mindray

BeneHeart D30

Defibrillator Monitor

Empowering Every Second

Digitally signed by Prodan Sveatoslav
Date: 2024.06.14 15:50:25 EEST
Reason: MoldSign Signature
Location: Moldova

www.mindray.com

P/N:ENG-BeneHeart D30-210285X8P-20230105

mindray
healthcare within reach

All in one
360J Manual defib /AED /Pacing /Monitoring: ECG, SPO_2 , NIBP, CO_2

Ultra-light
Only 4.2kg(with battery) for exceptional portability

Versatile paddles
External paddles with contact indicator improve usability for clinicians

Three-step operation
Power-Charge-Shock buttons for rapid and reliable operation

Auditory and visual indication
Trace the operation process with the help of sound and light indicators

Build-in recorder
Enable multiple report printouts e.g. waveform, alarm, event, review, test

Smart Touch, More Intuitive

Capacitive Full-Touch Screen

With advanced high-definition capacitive touch screen technology and flat UI design, D30 offers optimal experience of clearer display and smoother operation, enabling efficiency at your fingertips.

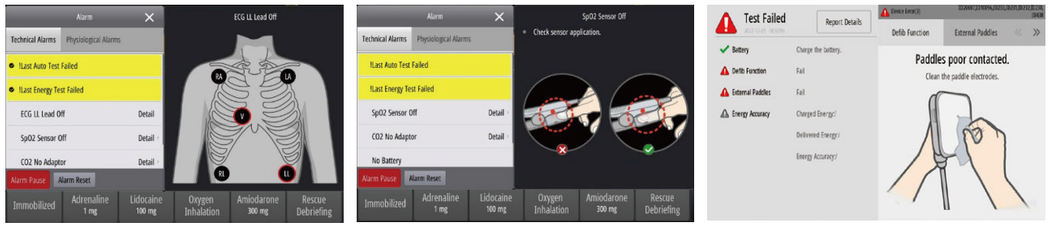
Optimal visibility
- 8" display with1024×768 resolution
- Auto-brightness

Confident operation
- Gesture-control touchscreen
- Keep physical knob and buttons for key operations

Wide adaptability
With the intelligent sensing, you can operate D30 normally even if
- the screen is spilled with liquid
- wearing up to 5 layers of gloves

Visual AlarmSight™

D30 provides a series of problem-solving support with graphical visualization, not only alerting you to the problems, but also suggesting solutions to help resolve them simply.



Extensive Data Storage

1000 sets events	**120** hours ECG waveform	**200** hours trend data	**1000** sets auto test reports	**8** hours voice recording

Rescue Triangle, More Comprehensive

High-quality rescue requires the resuscitation team to maintain the high quality and effectiveness of cardiopulmonary resuscitation during the rescue process. It also relies on timely, regular review and analysis of the rescue data and rescue quality that help identify the highlight for routine rescue training and assessment. Only by combining and advancing the three-in-one solution can the quality of rescue and the survival rate of SCA patients be improved.

Faster Resuscitation

QShock™ -Faster to Shock

In line with the BeneHeart series, D30 is also equipped with new QShock™ technology, taking less than 5s from power on to shock.

Power on in **2**s → Charging to 200J in **3**s → ECG recovery in **2.5**s

Shorter Interruption

Mindray has developed state-of-the-art technologies that can filter out the compression interference for both ALS and BLS, to effectively reduce pauses in recognizing heart rhythm[1].

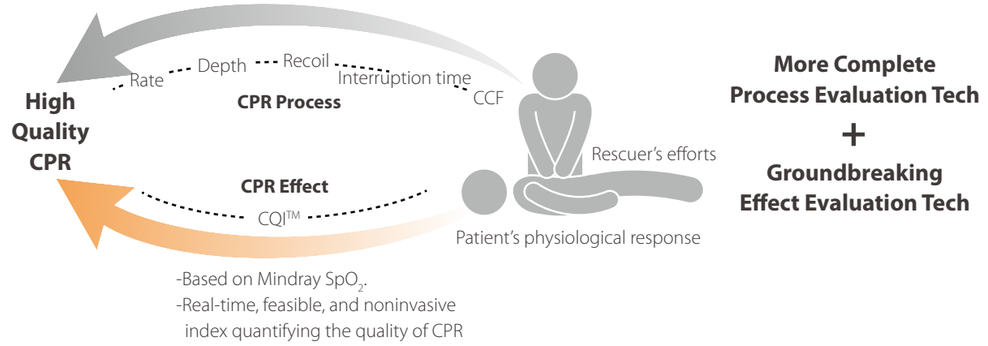
Raw ECG with compression interference

Filtered ECG without compression interference

[1] only available when you perform CPR using defib pads or the CPR sensor.

CPR Feedback of both Process & Effect

With the CPR process feedback monitoring the real-time performance of rescuers, and the effect evaluation reflecting patients' responses to the rescue, D30 provides a comprehensive assessment of CPR to obtain a satisfactory resuscitation result.



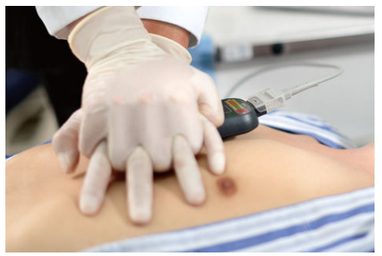
Structured Debriefing

D30's structured debriefing protocols improve the performance of resuscitation teams in subsequent resuscitation events.

- The key data of each rescue is automatically uploaded to the debriefing system.
- CPR quality and defibrillation data included.
- Not only post-event analysis, but also periodic review.

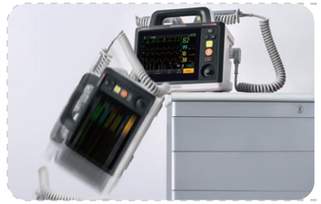
Hands-on Training

- Training mode in D30 help you get real operation experience.
- Both single and multi-person mode are available.
- Support CPR and defib operation training



Redefine Toughness with Innovation

Preparing for varied scenarios and contingencies, D30 is designed to take on every new challenge in hospital environments anytime, anywhere. D30 empowers clinicians to respond confidently to changing clinical requirements and stay prepared for whatever comes their way.



0.75m drop protection of all six sides

IP55 water-/dust-proof

Bend-resistant cable, withstanding more than 400,000 tests

Resistant to 49 disinfectants

Bedrail hook for convenient nosocomial transhipment

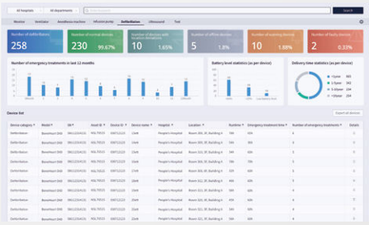
Keep Connected with Greater Efficient

M-Connect™ IT solution integrates the patient data from D30 to avoid manual recording errors and allows flexible viewing of patient data on mobile devices anytime, anywhere. Its simple yet robust network connection is compatible with standard information infrastructure in most hospitals.

M-IoT Device Manager

M-IoT Device Manager obtains comprehensive device data to help biomedical engineers ensure the safety and effectiveness of all equipment at all times.

- Real-time failure monitoring and guidance for timely maintenance, reducing equipment downtime
- Battery status monitoring to ensure patient safety by limiting interruptions
- IP/MAC address for network access control to ensure cybersecurity



Pictures and function descriptions are for reference only. For actual configuration, please consult Mindray's sales staff.

BeneHeart D30

Defibrillator / Monitor

Physical Specifications

Dimension	285 mm (w) × 170 mm (d) × 265 mm (h), without external paddles
Weight	4.2 kg (main unit with a battery)

Environmental and Physical Requirements

Water resistance	IPX5
Solids resistance	IP5X
Temperature	Operating: -20 to 55 °C Storage: -40 to 75 °C
Humidity	Operating/storage: 5 to 95 % (non-condensing)
Altitude	Operating/storage: -382 m to +4575 m
Shock	Meets the requirements for medical devices of 6.3.4.2, EN1789 (10.1.3, IEC60601-1-12)
Vibration	Meets the requirements for medical devices of 6.3.4.2, EN1789 (10.1.3, IEC60601-1-12)
Bump	Meets the requirements of 6.3.4.2, EN1789
Free fall	1 fall on each surface (6 surfaces in total), at the height of 0.75 m
EMC	Meets IEC60601-1-2
Safety	Meets EN/IEC 60601-1

Display

Type	LCD color capacitive touch display, protected by tempered glass
Dimensions	8 in
Resolution	1024 × 768 pixels
Display waveforms	Max. 5 channels
Wave viewing time	Max. 36 s (ECG)
Sweep speed	ECG/SPO2: 6.25, 12.5, 25, 50mm/s RESP/CO2: 3, 6.25, 12.5, 25, 50mm/s
Trace freeze	Yes
Screenshot	Yes
High contrast mode	Yes
Auto-brightness	Yes
Gesture control	Yes

Power

AC power	
Line voltage	100 to 240 V
Current	1.8 to 0.8 A
Frequency	50/60 Hz (±3 Hz)
DC power (with DC/AC inverter)	
Input voltage	12 V
Output voltage	230 V
Output power	150 W
Battery	
Type	4500 mAh, rechargeable lithium ion battery pack
Number	1
Charge time	Less than 3 hours to 90% and less than 4 hours to 100% with equipment power off
Capacity indicator	5-segment led indicator for fast battery capacity evaluation
Capacity (new, fully charged battery)	Monitoring mode: 6.5 hours, configured with 3-/5-lead ECG, manual defibrillation, screen brightness set to the lowest level without printing Defib mode: 220 times, 360 J discharge at intervals of 1 minute without recording Pacing mode: 4.5 hours, 50 Ohm load impedance, pacing rate: 80 bpm, pacing output: 60 mA

Recorder

Method	High-resolution thermal dot array
Waveforms	Max. 3 channels
Speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Paper width	50 mm
Reports	Real-time waveforms, ST real-time, QT real-time, event real-time, physiological alarm, frozen waveforms, tabular trends review, graphic trends review, physiological event review, full disclosure review, rescue record, event summary, auto test, and configuration
Auto recording	Recorder can be configured to record marked events, charge, shock, alarm, auto test

Data Storage

Internal storage	4 GB
Events	Up to 1000 events for one patient
Waveform storage	Up to 120 hours of consecutive ECG waveform
Tabular trends	200 hours, resolution: 1 min
Voice recording	At least 8 hours for each patient
Data export	Data can be exported to PC through USB flash memory

Defibrillator

Waveform	Biphasic truncated exponential waveform, with impedance compensation
Energy accuracy	±2 J or 10 % of setting, whichever is greater
Power on time	Less than 2 seconds with a new, fully charged battery
Charge time	Less than 3 seconds to 200 J with a new, fully charged battery Less than 7 seconds to 360 J with a new, fully charged battery
ECG recovery time	Less than 2.5 seconds
Shock delivery	Via multifunction defib electrode pads, or paddles
Patient impedance Range	25 to 300 Ω (external defibrillation)
Manual mode	
Output energy	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 50, 70, 100, 120, 150, 170, 200, 300, 360 J
Synchronous cardioversion	Energy transfer begins within 60 ms of the QRS peak Energy transfer begins within 25 ms of the external sync pulse
AED mode	
Output energy	User configurable
AED shock series	Energy level: 100 to 360J, configurable for

	adult; 10 to 200J, configurable for pediatric
	Shocks: 1, 2, 3, configurable
	Meets 2020 AHA/2021 ERC guidelines by default
Time from rhythm analysis to charge done	Initial analysis: 10s
	Non-initial analysis: 8s
AED mode monitor parameters	ECG, SPO2, CO2, NIBP, filtered ECG, CPR feedback, CCF, CQI
Sensitivity and specificity	Meets IEC 60601-2-4 and AHA recommendation

Noninvasive Pacing

Waveform	Monophasic square wave pulse
Pulse width	20 ms or 40 ms, ±5%
Refractory period	200 to 300 ms, ±3% (function of rate)
Pacing mode	Demand or fixed
Pacing rate	30 ppm to 210 ppm, ±1.5%
Pacing output	0 mA to 200 mA, ±5% or 5 mA, whichever is greater
4:1 pacing	Pacing pulse frequency reduced by factor of 4 when activated

ECG

Lead type	3 leads ECG, 5 leads ECG
Lead selection	3-lead: I, II, III
	5-lead: I, II, III, aVR, aVL, aVF, V
Heart rate display	Adult: 15 to 300 bpm
	Pediatric: 15 to 350 bpm
	Neonate: 15 to 350 bpm
Resolution	1 bpm
Arrythmia	Yes
Alarms	Yes
ST/QT monitoring	Yes
ECG size	1.25 mm/mV (×0.125), 2.5 mm/mV (×0.25), 5 mm/mV (×0.5), 10 mm/mV (×1), 20 mm/mV (×2), 40 mm/mV (×4), Auto

Respiration

Method	Trans-thoracic impedance
Range	Adult: 0 to 200 rpm
	Pediatric, neonate: 0 to 200 rpm
Resolution	1 rpm

SpO_2 Pulse Oximetry

Mindray SpO_2	
Range	0 to 100%
Resolution	1%
PR range	20 to 300 bpm
Nellcor SpO_2	
Range	0 to 100%
Resolution	1%
PR range	20 to 300 bpm
Masimo SpO_2	
Range	1 to 100%
Resolution	1%
PR range	25 to 240 bpm

NIBP

Operating mode	Manual, Auto, STAT, Sequence
Static pressure range	0 to 300 mmHg
Displayed pressures	Systolic, Diastolic, Mean
Cuff inflation pressure (default)	Adult: 160 mmHg
	Pediatric: 140 mmHg
	Neonate: 90 mmHg
PR Range	30 to 300 bpm

CO_2

Sidestream CO2	
Measurement range	0 to 150 mmHg
Resolution	1 mmHg
awRR measurement range	0 to 150 rpm
awRR accuracy	0 to 60 rpm: ±1 rpm
	61 to 150 rpm: ±2 rpm
Sample Flowrate	50ml/min

CPR Feedback

Parameters monitored	From CPR sensor*: rate, depth, recoil, compression fraction (CCF), interruption time
	From pads: rate, interruption time
	From Mindray SPO2: rate, CCF, interruption time, Compression Quality Index (CQI)
CPR metronome	Yes
CPR countdown	Yes
CPR filter	Yes

CPR Sensor*

Weight	Approximately 180 g (without battery)
Thickness	17.5 to 19 mm
Compression depth	Measurement range: 0 to 8 cm
	Accuracy: ±5 mm or 10 %, whichever is greater
Compression rate	Measurement range: 40 to 160 cpm
	Accuracy: ±2 cpm

Network

Data connection	Wired, Wi-Fi, 4G
Data transmission	
Patient data	In-hospital: sends real-time data to CMS or HL7 service via Wi-Fi or wired network
	Pre-hospital: sends real-time data to CMS via 4G network
Device data	Sends device data (such as auto test report, battery status, etc.) to the device management system via Wi-Fi or wired network

* Some of functions marked with an asterisk may not be available. Please contact your local Mindray sales representative for the most current information.

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P/N: ENG-D30 Datasheet-210285X2P-20230331

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healthcare within reach

BeneHeart D30/BeneHeart D20A

BeneHeart D20/BeneHeart D20C

Defibrillator/Monitor

Operator’s Manual

CE 2797

Release time: January 2023

Revision: 2.0

3.4.3 Installing the Battery

The equipment can operate on the battery power when an external power supply is not available. For details on installing the battery, see *23.3 Replacing the Battery*.

3.5 Turning on the Equipment

Before turning on the equipment, perform the following inspections:

1. Check the equipment for any mechanical damage. Make sure that all external cables, plug-ins and accessories are properly connected.
2. Connect the equipment to the external power supply. Make sure the battery power is sufficient if the equipment is powered by the battery.

Press the power switch to turn on the equipment. After the start-up screen is displayed, the equipment gives a beep, and meanwhile, the alarm lamp illuminates in red, and then turns yellow, and finally turns off.

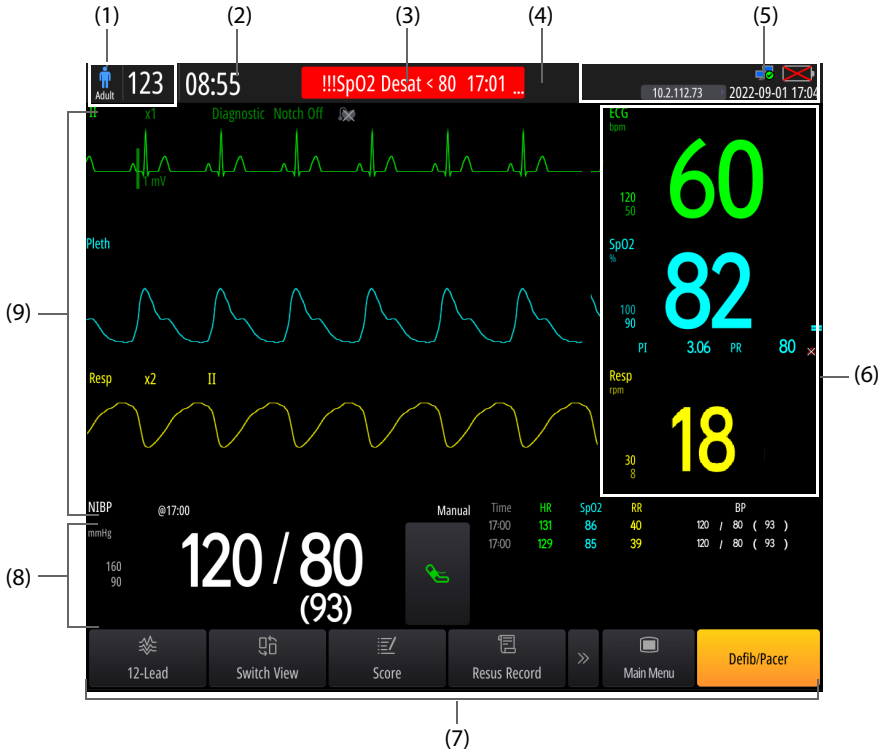
If the AED mode or Manual Defib mode is the default startup mode, the alarm system is off when the alarm lamp turns off. If the Monitor mode is the default startup mode, the alarm system is activated when the alarm lamp turns off. The setting of **Default Startup Mode** can be changed in the Configuration mode only. For more information, see *22.7.1 General Setup Menu*.

CAUTION

- **Do not use the equipment on a patient if you suspect it is not working properly, or if it is mechanically damaged. Contact the service personnel or Mindray.**
- **Check that visual and auditory alarm signals are presented correctly when the equipment is turned on.**

3.6 Main Screen Display

The following figure shows the main screen display.



4.3 Connecting the Multifunction Electrode Pads

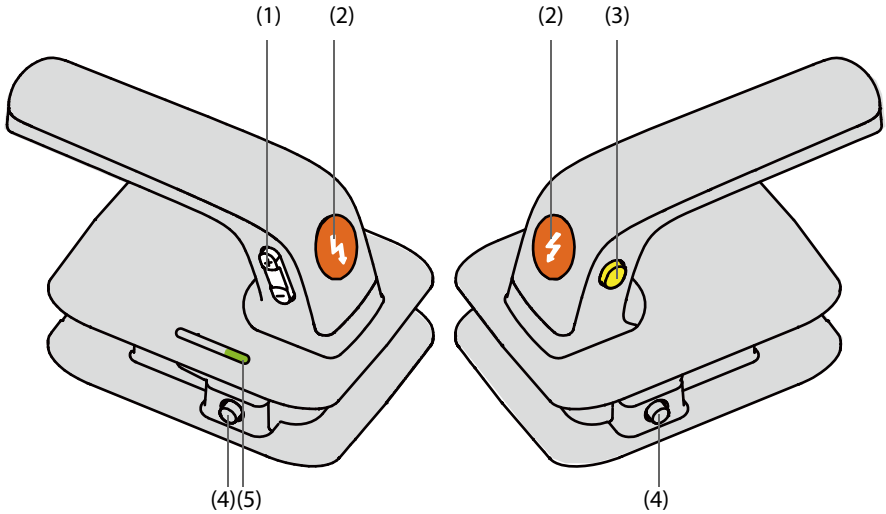
To connect the electrode pads, follow this procedure:

1. Connect the therapy cable. For more information, see *4.2 Connecting the Therapy Cable*.
2. Push the therapy cable and pads connector together unit you hear a click.

3. If a defibrillation test is needed, connect the test load to the therapy cable.

4.4 Connecting the External Paddles

The following figure shows the adult external paddles.



Sternum paddle

Apex paddle

(1) Energy Selection button

(2) Shock button

(3) Charge button

(4) Latch button

(5) Patient contact indicator: indicates the contact status between the patient and external paddles. The patient contact indication in the Manual Defib window has a same function. For more information, see *4.8 Checking the Patient Contact Indicator*.

11 Monitoring ECG

11.1 ECG Introduction

The electrocardiogram (ECG) measures and records the electrical activity of the heart. The equipment provides ECG monitoring through ECG electrodes (3-lead, 5-lead, 12-lead), electrode pads or external paddles, also provide arrhythmia analysis, ST-segment analysis, and QT/QTc measurements.

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

11.2 ECG Safety Information

WARNING

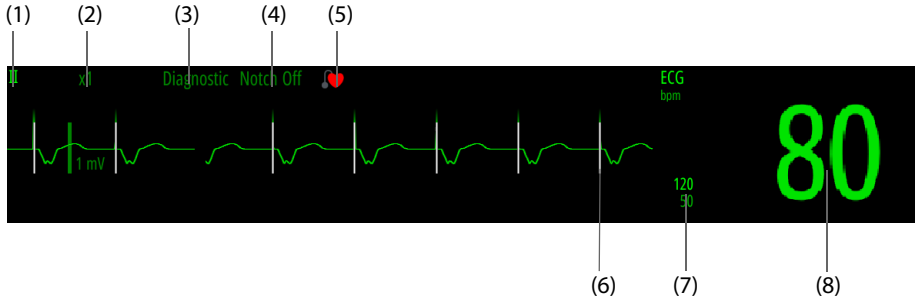
- **ECG monitoring provided by this equipment is not intended for direct cardiac application.**
- **Make sure the conductive parts of electrodes and associated connectors, including the neutral electrode, do not contact any other conductive parts including earth.**
- **Use defibrillation-proof ECG cables during defibrillation.**
- **Do not touch the patient or metal devices connected to the patient during defibrillation.**
- **To reduce the hazard of burns during high-frequency surgical procedure, ensure that cables and transducers connected to the equipment never come into contact with the electrosurgery unit (ESU).**
- **To reduce the hazard of burns during use of high-frequency surgical unit (ESU), the ECG electrodes should not be located between the surgical site and the ESU return electrode.**

CAUTION

- **Periodically inspect the electrode application site to ensure skin integrity. If the skin quality changes, replace the electrodes or change the application site.**
- **Interference from ungrounded instrument near the patient and electrosurgery interference can induce noise and artifact into the waveforms.**
- **If selected lead cannot provide valid ECG signals, a dash line is shown in the ECG waveform area.**

11.3 ECG Display

The following figures show the ECG waveform and numeric areas.



(1) ECG lead label

(2) ECG waveform gain

(3) ECG filter mode

(4) Notch filter status

(5) Paced status: If **Paced** is set to **Yes**, is displayed. If **Paced** is set to **No**, is displayed.

Power supply	Manual Defib						AED					
	Charge time*		From initial power on (from cold start) to charge done		From initial power on (from fast startup mode) to charge done		From initiation of rhythm analysis to charge done		From initial power on (from cold start) to charge done		From initial power on (from fast startup mode) to charge done	
	200J	**360J**	**200J**	**360J**	**200J**	**360J**	**200J**	**360J**	**200J**	**360J**	**200J**	**360J**
With a new fully charged battery	<3 s	<7 s	<11 s	<14 s	<6 s	<10 s	<10 s	<12 s	<21 s	<26 s	<13 s	<15 s
With a new fully charged battery, depleted by 15 discharges of 360 J	<4 s	<8 s	<12 s	<15 s	<7 s	<11 s	<11 s	<13 s	<23 s	<27 s	<14 s	<16 s
With an external power supply	<4 s	<7 s	<11 s	<14 s	<7 s	<10 s	<11 s	<12 s	<22 s	<24 s	<14 s	<15 s
* The battery is charged at ambient temperature of 20 ±5 °C.												

NOTE

- **The equipment startup time in the fast startup mode is less than 2s.**

A.7.2 CPR Compression Specifications

Compressions from CPR Sensor

Compression rate	Measurement range: 40 to 160 cpm Accuracy: ±2 cpm

Compressions from Electrode Pads

Compression rate	Measurement range: 60 to 200 cpm Accuracy: ±3 cpm

A.7.3 Pacer Specifications

Standards	Meet standards of IEC 60601-2-4
Pacer mode	Demand, fixed
Output waveform	Monophasic square wave pulse pulse width 20 ms or 40 ms Accuracy: ±5%
Pacing rate	30ppm to 210ppm Accuracy: ±1.5% Resolution: 5 ppm
Pacing output	0mA to 200mA, Accuracy: ±5% or ±5mA, whichever is greater Resolution: 1mA, 2mA or 5mA
Refractory period	200 to 300 ms (depending on pacing rate)
4:1 pacing	Pacing pulse frequency reduced by factor of 4 when this function is activated.

NOTE

- **When pacing rate is changed from 30ppm to 210ppm, the response time to pacing (HR rising from 30bpm to 210bpm) is less than 20s.**

A.8 Monitor Specifications

A.8.1 ECG Specifications (from ECG Accessories)

Standards	Meet standards of IEC 60601-2-27 and IEC 60601-2-25
Patient connection	3-lead ECG cable, 5-lead ECG cable or 12-lead ECG cable
ECG inputs	3-lead ECG: I, II, III 5-lead ECG: I, II, III, aVR, aVL, aVF, V 12-lead ECG: I, II, III, aVR, aVL, aVF, V1 to V6
ECG standard	AHA, IEC
Display sensitivity	1.25 mm/mV (×0.125), 2.5 mm/mV (×0.25), 5 mm/mV (×0.5), 10 mm/mV (×1), 20 mm/mV (×2), 40mm/mV (×4), Auto, less than ± 5% error
Sweep speed	6.25mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s, less than ± 5% error
Bandwidth (-3dB)	Diagnostic mode: 0.05 to 150 Hz Monitor mode: 0.5 to 40 Hz Therapy mode: 1 to 20 Hz ST mode: 0.05 to 40 Hz High Freq Cut-off (for 12-lead ECG analysis): 350 Hz, 150Hz, 35Hz, 20Hz, selectable
Common mode rejection	Monitor, Therapy and ST modes: >105 dB (with notch filter on), >90 dB (with notch filter off) Diagnostic mode: >90 dB (with notch filter off) High Freq Cut-off (for 12-lead ECG analysis): >90 dB (with notch filter off)
Notch filter	50/60Hz, Monitor, Therapy and ST modes: notch filter turns on automatically. Diagnostic mode and High Freq Cut-off: notch filter is turned on manually. Rejection on power frequency interference: ≥20 dB
Differential input impedance	≥5 MΩ
ECG signal range	±8mV (peak-to-peak value)
Calibration signal	1mV (peak-to-peak value) ±5%
Electrode offset potential tolerance	±500mV
Lead-off detection current	Measuring electrode: ≤0.1 μA Drive electrode: ≤1 μA
Baseline recovery time	<2.5 s (after defibrillation)
Defibrillation protection	Enduring 5000V (360 J) charge without data loss or corruption Baseline recovery time: <2.5 s (after defibrillation) Polarization recovery time: <10 s Defibrillation energy absorption: ≤10% (100Ω load)
ESU protection	Cut mode: 300 W Coagulate mode: 100 W Recovery time: ≤10 s Noise rejection: 2mV In compliance with the requirements in clause 202.6.2.101 of IEC 60601-2-27
Pace Pulse	

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 (no greater than 10% of pulse width) No overshoot
Pace pulse rejection	When tested in accordance with the IEC 60601-2-27: 201.12.1.101.13, 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 Input slew rate: 2.2 V/s ± 15% RTI No overshoot
HR	
Measurement range	Adult: 15 to 300 bpm Pediatric, neonate: 15 to 350 bpm
Accuracy	±1% or ±1bpm, which ever is greater
Resolution	1 bpm
Heart rate averaging	In compliance with the requirements in Clause 201.7.9.2.9.101 b) 3) of IEC 60601-2-27, 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 screen is updated every second.
Response time to heart rate change	Meets the requirements of IEC 60601-2-27: Clause 201.7.9.2.9.101 b) 5). From 80 to 120 bpm: less than 11 s From 80 to 40 bpm: less than 11 s
Time to alarm for tachycardia	Meets the requirements in Clause 201.7.9.2.9.101 b) 6) of IEC 60601-2-27. Waveform B1h - range: <11 s B1 - range: <11 s B1d - range: <11 s B2h - range: <11 s B2 - range: <11 s B2d - range: <11 s
Arrhythmia analysis classifications	Asystole, V-Fib/V-Tach, V-Tach, Vent Brady, Extreme Tachy, Extreme Brady, Vent Rhythm, PVCs/min, Pauses/min, Couplet, Bigeminy, Trigeminy, R on T, Run PVCs, PVC, Brady, Tachy, Missed Beat, Pacer Not Pacing, Pacer Not Capture, Multiform PVC, Nonsus V-Tach, Pause, Irr Rhythm, A-Fib (only for adults), SVT, SVCs/min
Tall T-wave rejection capability	When the test is performed based on Clause 201.12.1.101.17 of IEC 60601-2-27, the heart rate meter will reject all 100 ms QRS complexes with less than 1.2 mV of amplitude, and T waves with T-wave interval of 180 ms and those with Q-T interval of 350 ms.
Response to irregular rhythm	In compliance with the requirements in Clause 201.7.9.2.9.101 b) 4) of IEC 60601-2-27, 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
ST Segment Analysis	

Measurement range	-2.0 to 2.0 mV RTI
Accuracy	-0.8 to 0.8 mV: ±0.02 mV or ±10%, whichever is greater. Beyond this range: Not specified.
Resolution	0.01 mV
QT/QTc Analysis	
Measurement range	QT: 200 to 800 ms QTc: 200 to 800 ms QT-HR: 15 to 150 bpm for adult, 15 to 180 bpm for pediatric and neonate
Accuracy	QT: ±30 ms
Resolution	QT: 4 ms QTc: 1 ms
12-lead ECG Interpretation	
Sampling rate	1000 samples/s (A/D) 500 samples/s (ECG algorithm)
Amplitude quantization	24 bits
Measurements	Heart rate, PR interval, QRS duration, QT/QTc interval, P/QRS/T axis and diagnosis statement

A.8.2 ECG Specifications (from Therapy Accessories)

Patient connection	Paddles or multifunction electrode pads
ECG inputs	Paddles or Pads
Display sensitivity	1.25 mm/mV (×0.125), 2.5 mm/mV (×0.25), 5 mm/mV (×0.5), 10 mm/mV (×1), 20 mm/mV (×2), 40mm/mV (×4), Auto, less than ± 5% error
Sweep speed	6.25mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s, less than ± 5% error
Bandwidth (-3dB)	Therapy mode: 1 to 20 Hz $\binom{+0.4dB}{-3.0dB}$
Common mode rejection	Therapy mode: >105 dB (with notch filter on)
Notch filter	Therapy mode: 50/60Hz, notch filter turns on automatically.
Differential input impedance	≥5 MΩ
ECG signal range	±8mV (peak-to-peak value)
Calibration signal	1mV (peak-to-peak value) ±5%
Electrode offset potential tolerance	±1V
Lead-off detection current	≤0.1 μA
Baseline recovery time	<2.5 s (after defibrillation)
Defibrillation protection	Enduring 5000V (360 J) charge without data loss or corruption Baseline recovery time: <2.5 s (after defibrillation) Polarization recovery time: <10 s Defibrillation energy absorption: ≤10% (100Ω load)
ESU protection	Cut mode: 300 W Coagulate mode: 100 W Recovery time: ≤10 s In compliance with the requirements in clause 202.6.2.101 of IEC 60601-2-27
Pace Pulse	

D Alarm Messages

D.1 Physiological Alarm Messages

D.1.1 General Physiological Alarm Messages

Alarm Messages	Default Priority	Cause and Solution
XX* High	Med	The measured value has risen above the high alarm limit or fallen below the low alarm limit. Check the patient's condition and check if the patient category and alarm limit settings are correct.
XX* Low	Med	
*XX represents a parameter label, such as HR, NIBP, RR, SpO_2, PR, and so on.		

D.1.2 Arrhythmia Alarm Messages

If any of arrhythmia alarms in the following table occurs, check the patient's condition and the connections of electrodes, leadwires and patient cable.

Alarm Message	Default Priority	Alarm Message	Default Priority
Asystole	High	Brady	Med
V-Fib/V-Tach	High	Pacer Not Pacing	Prompt
V-Tach	High	Pacer Not Capture	Prompt
Vent Brady	High	Missed Beat	Prompt
Extreme Tachy	High	Nonsus V-Tach	Med
Extreme Brady	High	Vent Rhythm	Med
R on T	Med	Pause	Low
Run PVCs	Low	Irr Rhythm	Prompt
Couplet	Prompt	A-Fib	Prompt
Multiform PVC	Med	PVCs/min	Med
PVC	Prompt	Pauses/min	Med
Bigeminy	Med	SVT	Med
Trigeminy	Med	SVCs/min High	Prompt
Tachy	Med		

D.1.3 ST Physiological Alarm Messages

ST Alarm Mode	Alarm Messages	Default Priority	Cause and Solution
Absolute	ST-XX* High	Med	The ST value of respective ECG lead 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.
	ST-XX* Low	Med	

F Accessories

The accessory material that contacts the patients has undertaken the bio-compatibility test and is verified to be in compliance with ISO 10993-1.

WARNING

- **Use accessories specified in this chapter. Using other accessories may cause damage to the equipment or not meet the claimed specifications.**
- **Single-use accessories are not designed to be reused. Reuse may cause a risk of contamination and affect the measurement accuracy.**

CAUTION

- **The accessories may not meet the performance specifications if stored or used outside the specified temperature and humidity ranges. If accessory performance is degraded due to aging or environmental conditions, contact your service personnel.**
- **Check the accessories and their packages for any sign of damage. Do not use them if any damage is detected.**
- **Use the accessories before the expiry date if their expiry date is indicated.**
- **The disposable accessories shall be disposed of according to hospital's regulations.**

F.1 ECG Accessories

F.1.1 ECG Electrodes

Model	PN	Description	Applicable Patient
31499224	0010-10-12304	Electrode Kendall, 10 pcs/package	Adult
2245-50	9000-10-07469	Electrode 3M, 50 pcs/package	Pediatric
1050NPSMKittycat	0681-00-0098-01	NEO Pre-wired Electrode radio Opaque	Neonate
1051NPSMKittycat	0681-00-0098-02	NEO Pre-wired Electrode radio Translucent	Neonate
SF06	040-002711-00	Electrode, 5 pcs/package	Adult
SF07	040-002833-00	Electrode, Intco	Pediatric, Neonate
H124SG	900E-10-04880	Electrode, Kendall, 50 pcs/package	Neonate
EMG-SN10-20×20	040-003254-00	NEO Pre-wired Electrode radio Translucent, AHA	Neonate
EMG-SN10-20×20	040-003255-00	NEO Pre-wired Electrode radio Translucent, IEC	Neonate
EMG-SN09-20×28	040-003251-00	NEO Pre-wired Electrode radio Translucent, AHA	Neonate
EMG-SN09-20×28	040-003252-00	NEO Pre-wired Electrode radio Translucent, IEC	Neonate

F.1.2 12-Pin Separable Trunk Cables

Model	PN	Description	Applicable Patient
EV6201	0010-30-42719	ECG cable,12-pin, 3/5-lead, defibrillation-proof AHA/IEC	Adult, Pediatric
EV6202	0010-30-42720	ECG cable,12-pin, 3-lead, defibrillation-proof, AHA/IEC	Neonate, Infant
EV6211	0010-30-42723	ECG cable, 12-pin, 3/5-lead, ESU-proof, AHA/IEC	Adult, Pediatric
EV6212	0010-30-42724	ECG cable, 12-pin, 3-lead, ESU-proof, AHA/IEC	Neonate, Infant
EV6222	040-000754-00	ECG cable, 12-pin, 3-lead, defibrillation-proof, DIN connector	Neonate
EV6203	0010-30-42721	ECG cable, 12-lead, defibrillation-proof, AHA	Adult
EV6204	0010-30-42722	ECG cable, 12-lead, defibrillation-proof, IEC	Adult

F.1.3 12-Pin Integrative Trunk Cables

Model	PN	Description	Applicable Patient
EA6251B	040-000961-00	ECG cable,12-pin, 5-lead, AHA, snap	Adult, Pediatric
EA6252B	040-000963-00	ECG cable,12-pin, 5-lead, IEC, snap	Adult, Pediatric
EA6251A	040-000960-00	ECG cable,12-pin, 5-lead, AHA, clip	Adult, Pediatric
EA6252A	040-000962-00	ECG cable,12-pin, 5-lead, IEC, clip	Adult, Pediatric
EA6231B	040-000965-00	ECG cable,12-pin, 3-lead, AHA, snap	Adult, Pediatric
EA6232B	040-000967-00	ECG cable,12-pin, 3-lead, IEC, snap	Adult, Pediatric
EA6231A	040-000964-00	ECG cable,12-pin, 3-lead, AHA, clip	Adult, Pediatric
EA6232A	040-000966-00	ECG cable,12-pin, 3-lead, IEC, clip	Adult, Pediatric

F.1.4 3-lead ECG Leadwires

Model	PN	Description	Length	Applicable Patient
EL6302A	0010-30-42725	ECG leadwires, 3-lead, IEC, clip	0.6 m	Adult, Pediatric
EL6301A	0010-30-42726	ECG leadwires, 3-lead, AHA, clip	0.6 m	Adult, Pediatric
EL6307A	0010-30-42898	ECG leadwires, 3-lead, AHA, clip	0.6 m	Pediatric
EL6308A	0010-30-42899	ECG leadwires, 3-lead, IEC, clip	0.6 m	Pediatric
EL6305A	0010-30-42896	ECG leadwires, 3-lead, AHA, clip, long	1 m	Neonate, Infant
EL6306A	0010-30-42897	ECG leadwires, 3-lead, IEC, clip, long	1 m	Neonate, Infant
EL6303A	0010-30-42731	ECG leadwires, 3-lead, AHA, clip, long	1 m	Adult, Pediatric
EL6304A	0010-30-42732	ECG leadwires, 3-lead, IEC, clip, long	1 m	Adult, Pediatric
EL6301B	0010-30-42734	ECG leadwires, 3-lead, AHA, snap, long	1 m	Adult, Pediatric
EL6302B	0010-30-42733	ECG leadwires, 3-lead, IEC, snap, long	1 m	Adult, Pediatric
EL6307B	0010-30-42900	ECG leadwires, 3-lead, AHA, snap	0.6 m	Pediatric

Model	Part No.	Description	Limb Circumference	Bladder Width	Applicable Patient
CM1507	115-015941-00	Disposable NIBP cuff	33 cm to 47 cm	16.5 cm	Adult

F.4 CO_2 Accessories

Model	Part No.	Description	Applicable Patient
GA3501	045-003134-00	Reusable CO_2 adapter	/
MVIIHL	040-006160-00	Disposable airway sampling line, long, humidified	Neonatal, Infant
MVAIHL	040-006161-00	Disposable airway sampling line, long, humidified	Adult, Pediatric
MVAIL	040-006162-00	Disposable airway sampling line, humidified	Adult, Pediatric
MVIIH	040-006163-00	Disposable airway sampling line, humidified	Neonatal, Infant
MVAIH	040-006164-00	Disposable airway sampling line, humidified	Adult, Pediatric
MVAI	040-006165-00	Disposable airway sampling line	Adult, Pediatric
MVPN	040-006166-00	Disposable nasal sampling line	Pediatric
MVAN	040-006167-00	Disposable nasal sampling line	Adult
MVANH	040-006168-00	Disposable nasal sampling line, humidified	Adult
MVA	040-006169-00	Disposable nasal sampling line	Adult
MVP	040-006170-00	Disposable nasal sampling line	Pediatric
MVPNOH	040-006171-00	Disposable nasal sampling line, humidified, plus O_2	Pediatric
MVAOL	040-006172-00	Disposable nasal sampling line, long, plus O_2	Adult
MVAO	040-006173-00	Disposable nasal sampling line, plus O_2	Adult
MVANOH	040-006174-00	Disposable nasal sampling line, humidified, plus O_2	Adult
MVINH	040-006175-00	Disposable nasal sampling line, humidified	Neonatal, Infant
MVPO	040-006176-00	Disposable nasal sampling line, plus O_2	Pediatric
MVPOL	040-006177-00	Disposable nasal sampling line, long, plus O_2	Pediatric

F.5 Therapy Accessories

Model	Part No.	Description	Applicable Patient
MR6601	125-000130-00	Reusable external paddles (for hospital)	Adult, Pediatric
MR6501	115-018366-00	Reusable internal paddles, 1 inch without button	Neonate
	125-000166-00	Reusable internal paddles, 1 inch with button	
MR6502	115-018367-00	Reusable internal paddles, 2 inches without button	Pediatric
	125-000167-00	Reusable internal paddles, 2 inches with button	

Model	Part No.	Description	Applicable Patient
MR6503	115-018368-00	Reusable internal paddles, 3 inches without button	Adult
	125-000168-00	Reusable internal paddles, 3 inches with button	
MR60	0651-30-77007	Disposable multifunction electrode pads, 5 sets/ package	Adult
MR61	0651-30-77008	Disposable multifunction electrode pads, 5 sets/ package	Pediatric
MR62	115-035426-00	Disposable multifunction electrode pads, 5 sets/ package	Adult
MR63	115-035427-00	Disposable multifunction electrode pads, 5 sets/ package	Pediatric
MR6701	115-006578-00	Reusable pads cable with 50Ω test load	Adult, Pediatric
15-25	0000-10-10775	Reusable electrode gel	Adult, Pediatric
MR6311	125-000255-00	Reusable carrying case	All

F.6 Other Accessories

Part No.	Description
115-084255-00	Simple mounting
0010-30-12471	DC/AC inverter
115-084253-00	Transport dock
0651-20-77122	Analog output cable
0651-20-77046	Synchronous defibrillation input cable
115-067930-00	Wi-Fi to 4G router kit
115-084254-00	Charger station
115-039575-00	Barcode reader
A30-000001---	Recorder paper, 50 mm×20 m
022-000550-00	Rechargeable lithium-ion battery
040-000413-00	Test load