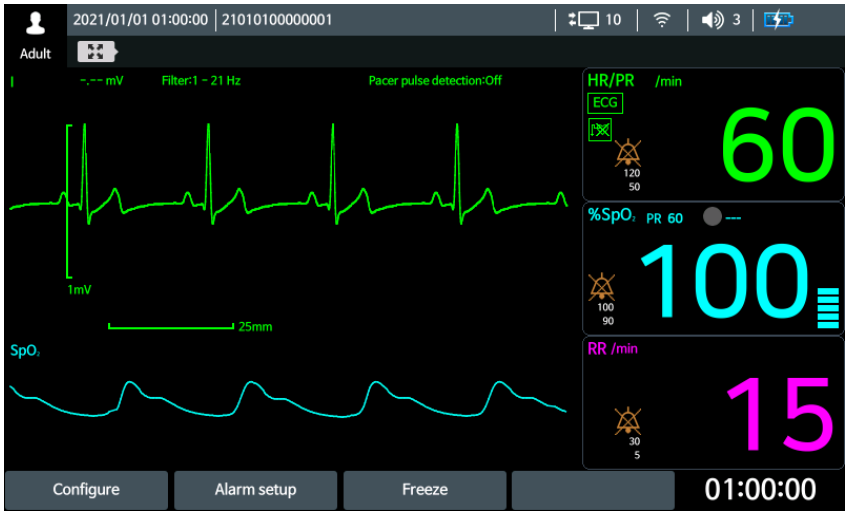


Figure 15. 4mV waveform

ECG
Set Grid, Sweep speed, Size, Pacer pulse detection, ST level measurement position, Filter mode and Number of waveforms for ECG parameter.

Respiration
Set Sweep speed and Size for Respiration parameter.

SpO_2
Set Sweep speed for SpO_2 parameter.

Parameter

In the Parameter menu, users may set the defibrillator/monitor parameter: HR/PR, Respiration and SpO_2.

Table 12. Parameter menu

Level 1 Menu	Level 2 Menu or Response
PARAMETER MENU	
HR/PR	HR/PR source, Asystole time, Alarm limits, Limit audio alarm
RR	Apnea time, Alarm limits, Limit audio alarm
SpO_2	SatSeconds, Alarm limits, Limit audio alarm

HR/PR
Set HR/PR source, Asystole time, Alarm limits and Limit audio alarm.

RR
Set Apnea time, Alarm limits and Limit audio alarm.

SpO_2
Set SatSeconds, Alarm limits and Limit audio alarm.

Alarm Setup

Set the alarm limits for the each parameter or select whether alarm limits display is enabled or not. Audio alarm pause/off function can be activated during the audio alarm pause/off period. For more information about Alarm limits, refer to ***Alarms and Limits*** section.

Table 13. Alarm setup menu

Level 1 Menu	Level 2 Menu or Response
ALARM SETUP MENU	
Alarm limits	Alarm limits for each parameter
Alarm limit display	On, Off
Audio alarm pause/off	Start, Cancel

Note: The audio alarm pause/off period can be set to Disable, 1 min, 3 min, 5 min, 10 min, 20 min, 30 min, 60 min or Indefinite by authorized personnel via Service menu. Audio alarm off menu is not displayed when Audio alarm pause/off period is set Disable. For more information to set the Audio alarm pause/off period, refer to Service manual.

Patient

For patient management, user can access the Patient Menu via Configure Menu. (It is also accessible by pressing the Knob on the Patient information area)

In the Patient Menu, user can manage patient information, including admitting and discharging a patient.

Table 14. Patient menu

Level 1 Menu	Level 2 Menu or Response
PATIENT MENU	
Patient information area	
Discharge patient	(Open the Discharge patient pop-up window)
Modify	Patient ID, Patient type, Pacer pulse detection, Name, Gender, Birth date
New patient	(Open the New patient pop-up window)

Note: Name can be entered by using the keyboard.

Printer

In Printer menu, set Print on shock delivery, Print on shock decision, Print on pacing output, Print on alarm, Print on mark event, Print on self-test and Printing waveform for Printer. For more information about Printer, refer to ***Printing*** section.

Table 15. Printer menu

Level 1 Menu	Level 2 Menu or Response
PRINTER MENU	
Print on shock delivery	On, Off
Print on shock decision	On, Off
Print on pacing output	On, Off
Print on alarm	On, Off
Print on mark event	On, Off
Print on self-test	On, Off
Printing waveform	Printing speed, Printing time

Review

In Review menu, user can open Event report, tabular trend and Data management.

Table 16. Review menu

Level 1 Menu	Level 2 Menu or Response
REVIEW MENU	
Event report	Display the Event report screen
Tabular trend	Display the Tabular trend screen
Data management	(Open the Data management pop-up window)
Clear event report	(Open the Clear event report pop-up window)
Clear trends	(Open the Clear trends pop-up window)
Clear data management	(Open the Clear data management pop-up window)

Service setting

In Service setting, user can enter the Password using the keyboard to open the Service menu. User can terminate the defibrillator/monitor and check the system information applied to the defibrillator/monitor: Serial number, System software version and Font license

Note: For more details about Pass code and Service menu, contact qualified service personnel or your local supplier for assistance.

Table 17. Service setting menu

Level 1 Menu	Level 2 Menu or Response
SERVICE SETTING MENU	
Password	(Entered by numeric keyboard)
System information	Serial number System software version

Password

Activate the numeric keyboard to enter the password. User can enter the password to open the Service menu. The defibrillator/monitor operates differently depending on each password entered. For more details on Password, refer to the Service manual.

System information

Display general information applied to the defibrillator/monitor such as Serial number, System software version and Font license.

Others

In others menu, user may set the date & time, and can open the User test menu.

Table 18. Others menu

Level 1 Menu	Level 2 Menu or Response
OTHERS MENU	
Date & Time	Year, Month, Date, Hour, Minute, Set
User test	(Open the User test pop-up window)

Date & Time

Users may set the date and time displayed on the defibrillator/monitor display and printed out a printer paper.

Note: The date format may be selected either 'YYYY/MM/DD', 'MM/DD/YYYY' or 'DD/MM/YYYY' via Service menu.

Note: According to the date format, the order of Year, Month and Date can be different.

This page is intentionally left blank.

ALARMS AND LIMITS

⚠ WARNING	**Each time the defibrillator/monitor is used, check alarm limits to make sure that they are appropriate for the patient being monitored.**
⚠ WARNING	**If different alarm presets are used for the same or similar equipment in any single area, e.g. an intensive care unit or cardiac operating room, a potential hazard can exist.**
⚠ WARNING	**Always respond immediately to a system alarm since the patient may not be monitored during certain alarm conditions.**
⚠ WARNING	**Alarm volume adjustment is related to safety to patient. If the volume of alarm sound is not loud enough for clinician to hear the clinicians are not able to recognize patient alarm. It causes patient risk.**
⚠ CAUTION	**Do not to cover the holes for the speaker which allows the alarm sound to exit the defibrillator/monitor. Also do not disable audible alarms when it is not appropriate to do so.**

General

When the defibrillator/monitor detects certain conditions that require user attention, the defibrillator/monitor enters an alarm state. The defibrillator/monitor response is indicated by:

- Visual alarm
- Audible alarm
- Physiological alarm including identification of out-of-limit vital signs
- Technical alarm

Note: The audible and visual alarms on the defibrillator/monitor, used in conjunction with clinical signs and symptoms, are the primary source for notifying medical personnel that a patient alarm condition exists.

Changing Alarm Volume

User can select an alarm volume level of 1 to 5. Refer to ***Using the defibrillator/monitor*** section.

Alarm Priority and Messages

There are three possible priorities for visual and audible alarms: High, Medium, and Low. The high, medium, low priority messages and informative messages are displayed in the alarm/informative message area and the defibrillator messages are displayed in the defibrillator message area. A message is displayed alternatively every 2 seconds when the defibrillator/monitor is in multiple alarm conditions. Refer to the ***Troubleshooting*** section for the recommended actions.

Table 19. Alarm priority condition

Alarm Priority	Messages
High Priority	ECG: Asystole
	ECG: V-FIB
	SpO_2: Loss of pulse
	System: Critically low battery condition
	Last self-test failed
Medium Priority	HR: High limit is violated
	HR: Low limit is violated

Alarm Priority	Messages
	ECG: Signal Saturation
	PR: High limit is violated
	PR: Low limit is violated
	PR: High limit is violated
	PR: Low limit is violated
	RR: Loss of respiration signal
	RR: High limit is violated
	RR: Low limit is violated
	SpO_2: High limit is violated
	SpO_2: Low limit is violated
Low Priority	ECG: Pads cable disconnected
	ECG: Pads off
	ECG: Cable/Sensor disconnected
	ECG: Leads off
	ECG: Chest lead off
	ECG: Out of range
	RR: Cable/Sensor disconnected
	RR: Leads off
	RR: Out of range
	SpO_2: Sensor off
	SpO_2: Cable/Sensor disconnected
	SpO_2: Out of range
	SpO_2: Module reset
	SpO_2: Reconnect / Replace SpO_2 sensor
	SpO_2: Reposition / Replace SpO_2 sensor
	SpO_2: Replace SpO_2 Sensor
	SpO_2: EEE001
	SpO_2: EEE003
	SpO_2: EEE035
	SpO_2: EEE069
	SpO_2: EEE103
	SpO_2: EEE171
	SpO_2: EEE220
	Printer: Out of paper
	Low battery condition
	Therapy module communication error
	ECG/Respiration module communication error
	SpO_2 module communication error
	Sub CPU communication error
	Printer communication error
	RT clock error
	Speaker error
	Connection to the CMS was disconnected
	Module error / EEE901
	Module error / EEE902
	Module error / EEE903
	Module error / EEE904
	Module error / EEE905
	Module error / EEE906
	Module error / EEE907
	Module error / EEE908
	Module error / EEE909
	Module error / EEE910

Alarm Priority	Messages
Informative	ECG: Motion artifact
	SpO_2: Weak pulse
	SpO_2: Weak signal
	SpO_2: Waveform interference*
	SpO_2: Excess infrared light*
	SpO_2: Electrical/Optical interference*
	SpO_2: High Pulse amplitude
	SpO_2: Try an alternate sensor placement site
	SpO_2: Optically cover sensor site
	SpO_2: Use an Ear or Forehead sensor
	SpO_2: Use a Nasal or Forehead sensor
	SpO_2: Use an OxiMax adhesive sensor
	SpO_2: Secure the sensor cable
	SpO_2: Use a headband with the forehead sensor
	SpO_2: Warm up sensor site
	SpO_2: Check the bandage assembly
	SpO_2: Remove any nail polish from nail beds
	SpO_2: Ensure sensor is not too tight
	SpO_2: Reposition sensor
	SpO_2: Eliminate external interference
	SpO_2: Clean sensor site
	SpO_2: Pulse search
	SpO_2: Motion interference
	Abnormally shut down last time
	Printer: Not available
	Printer: Not available in Low battery condition
	Audio alarm is off
	Audio alarm is paused
	Audio alarm is acknowledged (silenced)
	Demo mode

Note: There may be other informative messages that are not listed above.

**When this informative message is displayed, the measurement may be inaccurate due to the interference*

Visual Alarm Indication

Table 20. Visual alarm characteristics

Alarm Priority	Color	Flashing Period	Duty Cycle
High priority	Red	700ms (about 1.43Hz)	ON: 400 ms / OFF: 300 ms
Medium priority	Yellow	2000ms (about 0.5Hz)	ON: 1000 ms / OFF: 1000 ms
Low priority	Yellow	N/A	Always ON

Note: Alarm button of the front panel respond with the flashing rates described in Table 20 when an alarm occurs.

When a **high priority alarm** is activated, a non-flashing alarm message is displayed. The numerical area will flash red.

When a **medium priority alarm** is activated, a non-flashing alarm message is displayed. The numerical area will flash yellow.

When a **low priority alarm** is activated, a non-flashing alarm message is displayed. The numerical area will change to yellow.

Audible Alarm Indication

⚠ WARNING	**Do not turn off the audible alarm or decrease its volume if patient safety could be compromised.**
⚠ WARNING	**Make sure that the defibrillator/monitor speaker is not obstructed. Failure to do so could result in an inaudible alarm tone.**

Table 21. Audible alarm characteristics

Alarm Priority	Audio Alarm Interval	Tone Pitch	Beep Rate
High priority	9 sec	540 Hz	10 beeps in 13.38 sec
Medium priority	15 sec	480 Hz	3 beeps in 16.11 sec
Low priority	30 sec	400 Hz	1 beep in 30.27 sec

Note: Audible alarms may be decreased in volume as described in Table 9 or temporarily paused.

Note: Audible alarm characteristics in Table 21 are default. Each alarm audio characteristic depends on audio alarm interval setting. The detailed information is described in the service manual.

Note: Audio alarm interval can only be changed by authorized personnel via the Service Setting Menu.

Note: The maximum mean time of the alarm delay is less than 10 seconds unless otherwise specified in this manual.

Changing Alarm Limits

⚠ WARNING	**Each time the defibrillator/monitor is used, check alarm limits to make sure that they are appropriate for the patient being monitored.**
⚠ WARNING	**If different alarm presets are used for the same or similar equipment in any single area, e.g. an intensive care unit or cardiac operating room, a potential hazard can exist.**
⚠ CAUTION	**Do not set the alarm limits to extreme values that can cause the alarm to become useless.**

If necessary, you can change alarm limits from default values for the following vital signs:

- HR/PR upper and HR/PR lower alarm limits
- Respiration upper and Respiration lower alarm limits
- SpO_2 upper and SpO_2 lower alarm limits

Audio alarm off for each parameter may be set via interaction with the Alarm Setup Menu on the Configure Menu that presents the limits. The other way, rotate the knob to highlight the parameter of the screen, then press the knob.

Setting Alarm Limits via Alarm limits Menu

User may confirm and set the alarm limits via Alarm Setup Menu on the Software Menu Area. The other method, press Alarm Setup Menu on Configure Menu or rotate the knob to highlight the parameter of the screen, then press the knob. The defibrillator/monitor will display all alarm limits that are currently in effect for all monitored parameters. Select the alarm limits of relevant parameter to set.

Table 22. Alarm setup menu

Level 1 Menu	Level 2 Menu or Response
ALARM SETUP MENU	
Alarm limits	Alarm limits for each parameter
Alarm limit display	On, Off
Audio alarm pause/off	Start, Cancel

Note: The audio alarm pause/off period can be set to Disable, 1 min, 3 min, 5 min, 10 min, 20 min, 30 min, 60 min or Indefinite by authorized personnel via Service menu. Audio alarm off menu is not displayed when Audio alarm pause/off period is set Disable. For more information to set the ***Audio alarm pause/off period****, refer to Service manual.*

Alarm Limits Ranges

Table 23 describes the possible alarm limits. The defibrillator/monitor is shipped with factory default settings.

Note: Authorized personnel can define the way to save the power default: user setting, backup and factory default. The detailed information is described in the service manual.

Table 23. Alarm limits ranges

Parameters	Upper Limit, Default	Lower Limit, Default	Resolution
HR/PR (BPM)			
Adult	25 ~ 300 BPM, 120 BPM	20 ~ 295 BPM, 50 BPM	5 BPM
Pediatric	25 ~ 300 BPM, 160 BPM	20 ~ 295 BPM, 70 BPM	5 BPM
Neonatal	25 ~ 300 BPM, 200 BPM	20 ~ 295 BPM, 100 BPM	5 BPM
Respiration (/min)			
Adult	4 ~ 150 /min, 30 /min	3 ~ 149 /min, 5 /min	1 /min
Pediatric	4 ~ 150 /min, 40 /min	3 ~ 149 /min, 10 /min	1 /min
Neonatal	4 ~ 150 /min, 65 /min	3 ~ 149 /min, 25 /min	1 /min
SpO_2 (%)			
Adult / Pediatric	21 ~ 100 %, 100 %	20 ~ 99 %, 90 %	1 %
Neonatal	21 ~ 100 %, 100 %	20 ~ 99 %, 85 %	1 %

Setting Alarm Limits

Alarm Limits determine the high and low points of patient data at which the defibrillator/monitor will sound an alarm. User can change the alarm limits of the each parameter. Alarm Setup menu can be accessed by pressing the area of each parameter or via Configure.

Alarm Audio Acknowledged (Silence)

⚠ WARNING **Do not pause the alarm audio or decrease its volume or turn off the audible alarm if patient safety could be compromised.**

When an alarm occurs, user can pause the alarm audio for the audio alarm acknowledged (silenced) period (30, 60, 90 or 120 seconds) selected via the Service menu. However, visual alarms continue during this time. The factory default for audio alarm acknowledged (silenced) period is 60 seconds.

To pause the alarm audio:
1. Press the Audio Alarm Acknowledged Button to immediately pause the alarm tone. The alarm resumes after the alarm audio period if the alarm condition has not been corrected.
2. Check the patient and provide appropriate care.

During the audio alarm acknowledged (silenced) period, you can press the ***Audio Alarm Acknowledged button*** again to re-enable the alarm audio tones. Also, if another alarm occurs during the alarm audio paused period, the alarm audio tones will be automatically re-enabled.

Note: Invalid tone occurs when there is no alarm condition or the audio alarm pause/off is activated already.

Note: Low battery alarm or critically low battery alarm cannot be stopped by the Audio Alarm Acknowledged button or Audio Alarm Inactivation menu.

Note: The alarm audio is caused by some technical errors may be canceled by pressing the Audio Alarm Acknowledged button. However, battery failure and physiological alarms cannot be canceled until the alarm condition is corrected.

Audio Paused and OFF

⚠ **WARNING**	**Do not pause the audio or decrease its volume if patient safety could be compromised.**
⚠ **WARNING**	**If an alarm condition occurs while in the Audio Off state, the only alarm indication on the defibrillator/monitor will be visual displays related to the alarm condition.**
⚠ **WARNING**	**Default startup setup is with Audio off on Power ON. If Audio Alarms are required, make sure to activate audio alarm ON for the patient being monitored.**
⚠ **WARNING**	**Check the audible alarm silence duration before temporarily silencing the audible alarms.**
⚠ **WARNING**	**Do not pause the alarm audio or decrease its volume or turn off the audible alarm if patient safety could be compromised.**

To initiate an alarm audio pause or off:

1. To initiate an alarm audio pause or off, press the ***Configure button*** and press the ***Alarm Setup button***.
2. Press the ***Start button*** on ***Audio Alarm Off menu***.
3. To cancel alarm audio pause or off condition, Press the ***Cancel button*** on ***Audio Alarm Off menu***.

Note: The names of menu items are displayed differently depending on the user defined time period.

If the *Start button* is pressed:
The audio alarm is stopped when the audio off condition, and the audio alarm paused when the audio alarm pause condition. If an alarm condition that can be cleared occurs, the audio alarm is cleared. Audio alarm off condition is started in the audio alarm off.

If the *Cancel button* is pressed:
The audio alarm condition is changed from the Pause condition or off condition to the normal condition.

This action disables alarm audios for a user-defined Alarm Audio Pause (when Audio alarm pause/off period is 1, 3, 5, 10, 20, 30, 60 minutes) or Alarm Audio Off (When Audio alarm pause/off period is Indefinite) selected via the ***Service Setting menu***. The factory default for alarm audio pause/off is indefinite.

Note: The periods can only be changed by authorized personnel via the Service Setting Menu.

Alarm Audio Pause/Off Period
If alarm audio pause/off period is set to **1, 3, 5, 10, 20, 30** or **60** minutes, the alarm audio is not activated for the specified time interval and the message, **'Audio alarm is paused'**, is displayed.

If alarm audio pause/off period is set to **Disable** is selected, the audio alarm off function is disabled and alarm is not off.

If alarm audio pause/off period is set to **Indefinite** is selected, the audio alarm is off and the message, **'Audio alarm is off'**, is displayed.

In the alarm audio off state, an **Alarm Reminder Tone** will sound at the preset interval to remind the user that the alarm audio is off. The preset interval for an **Alarm Reminder Tone** can be set to **OFF**, **3** or **10 minutes** via Service Menu. If **OFF** is selected, the **Alarm Reminder Tone** will be disabled.

Note: Low battery alarm or critically low battery alarm cannot be stopped by the audio alarm acknowledged (silenced) button or Audio alarm pause/off button.

Note: Users may disable limit violation alarm audios of each vital sign via alarm limits menu.

AED(Automated External Defibrillator) MODE

⚠ WARNING	**The defibrillator/monitor will only administer a shock if it is needed. A voice prompt will tell you when to press the Shock button to administer defibrillation therapy.**
⚠ WARNING	**The defibrillator/monitor should not be used on someone who is responsive when shaken or breathing normally.**
⚠ WARNING	**Do not use pads if the adhesive gel is dried or damaged. Pads that are dried out or damaged may cause electrical arcing and patient skin burns during defibrillation. Do not use pads that have been removed from foil package for more than 24 hours. Do not use electrodes beyond expiration date. Check that pads adhesive is intact and undamaged. Do not reuse disposable pads that are labeled for single patient use.**
⚠ WARNING	**Do not use paddles for AED mode. AED mode is enabled only with pads.**
⚠ WARNING	**Disconnect non-defibrillation proof electronic devices or equipment from patient before defibrillation.**
⚠ WARNING	**Do not administer a shock using the electrode monitoring cable.**
⚠ WARNING	**Do not place pads in the anterior-posterior position when operating this defibrillator/monitor in AED mode. A shock or no shock advised decision may be inappropriately advised. The shock advisory algorithm requires the electrodes to be placed in the anterior-lateral (Lead II) position.**
⚠ WARNING	**Be sure that the electrodes do not come in contact with other conductive materials, especially when connecting or disconnecting the electrodes to or from the patient.**
⚠ WARNING	**Heart rate alarms are temporarily paused in AED Mode. Heart rate alarms are also paused while the defibrillator/monitor is charging for defibrillation and delivering a shock.**
⚠ WARNING	**Do not use pediatric electrodes on adults or larger children. Delivery of defibrillation energies equal to or greater than 100 joules (typically used on adults) through these smaller electrodes increases the possibility of skin burns.**

The AED Mode of defibrillator/monitor is designed for the treatment of sudden cardiac arrest (SCA). It should only be used to treat someone who may be a victim of a SCA and is:

- unresponsive to stimulus,
- not breathing,
- exhibiting no signs of life.

If the person is unresponsive but you are unsure that they have suffered from a SCA begin CPR. When it is appropriate to treat, apply the defibrillator/monitor and follow the audible instructions.

General

Defibrillation therapy is the definitive method for termination of a variety of potentially fatal arrhythmias. The defibrillator/monitor's Automated External Defibrillation (AED) Mode is designed to guide you through standard treatment algorithms for cardiac arrest. The defibrillator/monitor provides therapy through the application of a brief biphasic pulse of electricity to the cardiac muscle. This electrical energy is transferred through disposable multifunction pads applied to the patient's bare chest.

Configuration choices allow you to customize AED Mode to better meet the unique needs of your organization or resuscitation team. This chapter describes how to use AED Mode. It explains the prompts that guide you through the defibrillation process and describes how prompts vary depending upon the condition of the patient and the configuration of your device.

Sudden Cardiac Arrest (SCA)

Sudden cardiac arrest is a condition in which the heart suddenly stops pumping effectively due to a malfunction of the heart‘s electrical system. Often victims of SCA have no prior warning signs or symptoms. SCA can also occur in people with previously diagnosed heart conditions. Survival for an SCA victim depends on immediate cardio-pulmonary resuscitation (CPR). The use of an external defibrillator within the first few minutes of collapse can greatly improve the patients' chances of survival. Heart attack and SCA are not the same, though sometimes a heart attack can lead to a SCA. If you are experiencing symptoms of a heart attack (pain, pressure, shortness of breath, squeezing feeling in chest or elsewhere in the body) seek emergency medical attention immediately.

Heart Rhythm

The normal electrical rhythm by which the heart muscle contracts to create blood flow around the body is known as Normal Sinus Rhythm (NSR). Ventricular Fibrillation (VF) caused by chaotic electrical signals in the heart is often the cause of SCA, but a shock can be administered to re-establish normal sinus rhythm. This treatment is called defibrillation. The AED Mode is designed to automatically detect ventricular fibrillation (VF) and perform defibrillation on victims of sudden cardiac arrest.

Detecting Fibrillation

The electrical rhythm by which the heart muscle contracts can be detected and used for medical diagnosis and the resulting reading is called an Electrocardiogram (ECG). The AED Mode is designed to analyze a patient's ECG in order to detect ventricular fibrillation (VF) in the heart. If ventricular fibrillation (VF) is detected, the defibrillator/monitor will deliver a carefully engineered electrical shock designed to stop the chaotic electrical activity experienced within the heart muscle during SCA. This may allow the victim‘s heart to return to a normal sinus rhythm.

Rhythm Recognition Performance

The ECG database for validation of rhythm recognition performance includes ventricular fibrillation (VF) rhythms of varying amplitudes, ventricular tachycardia (VT) rhythms of varying rates and QRS width, various sinus rhythms including supraventricular tachycardias, atrial fibrillation and atrial flutter, sinus rhythms with PVC (premature ventricular contraction), asystole, and pacemaker rhythms.

AHA/ERC Guidelines (Rescue protocol)

The AED rescue protocol is consistent with the guidelines recommended by the **AHA/ERC 2015 Guidelines** for Resuscitation and Emergency Cardiac Care. The AED rescue protocol is subject to be upgradeable in order to be consistent with and optimized for the guidelines recommended by the **latest version of AHA/ERC Guidelines** for Resuscitation and Emergency Cardiac Care. Please contact your Mediana service representative for more information.

Note: AHA is the abbreviation for 'American Heart Association' and ERC is the abbreviation for 'European Resuscitation Council'.

Note: This section is described in accordance with ERC Guidelines. Differences for ERC Guidelines and AHA Guidelines are described with Note format.

Preparing for Defibrillation

⚠ **WARNING**	**The AED algorithm is not designed to handle erratic spiking problems caused by a properly or improperly functioning pacemaker. In patients with cardiac pacemakers, the defibrillator/monitor may have reduced sensitivity and not detect all shockable rhythms.**

1. Confirm that the patient is:
   - unresponsive to stimulus,
   - not breathing,
   - exhibiting no signs of life.

2. Remove clothing to expose the patient's chest. Wipe moisture from the patient's chest and if the patient has an excessively hairy chest, shave the area where the electrodes are about to be applied.
3. Make sure the pads packaging is intact and within the expiration date shown.
4. Apply pads to the patient as directed on the pads package. Use the anterior-anterior (anterior-lateral) pads placement.
5. If not pre-connected, insert the pads cable into paddle/pads connector located on the left panel of the device. Push until you hear it click into place.

Note: Successful resuscitation is dependent on many variables specific to the patient's physiological state and the circumstances surrounding the patient incident. Failure to have a successful patient outcome is not a reliable indicator of defibrillator/monitor performance. The presence or absence of a muscular response to the transfer of energy during electrical therapy is not a reliable indicator of energy delivery or device performance.

Operating the AED Mode of defibrillator/monitor

⚠ **WARNING**	**Do not let the multifunction pads touch each other or other monitoring electrodes, lead wires, dressings, transdermal patches, etc. Such contact can cause electrical arcing and patient skin burns during defibrillation and may divert defibrillation current away from the heart.**
⚠ **WARNING**	**During defibrillation, air pockets between the skin and multifunction pads can cause patient skin burns. To help prevent air pockets, make sure defibrillation pads completely adhere to the skin. Do not use dried-out multifunction pads.**
⚠ **CAUTION**	**Aggressive handling of multifunction pads in storage or prior to use can damage the pads. Discard the pads if they become damaged.**

1. Rotate the ***Multi function knob*** of the defibrillator/monitor and start the ***AED Mode***
2. Check whether the ***AED Mode*** is normally enable and follow the voice prompt and the action icons.

Note: Impedance is the resistance between the defibrillator's pads or paddles that the defibrillator must overcome to deliver an effective discharge of energy. The degree of impedance differs from patient to patient and is affected by several factors including the presence of chest hair, moisture, and lotions or powders on the skin.

Note: The low-energy biphasic waveform is an impedance-compensating waveform that is designed to be effective across a wide range of patients. However, if you receive a 'Poor Pads Contact' message, check that the patient's skin has been washed and dried and that any chest hair has been clipped. If the message persists, change the pads and/or the pads cable.

Note: The AED mode constantly detects ECG signals from after the ECG analysis to before delivering the shock. If the ECG rhythm changed to a non-shockable rhythm, the shock energy that is accumulated on the high-voltage capacitor will be disarmed through internal resistance.

Performing CPR

After the electric shock is delivered, the following voice prompt would be emitted.

- **It is safe to touch the patient.**
- **Begin CPR.**

Follow the voice prompts to properly perform the CPR.
When performing CPR, use the metronome sound from the defibrillator/monitor in AED mode for compression rate – the defibrillator/monitor emits a tone at a rate of 100 beats per minute. Also, action icon of the defibrillator/monitor will be flashing at a same rate of metronome sound.

Rescuer performs 5 cycles of CPR, each cycle include 30 times of chest compression and 2 times of rescue breaths. Or perform the chest compression without rescue breath, if untrained or unable to do rescue breaths. The defibrillator/monitor will remain in CPR mode for 5 cycles (approximately 2 minutes). After CPR mode you will hear the following voice prompt:

- **Stop CPR.**

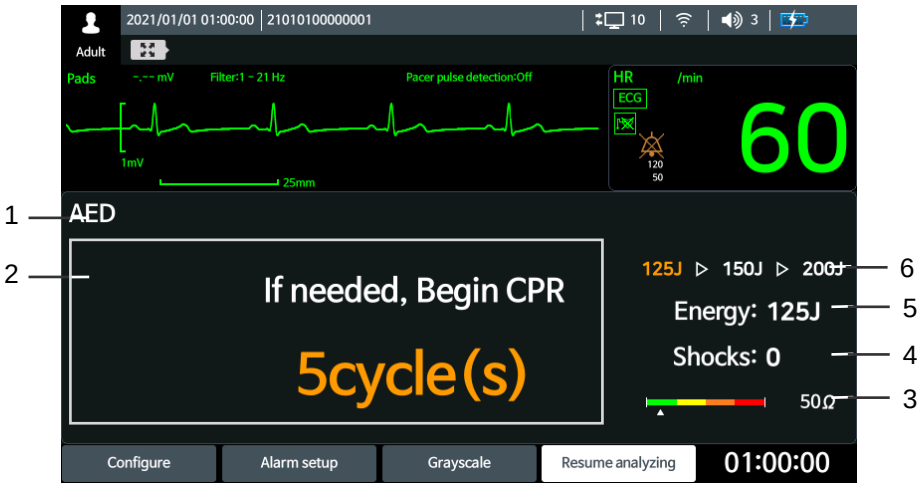
The defibrillator/monitor in AED mode will then return to analyzing procedure. Continue to follow this instruction until emergency physician arrives and the hand over patient to emergency physician.

Note: In accordance with AHA/ERC 2015 Guidelines,

- *the recommended compression rate is 100 ~ 120 beats per minute,*
- *the recommended compression depth is at least 2 inches (5 cm), but not more than 2.4 inches (6 cm),*
- *the recommended compression ventilation ratio is 30:2,*
- *the recommended duration is 5 cycles (30:2 x 5 cycles).*

Note: Your Mediana dealer will have trained you in the particular SCA treatment protocol you have chosen. In all cases follow the voice prompts and visual instructions given by the defibrillator/monitor in AED mode.

Description of AED Mode Menu Functions



1 Operating mode
2 Instruction message
3 Contact indicator
4 Number of shock
5 Energy level
6 Energy escalation

Figure 16. AED mode menu

Contact indicator
When the Contact indicator is set to **On**, the indicator bar and impedance measured from pads are displayed. Contact indicator can be set between On, Off via ***Service Setting menu***. Refer to the Service manual for detail.

Energy escalation
When the Energy escalation is set to **On**, energy escalation is displayed. When shock is delivered twice, three times, selected energy level is gradually escalated. Energy escalation can be set between On, Off via ***Service Setting menu***. Energy escalation energy cab be set via ***Service Setting menu***. Refer to the Service manual for detail.

Note: For displayed content except for informative message, refer to the Using the Defibrillator/Monitor section.

MANUAL MODE

⚠ **WARNING**	**Make sure that the ECG signal quality is good and that sync marks are correctly displayed above each QRS complex prior to performing synchronized defibrillation (cardioversion).**
⚠ **WARNING**	**Artifact introduced by paddle movement may resemble an R-wave and trigger a defibrillation shock when performing synchronized defibrillation (cardioversion).**
⚠ **WARNING**	**Disconnect non-defibrillation-proof electronic devices or equipment from patient before defibrillation.**
⚠ **WARNING**	**The defibrillator/monitor has a mechanism to inhibit its output when the impedance of human body which can be measured by paddle is out of range.**
⚠ **CAUTION**	**Whenever possible, Mediana recommended that user performs synchronized defibrillation (cardioversion) procedures while directly monitoring the patient through the defibrillator's electrodes or lead inputs.**

This section explains how to prepare for and perform asynchronous defibrillation and synchronous defibrillation (cardioversion) using multifunction electrode pads, external paddles.

General

Defibrillation therapy is the definitive method for termination of a variety of potentially fatal arrhythmias. The defibrillator/monitor provides this therapy through the application of a brief biphasic waveform of electricity to the cardiac muscle. This electrical energy is transferred through attached paddles or disposable multifunction pads applied to the patient's bare chest.
In manual mode, you must assess the ECG, decide if defibrillation or cardioversion is indicated, select the appropriate energy setting, charge the defibrillator/monitor, and deliver the shock. The entire defibrillation process is under your control. Voice prompts are not present. However, text messages on the display provide relevant information throughout the process. It is important to be attentive to these messages when displayed.

Note: Defibrillation is always performed through paddles or pads. However, during defibrillation you may choose to monitor the ECG using an alternate ECG source (3- or 5-lead monitoring electrodes).

Note: Defibrillating asystole can inhibit the recovery of natural pacemakers in the heart and completely eliminate any chance of recovery. Asystole should not be routinely shocked.

Note: Successful resuscitation is dependent on many variables specific to the patient's physiological state and the circumstances surrounding the patient event. Failure to have a successful patient outcome is not a reliable indicator of defibrillator/monitor performance. The presence or absence or a muscular response to the transfer of energy during electrical therapy is not a reliable indicator of energy delivery or device performance.

Preparing for Defibrillation

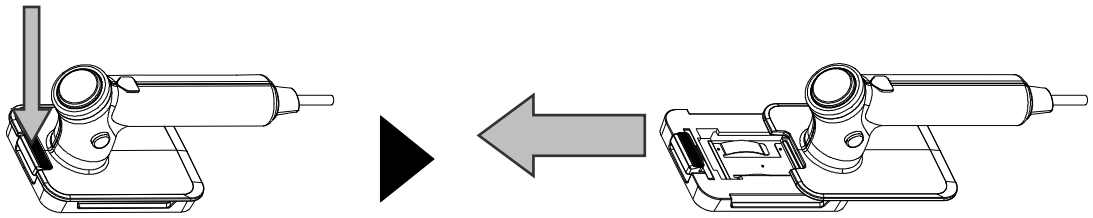
Using adult external paddles

1. External paddles are placed on the device.
2. Remove the paddles from the paddle tray by pulling the paddles straight up and out of the paddle tray.
3. Apply conductive matter to the paddle electrodes. Do not distribute conductive matter by rubbing the paddle electrodes together.
4. Apply paddles to the patient's bare chest.

Using pediatric external paddles

1. The defibrillator/monitor external paddles come with pediatric paddles included.
2. Depress the latch at the front of the external paddles while pulling forward on the adult paddle plate.
3. Apply paddle to the patient's bare chest.

Note: The paddle is an assembled product which is intended to use for adult patient. Remove the plate of paddle for adult, and there is the paddle for pediatric patient.



Operating the Manual Mode of Defibrillator/Monitor

1. Select manual mode of defibrillator/monitor by rotating the ***Mode select knob***.
2. Select the defibrillation energy by pressing the ***Energy level button***.
3. Charge the selected energy to pressing the ***Charge button***.
4. Check the defibrillation mode and set the mode between sync mode and async mode by using ***Sync button***.
5. Press the ***Shock button*** when charge complete message is displayed.

Note: Press the Analyze button and follow instruction on the screen to use advisory mode.

Note: In the manual mode, Advisory mode can help you judge whether the defibrillation is needed is provided.

Note: When using the external paddle, Shock button on the front panel does not work; only the Shock button on the paddle works. The Shock button on the external paddle works only when the Shock buttons of APEX and STERNUM are pressed together.

Note: Defibrillation currents can be passed to you or others around you to cause injury. Do not touch the patient or any equipment connected to the patient during defibrillation.

Note: Defibrillation should always be done with a paddle or pad. During defibrillation, however, other ECG sources (3- or 5-lead monitoring electrodes) can be used to monitor the ECG.

Note: Implementing defibrillation in patients with asystole may interfere with the natural recovery of the heart's inherent pacemaker or may not permanently recover the heart's inherent pacemaker. Therefore, defibrillation therapy should not be used in the absence of a pulse.

Note: For defibrillation in sync mode, you must hold the Shock button (or the Shock button on the paddle) until shock is delivered. The defibrillator/monitor will deliver shock based on the next detected R-wave.

Note: If Continuous mode is off, advisory mode will exit after completion of advisory mode to CPR. To use advisory mode continuously, turn on the continuous mode. See the Advisory Mode section of the service manual for details.

Defibrillating (Async mode)

If the device and paddles are prepared for defibrillation, perform the following steps;

1. To select the energy setting, press the ***Select Energy Level button*** and rotate the ***Multi function knob*** to the desired energy level. Energy choices range from 1 to 200J.

Note: If Select Energy Level button is not pressed, defibrillator/monitor has default energy level setting. To change default setting, enter the Service Setting menu.

Note: Clinicians must select an appropriate energy level for defibrillation of pediatric patients.

2. To charge the energy, press the ***Charge button***. If using external paddles, the ***Charge buttons*** on the paddle or on the front panel can be used. When completing the charge, the charge indicator of the paddle turns on in red. Before 3 steps, check the charge indicator.

Note: You may increase or decrease the selected energy at any time during charging or after charging is complete.

3. There are two ways to shock the energy.
   - Press the ***Shock button*** which is placed on the front side of defibrillaotr/monitor
   - Press the ***Shock button*** located on the external paddles.

Synchronized Cardioversion (Sync mode)

Synchronized Cardioversion allows you to synchronize delivery of the shock with the R-wave of the ECG being monitored in Wave Sector 1. You may choose to perform synchronized cardioversion through either multifunction pads, or external paddles.
When using paddles, you should defibrillator/monitor the ECG through monitoring electrodes connected to a 3- or 5-lead ECG cable or a defibrillator/monitor. You may choose to defibrillator/monitor through an alternate source when using pads, as well. During cardioversion, energy shock is still delivered through either pads or paddles.

If the defibrillator/monitor and paddles are prepared for defibrillation, perform the following steps;

1. To activate Sync mode, press the ***Sync Soft key*** located lower right corner of the screen.
2. Confirm that the Sync marker appears with each R-wave.
3. To select the energy setting, rotate the ***Multi function knob*** to the desired ***Energy Level button*** and press it. Energy choices range from 1 to 200J.

Note: Clinicians must select an appropriate energy level for defibrillation of pediatric patients.

4. To charge the energy, press the ***Charge button***. If using external paddles, the ***Charge button*** on the paddles may be used instead. When completing the charge, the charge indicator of the paddle turns on in red. Before 5 steps, check the charge indicator.

Note: You may increase or decrease the selected energy at any time during charging or after charging is complete.

5. There are two ways to shock the energy.
   - Press the ***Shock button*** which is placed on the front side of defibrillator/ monitor.
   - Press the ***Shock button*** located on the external paddles. The shock will be delivered when the next R-wave is detected.

Note: Defibrillation current can cause operator or bystander injury. Do not touch the patient, or equipment connected to the patient, during defibrillation.

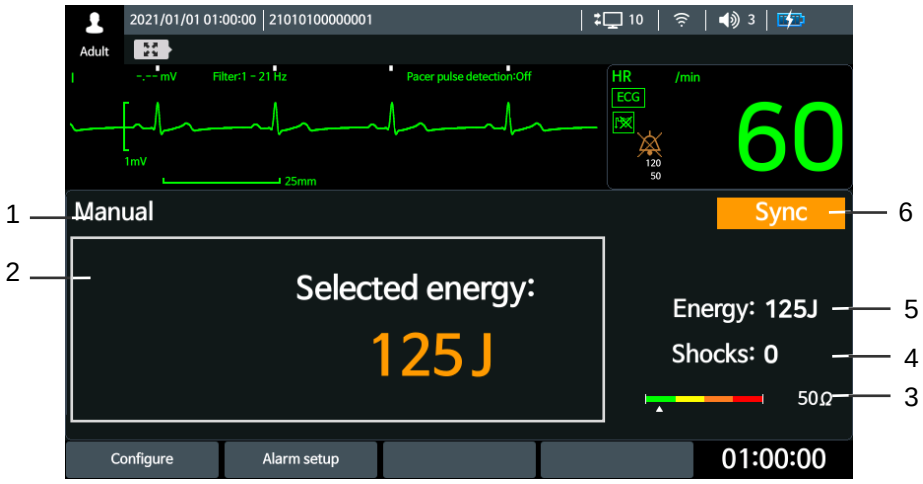
If additional synchronized shocks are indicated, perform the following steps;

1. Make sure the Sync function is still enabled, as indicated by the presence of the Sync message in the upper right corner of the Wave Sector 1.
2. Repeat Steps 4-5 under ‘Delivering a Synchronized Shock’.

To turn off the Sync function of the defibrillator/monitor, Press the ***Sync Soft key.***

Note: The maximum time delay between synchronization pulse and delivery of energy is not exceeded 60ms.

Description of the Manual Mode Menu Functions



1 Operating mode
2 Instruction message
3 Contact indicator
4 Number of shock
5 Energy level
6 Synchronous mode

Figure 17. Manual mode screen

Contact indicator
When the Contact indicator is set to ***On***, the indicator bar and impedance measured from pads are displayed. Contact indicator can be set between On, Off via ***Service Setting menu***. Refer to the Service manual for detail.

Number of shock
Number of delivered shock is displayed. When the number exceeds 999, the number initializes to 1. In the advisory mode, the number of shock is added up, in the AED mode, the number of shock is not added up.

Synchronous mode
Synchronous or asynchronous mode state is displayed. Sync is displayed in the synchronous mode and message is not displayed in the asynchronous mode.

Note: For displayed content except for informative message, refer to the Using the Defibrillator/Monitor section.

MONITOR MODE

General

In monitor mode, you can monitor Electrocardiography (ECG) acquired a 3-, or 5-lead ECG electrodes. Optional monitoring of functional arterial oxygen saturation (SpO_2) and respiration (RESP) are also available. Measurements from these parameters are presented on the display and alarms are available to alert you to changes in the patient's condition. Monitor mode also provides display format of large numeric screen. However, monitor mode cannot provide the defibrillator function including select the delivered energy, analyze, charge, deliver the shock and appear defibrillator messages on the display.

Description of Monitor Mode Menu Functions

1. Select monitor mode of defibrillator/monitor by rotating the ***Mode select knob***.
2. When the manual mode of defibrillator/monitor is activated normally, the energy select display will be displayed on the top of the screen and other parameter information will be displayed.

Monitor mode does not provide action advice and provides up to 3 waves as shown below.

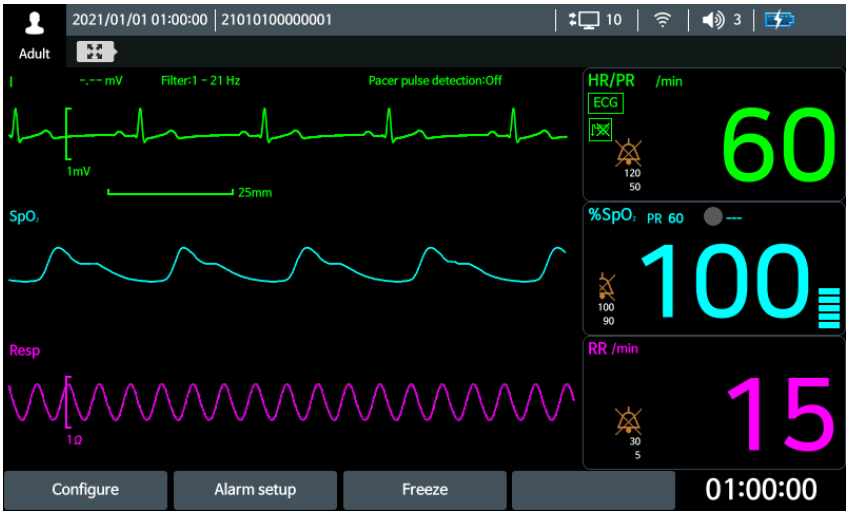


Figure 18. Monitor mode menu – Full color mode

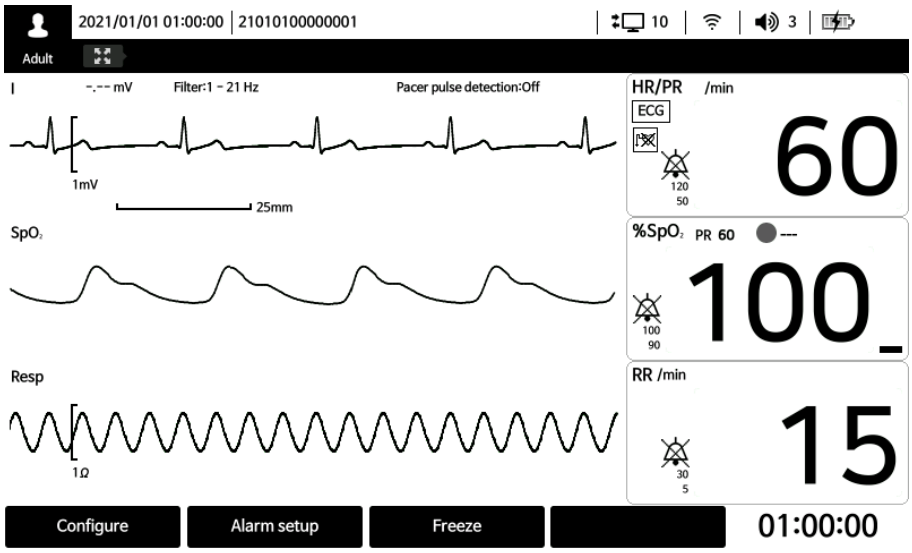


Figure 19. Monitor mode menu – Grayscale mode

*Note: For displayed content, refer to the **Using the Defibrillator/Monitor** section.*

Freeze

The defibrillator/monitor provides a freeze menu to check previous measured waveform data. User can set the frozen screen via ***Freeze button*** in ***Waveform menu*** at the bottom of the measurement screen. The defibrillator/monitor can freeze the waveforms for 120 seconds.

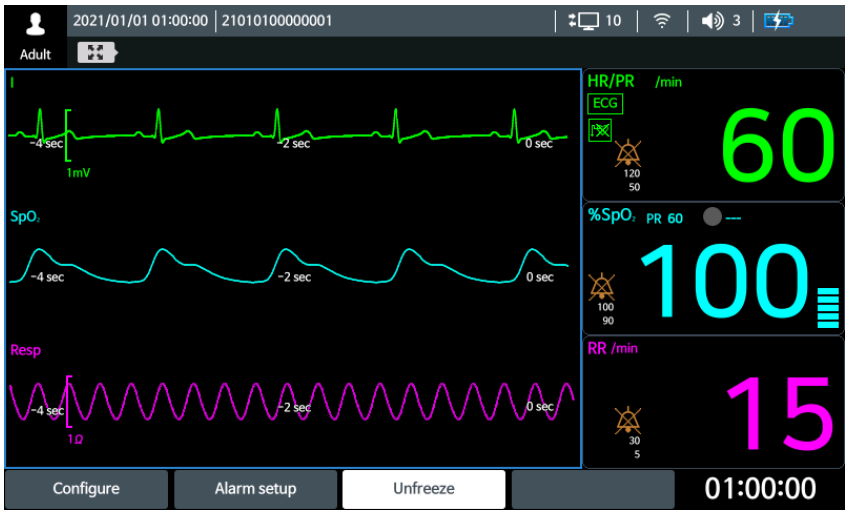


Figure 20. Monitor mode menu – Freeze

Reviewing frozen waveforms

When waveforms are frozen, user can view the waveforms by rotating the Multi function knob to move the frozen waveforms right or left. With each step or clock, the frozen time changed at intervals of 1 second.

Unfreeze

To unfreeze the frozen waveforms, press the ***Unfreeze*** Soft key at the bottom of the measurement screen.

PACING MODE

⚠ WARNING	Use demand mode pacing whenever possible. Use Fixed mode pacing when motion artifact or other ECG noise makes R-wave detection unreliable.
⚠ WARNING	Observe the patient continuously while the pacemaker is in use. Patient response to pacing therapy (for example, capture threshold) may change over time.
⚠ WARNING	Prolonged noninvasive pacing may cause patient skin irritation and burns, especially with higher pacing current levels. Discontinue noninvasive pacing if skin becomes burned and another method of pacing is available.
⚠ WARNING	The ECG size must be properly adjusted so that the patient's own beats are detected. If ECG size is set too high or too low, pacing pulses may not be delivered when required. Adjust ECG size so that pacing pulse mark is placed on the patient's QRS complexes.
⚠ WARNING	If you are using the pacing function with battery power and the low battery appears, plug the device into AC power. When the device powers back up, pacing is no longer activated. Press Pacer to re-activate the pacing function.
⚠ WARNING	Using other manufacturers' combination pads with this device could cause a decrease in pacing efficacy or the inability to pace because of unacceptably high impedance levels and invalidate the safety agency certifications. Use only the pads that are specified in these operating instructions.
⚠ WARNING	Use of other ECG monitoring devices may provide misleading information due to the presence of pace artifacts.
⚠ WARNING	Under certain conditions it may not be possible to properly defibrillator/monitor or pace while electrosurgical apparatus is operating.
⚠ WARNING	When poor pads contact, dry skin and/or skin with hair causes excessively high impedance, which restrain the generation of the selected pacing current, and that close surveillance is essential to avoid any risk caused by high impedance if it occurs, the 'Pacer out ___ mA' warning message is provided on the screen.
⚠ WARNING	Do not pace with defibrillation pad.
⚠ WARNING	Pacing rate should be set higher than the patient's heart rate while using fixed mode.
⚠ WARNING	Close patient surveillance is required because ventricular fibrillation could be induced when pacing pulse is activated on T-wave under fixed mode while using fixed mode.
⚠ CAUTION	Monitor the patient condition continuously through other physiological measurements or mechanical captures when pacing is activated.

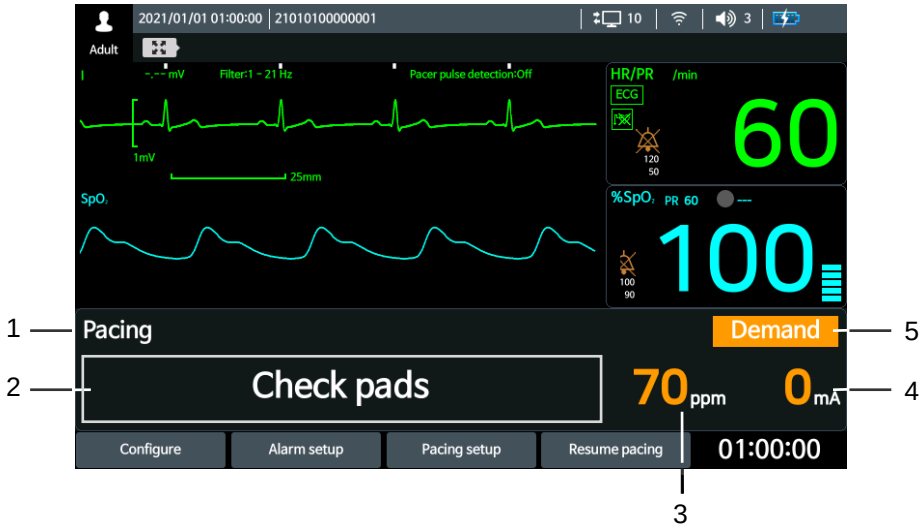
General

Pacing therapy is used to deliver pace pulses to the heart. Pace pulses are delivered through multifunction pads that are applied to the patient's bare chest.

Note: Use only approved lead sets when pacing with the defibrillator/monitor.

Note: Waveforms, ECG monitoring, measurements, and most alarms remain active and retain their settings when you convert from manual mode or monitor mode to pacing mode.

Description of Pacing Mode Menu Functions



1 Operating mode
2 Instruction message
3 Pacing rate
4 Pacing current
5 Pacing output mode

Figure 21. Pacing mode menu

Note: For displayed content, refer to the Using the Defibrillator/Monitor section.

Demand Mode and Fixed Mode

The defibrillator/monitor can deliver pace pulses in either Demand mode or Fixed mode.

1. In Demand mode, the defibrillator/monitor only delivers pace pulses when the patient's heart rate is lower than the selected pacing rate.
2. In Fixed mode, the defibrillator/monitor delivers pace pulses at the selected rate.

Note: Use Demand mode pacing whenever possible. Use Fixed mode pacing when motion artifact or other ECG noise makes R-wave detection unreliable or when monitoring electrodes are not available.

The defibrillator/monitor requires a 3-, 5-, 12- lead ECG cable and monitoring electrodes as the source of the ECG during standard pacing. Pace pulses are delivered through the multifunction pads. However, the pads cannot be used to monitoring the ECG and deliver pace pulses simultaneously.

Preparing for Pacing

1. Remove clothing to expose the patient's chest. Wipe moisture from the patient's chest and if the patient has an excessively hairy chest, shave the area where the electrodes are about to be applied.
2. Make sure the pads packaging is intact and within the expiration date shown.
3. Apply pads to the patient as directed on the pads package. Use the anterior-anterior (anterior-lateral) pads placement.
4. If not pre-connected, insert the pads cable into paddle/pads connector located on the front panel of the device. Push until you hear it click into place.

Operating the Pacing Mode of Defibrillator/Monitor

1. Align the ***Mode select knob*** to 'Pacing' to select the pacing mode.
2. When the pacing mode of defibrillator/monitor is activated normally, the pace rate and current value will be displayed on the top of the screen and other parameter information will be displayed.
3. Press the ***Pacing setup software key***
4. Rotate the ***Multi function knob*** to the desired value of pacing current and pace pulse per minute.
5. Select the pacing mode between demand mode and fixed mode.
6. Press the ***Resume pacing software key*** to start pacing.

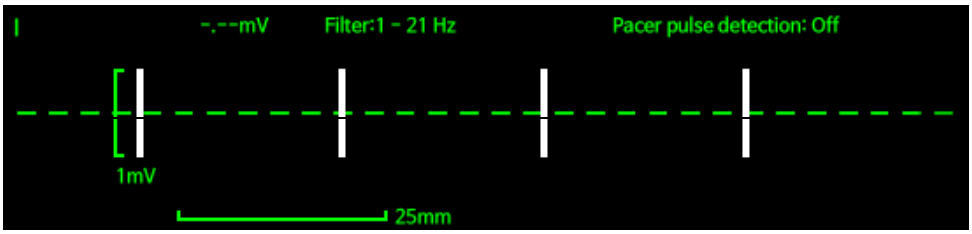


Figure 22. Pacing display (Fixed mode)

This page is intentionally left blank.

ECG MONITORING

⚠ WARNING	For best product performance and measurement accuracy, use only accessories supplied or recommended by Mediana. Use accessories according to the manufacturer's directions for use and your facility's standards. It may cause burns to the patients or defibrillator/monitor failure to use of pacing/defibrillation pads or adapters from sources other than Mediana.
⚠ WARNING	Line isolation defibrillator/monitor transients may resemble actual cardiac waveforms and thus inhibit heart rate alarms. Such transients may be minimized by proper electrode and cable placement, as specified in this manual and electrode directions for use.
⚠ WARNING	Do not use damaged ECG leads. Do not immerse ECG leads completely in water, solvents, or cleaning solutions. Do not sterilize ECG leads by irradiation, steam, or ethylene oxide. Follow the manufacturer's directions for use.
⚠ WARNING	Do not use ECG electrodes with expired dates. Do not use defective ECG electrodes. These might cause improper performance.
⚠ WARNING	ECG cables may be damaged if they are connected to a patient during defibrillation. Cables that have been connected to a patient during defibrillation should be checked for functionality before using again.
⚠ WARNING	It is possible for the patient to receive a burn due to an improperly connected electrosurgical unit. Additionally, the defibrillator/monitor could be damaged or measurement errors could occur. Place the ECG cable and leads as far as possible from the site of the electrosurgical unit and from the electrosurgical cables. This will minimize interference and the risk of burns to the patient.
⚠ WARNING	For pacemaker patients, the defibrillator/monitor may continue to count pacemaker rate during occurrences of cardiac arrest or some arrhythmias. To reduce the likelihood of this, ensure that the Pacer Detect setting is On in the ECG waveform Menu when monitoring such patients. Do not rely entirely upon the defibrillator/monitor alarms. Keep pacemaker patients under close surveillance.
⚠ WARNING	To ensure patient safety, the conductive parts of the ECG electrodes (including associated connectors) and other patient-applied parts should not contact other conductive parts, including earth ground, at any time.
⚠ WARNING	Correct the electrode placement. Improper electrode placement may cause incorrect result. User must be aware of proper defibrillator/monitor operation.
⚠ WARNING	Use only high quality ECG electrodes. ECG electrodes are for rhythm acquisition only. Do not attempt to defibrillate or pace through ECG electrodes.
⚠ WARNING	Precordial lead electrodes and lead wires may interfere with the placement of standard paddles or pads. Before defibrillation, remove any interfering precordial lead electrodes and lead wires.

General

The process of depolarization and repolarization of the myocardium generates electric potentials that are sensed by ECG electrodes on the skin surface. These electrodes are typically attached to the patient's right arm, left arm, and left leg. The defibrillator/monitor processes and amplifies these signals and presents the ECG waveform on the screen. Also, the defibrillator/monitor computes the minute heart rate at least every second by moving average. In addition to the acquisition of the QRS complex, the circuitry performs a number of other functions. The defibrillator/monitor can display:

- Heart rate in beats per minute
- Detection of a 'lead off' condition if an electrode is disconnected or poorly connected
- Detection of the presence of pacemaker signals within the ECG waveform complex

Note: Occasionally, electromagnetic interference beyond the range guaranteed from the manufacturer's EMC declaration may cause the defibrillator/monitor to display a 'ECG: Chest lead off ' alarm. This occurrence is rare, and duration should be short. When the interference ceases, the defibrillator/monitor removes the alarm. Refer to the Specification section.

Setup Connections

Note: Mediana recommends the use of silver/silver chloride electrodes (Ag/AgCl). When dissimilar metals are used for different electrodes, the electrodes may be subject to large offset potentials due to polarization, which may be severe enough to prevent obtaining an ECG trace. Using dissimilar metals may also increase recovery time after defibrillation.

1. Select the electrodes to be used. Use only one type of electrode on the same patient to avoid variations in electrical resistance. Prepare the electrode sites according to the electrode manufacturer's instructions. See Figure 23 and Figure 24 for electrode placement configurations.

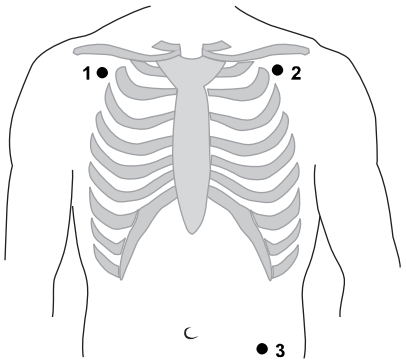


Figure 23. Standard 3 electrode placement

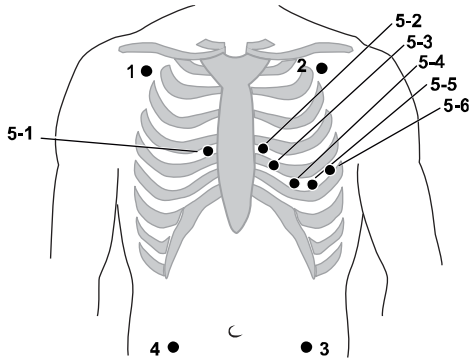


Figure 24. 5 electrode placement

Note: One of 5-1 to 5-6 Lead electrode placement sites for the fifth lead.

2. Connect the ECG lead.
3. Connect the ECG lead to the ECG connector on the defibrillator/monitor's front panel.
4. Attach the leads to the electrodes, and then apply the electrodes to the patient, using the color-code guide in Table 24. Verify that the desired Lead Selection is active in the ECG waveform area. Refer to Table 25. Lead II is best suited for most monitoring situations.

Table 24. ECG lead colors

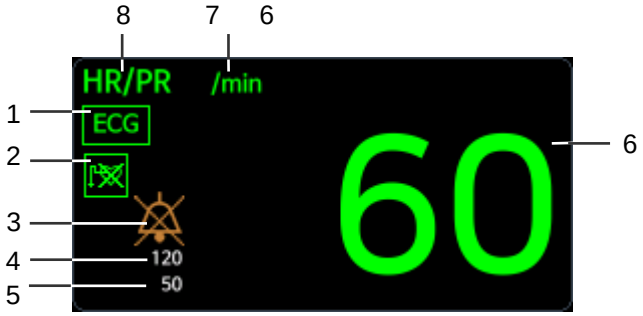
Lead	AAMI	IEC
1. Right arm	White (RA)	Red (R)
2. Left arm	Black (LA)	Yellow (L)
3. Left leg	Red (LL)	Green (F)
4. Right leg	Green (RL)	Black (N)
5-1 to 5-6. V (Chest)	Brown (V)	White (C)

Table 25. ECG lead pairs

Lead-Selection	Electrode Differential (AAMI)	Electrode Differential (IEC)
I	RA LA	R L
II	RA LL	R F
III	LA LL	L F
V (Chest)	(RA+LA+LL)/3 Chest (V)	(R+L+F)/3 Chest (C)
aVR	– (Lead I + Lead III/2)	– (Lead I + Lead III/2)
aVL	(Lead I – Lead III)/2	(Lead I – Lead III)/2
aVF	(Lead II + Lead III)/2	(Lead II + Lead III)/2

Description of HR/PR Menu Functions

The calculated Heart Rate/Pulse Rate may be derived from different sources (ECG or SpO_2) as shown by the icon in the HR/PR numerical area.



1	HR/PR source	5	Alarm limit lower
2	Pacer pulse detection icon	6	HR/PR value
3	Alarm audio icon	7	HR/PR unit
4	Alarm limit upper	8	HR/PR title

Figure 25. HR/PR display

Note: If the alarm limit display setting is set to ON, the alarm limit is displayed next to the measured value.

Note: Even if the alarm limit display setting is set to on, the alarm limit may not be displayed depending on some specifications.

Table 26. HR/PR menu

Level 1 Menu	Level 2 Menu or Response
HR/PR MENU	
HR/PR source	Auto, HR, PR
Asystole time	3 sec, 4 sec, 5 sec, 6 sec, 7 sec, 8 sec, 9 sec, 10 sec
HR/PR alarm limits	Upper/lower alarm limits
HR/PR limits audio alarm	On, Off

HR/PR source

User may select Auto, HR or PR to decide the source of the heart rate or pulse rate. If you select ***Auto***, the defibrillator/monitor automatically derives the heart rate or pulse rate from one of the monitoring parameters in this order of priority: ECG or SpO_2. When ***HR*** is selected, the heart rate is measured from ECG and the monitor can detect motion artifact. When ***PR*** is selected, the pulse rate is measured from SpO_2. The HR/PR tone volume can be adjusted in the ***Configure*** menu. Refer to the ***Using the Defibrillator/Monitor*** section.

Limit alarm audio off

When limit alarm audio off is set to Off, the alarm audio for limit alarm is went off.