

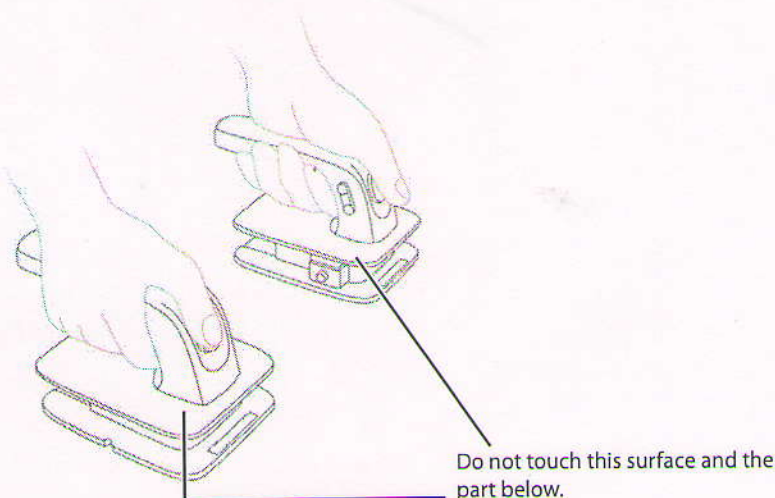
BeneHeart D3/BeneHeart D2

Defibrillator/Monitor

Operator's Manual

8.4 Manual Defibrillation Procedure

1. Remove clothing from the patient's chest. Wipe moisture from the patient's chest and, if necessary, clip or shave excessive chest hair.
2. Connect the therapy cable to the therapy port. Push until you hear it click into place.
3. Apply multifunction electrode pads or external paddles to the patient.
 - ◆ If multifunction electrode pads are used, apply pads according to the instructions for use indicated on pads package. Use anterior-lateral or anterior-posterior placement.
 - ◆ If external paddles are used, remove the paddle set from the paddle tray by grasping the handles and pulling them straight up. Apply conductive gel to the electrode surface of each paddle. Place the paddles to the patient's chest using the anterior-lateral placement.



WARNING

- **Hold only the insulating parts of the paddle handles to avoid shock hazard during charging or shock delivery.**
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4. Turn the Mode Select knob to Manual Defib.

You can access manual therapy directly, by confirmation or by password, which can be defined through configuration management. The default setting is **[Direct]**.

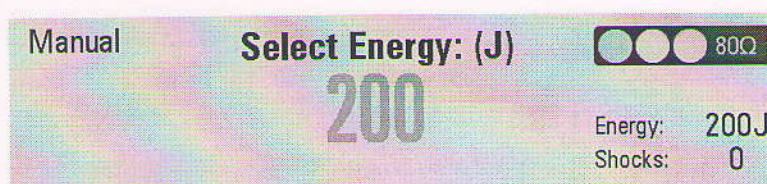
- ◆ If **[Manual Therapy Access]** is set to **[Direct]**, the equipment directly enters Manual Defib mode when the Mode Select knob is switched to Manual Defib.
- ◆ If **[Manual Therapy Access]** is set to **[Confirmed]**, a dialog box pops up when the Mode Select knob is switched to Manual Defib. You have to confirm whether to enter Manual Defib mode or not.
- ◆ If **[Manual Therapy Access]** is set to **[Password]**, a dialog box pops up, requiring the user to enter a password, when the Mode Select knob is switched to Manual Defib. The equipment enters Manual Defib mode only after correct password is entered.

5. Select energy

You can rotate the navigation knob to change the patient category among **[Adu]**, **[Ped]** and **[Neo]**.

You can also select desired energy level by the adjusting the Energy Select buttons on the equipment's front panel or the Energy Select buttons on external paddles if external paddles are used.

Your current energy selection is shown in the defibrillation information area as shown below.



6. Charge

Press the Charge button on the front panel. If external paddles are used, the Charge button on the paddles may be used instead. As the equipment charges, a progress bar is shown in the defibrillation information area. A charging tone sounds until desired energy level is reached, when you will hear a charge done tone.

If you have to increase or decrease the selected energy during charging or after charging is complete, adjust the Energy Select button to select the desired energy level as explained above. Then press the charge button again to restart charging.

To remove the energy, press the **[Disarm]** soft key. If the Shock button is not pressed within the specified time period, the equipment disarms automatically. You can define **[Time to Auto Disarm]** through configuration management.

7. Shock

Confirm that a shock is still indicated and that the equipment has charged to the selected energy level. Make sure no one is touching the patient, bed or any equipment connected to the patient. Call out loudly and clearly, **"Stay Clear!"**

- ◆ If pads are used, press the flashing Shock button on the front panel to deliver a shock to the patient.
- ◆ If external paddles are used, simultaneously press the Shock buttons located on the paddles to deliver a shock to the patient.

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). If an alternate ECG source is connected, any available lead may be displayed.
- When external paddles are used, the Shock button on the equipment's front panel is disabled.
- For defibrillation of adult patients, recommended energy level is 200 Joules.
- For defibrillation of pediatric patients under 8 years, pediatric electrode pads should be used. If pediatric electrode pads are not available, the adult electrode pads may be used instead, and set the patient category to [Ped].
- For defibrillation of neonatal patients, set the energy level according to the patient's clinical condition. The energy level for neonatal patient should be lower than the default setting.

8.4.1 Using Pediatric Paddles

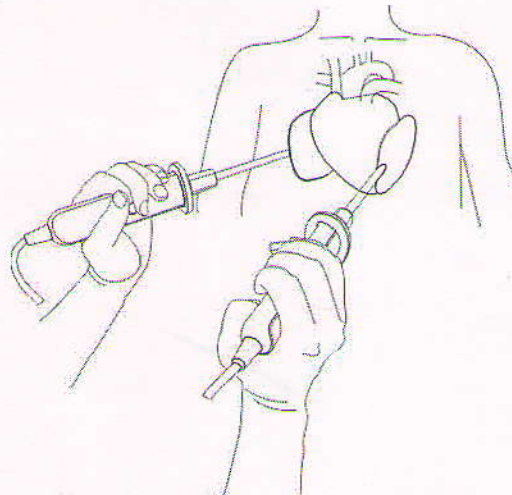
The external paddle set comes with pediatric paddles included. To use the pediatric paddle set, depress the latch at the front of the external paddle set while pulling forward on the adult paddle electrodes.

To defibrillate, refer to the procedure as described in Section 8.4 *Manual Defibrillation Procedure*.

8.4.2 Using Internal Paddles

To defibrillate using internal paddles:

1. Turn on the defibrillator and enter the manual defib mode.
2. Select the appropriate paddle size.
3. Connect the paddles to the defibrillator by aligning the white pointer on the paddles cable with the arrow on the therapy port. Push until you hear it click into place.
4. Select energy by pressing the Energy Select key on the equipment's front panel.
5. Place the conductive surface of paddle electrodes against the patient's right atrium and left ventricle, as shown in the figure below:



6. Charge the defibrillator by pressing the Charge key on the front panel.
7. Make sure no one is touching the patient or anything connected to the patient.
8. Press the Shock key on the front panel.

Using internal paddles for synchronized cardioversion requires that the patient's ECG be acquired through a standard ECG cable. The patient's ECG acquired through the internal paddles may be unreliable for synchronized cardioversion due to excessive noise or artifact causing inappropriate R-wave detection.

NOTE

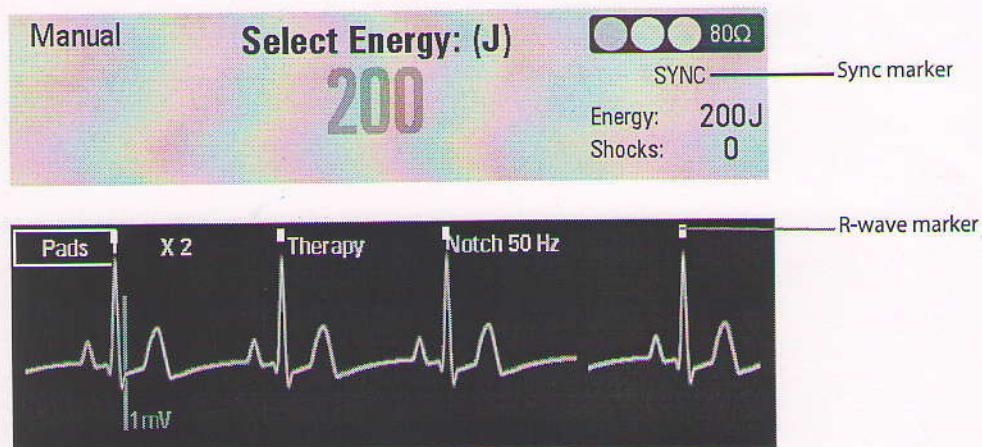
- When internal paddles are used for defibrillation, the energy selection is automatically limited to 50 joules because of possible cardiac damage from higher energies.
- Sterilize the internal paddles before each use. Otherwise, severe infection may result.
- Clean the internal paddles after each use.

8.5 Synchronized Cardioversion

Synchronized Cardioversion allows you to synchronize delivery of the defibrillator shock with the R-wave of the ECG. You may choose to perform synchronized cardioversion through either:

- Multifunction electrode pads, or
- External paddles

To use synchronized cardioversion, press the [Enter Sync] soft key in the asynchronous defibrillation mode. Then "Sync" appears in the manual Defibrillation information area and a marker appears above each R-wave, see the figure below:



Description	Applicable patient	Remark	PN
CapnoLine H O2Adult(008180)	Adult	Disposable	0010-10-42575
CapnoLine H O2Pediatric(008181)	Pediatric		0010-10-42576
NIV-Line Adult(008174)	Adult		0010-10-42577
NIV-LinePediatric(008175)	Pediatric		0010-10-42578

26.5 Therapy Accessories

Description	Model	Applicable patient	Remark	PN
External paddles	MR6601	Adult, pediatric	Reusable	0651-30-77001
Multifunction electrode pads	MR60	Adult	Disposable (5 sets/pack)	0651-30-77007
	MR61	Pediatric		0651-30-77008
	MR62	Adult		040-002608-00
	MR63	Pediatric		040-002609-00
Pads cable	MR6701	/	Reusable	0651-20-77031
Conductive gel	15-25	/	Consumable	0000-10-10775
Internal paddles	MR6501	Neonate	Reusable	0651-21-77043
	MR6502	Neonate	Reusable	0651-21-77044
	MR6503	Adult	Reusable	0651-21-77045
CPR sensor	MR6401	/	Reusable, with a battery	047-019365-00
CPR sensor cable	MR6801	/	Reusable	040-003096-00
CPR adhesive tape	MR6921	/	Disposable (3 sets/pack)	040-003123-00

26.6 Miscellaneous

Description	Model	PN
Rechargeable lithium ion battery	LI24I005A	022-000296-00
	LI24I001A	022-000047-00
Test load	MR6901	0651-20-77032
Test load	MR6905	040-000413-00
Wireless transmission module kit	/	115-006297-00
Y-cable	/	009-000829-00
Synchronous defibrillation input cable	/	0651-20-77046
Grounding cable	UL1015/14AWG	1000-21-00122
DC/AC adapter	/	0010-30-12471
Patient data management software kit	/	0651-30-77145
Carrying case and shield cover	/	115-018610-00
D3 back pouch	/	115-008708-00
Conducting gel mount kit	/	115-007857-00
Pothook kit	/	115-007587-00

Audio Indicator	
Speaker	Gives alarm tones (45 to 85 dB), key tones, QRS tones; Supports PITCH TONE and multi-level tone modulation; Alarm tones comply with IEC60601-1-8.
Multifunctional connector	
Standard	Meets the requirements of EN60601-1 for short-circuit protection and leakage current
Output impedance	Typically 50Ω
ECG Analog Output (only ECG lead set)	
Bandwidth (-3 dB; reference frequency: 10 Hz)	Diagnostic mode: 0.05 to 150 Hz Monitor mode: 0.5 to 40 Hz Therapy mode: 1 to 20 Hz
Maximum QRS delay	25 ms (in diagnostic mode, and with Notch off)
Sensitivity	1 V/mV ±5%
Pace enhancement	Signal amplitude: $V_{oh} \geq 2.5V$ Pulse width: 10ms±5% Signal rising and falling time: ≤100μs
Synchronous input	
Input signal range	0 to 5V (TTL level)
Input impedance	≥10 kΩ
Pulse width	>5 ms
Alarm output (Network connector)	
Alarm delay time from the equipment to other remote equipment	The alarm delay time from the equipment to other remote equipment is ≤4 seconds, measured at the equipment signal output connector.

A.2 Defibrillator Specifications

Standards	Meet standards of IEC 60601-2-4
Defibrillation mode	Manual defib, synchronous cardioversion, AED
Defibrillation waveform	Biphasic truncated exponential (BTE) waveform, auto-compensation according to patient impedance
Defibrillation electrodes	External paddles set coming with pediatric paddles included, multifunction electrode pads and internal paddles
Controls and indicators on external paddles	Charge button, Shock buttons, Energy Select buttons and charge done indicator

Range of selected energy	
External defibrillation	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 30, 50, 70, 100, 150, 170, 200, 300 (optional), 360 (optional) J
Internal defibrillation	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 30, 50 J

Patient impedance range	
External defibrillation	25 to 300 Ω
Internal defibrillation	15 to 300 Ω