BeneHeart DX/BeneHeart DM

Defibrillator/Monitor

White Paper

CE 2797

C 2022 S M d a B. -M d ca E c. c C., L d. A d.

R a : J: 2022

R L . : 1.0

Intellectual Property Statement

SHENZHEN MINDRAY BIO-MEDICAL ELECTRONICS CO., LTD. (

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R

mindray and BeneHeart

Responsibility on the Manufacturer Party

M

- a
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- t

WARNING

- **This equipment must be operated by persons who have been trained in its operation. The operator should be trained in basic life support, advanced cardiac life support or other emergency medical response.**
- **It is important for the hospital or organization that employs this equipment to carry out a reasonable service/maintenance plan. Neglect of this may result in machine breakdown or personal injury.**

Warranty

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Exemptions

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T a a a . d .

- Ma ç. . da a ca: db . . a- ad a .
- Ma ç. . da a ca: db ab . . - a . .
- Ma ç. . da a ca: db . c a c a a d a a .
- Ma ç. . da a ca: db . . a . . a b a d. a: . d u c . .
- Ma ç. . . a b a . a b b .
- O . ca: db .

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S: a . Sa a dC ca
P . a c (SSCP):

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Preface

Manual Purpose

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T, a, : a ba d. , , , a : c , : , . , a, d , . . c , , , a , . , a , . : . d: ç . l . : , , a, : , . , , a c , , aç : .

T, a, : a a, , a a , . , . d: ç . l , . : d a a b , c. , . , , : , , . , , , , a , ca, b . b , a, d c , u , , , , , , d d.

Intended Audience

T, a, : a a d . c , ca . . , a , , a , ç d , . , , a , . , , . , d . d ca . c d: , , ac , c a, d , , . . a : d . . , , . , . c , ca , , , .

Illustrations

A : , , . , , , , a, : a u a , a . , .T, a , . , , c a ç , , : . da , a d a d. , , : , , .

Conventions

- *Italic text* : d , , a, : a , . : , , , c d a, : a , c, a , , ç . , a, d . : a .
- **Bold text** : d , . , d ca , , c , , , , a, d , a . , a d .
- → : d , . , d ca , . , , a . c d: .

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1 Safety

1.1 Safety Information

DANGER

- **Indicates an imminent hazard that, if not avoided, will result in death or serious injury.**

WARNING

- **Indicates a potential hazard or unsafe practice that, if not avoided, could result in death or serious injury.**

CAUTION

- **Indicates a potential hazard or unsafe practice that, if not avoided, could result in minor personal injury or product/property damage.**

NOTE

- **Provides application tips or other useful information to ensure that you get the most from your product.**

1.1.1 Dangers

DANGER

- **The equipment delivers up to 360 J of electrical energy. Unless properly used by following the prompts provided by the equipment, this electrical energy may cause serious injury or death. Do not attempt to operate this equipment unless thoroughly familiar with the operations and functions of all controls, indicators, connectors, and accessories.**
- **To avoid explosion hazard, do not use the equipment in the presence of oxygen-rich atmospheres, flammable anesthetics, or other flammable agents (such as gasoline). Keep the equipment and the operating environment dry and clean.**
- **Defibrillation current can cause operator or bystander severe injury or even death. Keep distance from the patient or metal devices connected to the patient during defibrillation.**

1.1.2 Warnings

WARNING

- **Only use parts and accessories specified in this manual. Follow the instructions for use and adhere to all warnings and cautions.**
- **This equipment is used for single patient at a time.**
- **The equipment is not intended to be used within the Magnetic Resonance (MR) environment.**
- **Do not disassemble the equipment. It contains no operator serviceable components and dangerous high voltages may be present. Contact authorized service personnel for repair.**
- **Before connecting the equipment to the external power supply, check that the voltage and frequency ratings are the same as those indicated on the equipment's label or in this manual.**
- **Before each use, the operator must check the equipment condition to ensure that the equipment is ready for operation.**

- **To avoid risk of electric shock, the equipment must only be connected to mains power with protective earth. If a protective earth conductor is not provided, operate it on battery power, if possible.**
- **Do not use the multiple portable socket outlets (MPSO) or AC mains extension cords. Insure that the sum of the individual ground leakage currents does not exceed the allowable limits.**
- **Before putting the system into operation, the operator must verify that the equipment, connecting cables and accessories are in correct working order and operating condition.**
- **Do not exclusively rely on audible alarms for patient monitoring. Adjusting alarm volume to a low level or turning off alarm sound may result in patient hazards. Customize alarm settings according to patient situations and keep patients under close surveillance.**
- **Physiological data and alarm messages provided by the equipment should not be used as the sole basis for diagnosis or therapy decisions. They must be used in conjunction with clinical signs and symptoms. Misinterpreting measured values or other parameters may result in patient hazards.**
- **Do not place the equipment or accessories in any position that might cause it to fall on the patient.**
- **Do not start or operate the equipment unless the setup was verified to be correct.**
- **Place and secure cables and tubings carefully to prevent from stumbling, entanglement and patient strangulation.**
- **The software equipment copyright is solely owned by Mindray. No organization or individual shall resort to modifying, copying, or exchanging it or to any other infringement on it in any form or by any means without due permission.**
- **Disconnect the non defibrillation-proof devices from the patient during defibrillation.**
- **Make sure the synchronous input system is applied to this equipment and the input signal is correct if necessary.**
- **Do not defibrillate a patient who lies on the wet or metal ground.**
- **Do not perform any functional check if the equipment is connected with a patient. Otherwise the**

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2 Equipment Overview

2.1 Intended Use

2.1.1 Intended Purpose Statement

2.1.2 Indication for Use

-

2.1.3 Intended Users

2.1.4 Intended Patient Population

- AED
-
-
-

2.1.5 Intended Medical Conditions

2.1.6 Contra-indications

- AED

  T AED d c a dca d a a a :

  C c. :

  B a

  D ab : c

- Ma : a D b a .

  Ma : a d b a . c a dca d a a a . a . :

  C c. :

  B a

  D ab : c

2.1.7 Side-effects

N .

WARNING

- **According to the conclusion of clinical evaluation and residual risk evaluation, for the intended patients, there is no known side effects that can occur during or after the use of the medical device. And there is no need for the operator to make extra preparations. Thus, no residual risk associated with using the medical device should be disclosed.**

2.2 Applied Parts

T a d a : a :

- ECG c . d a d ad
- S O_2 .
- NIBP c
- T . b
- IBP/ICP a d c
- CO_2 a / a a a ca : a a d a a ada
- M : c . c . d ad
- E a d b a . add
- I a d b a . add
- CPR .

WARNING

- **When the equipment is placed at a an ambient temperate above 55°C, the surface temperature of applied parts should be limit to below 58°C.**

3 Equipment Preparation

3.1 Equipment Preparation Safety Information

WARNING

- **Use only installation accessories specified by Mindray.**
- **Connect only approved devices to this equipment. Devices connected to the equipment must meet the requirements of the applicable IEC standards (e.g. IEC 60950 safety standards for information technology equipment and IEC 60601-1 safety standards for medical electrical equipment). The system configuration must meet the requirements of the IEC 60601-1 medical electrical systems standard. Any personnel who connect devices to the equipment's signal input/output port are responsible for providing evidence that the safety certification of the devices has been performed in accordance to the IEC 60601-1. If you have any questions, please contact Mindray.**
- **The equipment and accessories connected to the equipment are suitable for use within the patient environment. For other devices and accessories connected to the equipment, consult corresponding manufacturers for the suitability within the patient environment.**
- **If it is not evident from the equipment specifications whether a particular combination with other devices is hazardous, for example, due to summation of leakage currents, please consult the manufacturer or an expert in the field. A determination must be made that the proposed combination will not negatively affect the devices themselves or the patient's safety.**

CAUTION

- **The equipment should be installed by authorized Mindray personnel.**
- **When disposing of the packaging material, be sure to observe the applicable waste control regulations and keep it out of children's reach.**
- **Before use, verify whether the packages are intact, especially the packages of single use accessories. In case of any damage, do not apply it to patients.**
- **Make sure that the equipment operating environment meets the specific requirements. Otherwise unexpected consequences, e.g. damage to the equipment, could result.**

NOTE

- **Put the equipment in a location where you can easily view and operate the equipment.**
- **Save the packing case and packaging material as they can be used if the equipment must be reshipped.**

3.2 Connecting the Power Supply

WARNING

- **Always use the accompanying power cord delivered with the equipment.**
- **Before connecting the equipment to the power supply, check that the voltage and frequency ratings are the same as those indicated beside the power input of the equipment.**
- **Use the battery if the integrity of the protective earth conductor or the protective earthing system in the installation is in doubt.**

WARNING

3.7 Turning Off the Equipment

CAUTION

- **Press and hold the power switch for 10s to forcibly shut down the equipment if it could not be shut down normally. This may cause loss of patient data.**

NOTE

- **To prevent the changes from losing in case of sudden power failure, the equipment saves the settings in real time. In case of a temporary power failure, if the power is restored within 60s, the equipment will resume with all active settings unchanged; if the power is interrupted for more than 120s, the equipment behaves the same as it is normally turned off; if the power is restored within 60s to 120s, the equipment will resume with all active settings unchanged, or behaves the same as it is normally turned off.**

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4 Therapy Preparation

4.1 Checking the Patient Contact Indicator

NOTE

- **It is recommended to perform the defibrillation on a patient when the patient contact indicator illuminates in green. If the patient contact indicator illuminates in orange, it also can be used for the defibrillation. However, the expected effects may not be achieved in this condition.**

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5 AED

5.1 AED Safety Information

DANGER

- **Defibrillation current can cause operator or bystander severe injury or even death. Do not touch the patient or any metal objects (including bed or gurney) connected to the patient during defibrillation.**
- **Avoid contact between parts of the patient's body such as exposed skin of head or limbs, conductive fluids such as gel, blood, or saline, and metal objects such as a bed frame or a stretcher which may provide unwanted pathways for the defibrillating current.**
- **During defibrillation, do not allow electrode pads to contact each other or to contact with ECG electrodes, lead wires, dressings, etc. Contact with metal objects may divert current away from the heart, which result in electrical arcing and patient skin burns.**

WARNING

- **Motion artifact may delay analysis or affect the ECG signal resulting in an inappropriate shock or no shock advised message. Do not touch the patient during ECG rhythm analysis or charging in the AED mode.**
- **Air pockets between the patient skin and electrode pads can cause electrical arcing and patient skin burns during defibrillation. To avoid poor adherence and air pockets, make sure electrode pads are completely adhered to the patient skin.**
- **Do not use dried-out electrode pads.**

CAUTION

- **Improper handling of electrode pads during storage or before use can damage the electrode pads. Discard the electrode pads if they become damaged.**
- **For patients with implantable pacemaker, the sensitivity and specificity of AED algorithm may be impaired.**

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 equipment 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 equipment performance.**

5.2 AED Procedure

NOTE

- **Anterior - lateral placement for adult patients, and anterior-posterior placement for pediatric patients are recommended placements for defibrillation with electrode pads.**
- **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 Patient Category to Ped.**
- **The Shock button must be pressed to deliver a shock. The equipment will not automatically deliver a shock.**
- **Impedance is the resistance found between electrode pads or external paddles. To deliver an effective discharge of energy, the impedance must be overcome. The degree of impedance varies with the patient. It is affected by other factors, such as the presence of chest hair, moisture, and lotions or powders on the patient skin. If the "Impedance too high. Shock not delivered" message appears, make sure that the patient's skin has been dried and that any chest hair has been clipped. If the message persists, replace the electrode pads or the pads cable with a new one.**

6 Manual Defibrillation

6.1 Manual Defibrillation Safety Information

DANGER

- **Defibrillation current can cause operator or bystander severe injury or even death. Do not touch the patient or any metal objects (including bed or gurney) connected to the patient during defibrillation.**
- **Avoid contact between parts of the patient's body such as exposed skin of head or limbs, conductive fluids such as gel, blood, or saline, and metal objects such as a bed frame or a stretcher which may provide unwanted pathways for the defibrillating current.**
- **During defibrillation, do not allow electrode pads and paddles to contact each other or to contact with ECG electrodes, lead wires, dressings, etc. Contact with metal objects may divert current away from the heart, which result in electrical arcing and patient skin burns.**
- **During manual defibrillation, make sure your hands are dry and free from conductive gel to avoid shock hazard.**

WARNING

- **During synchronized cardioversion, if monitoring patient's ECG through external paddles, artifact introduced by paddle movement may resemble an R-wave and trigger a defibrillation shock.**
- **Do not use conductive liquid. Use only conductive gel specified by the equipment manufacturer.**
- **If external paddles are used for defibrillation, apply the external paddles tightly and evenly to the patient's chest to ensure good skin contact.**
- **Clinicians must select an appropriate energy level for defibrillation of pediatric patients.**

CAUTION

- **Accessing the Manual Defib mode can be configured as password protected. Make sure you know and remember the password. Otherwise the manual defibrillation therapy cannot be delivered.**
- **Clear the conductive gel from the external paddles at the completion of the therapy to prevent the paddles from being corroded.**
- **Prior to using the equipment, disconnect the patient from all equipment that is not defibrillation-protected.**
- **Never charge and deliver shock frequently in non-clinical situations. Otherwise equipment damage could occur.**

NOTE

- **Impedance is the resistance found between electrode pads orexternal paddles. To deliver an effective discharge of energy, the impedance must be overcome. The degree of impedance varies with the patient. It is also affected by other factors, such as the presence of chest hair, moisture, and lotions or powders on the patient skin. If the "Impedance Too High, Shock Not Delivered" message appears, make sure that the patient's skin has been dried and that any chest hair has been clipped. If the message persists, replace the electrode pads or the pads cable with a new one.**
- **Alarms are switched off automatically and the "Alarm Off" message is displayed when the equipment enters the asynchronous defibrillation mode. Alarms remain off until toggled on by pressing the Alarm Pause button, the Sync mode, the Monitor mode or Pacer mode is entered.**
- **Defibrillation is always performed through paddles or electrode pads. However, you can also use**

6.4.1 Synchronized Cardioversion Procedure

NOTE

- **During synchronized cardioversion, the shock will be delivered when the equipment detects the next R-wave. If electrode electrodes or internal paddles without button are used, you should press and hold the Shock button on the equipment until the shock is delivered. If external paddles are used, you should press and hold the Shock buttons on both the external paddles until the shock is delivered. If internal paddles with a button are used, you should press and hold the Shock buttonan**

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7 CPR Assistance

7.1 CPR Assistance Safety Information

WARNING

- **Perform CPR on a patient on firm ground if possible. When you perform CPR on a patient lying on a mattress, a backboard must be used to limit the amount of compressed depth which is absorbed by the mattress. Depending on characteristics of the mattress, backboard and patient, the compensation depth does not guarantee that the patient chest is compressed by 50 mm.**
- **When the patient is breathing with high frequency or in the treatment of high-frequency ventilation, the CPR assistance disturbed by the thoracic movements may provide inaccurate feedback. You should count compressions by yourself and not rely on the compression rate provided by the CPR assistance in such conditions.**
- **The CPR assistance is not intended for use in a moving environment, such as an ambulance. If used during patient transport, the CPR assistance may provide inaccurate feedback. If CPR is indicated in a moving environment, do not rely on feedback provided by the CPR assistance in such conditions.**

NOTE

- **The CPR sensor is not available in the markets of UK, Germany and France.**

7.2 CPR Metronome

WARNING

- **The CPR metronome sounds do not indicate information regarding the patient's condition. Because**

7.3 CPR Feedbacks

NOTE

- When the interruption time exceeds five minutes, a CPR event is automatically generated.

7.4 CPR Quality (CQI) Monitoring

WARNING

- CQI monitoring is not intended for pediatric and neonatal patients.
- CQI results should not be used as the sole basis for diagnosis or therapy decisions. It is not intended to replace the competent judgment of a clinician. CQI monitoring must be used in conjunction with the patient's medical history, the cause of heart attack, as well as the clinical judgment.

NOTE

- A license is required for CQI monitoring.

CAUTION

- Use recommended SpO_2 sensor and apply it to a proper site.
- Avoid moving the measurement site.
- Apply the SpO_2 sensor properly. If the SpO_2 sensor is improperly applied or a wrong SpO2 sensor is used, erroneous CQI could result. For more information, see14.3 SpO_2 Display.

8 Noninvasive Pacing

8.1 Pacing Safety Information

WARNING

- **Heart rate and related alarms may be unreliable during pacing, you should always keep the patient under close survillance. The indicated heart rate or related alarms cannot be used as the sole basis for the patient's perfusion status.**
- **Monitoring ECG alone is sometimes not enough to verify that the patient's heart is providing cardiac output. The patient's response to pacing shall be verified by signs of improved cardiac output, such as a palpable pulse rate the same as the rate which pace pulses are being delivered, a rise in blood pressure, or improved skin color.**
- **To avoid a possible shock hazard, be careful to apply the electrode pads on the patient during pacing.**
- **If you are using the pacing function with battery power and the alarm "Low Battery" is presented, connect the equipment to external power supply or install a fully charged battery.**

CAUTION

- **Accessing the Pacer mode can be configured as password protected. Make sure you know and remember the password. Otherwise the pacing therapy cannot be delivered.**
- **For treatment of the patient with an implanted devices, such as permanent pacemaker or cardioverter-defibrillator, consult a physician and the instructions for use delivered with the device.**
- **Prolonged noninvasive pacing may cause patient skin irritation and burns. Periodically inspect the underlying skin and change ECG electrodes and electrode pads.**

NOTE

- **If pacing is interrupted for any reason, you must select Start Pacing to resume pacing.**
- **In the Pacer mode, you cannot change the patient's internal paced status from the ECG Setup menu.**
- **In the case that electrode pads poorly contact the patient, the alarm "Pacer Stopped Abnormally" and "Pads Off" may be presented.**
- **Electrode pads are not an available choice for the source of ECG waveform in the Pacer mode.**
- **In the Pacer mode, arrhythmia analysis is supported and available arrhythmia alarms are asystole, ventricular vibrillation and ventricular tachycardia.**
- **The monitoring or pacing function may be unstable in the presence of ESU or other electronic devices.**

8.2 Choosing the Pacer Mode Setting

NOTE

- **Use the demand mode pacing whenever possible. Only use the fixed mode pacing when there are interferes causing R-wave unreliable or no available ECG electrodes.**

8.2.1 Demand Mode Pacing Procedure

CAUTION

- **Routinely assess the patient's cardiac output.**

NOTE

- **Pacing will not start if there is a problem with the pads cable connection, pad patient connection, or ECG monitoring electrodes connection. If any situation occurs, a message will appear in the pacer information area to alert you that a lead is disconnected or that the electrode pads have a poor connection.**

8.2.2 Fixed Mode Pacing Procedure

NOTE

- **For fixed mode pacing, R-wave markers do not appear on the paced beats.**

9 Monitoring Preparation

9.1 Networked Monitoring with BeneVision N1 Monitor

WARNING

- **Do not discharge a patient on the N1 monitor before data is completely transferred.**
- **Removing the N1 monitor when transferring data will cause patient data incomplete.**

9.2 Defining the Monitoring Display

9.2.1 Setting the Switch for a Parameter

NOTE

- **When a parameter is manually switched off, you cannot monitor this parameter even if related accessories are connected.**

9.2.2 Defining the Normal Screen Display

NOTE

- **ECG waveform and numerics are always displayed on the first line of the parameter waveform area and numeric area.**

9.3 Freezing Waveforms

NOTE

- **You can view the frozen waveforms of up to 120 seconds.**

9.4 Camera Shooting

WARNING

- **Do not look straight at the camera backlight.**
- **The camera is used for taking photos for the patient rescue, pay attention for the patient privacy.**

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10 Alarms

10.1 Alarm Introduction

NOTE

- **When multiple alarms of different priority levels occur simultaneously, the equipment selects the alarm of the highest priority to light the alarm lamp and issue the alarm tone.**
- **When multiple alarms of different priority levels occur simultaneously and should be displayed in the same area, the equipment only displays the messages of the highest priority alarm.**
- **When multiple physiological alarms of different priority levels occur simultaneously and should be displayed in the same area, the equipment displays the high priority alarm, while the medium and low priority alarms are displayed circularly.**

10.2.1 Setting Alarm Tone Properties

NOTE

- **When the alarm volume is set to 0, the alarm sound is turned off and the audio off symbol is displayed in the alarm status area.**
- **You cannot set the volume of high priority alarms if Alarm Volume is set to 0.**

10.2.2 Setting the Switch of SpO_2 Desat Alarm Off

WARNING

- **If you switch off the SpO2 Desat alarm, the equipment will not alarm when the patient's SpO_2 is extremely low. This may result in a hazard to the patient. Always keep the patient under close surveillance.**

10.2.3 Setting the Switch of Apnea Alarm Off

WARNING

- **If you switch off the apnea alarm, the equipment will not issue the apnea alarm in case that apnea happens. This may result in a hazard to the patient. Keep the patient under close surveillance.**

10.3 Pausing Alarms

10.3.1 Defining the Alarm Pause Function

WARNING

- **Pausing alarms may result in a hazard to the patient.**

10.3.2 Password Protected Alarm Pause Settings

NOTE

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

10.4 Switching Off All Alarms

WARNING

- **Switching off alarms may result in a hazard to the patient.**

10.5 Pausing Alarm Sounds

WARNING

- **Pausing alarm sounds may result in a hazard to the patient.**

10.6 Switching Off Alarm Sounds

WARNING

- **Switching off alarm sounds may result in a hazard to the patient.**

10.7 Resetting Alarms

NOTE

- **If a new alarm is triggered after the alarm system is reset, the alarm reset symbol will disappear, indications of the alarm lamp, alarm tone and alarm messages will be reactivated.**

10.8 Latching Alarms

NOTE

- **Changing alarm priority may affect the latching status of corresponding alarm. Determine if you need to reset the alarm latching status if you changed the alarm priority.**
- **When the alarm system is reset, latched physiological alarms are cleared.**

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11 Monitoring ECG

11.1 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.**

11.2 ECG Display

NOTE

- **The ECG numeric area and waveform area are configured to be different for different lead type and ECG settings.**

11.3 Preparing for ECG Monitoring

NOTE

- **The external paddles are not recommended for ECG monitoring.**

11.3.1 Preparing the Patient for Electrode Application

CAUTION

- **Proper skin preparation is necessary for good signal quality at the electrode site, as the skin is a poor conductor of electricity.**

11.3.2 Applying ECG Electrodes

NOTE

- **Store the electrodes at room temperature.**
- **Only open the electrode package immediately prior to use.**
- **Never mix patient electrode types or brands. This may lead to problem due to impedance mismatch.**
- **When applying the electrodes, avoid bony area, obvious layers of fat, and major muscles. Muscle movement can result in electrical interference. Applying electrodes on major muscles, for example on muscles of the thorax, may lead to erroneous arrhythmia alarms due to excessive muscle movement.**

11.3.3 Electrode Color Coding

NOTE

- **For the 5-lead electrode placement, place the precordial electrode according to the physician's preference.**

WARNING

- **To reduce the hazard of burns during use of electrosurgical units (ESU), the ECG electrodes should not be located between the surgical site and the ESU return electrode.**
- **Never entangle the ESU cable and the ECG cable together.**
- **If the ESU is used, do not place ECG electrodes near the grounding plate of the ESU. Otherwise interference on ECG signals may occur.**

11.3.4 Checking Paced Status

WARNING

- **When monitoring a patient implanted with a pacemaker, be sure to select correct paced status. Otherwise, the pace pulses may be counted in the case of cardiac arrest or some arrhythmias. Do not completely rely on the heart rate reading or the heart rate alarms. Always keep paced patients under close surveillance.**
- **For paced patients, set Paced to Yes. Otherwise the monitor could mistake a pace pulse for a QRS complex and fail to generate alarm when the ECG signal is too weak. On ventricular paced patients, episodes of ventricular tachycardia may not always be detected.Do not rely entirely upon the system's automated arrhythmia detection algorithm.**
- **False low heart rate or false asystole alarms may result with certain pacemakers because of pacemaker artifacts, such as electrical overshoot of the pacemaker overlapping the true QRS complexes.**
- **Do not rely entirely on heart rate meter alarms when monitoring patients with pacemakers. Always keep these patients under close surveillance.**
- **For non-paced patients, you must set Paced to No.**

11.3.5 Setting the Switch of Pacer Rejection

NOTE

- **When pace pulses are detected, the pace pulse marks "|" are shown on the ECG waveforms. Pacer Rejection setting has no impact on the display of pace pulse marks "|".**
- **You can switch on pacer rejection only when Paced is set to Yes. If Paced is set to no, the setting of Pacer Reject is disabled.**

11.4 Changing ECG Settings

11.4.1 Setting the Analysis Mode

NOTE

- **It is difficult for the equipment to differentiate an aberrantly conducted beat from a ventricular beat. An aberrantly conducted beat may be misclassified as a ventricular beat. In this case, choose**

CAUTION

- **Since the arrhythmia detection algorithm sensitivity and specificity are less than 100%, sometimes there may be some false arrhythmias detected and also some true arrhythmia events may not be detected. This is especially true when the signal is noisy.**
- **The ECG size and minimum QRS detection threshold settings affect arrhythmia detection and heart rate calculation sensitivity.**
- **If QRS amplitude is low, the equipment might not be able to calculate heart rate and false asystole calls may occur.**
- **During the learning phase of the algorithm, arrhythmia detection may not be available. So you should closely monitor patient condition during and for several minutes after the learning phase to allow the algorithm to reach optimal detection performance.**

11.5.2 Changing Arrhythmia Settings

11.5.2.1 Changing Arrhythmia Alarm Settings

11.5.2.5 Setting Arrhythmia Refractory Periods

NOTE

- **Refractory periods are only applicable to arrhythmias in the medium priority chains.**
- **Refractory periods have no impact on Tachy, Brady, HR High, HR Low, A-Fib/A-Fib End, Irr Rhythm/Irr Rhythm End.**

11.6 ST Segment Monitoring

11.6.1 ST Safety Information

WARNING

- **ST values may be affected by such factors as some drugs or metabolic and conduction disturbances.**
- **ST deviation is often calculated at a fixed offset from the J point. Changes in heart rate may affect ST.**
- **The ST deviation measurement algorithm has been tested for accuracy. The significance of ST segment changes needs to be determined by a physician.**
- **The equipment provides ST deviation level change information. The clinical significance of the ST**

11.9 ECG Troubleshooting

NOTE

- **For the physiological and technical alarm messages, see *D Alarm Messages*.**

12 Resting 12-Lead ECG Analysis

12.1 Resting 12-Lead ECG Analysis Introduction

WARNING

- **Resting 12-lead ECG analysis provided by this equipment is not intended for direct cardiac application.**

12.2 Changing 12-Lead ECG Settings

NOTE

- **For patients under 16 years old, it is recommended to V3 Placement to V4R and place chest electrodes at V4R, V1, V2, V4, V5, V6. This is a normal practice for a patient of this age.**

12.3 Initiating 12-Lead ECG Measurement

NOTE

- **Check that patient information is correct before initiating 12-lead ECG auto measurement.**

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13 Monitoring Respiration (Resp)

13.1 Resp Safety Information

WARNING

- **When monitoring the patient's respiration, do not use ESU-proof ECG cables.**
- **If you do not set the detection level for the respiration correctly in manual detection mode, it may not be possible for the equipment to detect apnea. If you set the detection level too low, the equipment is more likely to detect cardiac activity, and to falsely interpret cardiac activity as respiratory activity in the case of apnea.**
- **The respiration measurement does not recognize the cause of apneas. It only indicates an alarm if no breath is detected when a pre-adjusted time has elapsed since the last detected breath. Therefore, it cannot be used for diagnostic purpose.**
- **If operating under conditions according to the EMC Standard IEC 60601-1-2 (Radiated Immunity 3V/m), field strengths above 3V/m may cause erroneous measurements at various frequencies. Therefore, it is recommended to avoid the use of electrically radiating equipment in close proximity to the respiration measurement unit.**
- **The impedance respiration measurement may cause rate changes in Minute Ventilation Rate Responsive Pacemakers. Set the pacemaker rate responsive mode off or disable the impedance respiration measurement on the equipment.**
- **When using the electrosurgery unit, ensure proper contact of the ESU return electrode to the patient to avoid burns at measurement sites. Also ensure that the ESU return electrode is near the operating area.**

CAUTION

- **Respiration monitoring is not for use on the patients who are very active, as this will cause false alarms.**

13.2 Resp Display

NOTE

- **If ESU-proof ECG cables are used, the Resp waveform area will display the message "Check Leads". Replace the ECG cable if necessary.**

13.3 Preparing for Resp Monitoring

13.3.1 Placing the Electrodes

CAUTION

- **To reduce cardiovascular artifact, apply the respiration electrodes so that the liver area and the ventricles of the heart are not in the line between the respiratory electrodes. This is especially important for neonatal patients.**
- **To optimize the respiration waveform, place the RA and LA electrodes horizontally when monitoring respiration with ECG Lead I; place the RA and LL electrodes diagonally when monitoring respiration with ECG Lead II.**
- **To optimize respiratory waveforms for patients breathing mainly abdominally, apply the LL electrode on the left abdomen at the point of maximum abdominal expansion.**

- **For patients expand chests laterally (normally neonatal patients), to avoid negative intrathoracic pressure and optimize respiratory waveforms, respectively apply the electrodes in the right midaxillary and the left lateral chest areas at the maximum point of the breathing movement.**
- **Periodically inspect the electrode application site to ensure skin quality. If the skin quality changes, replace the electrodes or change the application site.**

NOTE

- **Store the electrodes at room temperature. Open the electrode package immediately prior to use.**
- **Check that the electrode packages are intact and not expired. Make sure the electrode gel is moist.**

13.4 Changing Resp Settings

NOTE

- **You can switch off the apnea alarm only when Apnea Alarm Off is enabled. For more information, see *10.2.3 Setting the Switch of Apnea Alarm Off*.**

14 Monitoring Pulse Oxygen Saturation (SpO_2)

14.1 SpO_2 Introduction

NOTE

- **The SpO_2 extension cable should be compatible with the SpO_2 connectors. For example, you can only the Mindray SpO_2 extension cable to the Mindray SpO_2 connectors.**
-

CAUTION

- **Change the application site or replace the sensor and/or patient cable when a persistent "SpO2 Low Signal Quality" message is displayed on the equipment. These messages may indicate that patient monitoring time is exhausted on the patient cable or sensor.**
- **Replace the cable or sensor when a "SpO2 Sensor Off", "SpO2 No Sensor", or "SpO2 Low Signal Quality" message is consistently displayed while monitoring consecutive patients after completing troubleshooting steps listed in this manual.**
- **Variation in measurements may be profound and may be affected by sampling technique as well as the patient's physiological conditions. Any results exhibiting inconsistency with the patient's clinical status should be repeated and/or supplemented with additional test data. Blood samples should be analyzed by laboratory instruments prior to clinical decision making to completely understand the patient's condition.**
- **Do not place the pulse oximeter where the controls can be changed by the patient.**
- **If using pulse oximetry during full body irradiation, keep the sensor out of the radiation field. If the sensor is exposed to the radiation, the reading might be inaccurate or the device might read zero for the duration of the active irradiation period.**

NOTE

- **Additional information specific to the Masimo sensors compatible with the equipment, including information about parameter/measurement performance during motion and low perfusion, may be found in the sensor's directions for use (DFU).**
- **Masimo cables and sensors are provided with X-Cal™ technology to minimize the risk of inaccurate readings and unanticipated loss of patient monitoring. Refer to the Cable or Sensor DFU for the specified duration of the patient monitoring time.**

14.3 SpO_2 Display

NOTE

- **PI is only available for Mindray SpO_2 and Masimo SpO_2.**

14.4 Preparing for SpO_2 Monitoring

CAUTION

- **Select proper SpO2 sensor according to application site. Applying sensor too tight may severely obstruct circulation and lead inaccurate measurements. Loose application may result in measurement site exposing to ambient light.**
- **Avoid placing the SpO_2 sensor on the same extremity with an NIBP cuff, arterial catheter, or intravascular line.**
- **When monitoring SpO_2 at high ambient temperature, to avoid burns at the application site that is not well perfused, pay attention to prolonged SpO_2 sensor application.**

14.5 Changing SpO_2 Settings

14.5.1 Changing the SpO_2 Alarm Properties

NOTE

- **You can switch off the SpO2 Desat alarm only when SpO2 Desat Alarm Off is enabled. For more information, see section *10.2.2 Setting the Switch of SpO_2 Desat Alarm Off*.**

14.5.2 Nellcor Sat-Seconds Alarm Management

NOTE

- **The SpO_2 Too Low or SpO_2 Too High alarm is presented in the case that SpO_2 value violates the alarm limits for 3 times within one minute even if the setting of Sat-Seconds is not reached.**

14.5.3 Setting SpO_2 Sensitivity (for Masimo SpO_2)

CAUTION

- **When using the Maximum Sensitivity setting, performance of "Sensor Off" detection may be compromised. If the equipment and the sensor becomes detached from the patient, the potential for false readings may occur due to environmental noise such as light, and vibration.**

14.6 SpO_2 Troubleshooting

NOTE

- **For the physiological and technical alarm messages, see *D Alarm Messages*.**

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15 Monitoring Noninvasive Blood Pressure (NIBP)

15.1 NIBP Introduction

NOTE

- **Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultatory method or an intra-arterial blood pressure measurement device, within the limits prescribed by the American National Standard: manual, electronic, or automated sphygmomanometers.**
- **NIBP measurement can be performed during electro-surgery and discharge of defibrillator.**

15.2 NIBP Safety Information

WARNING

- **Be sure to select the correct patient category setting for your patient before NIBP measurement. Do not apply the higher adult settings for pediatric or neonatal patients. Otherwise, it may present a safety hazard.**
- **Do not perform NIBP measurements on patients with sickle-cell disease.**
- **To avoid further injury, do not apply the NIBP cuff on the limb with a wound.**
- **Use clinical judgment to determine whether to perform frequent unattended blood pressure measurements on patients with severe blood clotting disorders because of the risk of hematoma in the limb fitted with the cuff.**
- **To avoid the risk of patient injury, do not apply the NIBP cuff on a limb that has an intravenous infusion or catheter in place. Apply the cuff on another limb if possible.**
- **Do not apply cuff on the arm on the side of a mastectomy or lymph node clearance.**
- **Continuous cuff pressure due to connection tubing kinking may cause blood flow interference, and resulting in harmful injury to the patient.**
- **NIBP reading can be affected by the measurement site, the position of the patient, exercise, or the patient's physiologic condition. If you doubt the NIBP measurements, determine the patient's vital signs by alternative means, and then verify that the monitor is working correctly.**
- **Taking NIBP measurements exert pressure on the patient's tissue. This can cause skin purpura, ischemia, and neuropathy. Periodically check the cuff site and the limb distal to the cuff for normal color, warmth and sensitivity. If there is a sign of skin change or poor distal circulation, move the cuff to another limb or stop NIBP measurements. Check more frequently when using the STAT mode or using the auto mode at short intervals. Auto NIBP measurements with one and two minute intervals are not recommended for extended periods of time.**
- **NIBP diagnostic significance must be decided by the physician.**

CAUTION

- **Using IABP may cause NIBP, including PR, measurements inaccurate or failed.**
- **Accuracy of NIBP measurement depends on using a cuff of proper size. It is essential to measure limb circumference and choose a cuff with proper size.**

15.3 NIBP Measurement Limitations

NOTE

- **The effectiveness of the sphygmomanometer has not been established in pregnant, including pre-eclamptic patients.**

15.4 NIBP Display

NOTE

- **If NIBP measurement fails, "XX" is displayed; if NIBP measurement is not taken, "--" is displayed.**
- **Outlined NIBP numerics indicate that the measurement exceeds the NIBP timeout. So these NIBP values are not recommended for reference. The setting of NIBP timeout can be changed in the Configuration mode only. For more information, see *24.7.4.8 NIBP Setup Tab*.**

15.5 Preparing for NIBP Measurements

15.5.1 Preparing the Patient for NIBP Measurements

NOTE

- **It is recommended that the patient calms down and relaxes as much as possible before performing the measurement and that the patient do not talk during the measurement.**
- **It is recommended to have the patient sit quietly for several minutes before taking the measurement.**
- **Other factors that have been shown to result in an overestimation of blood pressure are labored breathing, full bladder, pain etc.**

15.5.2 Placing the NIBP Cuff

CAUTION

- **Using a cuff of wrong size, or a cuff with twisted bladder and kinked air tubing, can cause inaccurate measurements.**
- **Do not touch or apply external pressure against the cuff and air tubing during NIBP measurement. This may cause inaccurate blood pressure values.**
- **Use care when placing the cuff on an extremity used for monitoring other patient parameters.**

15.6 Changing NIBP Settings

NOTE

- **For known hypertensive patients, you need to set initial cuff pressure to a higher value to reduce the measurement time.**

16 Monitoring Temperature (Temp)

16.1 Temperature Troubleshooting

NOTE

- **For the physiological and technical alarm messages, see *D Alarm Messages*.**

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17 Monitoring Invasive Blood Pressure (IBP)

17.1 IBP Safety Information

WARNING

- **Use only pressure transducers specified in this manual. Never reuse disposable pressure transducers.**
- **Make sure that the applied parts never contact other conductive parts.**
- **To reduce the hazard of burns during high-frequency surgical procedure, ensure that the equipment's cables and transducers never come into contact with the high-frequency surgical units.**
- **When using accessories, their operating temperature should be taken into consideration. For more information, see instructions for use of accessories.**
- **All invasive procedures involve risks to the patient. Use aseptic technique. Follow catheter manufacturer's instructions.**
- **Mechanical shock to the invasive blood pressure transducer may cause severe shifts in zero balance and calibration, and cause erroneous readings.**

CAUTION

- **Using IABP may cause IBP, including PR, measurements inaccurate or failed.**

17.1.1 Measuring an IBP

CAUTION

- **Make sure that all the transducers are zeroed correctly before the IBP measurement.**
- **Make sure that no air bubble exists in the IBP transducer system before the IBP measurement.**
- **If measuring intracranial pressure (ICP) with a sitting patient, level the transducer with the top of the patient's ear. Incorrect leveling may give incorrect values (not applicable if measuring ICP with the Codman ICP transducer).**

17.2 Measuring ICP Using the Codman ICP Transducer

CAUTION

- **If equipment of different brands are used to zero the Codman ICP transducer, the zero reference values can be different. Use a Mindray equipment to Zero the Codman ICP transducer if you will take ICP measurement using a Mindray equipment. Otherwise the ICP measurement can be inaccurate.**

17.3 IBP Display

NOTE

- **For some pressures, only the mean pressure is displayed in numeric area. Measurement units for different pressures may be different. If the Art and ICP pressures are measured simultaneously, CPP value is displayed in the ICP numeric area, which is obtained by subtracting ICP from the Art mean.**

17.4 Changing IBP Settings

NOTE

- **It is not allowed to select the same label for different pressures.**

17.5 IBP Troubleshooting

NOTE

- **For the physiological and technical alarm messages, see *D Alarm Messages*.**

18.3 Changing CO_2 Settings

18.3.1 Setting the Gas Compensation

WARNING

- **Make sure to use the appropriate compensations. Inappropriate compensations may cause inaccurate measurement values and result in misdiagnosis.**

18.3.2 Changing Barometric Pressure

18.4 CO_2 Calibration

19 Clinical Assistive Applications

19.1 Glasgow Coma Scale (GCS)

CAUTION

- **GCS is intended as an adjunct in patient assessment and must be used in conjunction with observation of clinical signs and symptoms.**
- **GCS is not applied to patients that are sedated, muscularly relaxed, with artificial airway, drunk, or in status epilepsies.**
- **GCS is not applied to deaf people and patients having language barrier or with mental disorder.**
- **When applied to children under five years old or elder people who are slow, the GCS score might be low.**

NOTE

- **A license is required for GCS.**

19.1.1 Setting the GCS Scoring Type

NOTE

- **Manually setting Score Type has no impact on settings of Patient Category and Age in the Patient Management menu.**

19.2 Early Warning Score (EWS)

WARNING

- **EWS should not be used as the sole basis for diagnosis or therapy decisions. It is not intended to replace the competent judgment of a clinician.The EWS scores and recommended actions must be used in conjunction with observation of clinical signs and symptoms.**
- **MEWS and NEWS are not applicable to pregnant woman, COPD (Chronic Obstructive Pulmonary Disease) patients and patients under 16 years old. NEWS2 is not applicable to pregnant woman and •**

19.3 HEART Score

NOTE

- **A license is required for HEART score.**

19.4 Traumatic Brain Injury (TBI) Assessment

NOTE

- **A license is required for TBI assessment.**

20 Review

20.1 Reviewing Events

NOTE

- **A total loss of power has no impact on the events stored.**
- **Alarms are saved as events and will be maintained if the equipment is powered down. The time of equipment power down is not recorded as an event and cannot be reviewed.**
- **Earlier events will be overwritten by later ones if the capacity is reached.**

20.1.1 Viewing Event Details

CAUTION

- **Ensure that you have selected the optimal leads with the best waveform amplitude and the highest signal-to-noise ratio. Selecting the optimal leads is important for detecting beats, classifying beats, and detecting ventricular fibrillation.**

NOTE

- **The switch setting for Beat Anno. on the Events review page is relevant to that on the Full Disclosure review page.**

20.2 Reviewing Full Disclosure

NOTE

- **The more waveforms you select to be stored, the shorter waveform storage time becomes. The waveforms may not be stored for 48 hours. Please exert caution when selecting waveforms.**

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21 Printing

21.1 Loading Paper

CAUTION

- **Use only specified thermal paper. Otherwise, it may cause damage to the recorder's printhead, the recorder may be unable to print, or poor print quality may result.**
- **Never pull the recorder paper with force when a recording is in process. Otherwise, it may cause damage to the recorder.**
- **Do not leave the recorder door open unless you reload paper or remove troubles.**

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22 Discharged Patient Management

22.1 Generating Patient Data

NOTE

- **Earlier stored data will be overwritten by later ones if the equipment capacity is reached.**

22.2 Accessing the Discharged Patient Mode

WARNING

- **Patient therapy and monitoring automatically end when you access the Discharged Patient mode. The equipment automatically restarts and takes effects changes after the Discharged Patient mode.**

22.3 Exporting Patient Data

NOTE

- **Do not remove the USB drive from the equipment before data is completely exported.**

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23 Data Communication

23.1 Data Communication Safety Information

CAUTION

- **Wireless network design, deployment, debugging, and maintenance should be executed by Mindray service personnel or authorized technicians.**
- **Always deploy the wireless network according to local wireless regulations.**
- **Using 5 GHz frequency band is recommended whenever possible. There are more interference sources in 2.4 GHz frequency band.**
- **Private APs and wireless routers are not allowed. These devices may cause radio interference and result in monitor and CMS data loss.**
- **To ensure network security and stability, data communication must be performed within a closed network or within a virtually isolated hospital network. The hospital is responsible for ensuring the security of the virtually isolated network.**
- **WPA2-PSK and WPA2-Enterprise verification and encryption should be used if possible. Otherwise, the equipment may not be able to work or patient information may be leaked. WPA2-Enterprise and a long password are recommended.**
- **Keep network authentication information, for example password, from being accessed by unauthorized users.**
- **Do not connect non-medical devices to the monitor network.**
- **If wireless network signal is poor, there may be a risk of CMS data loss.**
- **Maximum number of monitors connected to a single AP is 3. Too many monitors connected to the same AP may result in network disconnection.**
- **RF interference may result in wireless network disconnection.**
- **Disconnecting from the network may result in CMS data loss and function failure. Check the patient in case of network disconnection and reconnect the network as soon as possible.**
- **Ensure that the monitor IP address setting is correct. Changing the network settings may result in network disconnection. Contact your service personnel if you have any problems on setting the IP address.**

23.2 Connecting the CMS

NOTE

- **You can select CMS only when Select CMS is switched on. For more information, see *24.7.6.4 Central Station Setup Tab*.**

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24 Configuration Management

24.1 Configuration Management Introduction

WARNING

- **Accessing the Configuration mode is password protected. Patient therapy and monitoring automatically end when you access the Configuration mode.**
- **The configurations must be changed by authorized personnel only.**
- **Never connect the equipment with the patient when accessing the configuration management.**

24.2 Changing Configurations

NOTE

- **Restoring factory defaults have no impact on the item marked with "*" in the following tables.**
- **The alarm limits are effective for all patient categories if not specified.**
- **The alarm volume escalation function is not applied to the latched alarms.**

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25 Battery

25.1 Battery Safety Information

- **Keep batteries out of children's reach.**
- **Use only specified battery. Use of a different battery may present a risk of fire or explosion.**
- **Keep the batteries in their original package until you are ready to use them.**
- **Do not expose batteries to liquid.**
- **Do not crush, drop or puncture the battery. Mechanical abuse can lead to internal damage and internal short circuits. If a battery has been dropped or banged against a hard surface, whether**

25.4 Checking Battery Performance

NOTE

- **Life expectancy of a battery depends on how frequent and how long it is used. When properly used, the lithium-ion battery has a useful life of approximately two years. If improperly used, its life expectancy can be shorten. It is recommended to replace the battery every two years.**
- **To optimize the battery performance, a fully discharged (or near fully discharged) battery should be charged as soon as possible.**
- **Battery operating time depends on the equipment configuration and operation. For example, measuring NIBP repeatedly will shorten the battery operating time.**

25.5 Storing Batteries

NOTE

- **Remove the battery from the equipment if the equipment is not used for a prolonged time (for example, several weeks). Otherwise the battery may overdischarge.**
- **Storing batteries at high temperature for an extended period of time will significantly shorten their life expectancy.**
- **The battery storage temperature is between -20°C (-4°F) and 60°C (140°F). Storing batteries in a cool place can slow the aging process. Ideally the batteries should be stored at 15 °C.**

26 Care and Cleaning

26.1 Care and Cleaning Safety Information

WARNING

- **Use only cleaners, disinfectants and methods specified in this chapter. Using unapproved substances or methods may damage the equipment and void the warranty.**
- **Do not mix disinfecting solutions, as hazardous gases may result.**
- **Mindray is not liable for the efficacy of the specified cleaners, disinfectants, or methods as a means for controlling infection. Refer to your hospital for infection controlling.**
- **Be sure to power off the equipment and disconnect all power cables from the outlets before cleaning the equipment.**
- **The responsible hospital or institution shall carry out all cleaning and disinfection procedures specified in this chapter.**

CAUTION

- **Never immerse any part of the equipment or accessories in liquids or allow liquid to enter the interior.**
- **Any contact of cleaners or disinfectants with connectors or metal parts may cause corrosion.**
- **Do not pour or spray any liquid directly on the equipment or accessories or permit fluid to seep into connections or openings.**
- **If you spill liquid on the equipment or accessories, disconnect the power supply, dry the equipment, and contact your service personnel.**
- **Never use abrasive materials (such as steel wool or silver polish), or erosive cleaners (such as acetone or acetone-based cleaners).**
- **Dilute and use the cleaners or disinfectants according to the manufacturer's instructions.**
- **Check the equipment after cleaning and disinfecting. If there is any sign of damage, remove it from use.**

26.2 Cleaning and Disinfecting the Equipment

26.2.1 Cleaning the Main Unit

CAUTION

- **During the cleaning procedure, disable the touch function by turning off the equipment or locking the touchscreen.**

26.2.2 Cleaning the Thermal Print Head

CAUTION

- **Do not use anything that may destroy the thermal element.**
- **Do not add unnecessary force to the thermal head.**
- **The thermal print head gets hot when printing. Do not clean the print head immediately after printing.**

26.3 Cleaning and Disinfecting the Accessories

CAUTION

- **Fluids entering the NIBP air hose can damage the equipment. When cleaning or disinfecting the NIBP air hose, prevent liquid from entering the hose.**
- **Periodically inspect the NIBP air hose and connector for signs of wear or deterioration after cleaning or disinfecting the NIBP air hose. Replace the NIBP air hose if you detect a leak. Dispose of damaged NIBP air hose according to local laws for disposal of hospital waste.**
- **Never immerse or soak the accessories in any liquid.**
- **Never clean or disinfect the connectors and metal parts.**
- **Use only Mindray approved cleaners and disinfectants and methods listed in this section to clean or disinfect the accessories. Warranty does not cover damage caused by unapproved substances or methods.**
- **To avoid long term damage, the accessories should be disinfected only when necessary as determined by your hospital's policy.**

27 Maintenance

27.1 Maintenance Safety Information

WARNING

- **Stop using the equipment for any signs of visible damages. If damaged, contact your service personnel.**
- **Follow the maintenance and testing schedule or local regulations to perform testing and maintenance.Not implementing the maintenance schedule may cause equipment failure and possible health hazards.**
- **No modification of this equipment is allowed.**
- **This equipment contains no user serviceable parts.**
- **Do not open the equipment housings. The safety checks or maintenance involving any disassembly of the equipment should be performed by professional servicing personnel. Otherwise, undue equipment failure and possible health hazards could result.**
- **Do not touch any connected electrode pads or external paddles with hands during auto test and user test. Otherwise, electric shock could result.**
- **The service personnel must be properly qualified and thoroughly familiar with the operation of the equipment.**

CAUTION

- **The equipment and accessories shall not be served or maintained while in use with a patient.**
- **If a problem occurs to the equipment, contact the service personnel.**
- **At the end of its service life, the equipment, as well as its accessories, must be disposed of in compliance with the guidelines regulating the disposal of such products. If you have any questions concerning disposal of the equipment, please contact Mindray.**

NOTE

- **If needed, contact the manufacture for circuit diagrams, component part lists, descriptions, calibration instructions, or other information concerning the repair of the equipment.**

27.2 Routine Maintenance

27.2.1 Auto Test

NOTE

- **If the equipment is turned off, it can carry out the auto test only when it is either connected with the external power supply or installed with a battery (at least 60% of battery capacity).**
- **The auto test simulates the discharge test through impedances in the paddle tray. The auto test passes only when external paddles properly contact the metal parts of the paddle tray.**
- **Thoroughly clean the external paddles and properly place them in the paddle tray after each use. Otherwise, the auto test may fail or damaged external paddles may result.**
- **The auto test reduces the battery power. If the equipment is not connected to the external power supply immediately, low battery may result.**
-

C [illegible] : [illegible] . d ca d [illegible] c . 6.3.4.2, EN1789 (10.1.3, IEC60601-1-12):

P a acc a[illegible] . : 1000 / ^{2} (102)

D: a[illegible] . : 6

P: a : a -

N: b . . c : 3 . c d ç . a (18 . c [illegible] a)

Bump

C [illegible] : [illegible] . . ad a b: a c . 6.3.4.2, EN1789.

P a acc a[illegible] . : 15

P: d: a[illegible] . : 6

N: b . b: : 1000

D ç . [illegible] ca , [illegible] : [illegible] . a . a[illegible] . .

Vibration

C [illegible] : [illegible] . d ca d [illegible] c . 6.3.4.2, EN1789 (10.1.3, IEC60601-1-12).

10 H . 100 H : 5.0 (/ ^{2})^2/H

100 H . 200 H : -7 dB/Oc a

200 H . 2 000 H : 1.0 (/ ^{2})^2/H

D: a[illegible] . : 30 : d ç . ca a (3 a a)

- **Vibration (for fixed wing aircrafts): complies with requirements of 10.1.4, IEC60601-1-12**

T ca[illegible] . : S

C: : C

F : c : 10 . 2000H

G : 4.12

D ç . : 1 . : d ç . a (3 a a)

- **Vibration (for helicopters): complies with requirements of 10.1.4, IEC60601-1-12**

T ca[illegible] . : U2

C: : F (. a c [illegible])

F : c : 5H . 300H ; APSD 5H . 40H : 0.0063 /H , +3 dB/Oc a ; APSD 40H . 200H : 0.05 /H ; APSD 200H . 300H : 0.05 /H , -12 dB/Oc a

G : 3.37

C: : F1 (d: a c [illegible])

F : c : 5H . 300H ; APSD 5H . 40H : 0.0126 /H , +3 dB/Oc a ; APSD 40H . 200H : 0.1 /H ; APSD 200H . 300H : 0.1 /H , -12 dB/Oc a

G : 4.76

D: a[illegible] . : . a c [illegible] . : . 10 : a b a d d. [illegible] , d: a c [illegible] . 3 . : (a d a)

Free fall

1 a . ac : ac (6 : ac a), a [illegible] . 1.5

CO_2 module			
Item	**Temperature**	**Relative humidity**	**Barometric**
O a c d .	5 C . 40 C	5% . 95%,	430 H . 790 H (57.3 Pa . 105.3 Pa)
S . a c d .	-20 C . 60 C	-c d	

A.2 Power Supply Specifications

A.2.1 External Power Supply Specifications

DC power input	
I [illegible] a	18 VDC (5%)
I [illegible] C [illegible]	7.2A a
AC power adapter and transport dock (with AC input)	
I [illegible] a	100 240 VAC (-15%, +10%)
I [illegible] C [illegible]	1.8 0.8A
F [illegible]	50/60H (3H)
Transport dock (with DC input)	
I [illegible] a	12/24VDC (-15%, +25%)
I [illegible] C [illegible]	15.5 6.5A

A.2.2 Battery Specifications

Ba [illegible]	R c a ab [illegible] -. ba [illegible]	
Ba [illegible] a	14.4V	
Ba [illegible] ca ac	4500 A	
Ma [illegible] b . ba [illegible]	T . ba [illegible] ca b c [illegible] a .	
Ba [illegible] c a	C a d b [illegible] c [illegible] d . a .	L a 3 . 90% a d a 4 . 100% L a 5 . 90% a d a 6 . 100%
	C a d b c a a .	L a 3 . 90% a d a 4 . 100%.

Ba	O a c d	O ba	T ba	T c d
	M	6.5	13	N t: c a d ba . A b a t: . 20 5 C. T t: c t d , 3-/5- ad ECG, a t a d b a , c b a d a: t , t .
		5.5	11	N t: c a d ba . A b a t: . 20 5 C. T t: c t d , 3-/5- ad ECG, a t a d b a , c b a d a: t , t . T N1 . c t d , 3-/5- ad ECG, R , S O_2, NIBP a t a a , 15 .
	D b a	220 d c a . 360J	440 d c a . 360J	N t: c a d ba . A b a t: . 20 5 C. T t: c t d , 3-/5- ad ECG, a t a d b a , c b a d a: t , t . 3 d c a .
		300 d c a . 200J	600 d c a . 200J	
	Pac	4.5	9	N t: c a d ba . A b a t: . 20 5 C. T t: c t d , 3-/5- ad ECG, a t a d b a , c b a d a: t , t . 50 . ad da c , ac a 80b , ac . t a 60 A, ac t a 40 .
	L a a d	A a 20 . . . a d 6 d c a . 360J	A a 40 . . . a d 12 d c a . 360J	A b a t: . 20 5 C. T t: c t d , 3-/5- ad ECG, a t a d b a , c b a d a: t , t .
Ba t a:	5 LED d ca , c ba c a .			
S t d d a	A a 20 t . . . a d 6 d c a . 360J			

A.2.3 Charger Station Specifications

Ma t : b . ba c a d	T . ba ca b c a da , a .
AC power input	
I t . a	100 . 240 VAC (10%)
I t c	1.8 . 0.8A

F : , c	50/60H (3H)
DC power input	
I, : ,u . , a	12.4 , 30.3 VDC
I, : , c: , ,	15.5 , 6.5A

A.3 Physical Specifications

D , . , (W D H)	275 155 280 (, c: d , , a, d , c , : d , . : , , , add , a)
Ma : ,	4.1 (, : , , c , : d , DC . , : , ,3-/5- ad ECG, a, : a d b a , . , a, d. , ba , ,)

A.4 Hardware Specifications

A.4.1 Display Screen

Sc , ,	Ca ac , u , : , - . , , c . , . : c. c ,
Sc ,	9 , c.
R . : , . ,	1200 1020 , ,
V , d , a .	7 a , a :
Wa u , , ,	36 a , a : (ECG)

A.4.2 Recorder

A.4.3 LEDs

A.4.4 Audio Indicators

A: d. , a	A a ,. , : ISO . d , : , c . 600 H QRS , . , : , , b , : , c . 495 H C a ,. , : . , b , : , c . 400 H , 533 H C a d , ,. , : d : b b , : , c . 440 H K ,. , : , , b , : , c . 1000 H

A.4.5 External Connectors

P , :	1, c , , ç , m , a . , : .
M: , : , ç . , a c , , ç.	1, c , , ç a CPR , . . , c . , d ca d. , . , .
USB c , , ç.	, 1 USB 2.0, c , , ç USB d , c . , 1 USB 3.0,
N , . c , , ç.	1 RJ45 c , , ç. , 100 Ba -TX, IEEE 802.3, c , , ç a , a da d , , . cab .

A.4.6 Signal Outputs

Multifunctional connector	
S a da d	M , , : , . EN60601-1 . , , -c c: , . ç . , a d a a c: ,
ECG Analog Output (only from ECG accessories)	
Ba d d , (-3 dB; , c : , c : 10 H)	D a , . , c . d : 0.05 , . 150 H M , . . d : 0.5 , . 40 H T a . d : 1 , . 20 H ST . d : 0.05 , . 40 H
Ma : QRS d a	25 (, d a , . , c . d , a d , N , c .)
S , ,	1 V/ V 5%
Pac , , a c ,	S , a a , : d : V 2.5V S 4( )1.6(. 59 c)5.I.8(, 460

A.5 Data Storage

I, ,a . a	4 GB
E ,	A a 1000 , . ac a , .
Wa .	A a 120 , : . . , ECG a . a, d ac : , , . : . . a, 1 c , d, . 60 , : . . ECG a . a, d ac :
V. c c d,	A a 8 , : . ac a ,
Tab: a , d	A a 200 , : , d da, a , , . : . . a, 1 , : .
A: . . .	A a 1000 c d
Da, a , .	Da, a ca, b , . . a PC , : , a USB d ,

A.6 Communication Specifications

A.6.1 Wi-Fi Specifications (SX-SDMAC-2832S+ as Station)

T c d	M . c d : O : . db a AP Eac : ca c : ca CMS. T a AP a : . ca d -65 dB . T d a c b , , d c a d , : 20 c . A W-F c (. a , a -85 dB) , a c a , a d a W-F c (. a , a -50 dB) , a ad ac -c a , a d c . . . : . T c , d c c d , b: a . d , 2.4 G d c , c : a . b . , c d , a d ESU : . T d c d . c : d W-F d c .
Hospital network performance	
S ca ac , c : a d . ab	M . : : T . a d a . da a a . . : CMS 2 . T d a . : a d c : da CMS . b : 2 . T : c , d . . a . 30 da a . c a . W-F c : ca . . a 24- . : . d: 0.1%.
T c d	M . c d : O : . db a AP: 3 Eac : ca c : ca CMS. T a AP a : . ca d -65 dB . T d a c b , , d c a d , : 20 c . A W-F c (. a , a -85 dB) , a c a , a d a W-F c (. a , a -50 dB) , a ad ac -c a , a d c . . . : . T c , d c c d , b: a . d , 2.4 G d c , c : a . b . , c . a . , c d , a d ESU : . T d c d . c : d W-F d c .

A.6.2 Wi-Fi Specifications (Wlink as Station)

P . c	IEEE 802.11a/b/ /,
M d: a . d	BPSK, QPSK, 16QAM, 64QAM
O a , : c	2412 MH . 2472 MH 5180 MH . 5320 MH , 5500 MH . 5700 MH , 5745 MH . 5825 MH
W ba: d a	IEEE 802.11a: 6 Mb . 54 Mb IEEE 802.11b: 1 Mb . 11 Mb IEEE 802.11 : 6 Mb . 54 Mb IEEE 802.11 : MCS0 . MCS7
O: : .	<20 dB (CE : : d ç . . d - RMS)
O a , . d	A a . , acc AP . da a a . ,
Da a c:	S a da d : WPA-PSK, WPA2-PSK, WPA-E , WPA2-E EAP . d: EAP-TLS, EAP-TTLS, PEAP-MSCHAP 2 E c . , : TKIP, AES
D , ç . . d a c	T d , ç . . d a c b , : a d AP: 50 .
A a d a . , . d c , ç . ,	T a a d a a d a . , . d c , ç . , b , : a d CMS: 14 .
Pre-hospital network performance	

S ca ac , c : a d . ab	M : • T . a d a . da a a . . : CMS: 10 . • T d a . : a d , c : da CMS . b : 10 . • T da a . c a . W-F c : ca . . a 4- . : . d: 0.5%.
T c d . .	M : c d . : a . : • O : : d b a AP • Eac : ca c : ca CMS. • T a AP a : . ca d . a -65 dB . • T d a c b , d c a d : a 20 c . A W-F c (. a a -85 dB) , a a c a , a d a W-F c (. a a -50 dB) , a ad ac -c a , a d c . . : . T d c , c : d , b: a . d , 2.4 G d c , c : a . b , . , c d . . , a d ESU : . T d c d . c : d W-F d c .
Hospital network performance	
S ca ac , c : a d . ab	M : • T . a d a . da a a . . : CMS 2 . • T d a . : a d , c : da CMS . b : 2 . • T : c , ç d . . a . 30 , da a . c a . W-F c : ca . . a 24- . : . d: 0.1%.
T c d . .	M : c d . : a . : • N: b . : . d b a AP: 3 • Eac : ca c : ca CMS. • T a AP a : . ca d . a -65 dB . • T d a c b , d c a d : a 20 c . A W-F c (. a a -85 dB) , a a c a , a d a W-F c (. a a -50 dB) , a ad ac -c a , a d c . . : . T d c , c : d , b: a . d , 2.4 G d c , c : a . b , . , c . a . , d c d . . , a d ESU : . T d c d . c : d W-F d c .

A.6.3 Wi-Fi Specifications (Wlink as AP)

P . c	IEEE 802.11a/b/ /,
M d: a . . d	BPSK, QPSK, 16QAM, 64QAM
O a , : c	2412 MH . 2472 MH 5180 MH . 5320 MH , 5500 MH . 5700 MH , 5745 MH . 5825 MH
W ba: d a	IEEE 802.11a: 6 Mb . 54 Mb IEEE 802.11b: 1 Mb . 11 Mb IEEE 802.11 : 6 Mb . 54 Mb IEEE 802.11 , : MCS0 . MCS7
O: : .	<20 dB (CE : : d : ç . . d - RMS)
O a , . d	A AP, acc d b W-F a . . da a a . ,
Da a c:	S a , da d : WPA2-PSK E , c . , : AES
D , ç . d a c	T d , ç . d a c b , : : a d N1 . . : 30 .

Aa d a . . . d c . .	T a a. d a a d a . . . d c . . (b W-F a. d b: . .) b . . : . a. d N1 . . . : 14 .
Network performance	
S ca ac , . c : . a. d . . ab	M . . . : . T . a d a . da a a. . . . N1 . . . . T da a . c . a . N1 . . c . . d . . . . a 24- . : . d: 0.1%.
T c . d . .	M . . . . c . d . . : a . : . W . a d a c a . 2 . ac . . : . . a . . a . . Eac : . ca c : . ca . . . N1 . . . . T a . a . . . N1 . . . ca d . . a -80 dB . . T d a c b . . . . d c a d . : . a . 20 c . A W-F . c (. a . a -85 dB) . a c a . . a d a W-F . c (. a . a -50 dB) . a ad ac . -c a . . a . d . c . . : . T . . d c . c : d , b: a . . . d . , 2.4 G d c , c : a . b . . . . , c d . . , a d ESU : . . T . . d c d . . . c : d W-F d c . . T b: . . . d c . a . .

WARNING

- **Do perform all network functions of data communication within an enclosed network.**

A.6.4 Cellular Specifications

N .	4G, 5G
O a . : c	■ 4G . d: (EU): LTE FDD: B1/B3/B7/B8/B20/B28A LTE TDD: B38/B40/B41 WCDMA: B1/B8 GSM: B3/B8 ■ 5G . d: : NR: 1/ 2/ 3/ 5/ 7/ 8/ 12/ 20/ 28/ 38/ 40/ 41/ 48/ 66/ 71/ 77/ 78/ 79 LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B9/B12/B13/B14/B17/B18/ B19/B20/B25/B26/B28/B29/B30/B32/B66/B71 LTE-TDD: B34/B38/39/B40/B41/B42/B48
S a da d/M d: a . . d	LTE, 5G S: b-6GH
Aa d a . . . d c . .	T a a. d a a d a . . . d c . . b . . : . a. d CMS: 14 .
Pre-hospital network performance	
S ca ac , . c : . a. d . . ab	M . . . : . T . a d a . da a a. . . . : . . CMS: 10 . T da a . c . a . c : a c : ca . . . a 4- . : . d: 0.5%.

Transmitter	Meets the following requirements: • Wireless adapter can support 2 communication frequency bands. • Each frequency band can support CMS. • The power deviation is no more than -95 dB. • The adapter can support 20 channels. The channel number and channel frequency are as follows: 2.4G channel, starting from 2412 MHz.

A.6.5 Bluetooth Specifications

Protocol	Bluetooth 5.0
Modulation mode	GFSK
Operating frequency	2402 MHz ~ 2480 MHz
Channel spacing	2 MHz
Working data rate	2 Mbps, 1 Mbps, 125 kbps
Output power	20 dBm
Data encryption	AES128
Data communication rate	• The data communication rate between Bluetooth and Pad: 10 m. • The data communication rate between Bluetooth and NB: 30 m.
Application scenario and communication distance	The application data of Bluetooth communication (Bluetooth Wi-Fi and Bluetooth) between Bluetooth and NB: 14 m.
Network performance	
Success rate, response time and packet loss rate	Meets the following requirements: • The success rate of data packet transmission between Bluetooth and Pad: >99%. • The data packet transmission delay between Bluetooth and NB: 2 s. • The data packet loss rate between Bluetooth and NB: 0.1%.
Transmitter	Meets the following requirements: • Wireless adapter can support 2 communication frequency bands. • Bluetooth communication channel and frequency. • The power deviation is no more than -80 dB. • The adapter can support 20 channels. AWF channel (power deviation -85 dB) and adjacent channel and adjacent AWF channel (power deviation -50 dB), and adjacent-channel power deviation is no more than ESU. The channel number and channel frequency of Bluetooth channel and AWF channel.

A.6.6 NFC Specifications

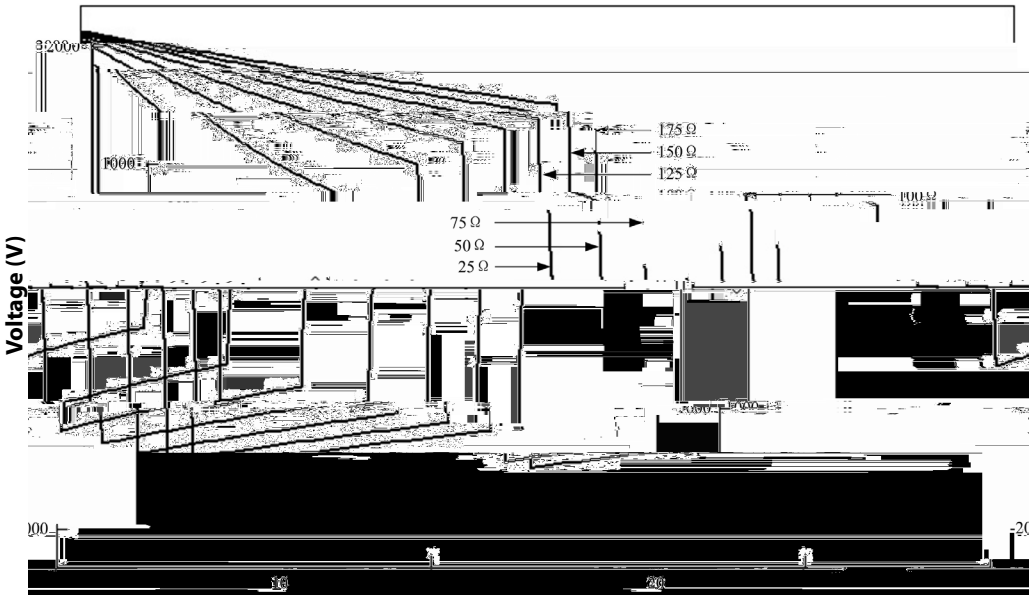
Protocol	ISO/IEC 14443 A, ISO/IEC 1443 B
Operating frequency	13.56 MHz

A.7 Therapy Specifications

A.7.1 Defibrillation Specifications

S a da d	M a da d . IEC 60601-2-4
D b a . d	Ma : a d b, c . d ca d. . , AED
D b a . a	B a c : ca d , . a (BTE) a . , a: -c a . acc d . a da c
D b a . c . d	E a add c a d a c add c: d d, : : c . d ad a d a add
C . a d d ca . . , S . c b: . , E S c b: . , c a d d ca . a d a c ac d ca .	C a b: . , S . c b: . , E S c b: . , c a d d ca . a d a c ac d ca .
C . a d d ca . . a add	S . c b: .
S . c ab a a	< 5
Range of selected energy	
E a d b a .	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 50, 70, 100, 120, 150, 170, 200, 300, 360 J
I a d b a .	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 50 J
Patient impedance range	
E a d b a .	25 . 300
I a d b a .	15 . 300
Synchronized discharge delay	
L ca c . d d c a d a	< 60 (. a . R- a)
R c . d d c a d a	< 25 (. d . c . . : a)
AED	
S . c	E : 100 . 360J, c : ab . ad: ; 10 . 100J, c : ab . d a c S . c : 1, 2, 3, c : ab ;

360 J defibrillation waveform into impedance of 25Ω, 50Ω, 75Ω, 100Ω, 125Ω, 150Ω, 175Ω



Selected energy	Impedance							Accuracy
	25Ω	50Ω	75Ω	100Ω	125Ω	150Ω	175Ω	
1 J	1	1	1	0.9	0.9	0.9	0.8	± 10%, ± 2J,
2 J	2	2	2	1.9	1.8	1.7	1.6	
3 J	2.9	3	2.9	2.8	2.7	2.6	2.4	
4 J	3.9	4	3.9	3.7	3.6	3.4	3.2	
5 J	4.9	5	4.9	4.7	4.5	4.3	4.1	
6 J	5.8	6	5.8	5.6	5.3	5.1	4.9	
7 J	6.8	7	6.8	6.6	6.3	6	5.7	
8 J	7.8	8	7.8	7.4	7.1	6.8	6.5	
9 J	8.8	9	8.8	8.4	8	7.7	7.3	
10 J	9.7	10	9.7	9.3	8.9	8.5	8.1	
15 J	15	15	15	14	13	13	12	
20 J	20	20	20	19	18	17	16	
25 J	24	25	24	23	22	21	20	
30 J	29	30	29	28	27	25	24	
50 J	49	50	49	47	45	43	41	
70 J	68	70	68	65	62	60	57	
100 J	97	100	97	93	89	85	81	
120 J	116	120	116	111	106	101	97	
150 J	146	150	146	140	134	128	122	
170 J	166	170	166	159	151	145	138	
200 J	195	200	195	187	178	170	163	
300 J	292	300	292	280	267	255	244	
360 J	351	360	350	336	321	306	293	

NOTE

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)

Standard	Meets standard IEC 60601-2-27 and IEC 60601-2-25
Patient cable	3-lead ECG cable, 5-lead ECG cable, 12-lead ECG cable
ECG wave	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 V6
ECG standard	AHA, IEC
Display gain	1.25 mV (0.125), 2.5 mV (0.25), 5 mV (0.5), 10 mV (1), 20 mV (2), 40 mV (4), Auto
Sweep speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s, and ±5%
Bandwidth (-3dB)	Diagnostic mode: 0.05 150 Hz Monitor mode: 0.5 40 Hz Trauma mode: 1 20 Hz ST mode: 0.05 40 Hz High Fidelity (for 12-lead 350 Hz, 150Hz, 35Hz, 20Hz, and cable ECG analysis):
CMRR	Monitor, Trauma and ST mode: >105 dB (when the notch filter is on), >90 dB (when the notch filter is off) Diagnostic mode: >90 dB (when the notch filter is on) High Fidelity (for 12-lead ECG analysis): >90 dB (when the notch filter is on)
Notch	50/60Hz, Monitor, Trauma and ST mode: when the notch filter is on: Diagnostic and High Fidelity: when the notch filter is on,
Differential input impedance	5 M
ECG signal range	8 mV (automatic)
Calibration signal	1 mV (peak-to-peak) 5%
Electrode offset potential	500 mV
Leakage current	Mains: 0.1 A Dual: 1 A
Baseline reset	<2.5 (after defibrillation)
Defibrillation protection	Energy: 5000V (360 J) can be withstood Baseline reset: <2.5 (after defibrillation) Paced pulse rejection: <10 Defibrillation pulse rejection: 10% (100 pulses)
ESU protection	Cut: 300 W Coagulation: 100 W Recovery: 10 Noise: 2 mV In accordance with: 202.6.2.101, IEC 60601-2-27
Pace Pulse	

Pac : a	Pac : ç . c d . a ab d a PACE a : A : d : 2 . 700 V W d : 0.1 . 2 R : 10 . 100º (. a . a 10%. : d) N . u .
Pac : ç .	W . d acc da c IEC 60601-2-27: 201.12.1.101.13, a a ç a : ç . c d . . A : d : 2 . 700 V W d : 0.1 . 2 R : 10 . 100º I : a : 2.2 V/ 15% RTI N . u .
HR	
M a : a	Ad: : 15 . 300 b P d a c, . a : 15 . 350 b
Acc: ac	1%. 1b , c u a
R . : .	1 b
S u	200 V (ad II)
H a a a	I c a, c : C a: 201.7.9.2.9.101 b) 3). IEC 60601-2-27, . c d : d: I a 3 c c: u RR u a a a . a 1200 , 4 . c RR u a a a d . c : HR. Q , a a c : d b : b a , a : a d . . . . c RR u a a d , a a . T HR a: d a d. c : da d u c d.
R . a . a, a a c a,	M : . IEC 60601-2-27: C a: 201.7.9.2.9.101 b) 5). F . 80 . 120 b : a, 11 F . 80 . 40 b : a, 11
T . a a . ac ca d a	M : C a: 201.7.9.2.9.101 b) 6). IEC 60601-2-27. Wa . 4a - a, : <11 4a - a, : <11 4ad - a, : <11 4b - a, : <11 4b - a, : <11 4bd - a, : <11
A , a a, a ca ca . ,	A , V-F b/V-Tac , V-Tac , V . B ad , F Tac , F B ad , V R , PVC / , Pa: / , C : , B , T , R. , T, R: , PVC , PVC, B ad , Tac , M d B a , Pac N Pac , Pac N Ca : , M: . PVC, N , : V-Tac , Pa: , I R , A-F b (, . ad:), SVT, SVC / ,
Ta T- a ç . , ca ab	W . d ba d. C a: 201.12.1.101.17. IEC 60601-2-27, a a 100 QRS c T- a 1.2 V. a : d , a, d T a T- a u a . 180 a, d . a Q-T u a . 350 .
R . . : a ,	I c a, c : C a: 201.7.9.2.9.101 b) 4). IEC 60601-2-27, a a a 20 c d . ab a . d a d a . . : V c a b , (3a): 80 1 b S. a , , u c a b , (3b): 60 1 b Ra d a , , u c a b , (3c): 120 1 b B d ç . a . (3d): 90 2 b

ST Segment Analysis	
M a : ,ę a,	-2.0ę. 2.0 V RTI
Acc ac	-0.8ę. 0.8 V: ŀ 0.02 V. ŀ 10%, ◆ c ų ąę .
B . , dę a, :	N ę c d.
R . ęę. ,	0.01 V
QT/QTc Analysis	
M a : ,ę a,	QT: 200ę. 800 QTc: 200ę. 800 QT-HR: 15ę. 150 b . ad: ę, 15ę. 180 b . d ąę c a, d , . , ąę
Acc ac	QTŀ 30
R . ęę. ,	QT: 4 QTc: 1
12-lead ECG Interpretation	
Sa , ąę	1000 a / (A/D) 500 a / (ECG a . ę)
A ę: d : a,ę ąę. ,	24 bę
M a : ,ę	H a ę ąę , PR ,ę ų a , QRS d: ąę . , , QT/QTc ,ę ų a , P/QRS/T a a, d d a , . ę ąę ,ę

A.8.2 ECG Specifications (from Therapy Accessories)

Pą ,ę c , , ç. ,	Padd . : ę : , ç. , ç. d ad
ECG , :ę	Padd . Pad
D a , ęų ę	1.25 / V (0.125), 2.5 / V (0.25), 5 / V (0.5), 10 / V (1), 20 / V (2), 40 / V (4), A:ę. , ę a, ±5% .
S◆ d	6.25 / , 12.5 / , 25 / , 50 / , ę a, ±5% .
Ba, d◆ dę (-3dB)	T a . d : 1ę. 20 H +0.4dB -3.0dB
C . , . d ç. ,	T a . d : >105 dB (◆ę , , . ę c ę . ,)
N ę c ę	T a . d : 50/60H , , . ę c ę ę : , . , a: ę. ąę ca .
D ,ę a , :ę da, c	5 M
ECG , a a,	ŀ 8 V (a ę. - a ų a:)
Ca b ąę . , , a	1 V (a ę. - a ų a:) ŀ 5%
E ç. d . ę . ę ,ę a ę. a, c	ŀ 1V
L ad-: d ę ç. , c: ,ę	0.1 A
Ba , c ų ę	<2.5 (a ę d b ąę . ,)
D b ąę . , . ę ç. ,	E, d: , 5000V (360 J) c a ◆ę . :ę da ą a . . c : ę . , Ba , c ų ę : <2.5 (a ę d b ąę . ,) P a ąę . , c ų ę : <10 D b ąę . , , ab . ę . , : 10% (100 . ad)
ESU . ę ç. ,	C:ę . d : 300 W C a : ąę . d : 100 W R c ų ę : 10 I c a, c ◆ę, ę : ,ę , c a: 202.6.2.101. IEC 60601-2-27
Pace Pulse	

Pac : a	Pac : ç . . , c d . a ab d a PACE a :
	A : d : ± 2 , ± 700 V
	W d : 0.1 , 2
	R : 10 , 100 (. a , a 10%. : d)
	N .
Pac : ç .	W d acc da c IEC 60601-2-27: 201.12.1.101.13, a a ç a : ç . . , c d . . .
	A : d : ± 2 , ± 700 V
	W d : 0.1 , 2
	R : 10 , 100
	N .
HR	
M a : a	Ad: : 15 , 300 b
	P d c 15 , 350 b
Acc ac	± 1%. ± 1b , c a
R . : .	1 b
S	200 V
H a a a	I c a c : C a: 201.7.9.2.9.101 b) 3). IEC 60601-2-27, . . , d : d:
	I a 3 c c RR a a a d . c : HR. O , a a c : d b : b a , a : a d : . . . c 12 RR a a d , a .
	T HR a : d a d. c : d d c d.
R . a . ac ca	M : . IEC 60601-2-27: C a: 201.7.9.2.9.101 b) 5).
	F . 80 , 120 b : a 11
	F . 80 , 40 b : a 11
T . a a . ac ca d a	M : C a: 201.7.9.2.9.101 b) 6). IEC 60601-2-27. W .
	4a - a : <11
	4a - a : <11
	4ad - a : <11
	4b - a : <11
	4b - a : <11
	4bd - a : <11

A.8.3 Resp Specifications

L ad	O . a ad l, II a, d A: .
R a . , c a . , a
<300º A RMS, 62.8 H (10%)
M , : a . , da, c d	0.3 5 a,
Ba , da, c a,	200 . 2500 , : , a, ECG cab 1 .
Ba, d d ,	0.2 . 2.5 H (-3 dB)
S d	6.25 / , 12.5 / . 25 / , a, ±5% .
Respiration Rate	
M a : , a,	0 . 200
R . : . ,	1
Acc: ac	121 . 200 : 2 0 . 120 : 1
A , a a a	10 , 15 , 20 , 25 , 30 , 35 , 40

A.8.4 SpO_2 Specifications

Mindray SpO_2 Module

S a, da d	M a, da d . ISO 80601-2-61
M a : , a,	0 . 100%
R . : . ,	1%
R . ,	< 30 (, . a : . , , . d : ba, c , S O_2 a : : dd , c a, . 70% . 100%)
Acc: ac *	70% . 100%: 2%ABS (ad: , d a c) 70% . 100%: 3%ABS (, . , a) 0 . 69%: , . c d
R , , a	1
* O, c , a add d . acc: ac . , . , a a , . acc: : , . acc: ac a a . , d: . . . . a , . . b , . S : d . d . a da acc: ac . P: Q . a , . , a a S O_2 , . b c , a a CO-Q . S , . , a d . 1 da . 30 da a a . 22 : . d . T a ca a, a . da a. . : d . . acc: ac (A) , , a d acc: ac c ca . , . P a . . , ab .	

Sensor type	Totally neonates	Data	Arms
518B	97 (51 a & 46 a)	200 a	2.38%
520N	122 (65 a & 57 a)	200 a	2.88%

T P: Q . a , . , a a S O_2 , . a a . a da d . , ad: : b c .

PI	
M a : , a,	0.05 . 20%
R . : . ,	0.05% . 9.99%: 0.01% 10.0% . 20.0%: 0.1%
CQI	
D a a,	0 . 100
R . : . ,	1

Rate	
D a a,	20, 300 c
Acc: ac a,	40, 160 c
Acc: ac	3 c
R . :, . ,	1 c

Masimo SpO_2 Module

S, a, da d	M , a, da d . ISO 80601-2-61
M a : , a,	1%, 100%
R . :, . ,	1%
R . , ,	20 (, a : . , , . d , : ba, c , $S O_2$, a : : dd , c a, . 70%, 100%)
Acc: ac [1]	70%, 100%, 2%ABS (a : d , :, . , . , , ad: , / d a, c . d) 70%, 100%, 3%ABS (a : d , :, . , . , , , , , a, . d) 70%, 100%, 3%ABS (a : d , , . , . ,) 1%, 69%: , . , c d
R , , a,	1
$S O_2$ a, a , ,	2-4 , 4-6 , 8 , 10 , 12 , 14 , 16
L , : . , c , d , . ,	P: a , : d : >0.02% L , , , a, . , : >5%
L , : . , $S O_2$ acc: ac [2]	2%
PI a : , a,	0.02, 20%
[1]T, Ma . : , , , , a, b , a da, d . , . , . , acc: ac , , : a, b. . d , : d . , , a, , ad: , , . :, , , d: c d , , a, : d , , a, . 70%, 100% S O2 a a, , a ab, a, . c , , a, d ECG . , , . T, , a a, . , : a : . , : . , , a, da d d , a, . , . P: . , : . , , a, da d d , a, . , , c a 68%. , . : a, . , . T, Ma . : , , , , a b , a da, d . . , , acc: ac , , : a, b. . d , : d . , , a, , ad: , , . :, , , d: c d , , a, : d , . , : bb , a, d , a , . , , a, 2, . 4 H . A, a, a , : d . 1, . 2 c a, d , . , - , , , . , , b , , 1, . 5 H . A, a, a , : d . 2, . 3 c , , d: c d , , a, : d , , a, . 70%, 100% S O2 a a, , a ab, a, . c , , a, d ECG . , , . T, , a a, . , : a : . , : . , , a, da d d , a, . , . P: . , : . , , a, da d d , a, . , , c a 68%. , . : a, . , . [2]T, Ma . : , , , a b , a da, d . . , : . , acc: ac , b , c, , , , a a, , a B. , l, , 2 : a, . a, d Ma . : a, . , , a , , , . a, , a 0.02% a, d a %, a . , . a, , a 5% . a, : a, . , a, , . 70, 100%. T, a a, . , : a : . , : . , , a, da d d , a, . , . P: . , : . , , a, da d d , a, . , , c a 68%. , . : a, . , .	

Nellcor SpO_2 Module

S, a, da d	M , a, da d . ISO 80601-2-61
M a : , a,	0, 100%
R . :, . ,	1%
R . , ,	30 (, a : . , , . d , : ba, c , $S O_2$, a : : dd , c a, . 70%, 100%)
Acc: ac	70%, 100%: 2%ABS (ad: , d a, c) 70%, 100%: 3%ABS (, . , a,) 0, 69%: , . , c d
R , , a,	1
W , , $S O_2$, . a d . , . , a, a, , a , d ca, d, , c d acc: ac a, , c a d b 1%, . c , a, . , , . , ca , . , , a : , . , a , . b , , . , a, b . . d.	

A.8.5 PR Specifications

PR from Mindray SpO_2 Module

M a : ,ᵹ a,	20ᵹ. 300 b
R . :ᵹ . ,	1 b
R . , ᵹ	<30 (, . a : . , ,. d ᵹ: ba, c , PR a : :dd , c a, . 25 ᵹ. 220b)
Acc: ac	± 3 b
R , , ą	1

PR from Masimo SpO_2 Module

M a : ,ᵹ a,	25ᵹ. 240 b
R . :ᵹ . ,	1 b
R . , ᵹ	20 (♦ᵹ , . a : . , ,. d ᵹ: ba, c , a, d a PR a : ᵹ a, ᵹ . , . 25ᵹ. 220 b)
Acc: ac	± 3 b (a : d ♦ᵹ . :ᵹ . ᵹ . ,) ± 5 b (a : d ♦ᵹ . ᵹ . ,)
R , , ą	1

PR from Nellcor SpO_2 Module

M a : ,ᵹ a,	20ᵹ. 300 b
R . :ᵹ . ,	1 b
R . , ᵹ	30 (, . a : . , ,. d ᵹ: ba, c , PR a : :dd , c a, . 25 ᵹ. 250 b)
Acc: ac	20ᵹ. 250 b ± 3 b 251ᵹ. 300 b :, . ᵹ c d
R , , ą	1

PR from IBP Module

M a : ,ᵹ a,	25ᵹ. 350 b
R . :ᵹ . ,	1 b
Acc: ac	± 1 b . ± 1%, ♦ , c , ą

A.8.6 NIBP Specifications

S ą a, da d	M ᵹ ᵹ a, da d. IEC 80601-2-30
T c , :	O c . ᵹ
M d . . ą . ,	Ma : a , A: ᵹ . , STAT, S : , c
A: ᵹ . d ᵹᵹ . , ᵹ , a	1 , 2 , 2.5 , 3 , 5 , 10 , 15 , 20 , 30 , 1 , 1.5 , 2 , 3 , 4 , 8
STAT . d c c ᵹ	5
Ma : a : ,ᵹᵹ	Ad: ᵹ , d ą c: 180 N . , ą : 90

M a : ,ᵩ a,	M a : ,ᵩ ᵩ	Ad: ᵩ	P d ą c	N . , ą
	S ᵩ. c (H)	25ᵩ. 290	25ᵩ. 240	25ᵩ. 140
	D a ᵩ. c (H)	10ᵩ. 250	10ᵩ. 200	10ᵩ. 115
	M a, (H)	15ᵩ. 260	15ᵩ. 215	15ᵩ. 125
M a : ,ᵩ acc: ac *	Ma a, . ᵩ 5 H Ma ᵩ a, da d d ᵤ ą . , : 8 H			
Sᵩą c : a : ,ᵩ a,	0 H ᵩ. 300 H			
Sᵩą c : a : ,ᵩ acc: ac	ᵩ 3 H			
R . : ᵩ . ,	1 H			
S ᵩ◆a .ᵤ : .ᵩ Ç . ,	Ad: ᵩ : 297 3 H P d ą c: 297 3 H N . , ą : 147 3 H			
I, ᵩ a c: , ą . , : a,	Ad: ᵩ : 80ᵩ. 280 H P d ą c: 80ᵩ. 210 H N . , ą : 60ᵩ. 140 H			
*M a : ,ᵩ acc: ac ᵤ ca ą . , : I, ad: ᵩ a, d d ą c . d ,ᵩ b . , d : a : ,ᵩ a : d ◆ᵩ, ᵩ, d ᵤ c a , c a, c ◆ᵩ, ᵩ Sᵩa, da d . N , - ᵤ a ᵤ , . a, . ᵩ (ISO 81060-2) , ᵩ . a, . a, d ᵩ a d a d d ᵤ ą . , b c a , ◆ᵩ, ᵩ a-aᵩ a . a : c ᵩą. a : ,ᵩ (d , d , . ,ᵩ, c , : ą . ,) , aᵩ ca ą ,ᵩ . : ą . , . F. a : c ᵩą. , c ,ᵩ, 5ᵩ K . ᵩ . . : , d ◆a : dᵩ. d ᵩ , ᵩ, d aᵩ. c : . I, , . , ą a . d ,ᵩ, b . , d : a : ,ᵩ a : d ◆ᵩ, ᵩ, d ᵤ c a , c a, c ◆ᵩ, ᵩ, A ca, Naᵩ. , a Sᵩa, da d . N , - ᵤ a ᵤ , . a, . ᵩ (ISO 81060-2) , ᵩ . a, . a, d ᵩ a, d a d d ᵤ ą . , b c a , ◆ᵩ, ᵩ a-aᵩ a a : ,ᵩ (d , d , . ,ᵩ, c , : ą . ,) , aᵩ ca ą ,ᵩ . : ą . , .				
PR				
M a : ,ᵩ a,	30ᵩ. 300 b			
R . : ᵩ . ,	1 b			
Acc: ac	ᵩ 3b . ᵩ 3%, ◆ , c ᵤ ą			

A.8.7 Temp Specifications

Sᵩa, da d	M ᵩᵩ , ᵩ a, da d . ISO 80601-2-56
T c , :	T, a ᵩ a, c
O ą , . d	D ç . d
M a : ,ᵩ a,	0 °Cᵩ. 50 °C (32 °Cᵩ. 122 °F)
Acc: ac	ᵩ 0.1 °C. ᵩ 0.2 °F (◆ᵩ, . : ᵩ c , d , . b .)
R . : ᵩ . ,	0.1 °C
R , , ą	1
M , : ᵩ . acc: ą a : ,ᵩ	B d : ac : <100 B d ca ᵩ : <80

A.8.8 IBP Specifications

Sᵩa, da d	M ᵩᵩ , ᵩ a, da d . IEC 60601-2-34
IBP	
M a : ,ᵩ a,	-50 H ᵩ. 360 H
R . : ᵩ . ,	1 H

Acc: ac	± 2%. ± 1 H , c. u a (r c: d , . .)
R , a	1
Pressure transducer	
E c , u. a	5 VDC ± 2%
S , u	5 V/V/ H
Z . ad: , a,	± 200 H
I da, c a,	300 . 3000
V. : d ac ,	<0.04 ^{3}/100 H

A.8.9 CO_2 Specifications

Sa, da d	M , a, da d. ISO 80601-2-55
M a: , a,	0 . 150 H
Acc: ac [1]	F: acc: ac . d : 0 . 40 H : ± 2 H 41 . 76 H : ± 5%. ad , 77 . 99 H : ± 10%. ad , 100 . 150 H : ± (3 H +8%. ad ,)
Acc: ac d	M , : , a: , acc: ac , 6 , : .
R . : . ,	1 H
Sa . a . a, c	± 15%. ± 15 / , c. u a .
Sa :	20 (ca), 90 (a :)
Sa . a	50 /
R	200 @50 / (a: d a CO_2 ada a, d a , ,) 250 @50 / (a: d a a, da d a , ,) 280 @50 / (a: d a. , a , ,)
R . ,	5.0 @50 / (a: d a CO_2 ada a, d a , ,) 5.0 @50 / (a: d a a, da d a , ,) 6.5 @50 / (a: d a. , a , ,)
A , a	10 , 15 , 20 , 25 , 30 , 35 , 40
awRR	
awRR a: , a,	0 . 150
awRR acc: ac	60 : ± 1 61 . 150 : ± 2
awRR . : . ,	1

Effect of interference gases on CO_2 measurements

Gas	Concentration	Quantitative effect [2]
O_2	100%	± 1 H
N_2O	60%	
Ha	4%	
S u	5%	
I .	5%	
E,	5%	

B EMC and Radio Regulatory Compliance

B.1 EMC

T : , , : , . IEC 60601-1-2: 2014.

WARNING

- **Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this device could result in increased electromagnetic emissions or decreased electromagnetic immunity of this device and result in improper operation.**
- **The non-ME EQUIPMENT (e.g. ITE) that is a part of an ME SYSTEM may be disrupted by the electromagnetic interference of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the non-ME EQUIPMENT or shielding the location.**
- **Use of this device adjacent to or stacked with other device should be avoided because it could result in improper operation. If such use is necessary, this device and the other device should be observed to verify that they are operating normally.**
- **Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the this device, including cables specified by the manufacturer. Otherwise, degradation of the performance of this device could result.**
- **Other devices may affect this equipment even though they meet the requirements of CISPR.**
- **When the inputted signal is below the minimum amplitude provided in technical specifications, erroneous measurements could result.**

NOTE

- **The equipment needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided below.**
- **Portable and mobile RF communications equipment may affect this equipment.**
- **This equipment is intended for use in professional healthcare facility environment, or in home healthcare environment such as restaurants, cafes, shops, stores, markets, schools, churches, libraries, outdoors (streets, sidewalks, parks), domiciles (residences, homes, nursing homes), train stations, bus stations, airports, hotels, hostels, pensions, museums, theatres. If it is used in special environment, such as magnetic resonance imaging environment, the equipment may be disrupted by the operation of nearby equipment.**

Guidance and Declaration - Electromagnetic Emissions		
T : , :ab . : , ç. a , c , . , c db . .T c: . , : . , : , . : da : , ç : d , :c a , . , .		
Emission test	**Compliance**	**Electromagnetic environment - guidance**
RF . , CISPR 11	G . 1	T : , : RF , . , . , , , a : ç . , . T . , , RF . , a . a , d a , . , ç . ca: a , , c , , ab ç . , c : , .
RF . , CISPR 11	C a B	T : , :ab . : , a ,ab , , , , c: d , d , c ,ab , , a , d ç . d ç c , , ç d ç . , :b c . t . ,a . : , . , , : b: d , : d . d , c : . .
Ha . , c . , IEC 60601-1-2 EN 61000-3-2	C a A	
V. ,a :ç: ą . , / c . , IEC 60601-1-2 EN 61000-3-3	C	

I d c a d Tab **Guidance and Declaration — Electromagnetic Immunity,** a a d HR acc ac , R acc ac , S O_2 acc ac , PR acc ac , NIBP acc ac , T acc ac , IBP acc ac , CO_2 acc ac , Pac Pac acc ac , CPR a a , da a d, ac .

Guidance and Declaration - Electromagnetic Immunity			
T ab . .T c . a c d b . .			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
E c a c d c a (ESD) IEC 61000-4-2	8 V c ac 15 V a	8 V c ac 15 V a	F. d b . d, c c . c a c . l . a c d c ca a, a d . d b a 30%.
E ca a a /b: IEC 61000-4-4	2 V . . : 1 V . / : : (a a 3)	2 V . . : 1 V . / : : (a a 3)	Ma . : a d b a . a ca c ca . a c d .
S: IEC 61000-4-5	1 V ( ) . ( ) 2 V ( ) . a	1 V ( ) . ( ) 2 V ( ) . a	
V. a d a d V. a : IEC 61000-4-11	0% U_T . 0,5 c c 0% U_T . 1 c c a d 70% U_T . 25/30 c c 0% U_T . 250/300 c c	0% U_T . 0,5 c c 0% U_T . 1 c c a d 70% U_T . 25/30 c c 0% U_T . 250/300 c c	Ma . : a d b a . a ca c ca . . a c d . l : . . d: : c : d . a . d: . a : c d d a . d: b . d a . : b . : . ab a .
RATED . : c a c d IEC 61000-4-8	30 A/	30 A/	P. : c a c d . d b a c a ac c . a ca . ca . a ca c ca . . a c d .
U_T A.C. a . a . a ca . . .			

Guidance and Declaration - Electromagnetic Immunity			
T : ab . : ç. a c . c db . .T c: . : . : da : ç ç : d c a . . ç.			
Immunity test	**IEC 60601 Test level**	**Compliance level**	**Electromagnetic environment - guidance**
C d: c d RF IEC 61000-4-6	3 V 150 ç. 80 MH	3 V (V1)	P. ab a d . b RF c : ca . : ç . : d b : d . c. ç. a a ç. ç d c : d cab ç a ç c d d a ç . d ç a c ca c: ç d . ç : ç . a cab ç. ç : c . ç ç a ç. .R c d d a ç . d ç a c : $d = \frac{3.5}{V1}\sqrt{P}$ 150 ç. 80 MH $d = \frac{3.5}{E1}\sqrt{P}$ 80 MH ç. 800 MH $d = \frac{7}{E1}\sqrt{P}$ 800 MH ç. 2.7 GH , P ç a : . : ç . ç a ç . , a ç (W) acc d . ç. ç ç a ç a : ac : a d d ç c d d a ç . d ç a c , ç ( )[b]. F d ç . ç . d RF ç a , a d ç d b a ç . a . ç c ç : [c], . : d b ç a ç c a c [d] ac : c a . l ç c a . cc: . ç c ç . : ç a d ç ç . . , b :
	6 V , ISM ba d a d a ç : ad . ba d [a] b ç , 0.15 MH a d 80 MH	6 V (V2)	
Rad ç d RF EM d IEC 61000-4-3	3V/ 80 MH ç. 2.7 GH (IEC60601-2-27, IEC60601-2-25, IEC60601-2-49, IEC60601-2-34)	3 V/ (E1)	
	10V/ 80 MH ç. 2.7 GH (IEC60601-2-4)	10 V/	
	20V/ 80 MH ç. 2.7GH (IEC60601-2-4, IEC80601-2-30, ISO 80601-2-55, ISO 80601-2-56, ISO 80601-2-61)	20 V/	
P ç d . RF c : ca . : IEC61000-4-3	27 V/ 380ç. 390 MH	27 V/	
	28 V/ 430ç. 470 MH , 800ç. 960 MH , 1700ç. 1990 MH , 2400ç. 2570 MH	28 V/	
	9 V/ 704ç. 787 MH , 5100ç. 5800 MH	9 V/	
N ç 1: A 80 MH a d 800 MH , ç : c a a . N ç 2: T : d a . ç a a ç : ç . . E ç . a ç c . a ç . a ç d b ab . ç . a d ç . . ç : ç : , . b ç a d . .			
[a] T ISM (d: ç a , c ç c, a d d ca) ba d b ç , 150 H a d 80 MH a 6.765 MH ç. 6.795 MH ; 13.553 MH ç. 13.567 MH ; 26.957 MH ç. 27.283 MH ; a d 40.66 MH ç. 40.70 MH . T a ç : ad . ba d b ç , 0,15 MH a d 80 MH a 1,8 MH ç. 2,0 MH , 3,5 MH ç. 4,0 MH , 5,3 MH ç. 5,4 MH , 7 MH ç. 7,3 MH , 10,1 MH ç. 10,15 MH , 14 MH ç. 14,2 MH , 18,07 MH ç. 18,17 MH , 21,0 MH ç. 21,4 MH , 24,89 MH ç. 24,99 MH , 28,0 MH ç. 29,7 MH a d 50,0 MH ç. 54,0 MH . [b] C a c ç ISM : c ba d b ç , 150 H ç. 80 MH a d ç : c a 80 MH ç. 2.7 GH a ç d d ç. d c a ç . . . d ç a ç . ç ab / . b c : ca . : ç c : d ca : ç c ç ad ç ç b . : ç ç . a ç a a . F ç a . , a add ç . a ç . . 10/3 : d ca c: ç ç c d d a ç . d ç a c . ç a ç ç ç : c a . [c] F d ç ç . d ç a ç , : c a ba ç a . . ad . (c : a /c d) ç . , a d a d . b ad . , a ç : ad . , AM a d FM ad . b . adca ç a d TV b . adca ç ca . . ç b d ç d ç . ç ca ç acc ac . T a ç ç . a ç c ç . ç d: ç . d RF ç a , a ç . a ç c ç : ç . : d b c , d d. l ç a : d d ç ç ç . ç : ç c ç d c : d c d ç a cab RF c a c ç ab ç , ç d c . : d b . b ç d ç . ç . a . a ç . . l ab . a . a c . b ç d, add ç . a a : a b c a , : c a . ç ç . . ç ç d c . [d] Q ç : c a 150 H ç. 80 MH , d ç ç ç . : d b ç a 3V/ .			

Recommended Separation Distances between Portable and Mobile RF, Communications Equipment and This Equipment			
T: : d . : a ç . a c . ' c ad RF d : ba c a c . d. T c: . : . : ca ' ç . a c ' c b a a ' a ' : d a c b ' . ab a d . b RF c : ca . ' : (a) a d ' : a c ' d d b . ' , acc d ' . ' a : . : . ' c : ca . ' : .			
Rated Maximum Output power of Transmitter Watts (W)	**Separation Distance According to Frequency of Transmitter (m)**		
	150 H . 80 MH	80 MH . 800 MH	800 MH . 2.7 GH
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.20	1.20	2.30
10	3.80	3.80	7.30
100	12.00	12.00	23.00
F a a a : . : . ' . ' d ab c ' d d a a . ' d a c d ' ( ) ca b d ' d : ' : a . ' a cab . ' : c . ' a ' , ' P ' a : . : . ' a ' ' a (W) acc d ' . ' a a : ac : .			
N 1: A 80 MH a d 800 MH ' : ' c a a .			
N 2: T : d ' a ' . a ' a ' : a . ' . E ç . a ' c . a a . ' a ç d b ab . ' . ' a d ç . ' . ' : ç : , b ç a d . .			

B.2 Radio Regulatory Compliance

T d c c ' ' a : ' a d . ' a . ' . ' . D ç 2014/53/EU.

WARNING

- **Keep a distance of at least 20 cm away from the equipment when wireless function is in use.**

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