iMEC8 Vet

Portable Multi-Parameter Veterinary Monitor

Operator's Manual

CE 0123

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Intellectual Property Statement

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mindray MINDRAY MINDRAY

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Manufacturer's Responsibility

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WARNING

- **This equipment must be operated by skilled/trained clinical professionals.**
- **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.**

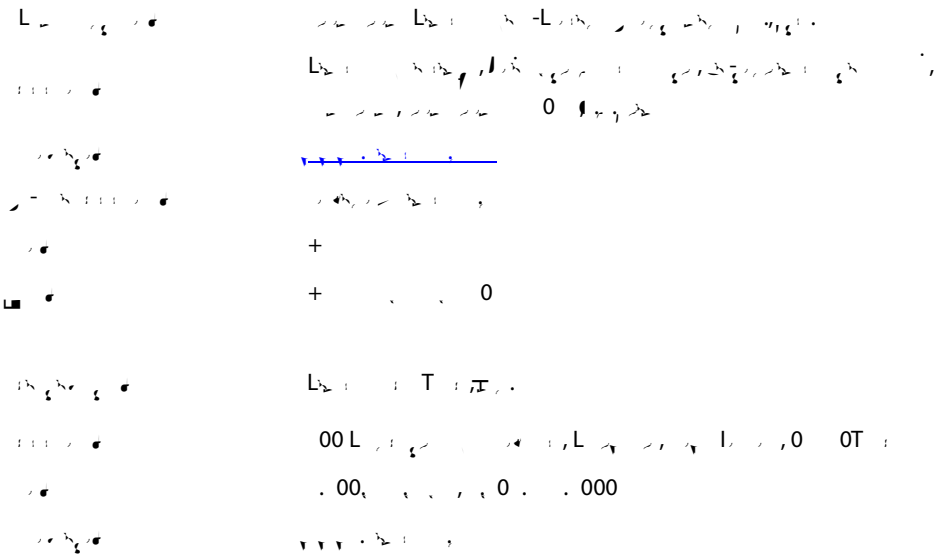
Service

(00) (0) - 000

NOTE

- **Upon request, Mindray provides circuit diagrams, component part lists, descriptions, calibration instructions, or other information which assist the user's appropriately qualified technical personnel to repair those parts of the equipment which are designated by Mindray DS USA, Inc. as repairable.**

Company Contact



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Illustrations

Conventions

- ***Italic text***
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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

1.1.2 Warnings

WARNING

- **The device is intended for animal monitoring by trained personnel in the specified places.**
- **This equipment is used for one patient at a time.**
- **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.**
- **The equipment must be connected to a properly installed power outlet with protective earth contacts only. If the installation does not provide for a protective earth conductor, disconnect it from the power line and operate it on battery power, if possible.**
- **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).**
- **Do not open the equipment housings. All servicing and future upgrades must be carried out by the personnel trained and authorized by our company only.**
- **Do not come into contact with patients during defibrillation, otherwise serious injury or death could result.**
- **Do not touch the equipment's metal parts or connectors when in contact with the patient, otherwise patient injury may result.**
- **Before connecting the equipment to the power line, check that the voltage and frequency ratings of the power line are the same as those indicated on the equipment's label or in this manual.**
- **Do not rely exclusively on the audible alarm system for monitoring. Adjustment of alarm volume to a low level or off may result in a hazard to the patient. Remember that alarm settings should be customized according to different patient situations and always keeping the patient under close surveillance is the most reliable way for safe monitoring.**
- **The physiological data and alarm messages displayed on the equipment should be reviewed by a clinician before being used for diagnostic interpretation and treatment.**
- **To avoid inadvertent disconnection, route all cables in a way to prevent a stumbling hazard. Wrap and secure excess cabling to reduce risk of entanglement or strangulation by patients or personnel.**
- **Ensure that the monitor is supplied with continuous electric power during work. Sudden power failure may lead**

1.1.3 Cautions

CAUTION

- **To ensure patient safety, use only parts and accessories specified in this manual.**
- **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.**
- **Magnetic and electrical fields are capable of interfering with the proper performance of the equipment. For this reason make sure that all external devices operated in the vicinity of the equipment comply with the relevant EMC requirements. Mobile phones, X-ray equipment or MRI devices are a possible source of interference as they may emit higher levels of electromagnetic radiation.**
- **Before connecting the equipment to the power line, check that the voltage and frequency ratings of the power line are the same as those indicated on the equipment's label or in this manual.**
- **Always install or carry the equipment properly to avoid damage caused by drop, impact, strong vibration or other mechanical force.**
- **Dry the equipment immediately in case of rain or water spray.**

1.1.4 Notes

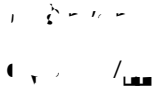
NOTE

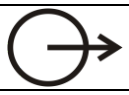
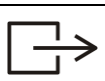
- **Put the equipment in a location where you can easily see the screen and access the operating controls.**
- **Keep this manual in the vicinity of the equipment so that it can be obtained conveniently when needed.**
- **The software was developed in compliance with IEC 60601-1-4. The possibility of hazards arising from software errors is minimized.**
- **When disposing of the packaging material, be sure to observe the applicable waste control regulations and keep it out of children's reach.**
- **This manual describes all features and options. Your equipment may not have all of them.**

1.2 Equipment Symbols

NOTE

- **Some symbols may not appear on your equipment.**

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2 The Basics

2.1 Monitor Description

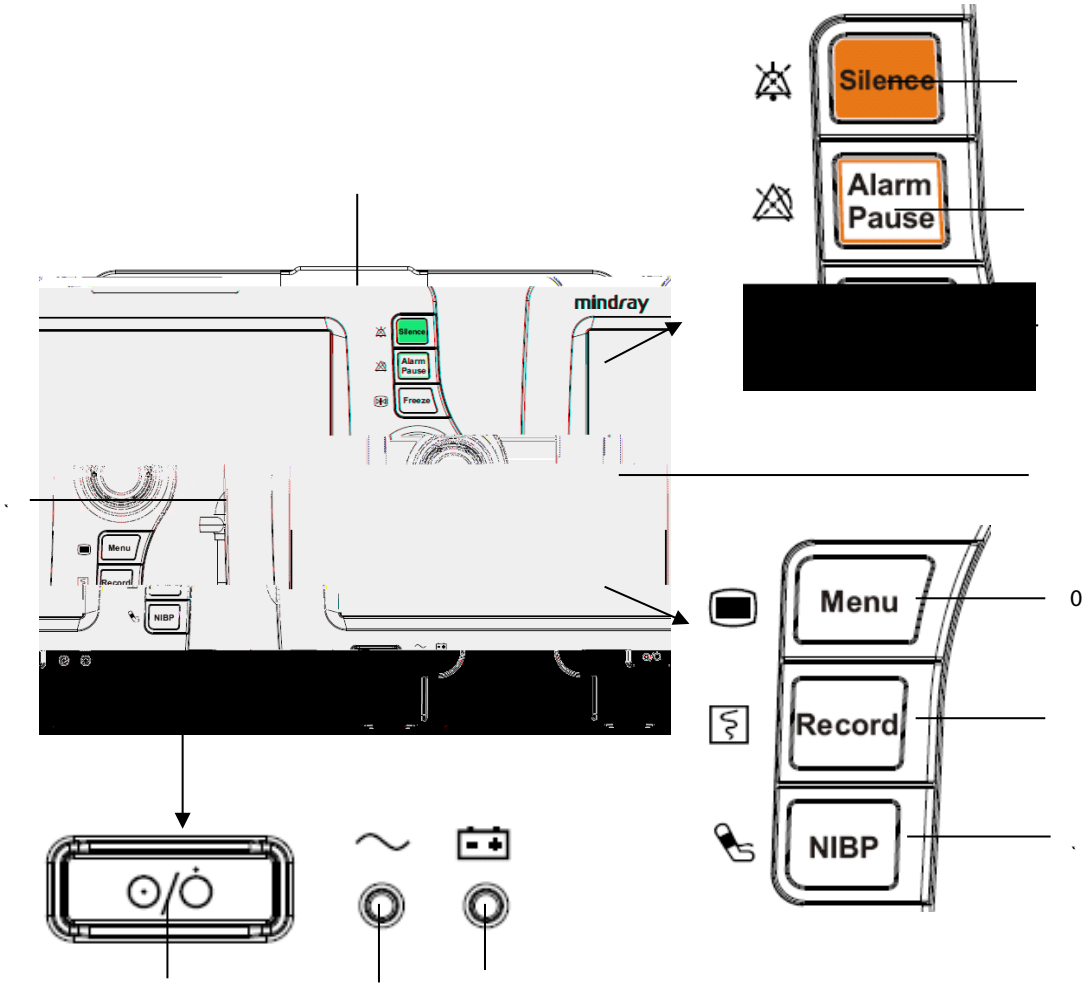
2.1.1 Intended Use

[redacted]

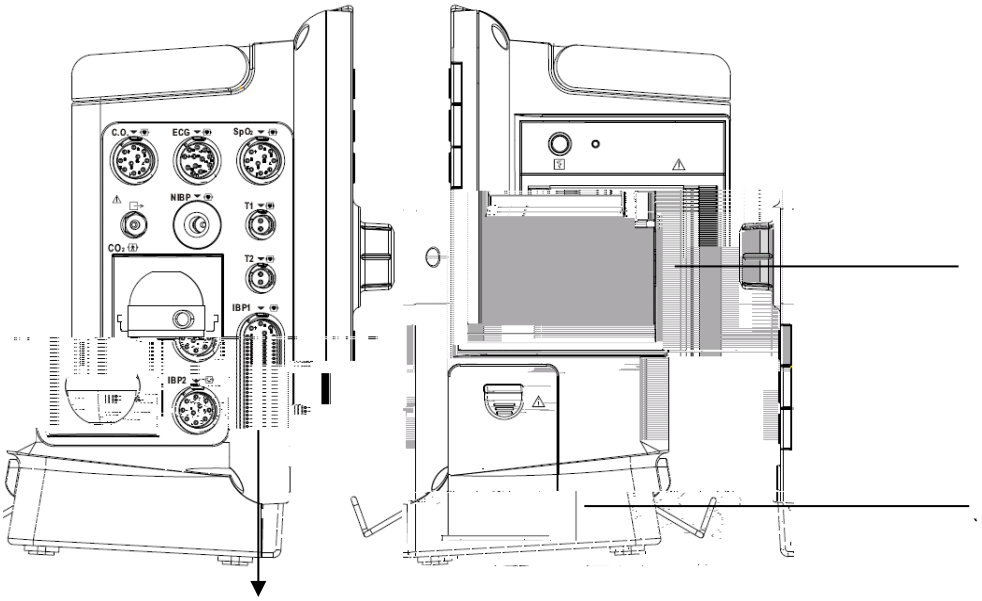
WARNING

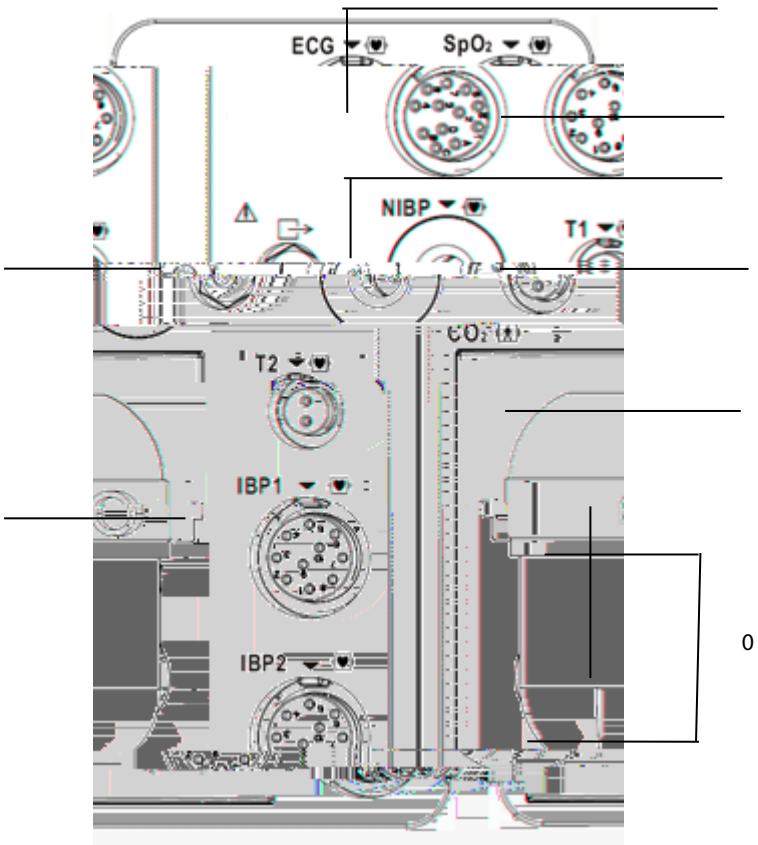
- **This monitor is intended for use only by clinical professionals or under their guidance. It must only be used by persons who have received adequate training in its use. Anyone unauthorized or untrained must not perform any operation on it.**

2.2 Front View

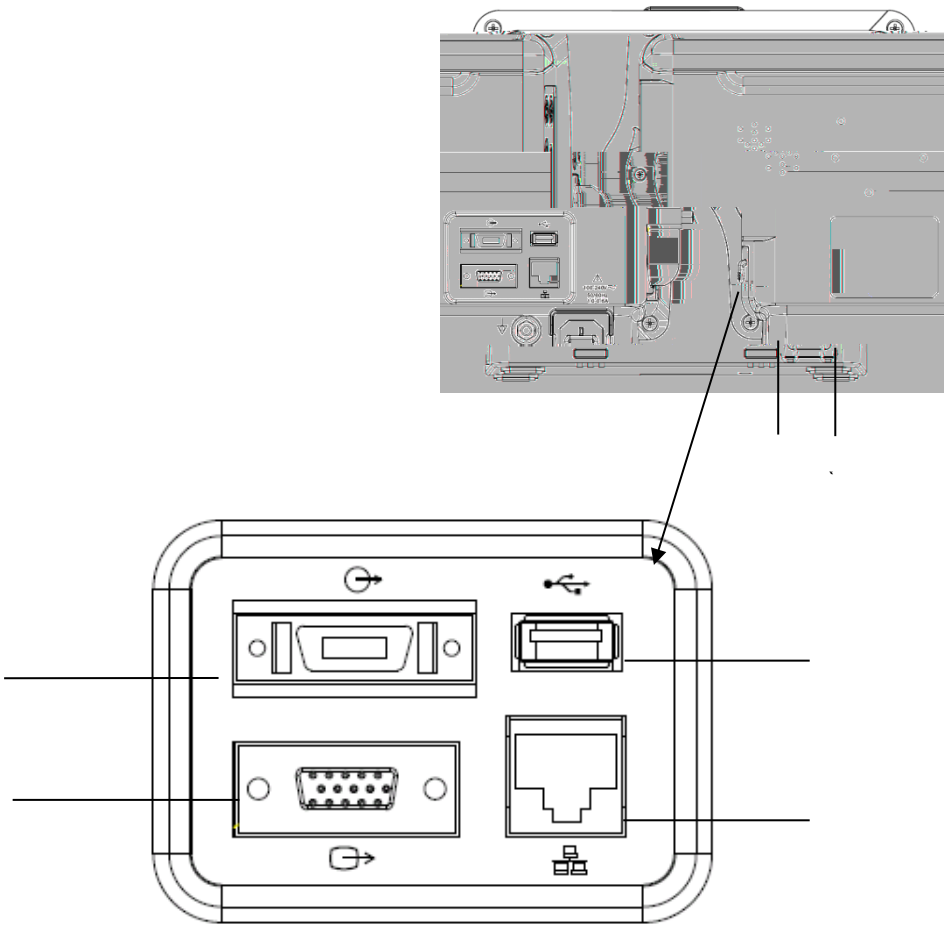


2.3 Side View

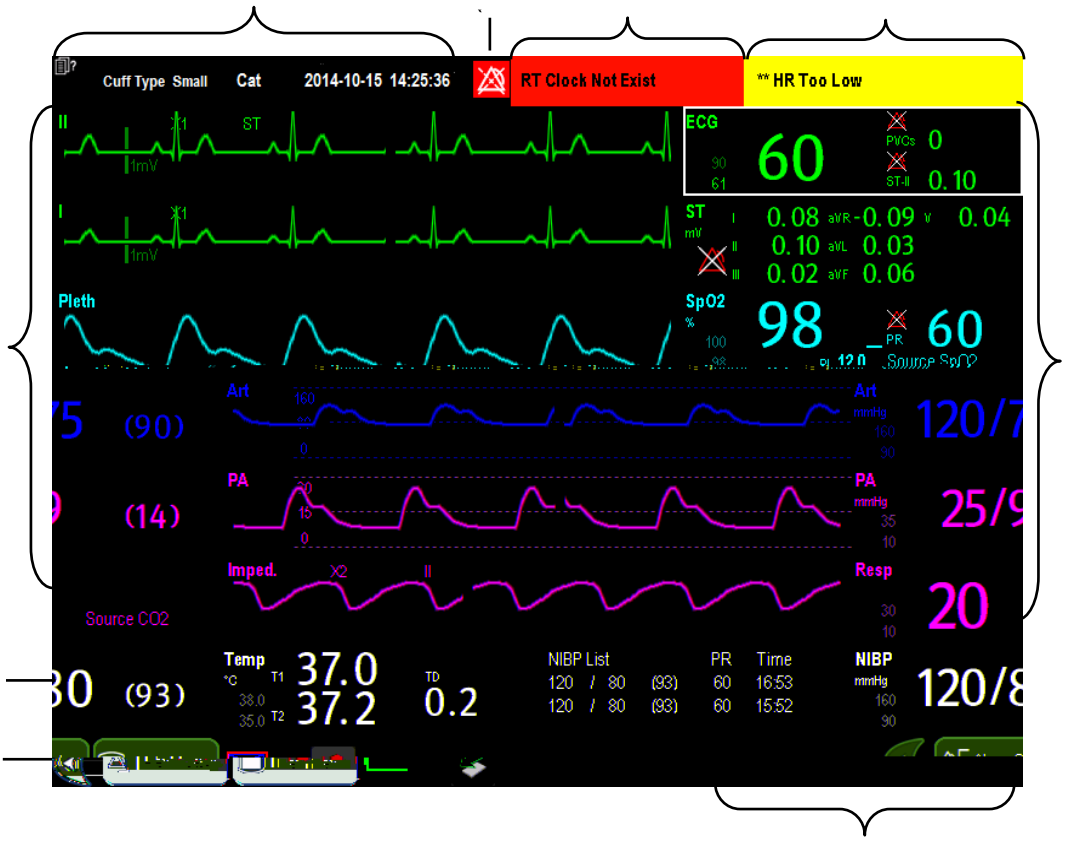




2.4 Rear View



2.5 Display Screen



Patient Setup **Patient Demographics**

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21 Batteries.

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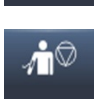
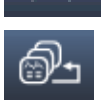
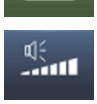
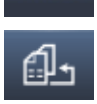
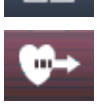
2.6 QuickKeys











Parameters

Unit Setup

. **Main Menu** → **Maintenance** → **Manage Configuration >>** → → **Ok** .

. **Manage Configuration** **Edit Config.>>** .

. **Edit** .

. **Screen Setup >>** .

. **Select QuickKeys** .

3 Basic Operations

3.1 Installation

⚠ WARNING

- **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 60601-1-1 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 with IEC 60601-1-1. If you have any question, please contact Mindray.**
- **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 manufacturers or else an expert in the field, to ensure the necessary safety of patients and all devices concerned will not be impaired by the proposed combination.**

⚠ CAUTION

- **The equipment shall be installed by personnel authorized by Mindray.**

NOTE

- **The software copyright of the equipment 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.**

3.1.1 Unpacking and Checking

NOTE

- **Save the packing case and packaging material as they can be used if the equipment must be reshipped.**

WARNING

- **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, please verify that the packages are intact, especially the packages of single use accessories. In case of any damage, do not apply it to patients.**

3.1.2 Environmental Requirements

CAUTION

- **Make sure that the operating environment of the equipment meets the specific requirements. Otherwise unexpected consequences, e.g. damage to the equipment, could result.**
- **Put the equipment in a location where you can easily see the screen, access the operating controls, and disconnect the equipment from AC power.**

3.2 Getting Started

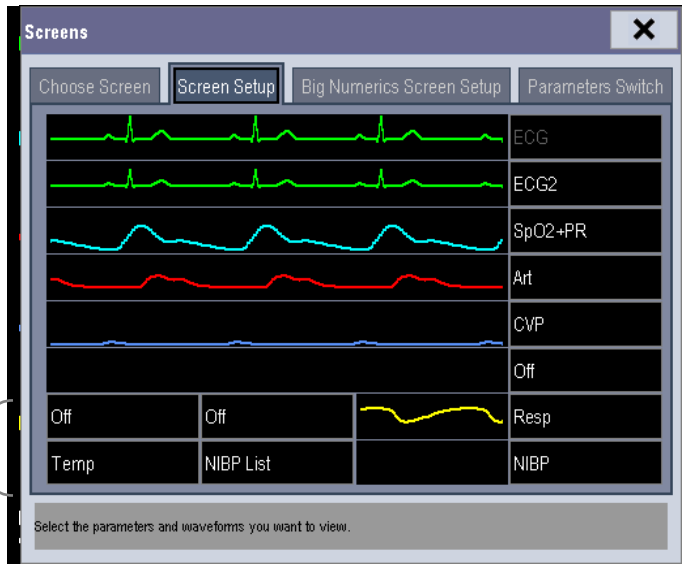
3.2.1 Turning Power On

3.2.2 Starting Monitoring

- **Patient Cat.** , **Paced** ,

3.6 Setting the Screen

Screen Setup **Main Menu]→ Screen Setup → Screen Layout >>**



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- **Screen Setup**
- **Parameters Switch**

WARNING

- **The parameters whose positions are not allocated in the [Screen Setup] window will not be displayed. However, the monitor can still give alarms of these parameters.**

3.7 Using the On-screen Keyboard

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3.8 Using the Timer

Main Menu → Screen Setup>> → Screen Layout >> **Screens**

Screen Setup

Timer ***3.6 Setting the Screen***

- **Start** **Pause**
- **Clear**
- **Setup** **Timer Setup** **Direction** **Up** **Down** **Down**
  - **Run Time(h:min:s)** 0 00
  - **Reminder Vol.** 0 0 0.0 0

3.9 Using the Main Menu

Main Menu]

3.10 Changing General Settings

3.10.2 Changing Language

. Main Menu → Maintenance >> → User Maintenance >> →

. User Maintenance Language

.

3.10.3 Adjusting the Screen Brightness

. Main Menu → Screen Setup >> → Brightness .

.

3.10.4 Showing/Hiding Online Help Information

. Main Menu → Screen Setup >> .

. Help On Off .

3.10.5 Setting the Date and Time

. Main Menu → Maintenance >> → System Time >> .

.

. Date Format yyyy-mm-dd , mm-dd-yyyy dd-mm-yyyy .

. Time Format 24h 12h .

CAUTION

- **If you change the date and time, the display time of stored trends and events will be changed accordingly.**

3.10.6 Adjusting Volume

Alarm Volume

. Alarm Setup → Others

lect the [

Key Volume

Volume Setup **Main Menu → Screen Setu >>** .

Key Volume

QRS Volume

ECG Setup **SpO2 Setup** .

Volume Setup **→ Others >>** ,

QRS Volume **Beat Vol**

3.11 Setting Parameters

3.11.1 Switching the Parameters On/Off

[Main Menu → Maintenance >> → User Maintenance >> → **→ Others** .

Para Switch Authority **Unprotected** **Protected** .

- **Para Switch Authority** **Unprotected** , **Main Menu → Screen Setup>> → Screen Layout >> → Parameters Switch** .
- **Para Switch Authority** **Protected** , **Main Menu → Maintenance >> → User Maintenance >> →** **→ Others >> → Parameters Switch Setup >>** .

NOTE

- **ECG is always selected, and you cannot switch it off.**

3.11.2 Accessing the Parameters Menu

Parameters >>

3.12 Operating Modes

3.12.1 Monitoring Mode

3.12.2 Night Mode

- **Battery Too Low System will shut down soon. Please replace the batteries or use the external power.**

⚠WARNING

- **During privacy mode, all audible alarms are suppressed and the alarm light is deactivated at the monitor. Alarms sound only at the central station.**

3.12.4 Demo Mode

Main Menu → Maintenance >> .

Demo >> **Ok** .

Main Menu → Maintenance >> → Exit Demo .

⚠ WARNING

- **The Demo mode is for demonstration purposes only. To avoid simulated data being mistaken for a monitored patient's data, you must not change into Demo mode during monitoring. Otherwise, improper monitoring and delayed treatment could result.**

3.12.5 Standby Mode

4 Managing Patients

4.1 Admitting a Patient

. **Patient Setup** , **Main Menu** → **Patient Setup >>** .

. **Discharge Patient** .

. **Discharge Patient** . **Admit Patient**

◆ **Yes**

4.2 Quick Admitting a Patient

T , **Quick Admit**

. **Patient Setup** , **Main Menu]→ Patient Setup >>** .

. **Quick Admit** .T **Ok**

- **Yes**
- **No**

. **Ok** .

4.3 Querying and Obtaining Patient Information

,T ,

. **Main Menu]→ Maintenance >> → User Maintenance >> → → Gateway Comm Setting >>** , **IP Address** **Port** . **ADT Query** **On** .

. **Patient Demographics** .

. **Obtain Patient Info. >>** **Obtain Patient Information** .

. T **Query** .

. **Import** .

. **Obtain Patient Information** .

NOTE

- **The option [Obtain Patient Information] is available in the [Patient Setup] menu only when [ADT Query] is set to [On].**
- **When obtaining patient information from HIS, the monitor will only update patient information. The patient's monitoring data is not changed and the patient is not discharged.**

4.4 Associating Patient Information

NOTE

- **A keyword takes effect only when being defined in eGateway. Refer to *eGateway Integration Manager Installation Guide* for details.**
- **The monitor displays corresponding patient information only when all the keywords have been inputted.**

4.5 Editing Patient Information

. **Patient Setup** , **Main Menu → Patient Setup >>** .

. **Patient Demographics** .

. **Ok** .

4.6 Discharging a Patient

. **Patient Setup** , **Main Menu → Patient Setup >>** .

. **Discharge Patient** .

- **Ok** .
- **Standby** **Ok** .
- **Cancel** .

NOTE

- **Discharging a patient clears all data history in the monitor.**

4.7 Transferring a Patient

Others >> User Maintenance Transferred Data Length . 4 h . Data Transfer Method . Off .

⚠WARNING

- **Do not discharge a patient before the patient is successfully transferred.**
- **After a patient is successfully transferred, check if the patient settings (especially patient category, paced status and alarm limits settings, etc) on the monitor are appropriate for this patient.**

NOTE

- **The system automatically switches on the HR alarm and lethal arrhythmia alarm after transferring the patient data.**

4.7.1 Transferring Data from the Monitor to a USB Drive

. Main Menu → Patient Setup >> .

. Transfer to Storage Medium Ok .

. Transfer to storage medium successful. Please remove the USB drive. .

.

4.7.2 Transferring Data from a USB Drive to the Monitor

- **Transfer**
- **Cancel Transfer**
- **Unload USB Drive**

Transfer. **Patient Demographics** **Ok**

- **Yes**
- **No**

Transfer from storage medium successful.

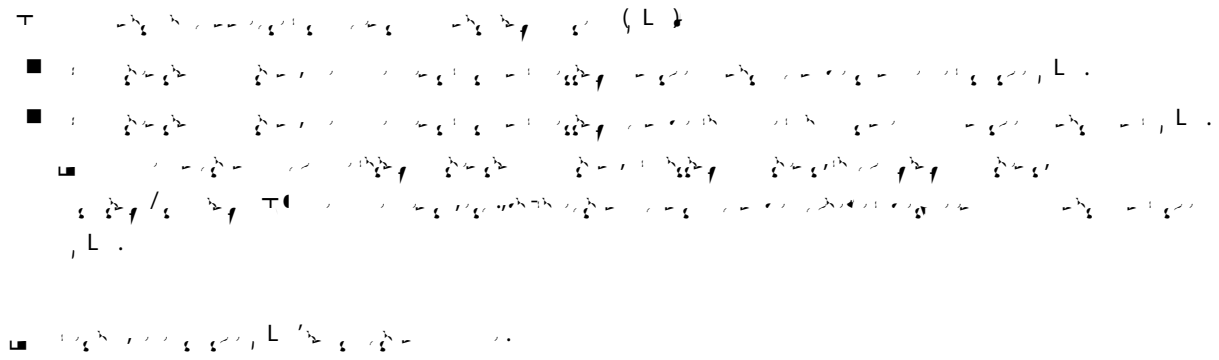
WARNING

- **The USB drive you use may have a write-protect function. In this case, please make sure the USB drive for data transfer is in read/write mode.**
- **Do not discharge a patient before the patient is successfully transferred.**
- **Do not remove the storage medium during the data transfer process. Otherwise, data files may be damaged.**
- **After a patient is successfully transferred, check if the patient settings (especially patient category, paced status and alarm limits settings, etc) on the monitor are appropriate for this patient.**

NOTE

- **The system automatically switches on the HR alarm and lethal arrhythmia alarm after transferring the patient data.**

4.8 Connecting to a Central Monitoring System



5 Managing Configurations

5.1 Introduction

WARNING

- **The configuration management function is password protected. The configuration management tasks must be performed by clinical professionals.**

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■ ***Configuration Default Information***.

5.2 Entering the [Manage Configuration] Menu

Maintenance >> → **Manage Configuration >>** **Ok** .

5.3 Setting Default Configuration

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Select Default Config. **Manage Configuration** .

Select Default Config. **Load the Latest Config.** **Load Specified Config.** .

Load Specified Config. ( ) **Default Canine Config.** **Defaults** ( ).

NOTE

- **To see which configuration is restored when the monitor starts, enter the main screen to check the prompt information at the lower part of the screen (displayed for about 10 seconds).**

5.4 Saving Current Settings

Save Current Settings As >> **Manage Configuration** .

Ok .

5.5 Editing a Configuration

Edit Config. >> **Manage Configuration** .

Config. on USB drive >> **Edit** .

Alarm Setup >> , **Screen Setup >>** **Parameter >>** .

Save **Save as** **Save** **Save as** .

5.6 Deleting a Configuration

. **Delete Config. >>** **Manage Configuration** .

. **Config. on USB drive >>**

Delete .

. **Yes** .

5.7 Transferring a Configuration

. **Export Config. >>** **Manage Configuration** .

. **Export Config.** **User Maintenance Settings**

Export .

. **Import Config. >>** **Manage Configuration** .

. **Import Config.** **User Maintenance Settings**

Import .

5.8 Loading a Configuration

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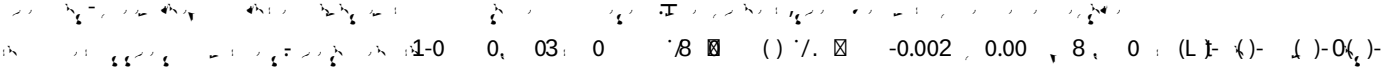
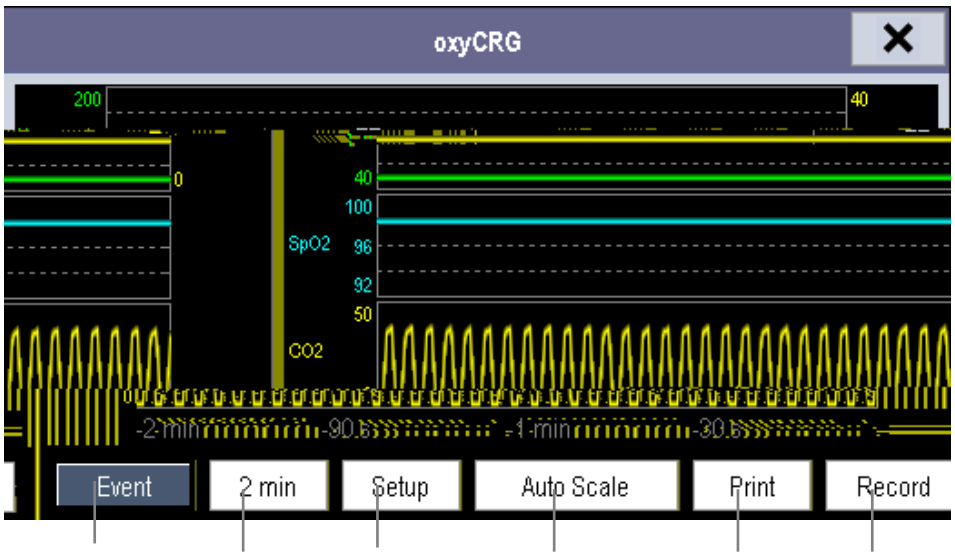
- **Minitrends**
- **Screens** → **Choose Screen** → **Minitrends Screen** →
- **Main Menu** → **Screen Setup** → **Screen Layout** → **Choose Screen** → **Minitrends Screen** → .





Review **OxyCRG Event** .

1 min , **2 min** , **4 min** , **8 min** .

Setup . **Setup**

Auto Scale .

Print

6.4 Viewing Other Patients

6.4.1 Care Group

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View Other Patient ,

- **Others** ,

- Screens → Choose Screen → View Others Screen → ,
- Main Menu → Screen Setup → Screen Layout → Choose Screen → View Others Screen → .

Setup View Other Patient .

Connected Monitor List , .

6.4.2 Viewing the Care Group Overview Bar

View Other Patient .

- .
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View This Patient

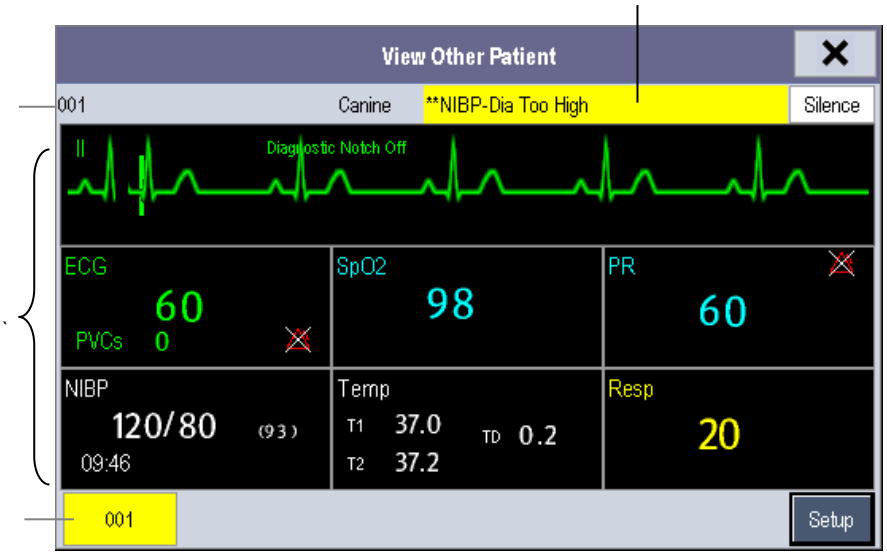
View Other Patient .

Alarms .

6.4.3 Understanding the [View Other Patient] Window

View Other Patient .

View Other Patient .



View Other Patient

Switch to Parameter Area , Switch to Waveform Area .

Alarm Information List

■

■

WARNING

- **The data presented in the [View Other Patient] window may have a delay. Do not rely on this window for realtime data.**

6.5 Understanding the Big Numerics Screen

Screens , , Main Menu → Screen Setup → Screen Layout → Choose Screen .

Big Numerics → .

Screens , → Big Numerics Screen Setup

FOR YOUR NOTES

7 Alarms

⚠WARNING

- **A potential hazard can exist if different alarm presets are used for the same or similar equipment in any single area, e.g. an intensive care unit or cardiac operating room.**
- **If your monitor is connected to the central monitoring system (CMS) or other monitors, alarms can be displayed and controlled remotely. Remote suspension, inhibition, or silence of monitor alarms via the CMS or other monitors may cause a potential hazard. For details, refer to the operator's manual of the CMS and the other monitors.**

7.1 Alarm Categories

7.2 Alarm Levels

	Physiological alarms	Technical alarms
High level		
Medium level		
Low level		

7.3.3 Flashing Numeric

7.3.4 Audible Alarm Tones

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NOTE

- **When multiple alarms of different levels occur simultaneously, the monitor will select the alarm of the highest level and give visual and audible alarm indications accordingly.**

7.3.5 Alarm Status Symbols

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7.4 Alarm Tone Configuration 6

WARNING

- **When the alarm sound is switched off, the monitor will give no audible alarm tones even if a new alarm occurs. Therefore the user should be very careful about whether to switch off the alarm sound or not.**
- **Do not rely exclusively on the audible alarm system for monitoring. Adjustment of alarm volume to a low level may result in a hazard to the patient. Always keep the patient under close surveillance.**

7.4.4 Changing the Alarm Tone Pattern

. **Main Menu → Maintenance >> → User Maintenance >>** →

. **Alarm Setup >>** **Alarm Setup** .

. **Alarm Sound** **ISO** , **Mode 1** **Mode 2** .

T

7.4.5 Setting the Reminder Tones

. **Main Menu → Maintenance >> → User Maintenance >>** →

. **Alarm Setup >>** **Alarm Setup** .

. **Reminder Tones** **On** , **Off** **Re-alarm** . **Re-alarm**

Reminder Interval .

Reminder Interval **1 min** , **2 min** **3 min** .

T **Main Menu → Alarm Setup >> → Others** **Alarm Setup** , → **Others** . **Reminder Vol**

High , **Medium**

7.5.1 Setting Alarm Properties for All Parameters

Alarm Setup >> → Parameters .

On/Off **Record**

⚠WARNING

- **Make sure that the alarm limits settings are appropriate for your patient before monitoring.**
- **Setting alarm limits to extreme values may cause the alarm system to become ineffective.**

7.5.2 Adjusting Alarm Limits Automatically

Alarm Setup >> → Parameters → Auto Limits → Ok .

Module	Parameter	Low alarm limit	High alarm limit	Auto alarm limits range

Module	Parameter	Low alarm limit	High alarm limit	Auto alarm limits range
( )	T	0. +	0. +	0
	T -L	L 0. +	L 0. +	0 0
		(0.)	(+ 0.)	
		(0.)	(+ 0.)	
T / / T / / / / ( )	T -	( ) ( )	(+) 0 ( )	
	T	( ) 0 ( )	(+) 0 ( )	0 0
	T -L	(L) ( )	(L +) ( )	0
	T -	0.		0
	T	0.		
	T -L	L 0.	L	
T / T / / / T / ( )	T -L	L 0.	L	0

0 0

.0 L

7.5.3 Setting Alarm Delay Time

Alarm Delay

Others Alarm Setup .

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-
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-
- L
-

Apnea Delay ST Alarm Delay Others Alarm Setup .

7.5.4 Setting SpO_2 Technical Alarm Delay

Tech. Alarm Delay Others Alarm Setup Off , 5 s , 10 s
15 s .

7.5.5 Setting Recording Length

Others Alarm Setup
Recording Length 8 s , 16 s 32 s.

- 8s.
- 16s.
- 32s.

7.5.6 Intubation Mode

Intubation Mode .

7.6 Pausing Alarms

-
-
-
-
-

1 min , **2 min** , **3 min** , **5 min** , **10 min** , **15 min** , **Permanent** .

Main Menu → **Maintenance >>** → **User Maintenance >>** →

Alarm Setup >> → **Alarm Pause Time**

7.7 Switching Off All Alarms

7.8 Silencing the Alarm Sound

7.11 Testing Alarms

7.12 When an Alarm Occurs

7.13 Using Care Group Alarms

7.13.1 Care Group Auto Alarms

7.13.2 Setting Care Group Alert Tone

. Screen Setup >> → Screen Layout >> → Choose Screen .

. Choose Screen View Others Screen .

. View Other Patient Setup>> , Alert Tone Repeat , Once Off .

7.13.3 Silencing Care Group Alarms

View Other Patient

Alarm Setup User Maintenance .

Silence . View Other Patient

WARNING

- **Silencing care group alarms may cause a potential hazard. Please act with caution.**

8 Monitoring ECG

8.1 Introduction

8.2 Safety

⚠ WARNING

- **Use only ECG electrodes and cables specified by the manufacturer.**
- **When connecting electrodes and/or patient cables, make sure that the connectors never come into contact with other conductive parts, or with earth. In particular, make sure that all of the ECG electrodes are attached to the patient, to prevent them from contacting conductive parts or earth.**
- **Periodically inspect the electrode application site to ensure skin quality. If the skin quality changes, replace the electrodes or change the application site.**
- **Use defibrillator-proof ECG cables during defibrillation.**
- **Do not touch the patient, or table, or instruments during defibrillation.**

NOTE

- **After defibrillation, the screen display recovers within 10 seconds if the correct electrodes are used and applied in accordance with the manufacturer's instructions for use.**
- **Interference from a non-grounded instrument near the patient and electrosurgery interference can cause problems with the waveform.**

8.3 Preparing to Monitor ECG

8.3.1 Preparing the Patient and Placing the Electrodes

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(0 0).

8.3.3 ECG Lead Placements.

8.3.2 Choosing AHA or IEC Lead Placement

. ECG Setup .

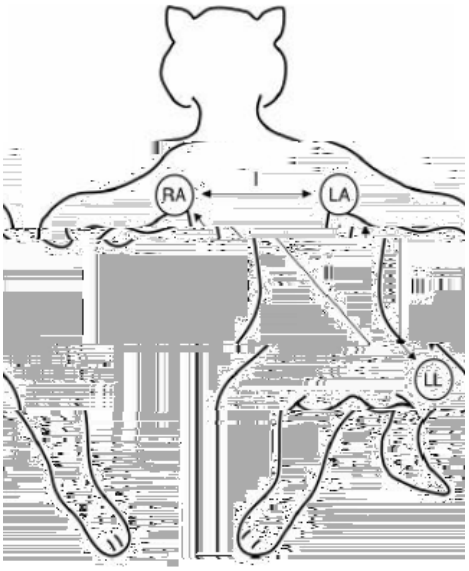
. Others → Lead Set 3-lead , 5-lead , Auto .

. Main Menu → Maintenance >> → User Maintenance >> .

. Others >> → ECG Standard AHA IEC .

8.3.3 ECG Lead Placements

3-Leadwire Electrode Placement



- .
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American Standard		European Standard	

5-Leadwire Electrode Placement

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

NOTE

- **The exploring lead is used for diagnostic purposes as needed. Otherwise, it may be left unplugged.**

[illegible]

American Standard		European Standard	
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

⚠ WARNING

- **When using electrosurgical units (ESU), patient leads should be placed in a position that is equidistant from the Electrosurgery electrotome and the grounding plate to avoid burns to the patient. Never entangle the ESU cable and the ECG cable together.**
- **When using electrosurgical units (ESU), never place ECG electrodes near to the grounding plate of the ESU, as this can cause a lot of interference on the ECG signal.**

8.3.4 Checking Paced Status

Paced Yes . Paced No

- Main Menu → Patient Setup → Patient Demographics ,
- → Others >> , Paced Yes No .

Please confirm the pace of patient

⚠Warning

- **For paced patients, you must set [Paced] to [Yes]. If it is incorrectly set to [No], the monitor could mistake a pace pulse for a QRS and fail to alarm when the ECG signal is too weak. Do not rely entirely on 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].**
- **The auto pacer recognition function is not applicable to pediatric and neonatal patients.**

8.4 Understanding the ECG Display

- **Auto**: **Alm Source** **Auto**

8.5.3 Setting the ECG Lead Set

Lead Set **ECG Setup** → **Others>>** . **Lead Set** **Auto**

8.5.4 Choosing an ECG Display Screen

Screens **Choose Screen**

- **Normal Screen**:
- **ECG 7-Lead Full-Screen**:
- **ECG 7-Lead Half-Screen**:

Normal Screen .

Screens → **Screen Setup** .

ECG1 Casc.

8.5.5 Changing the ECG Filter Settings

Filter **ECG Setup**

- **Monitor**:
- **Diagnostic**:
- **Surgery**: **Surgery**
- **ST**:

⚠Warning

- **The [Diagnostic] filter is recommended when monitoring a patient in an environment with slight interference only.**

8.5.6 Setting the Notch Filter

Filter Diagnostic Notch Filter

Filter Diagnostic

Filter Diagnostic

Others >> .

Notch Filter

- Strong
- Weak
- Off

Notch Filter Main Menu → Maintenance >> → User Maintenance >> →

Others >> → Notch Freq. 50Hz 60Hz

8.5.7 Changing the Pacer Reject Settings

ECG Setup → Others>> → Pacer Reject On Off .

Paced Yes

- Pacer Reject
-

Paced No Pacer Reject

8.5.8 Changing ECG Wave Settings

ECG Setup

- ECG , ECG1 , ECG2
  - „

8.5.9 Enabling Smart Lead Off

/ **Others >>** **ECG Setup** **Smart Lead Off**
On **Off**

8.5.10 Setting the Alarm Level for ECG Lead Off Alarms

Alarm Setup >> **User Maintenance** . **ECGLeadOff Lev.** .

8.5.11 Adjusting QRS Volume

Others >> **ECG Setup**

⚠ WARNING

- **The ST algorithm has been tested for accuracy of the ST segment data. The significance of the ST segment changes need to be determined by a clinician.**

8.6.1 Switching ST On and Off

. **ECG Setup** **ST Analysis >>** .

. **ST Analysis** **On** **Off** .

■

■

■

■

8.6.2 Changing ST Filter Settings

Diagnostic **ST** . , **Filter** **ST** **Diagnostic** **ST** .

Filter **Monitor** **Surgery** , **Monitor** **Surgery** **Diagnostic** **ST** ,

NOTE

- **When the filter mode is switched to [Diagnostic], the notch filter automatically switches to [Off]. In this case, you can still set the notch filter to [On] manually.**
- **When the filter mode is [Monitor], [Surgery] or [ST], the notch filter is fixed to [On], and can not be changed.**

8.6.3 Understanding the ST Display

8.6.3.1 ST Segment

. **ST Analysis** . **ST Analysis** **On** .

. **Screen Setup** **Screens** . **ST Segment** .

ST Analysis .

8.6.4 Saving the Current ST Segment as Reference

Save Ref. ST Analysis .T 0

NOTE

- **If the memory is full and you do not delete a group before saving a new one, the oldest saved group is deleted automatically.**

8.6.5 Changing the Reference Segment

Change Ref.

8.6.6 Deleting a Reference Segment

Delete Ref. ST Analysis Ok

8.6.7 Recording the ST Segment

Record ST Analysis .

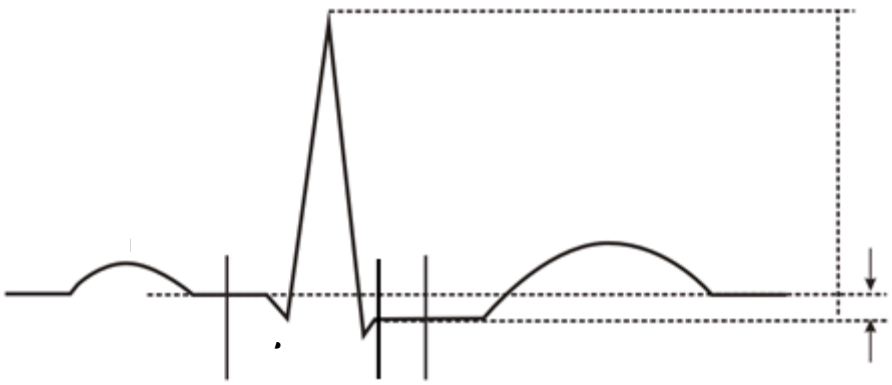
8.6.8 Changing the ST Alarm Limits

ST Alarm Setup >> ST Analysis

8.6.9 Setting the ST Alarm Delay Time

Others Alarm Setup .

8.6.10 Adjusting ST Measurement Points



WARNING

- **Always make sure that the positions of ST measurement points are appropriate for your patient.**

. **ST Analysis** **Adjust ST Point >>** **Adjust ST Point**

. **View Leads**

. **ISO**, **J** **ST Point**

- **J+60/80ms**, **J+40ms**, **J+60ms** **J+80ms**. **J+60/80ms**

8.7.2 Changing Arrhythmia Alarm Settings

→ **ECG Setup** → **Arrh. Analysis >>** **Alm Lev** **High**, **Med**, **Low** **Message**, **Alarm Setup** **User Maintenance**

WARNING

- **If you switch off all arrhythmia analysis alarms, the monitor cannot give any arrhythmia analysis alarm. Always keep the patient under close surveillance.**

8.7.3 Changing Arrhythmia Threshold Settings

→ **Arrh. Analysis >>** → **Arrh. Threshold**,

Arrh. event	Range	Default	Step	Unit
	00	0		/
	0			
	0 00	0		
	0	0		
	0 00	00		
	0	0		
				/
	00 00	0		
				/
	. .0 .		/	
				/
	0	0		

8.7.4 Setting the Extended Arrhythmia

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Main Menu → **Maintenance >>** → **User Maintenance >>** → → **Alarm Setup >>**, **Extended Arrh.** **Enable** **Disable**. **Extended Arrh.** **Disable**

⚠CAUTION

- **Set [Extended Arrh.] to [Disable] when the monitor is connected to the Central Monitoring System of version prior to 06.01.00. Failure to do so may cause the Central Monitoring System to be unable to display extended arrhythmia related alarms normally when extended arrhythmia occurs.**

8.7.5 Reviewing Arrhythmia Events

Review

8.8 ECG Relearning

8.8.1 Initiating an ECG Relearning Manually

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→ **Relearn** . **ECG Learning**

⚠CAUTION

- **Take care to initiate ECG relearning only during periods of normal rhythm and when the ECG signal is relatively noise-free. If ECG learning takes place during ventricular rhythm, the ectopics may be incorrectly learned as the normal QRS complex. This may result in missed detection of subsequent events of V-Tach and V-Fib.**

8.8.2 Automatic ECG Relearning

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-
-
- **Stop Calibrating ECG**
-
-

9 Monitoring Respiration (Resp)

9.1 Introduction

9.2 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 monitor to detect apnea. If you set the detection level too low, the monitor 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 EN 60601-1-2 (Radiated Immunity 3V/m), field strengths above 1V/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.**

9.3 Understanding the Resp Display

Resp Waveform

Resp Setup

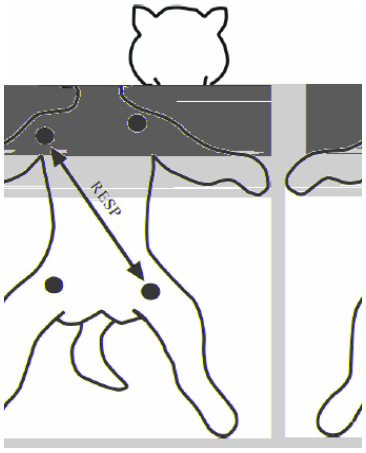
NOTE

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

9.4 Placing Resp Electrodes

NOTE

- **Please select the ECG cable with no resistance for RESP monitoring.**
- **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.**
- **Place the electrodes to try to avoid crossing the liver area and the ventricles of the heart with the electrodes line.**



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9.4.1 Optimizing Lead Placement for Resp

9.4.2 Cardiac Overlay

9.4.3 Abdominal Breathing

9.4.4 Lateral Chest Expansion

9.5 Choosing the Respiration Lead

Resp Setup **Resp Lead** **I**, **II** **Auto**.

9.6 Changing the Apnea Alarm Delay

Resp Setup **Apnea Delay**

Apnea Delay

9.7 Changing Resp Detection Mode

Resp Setup **Detection Mode** **Auto** **Manual**.

- **Upper Line**

  Lower Line

9.8 Changing Resp Wave Settings

⚠WARNING

- **When monitoring in manual detection mode, make sure to check the respiration detection level after you have increased or decreased the size of the respiration wave.**

Resp Setup

- **Gain**
- **Sweep**

9.9 Setting RR Source

Resp Setup

RR Source **Auto**

Auto

RR Source **Auto**

RR Source

Option	Description

9.10 Setting alarm properties

Alarm Setup >> **Resp Setup**

9.11 Switching Resp Measurement On/Off

Imped. Resp Measure. ON **Resp Setup**

Imped. Resp Measure. OFF **Resp Setup** **Yes**

Measurement OFF

10 Monitoring PR

10.1 Introduction

10.2 Setting the PR Source

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-
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SpO Setup]

PR Source Auto

Auto

PR Source Auto . IBP

10.3 Selecting the Active Alarm Source

Alm Source ECG

Setup SpO Setup

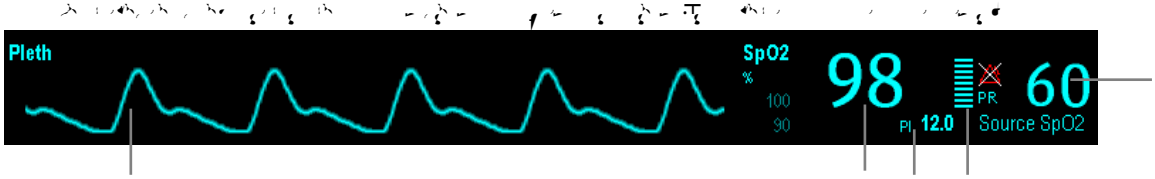
- HR /
- PR /
- Auto Alm Source Auto

10.4 QRS Tone

Beat Vol SpO Setup

11 Monitoring SpO_2

11.1 Introduction



11.2 Safety

⚠ WARNING

- **Use only SpO_2 sensors specified in this manual. Follow the SpO_2 sensor's instructions for use and adhere to all warnings and cautions.**
- **When a trend toward patient deoxygenation is indicated, blood samples should be analyzed by a laboratory co-oximeter to completely understand the patient's condition.**
- **Do not use SpO_2 sensors during magnetic resonance imaging (MRI). Induced current could potentially cause burns. The sensor may affect the MRI image, and the MRI unit may affect the accuracy of the oximetry measurements.**
- **Prolonged continuous monitoring may increase the risk of undesirable changes in skin characteristics, such as irritation, reddening, blistering or burns. Inspect the sensor site every two hours and move the sensor if the skin quality changes. Change the application site every four hours. For patients with poor peripheral blood circulation or sensitive skin, inspect the sensor site more frequently.**

11.3 Identifying SpO_2 Modules

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- L L
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NOTE

- **The Mindray SpO_2 module is not available in North America. The Masimo SpO_2 module is available in North America only.**

11.4 Applying the Sensor

Tongue Sensor Placement

NOTE

- **Be sure that the sensor cable is positioned along the side of the animal's face and body to avoid entanglement with the animal.**

11.5 Changing SpO_2 Settings

11.5.1 Accessing SpO_2 Menus

SpO Setup

11.5.2 Adjusting the Desat Alarm

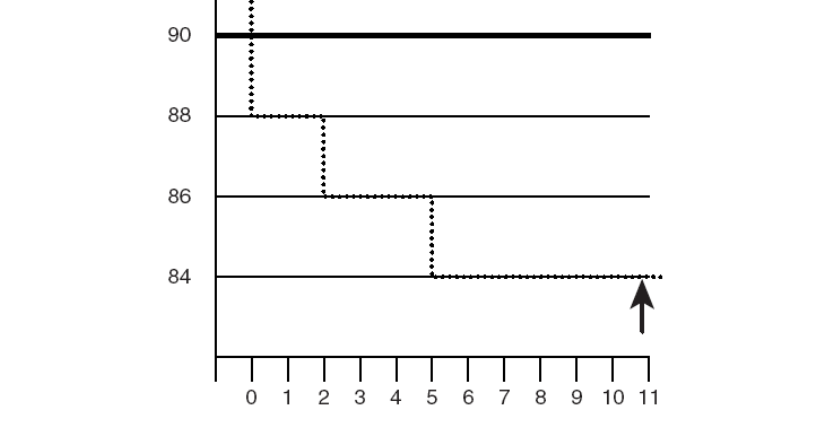
Alarm Setup >> **SpO Setup**

Desat .

SpO Desat

11.5.3 Setting SpO_2 Sensitivity

- Sensitivity: Normal, Maximum. SpO_2 Setup
  Sensitivity: Maximum



11.5.7 Changing the Speed of the Pleth Wave

SpO Setup **Sweep**

11.5.8 Setting the Alarm Level for SpO_2 Sensor Off Alarm

Alarm Setup >> **User Maintenance** **SpO2SensorOff Lev.**

11.5.9 Setting the SpO_2 Tone Mode

Others >> User Maintenance SpO Tone Mode 1 Mode 2 .

WARNING

- **The same SpO_2 tone mode shall be used for the same monitors in a single area.**

11.6 Measurement Limitations

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11.7 Masimo Information

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This posting serves as notice under 35 U.S.C.§287(a) for Masimo patents: http://www.masimo.com/patents.htm.

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11.8 Nellcor Information

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This posting serves as notice under 35 U.S.C.§287(a) for Covidien patents: http://www.covidien.com/patents.

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FOR YOUR NOTES

12 Monitoring NIBP

12.1 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.**

12.2 Safety

WARNING

- **Be sure to select the correct patient category setting for your patient before measurement. Do not measure NIBP on patients with sickle-cell disease or any condition where skin damage has occurred or is expected.**
- **Use clinical judgement 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.**
- **Do not use the NIBP cuff on a limb with an intravenous infusion or arterial catheter in place. This could cause tissue damage around the catheter when the infusion is slowed or blocked during cuff inflation.**
- **If you doubt the NIBP readings, determine the patient's vital signs by alternative means and then verify that the monitor is working correctly.**

12.3 Measurement Limitations

12.5 Setting Up the NIBP Measurement

12.5.1 Preparing to Measure NIBP

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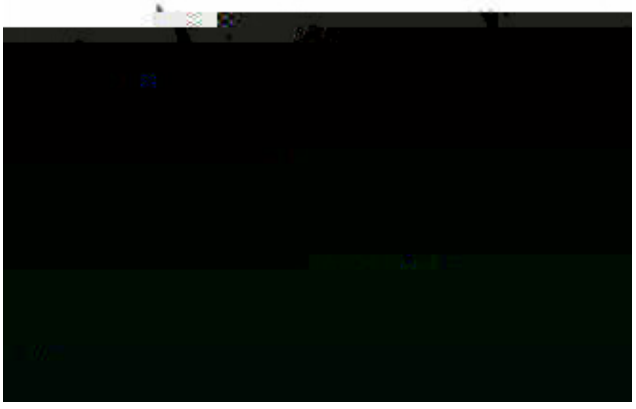
- ◆ 0%
  0% 0%
- ◆

NOTE

- **The use of the equipment is restricted to one patient at a time.**



Interval 20min

NIBP Setu Clock On .

NOTE

- **The clock function is available only when the auto measurement internal is 5 minutes or more.**

12.5.5 Starting a STAT Measurement

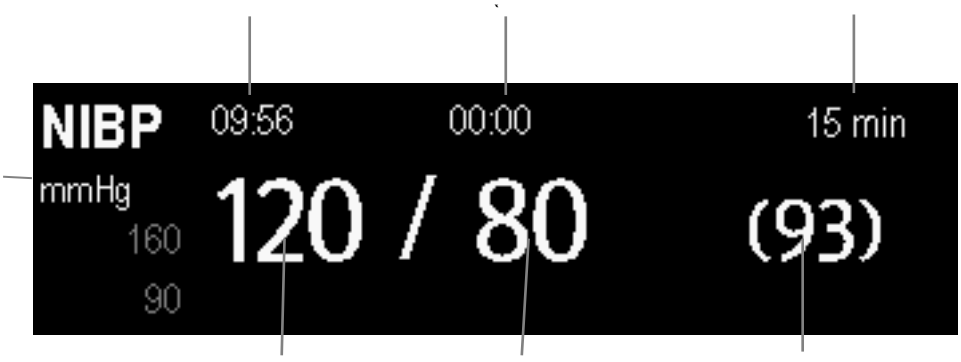
NIBP Setup

NIBP STAT .

⚠WARNING

- **Continuous non-invasive blood pressure measurements may cause purpura, ischemia and neuropathy in the limb with the cuff. Inspect the application site regularly to ensure skin quality and inspect the extremity of the cuffed limb for normal color, warmth and sensitivity. If any abnormity occurs, move the cuff to another site or stop the blood pressure measurements immediately.**

12.6 Understanding the NIBP Numerics



12.7 Changing NIBP Settings

NIBP Setup .

12.7.1 Setting the Initial Cuff Inflation Pressure

NIBP Setup Initial Pressure

12.7.2 Setting NIBP Alarm Properties

Alarm Setup >> NIBP Setup .

12.7.3 Displaying NIBP List

Screens → Screen Setup . NIBP List .

NIBP List .

12.7.4 Setting the Pressure Unit

Unit Setup >> User Maintenance Press. Unit
mmHg kPa .

12.7.5 Switching On NIBP End Tone

NIBP Setup .

12.8 Assisting Venous Puncture

VeniPuncture >> NIBP Setup Cuff Press.

VeniPuncture .

Stop All .

13 Monitoring Temp

13.1 Introduction

13.2 Safety

⚠ WARNING

- **Verify that the probe detection program works correctly before monitoring. Unplug the temperature probe cable from the T1 or T2 connector, and the monitor can display the message [T1 Sensor Off] or [T2 Sensor Off] and give alarm tones correctly.**

13.3 Making a Temp Measurement

13.4 Understanding the Temp Display

Alarm Setup

Temp Setup

13.5 Setting the Temperature Unit

Unit Setup >> **User Maintenance** **Temp Unit]**

°C **°F**

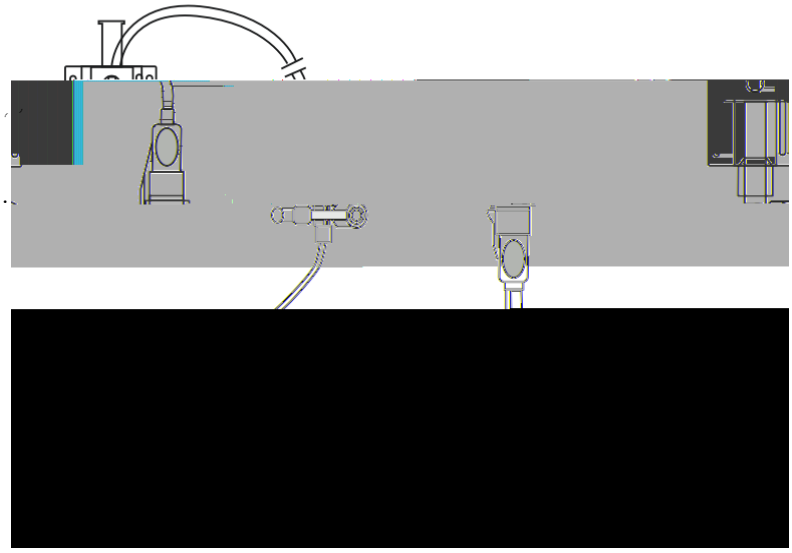
14 Monitoring IBP

14.1 Introduction

14.2 Safety

WARNING

- **Use only pressure transducers specified in this manual. Never reuse disposable pressure transducers.**
- **Make sure that the applied parts never contact**



Art Zero >> → Zero **Zero**

Zero IBP **Zero All Channels**

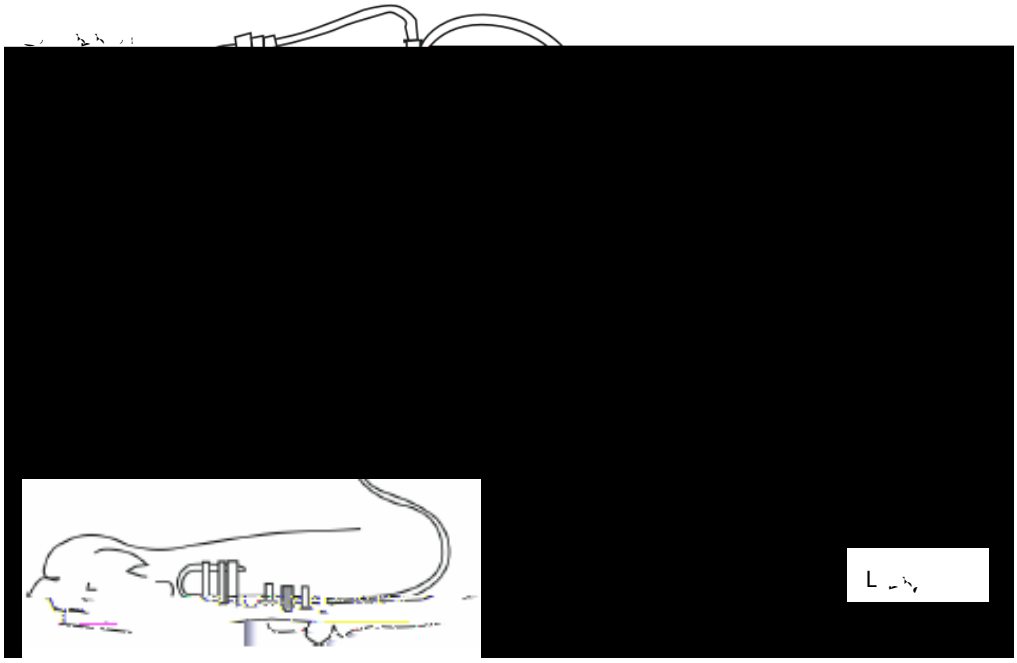
NOTE

- **Your hospital policy may recommend that the ICP transducer is zeroed less frequently than other transducers.**

14.4 Setting Up the Pressure Measurement

WARNING

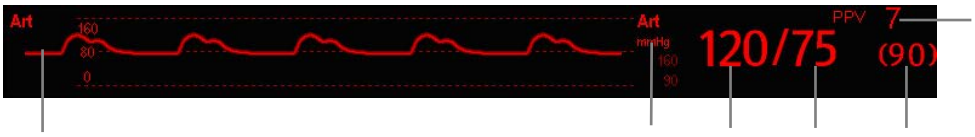
- **If air bubbles appear in the tubing system, flush the system with the infusion solution again. Air bubbles may lead to inaccurate pressure readings.**



WARNING

- **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.**

14.5 Understanding the IBP Display



14.6 Changing IBP Settings

14.6.1 Changing a Pressure for Monitoring

Label

Label	Description	Label	Description

NOTE

- **When two pressures are deteted having the same label, the monitor changes one pressure label to a currently unused one.**

14.6.2 Setting the Pressure Label Order

IBP Label Order Setup >>

Defaults **IBP Label Order Setup**

Sensitivity High, Med Low.

14.6.5 Setting Up the IBP Wave

- Sweep
- Scale Auto
- Filter

14.6.6 Enabling PPV Measurement and Setting PPV Source

PPV Measurement On.

WARNING

- **This monitor can calculate PPV from beat-to-beat values of any arterial pulsatile pressure. The circumstances under which the calculation of a PPV value is clinically meaningful, appropriate and reliable must be determined by a physician.**
- **The clinical value of the derived PPV information must be determined by a physician. According to recent scientific literature, the clinical relevance of PPV information is restricted to sedated patients receiving controlled mechanical ventilation and mainly free from cardiac arrhythmia.**
- **PPV calculation may lead to inaccurate values in the following situations:**
  - **at respiration rates below 8 rpm**
  - **during ventilation with tidal volumes lower than 8 ml/kg**
- **for patients with acute right ventricular dysfunction ("cor pulmonale").**

14.7 Overlapping IBP Waveforms

Main Menu → Screen Setup>> → Screen Layout>> Screens

Screen Setup

IBP Overlap

Overlapping Waveform Setup

- Left Scale [Right Scale
- CVP Scale
- PA Scale
- Gridlines On Off
- Sweep

14.8 Measuring PAWP

14.8.1 Preparing to Measure PAWP

PA

PAWP

NOTE

- **After entering the PAWP measurement window, the monitor will turn off the PA alarm automatically.**

14.8.2 Setting Up the PAWP Measurement

Freeze

Adjust

Confirm

Next Measure .

⚠WARNING

- **Prolonged inflation can cause pulmonary hemorrhage, infarction or both. Inflate the balloon for the minimum time necessary to get an accurate measurement.**
- **If the PAWP is greater than the PA (systolic), deflate the balloon and report the incident in accordance with hospital policy. Because the pulmonary artery could be accidentally ruptured, and the PAWP value derived will not reflect the patient's hemodynamic state, but will merely reflect the pressure in the catheter or balloon.**

14.8.3 Understanding the PAWP Setup Menu

Setup **PAWP Setup**

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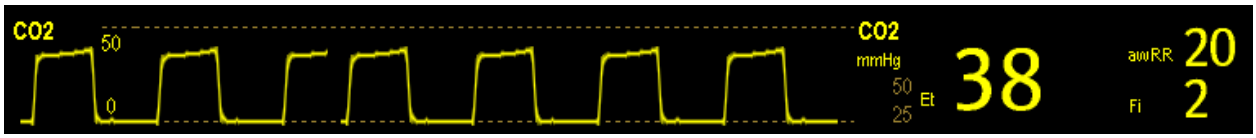
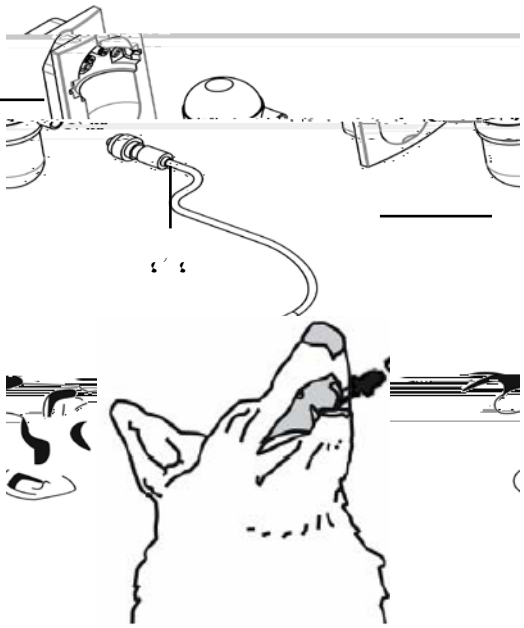
15 Monitoring Carbon Dioxide (CO_2)

15.1 Introduction



15.2 Measuring CO_2

15.2.1 Making a Sidestream CO_2 Measurement



CO2 Sensor Warmup

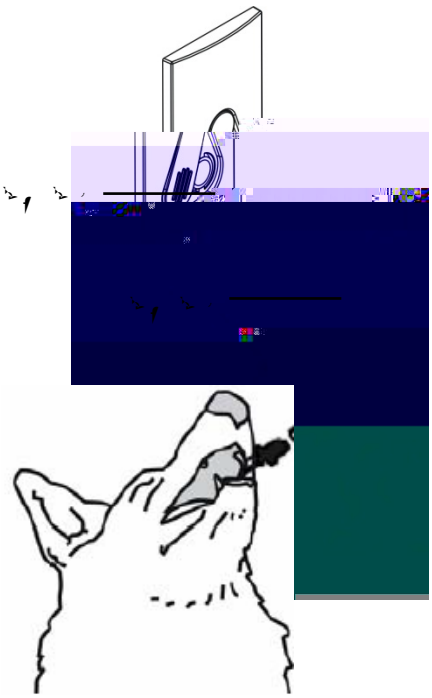
CAUTION

- **The watertrap collects water drops condensed in the sampling line and therefore prevents them from entering the module. If the collected water reaches a certain amount , you should drain it to avoid blocking the airway.**
- **The watertrap has a filter preventing bacterium, water and secretions from entering the module. After long-term use, dust or other substances may compromise the performance of the filter or even block the airway. In this case, replace the watertrap. It is recommended to replace the watertrap once a month, or when the watertrap is found leaky, damaged or contaminated.**

NOTE

- **To extend the lifetime of the watertrap and module, disconnect the watertrap and set the operating mode to standby mode when CO_2 monitoring is not required.**

15.2.2 Making a Microstream CO_2 Measurement



15.3 Changing CO_2 Settings

15.3.1 Accessing CO_2 Menus

CO2 Setup

15.3.2 Entering the Standby Mode

-
-
-

Operating Mode **CO2 Setup**
Standby **Measure** .

-

CO₂ Setup Auto Standby

15.3.3 Setting the CO_2 Unit

Unit Setup >> User Maintenance CO₂ Unit

mmHg , % kPa .

15.3.4 Setting up Gas Compensations

WARNING

- **Make sure that the appropriate compensations are used. Inappropriate compensations may cause inaccurate measurement values and result in misdiagnosis.**

CO₂ Setup .

- O₂ Compen
- N₂O Compen
- Des Compen

15.3.5 Setting up Humidity Compensation

( ), ( ).

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

$_2$( ) $_2$(%) (47)/100

15.3.6 Setting the Apnea Alarm Delay

CO2 Setup **Apnea Delay** **Apnea Delay**

WARNING

- **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.**

15.3.7 Choosing a Time Interval for Peak-Picking

CO_2 Setup **Max Hold** **Single Breath**, **10 s**, **20 s** **30 s** ( ).

- **Single Breath**
- **10 s** **20 s**, **30 s** 0, 0 0

15.3.8 Setting the Flow Rate

CO2 Setup **Flow Rate**.

WARNING

- **Please consider the patient's actual bearing capability and select the appropriate flow rate when setting the flow rate.**

15.3.9 Setting up the CO_2 Wave

CO_2 Setup

- **Wave Type** **Draw** **Fill**
  - **Draw**
  - **Fill**
- **Sweep**
- **Scale**.

15.4 Setting RR Source

CO2 Setup .

RR Source **Auto**

RR Source ***Setting RR Source***

Resp.

15.5 Setting Barometric Pressure Compensation

).

. **Main Menu → Maintenance >> → User Maintenance >> →** **→ Maintain CO2 >> → Calibrate CO2 >>** .

Barometric Pressure

15.6 Measurement Limitations

-
- L
- 0 (00)
-

15.7 Leakage Test

Need maintenance. Enter CO_2 setup menu. **User Maintenance >> → e>>etdswm (eEMC /H2 [(o)8 i)-1 7reas pOce Cea**

15.8 Troubleshooting the Sidestream CO_2 Sampling System

15.9 Removing Exhaust Gases from the System

WARNING

- **Anesthetics: When using the Sidestream or Microstream CO_2 measurement on patients who are receiving or have recently received anesthetics, connect the outlet to a scavenging system, or to the anesthesia machine/ventilator, to avoid exposing medical staff to anesthetics.**

15.10 Zeroing the Sensor

15.12 Oridion Information

Microstream

Oridion Patents

No Implied License

16 Freezing Waveforms

16.1 Freezing Waveforms

Freeze

16.2 Viewing Frozen Waveforms

- **Scroll**
- **Scroll**

0 s

16.3 Unfreezing Waveforms

- **Freeze**

16.4 Recording Frozen Waveforms

Freeze **Wave 1** **Wave 2** **Wave 3**

Record

17 Review

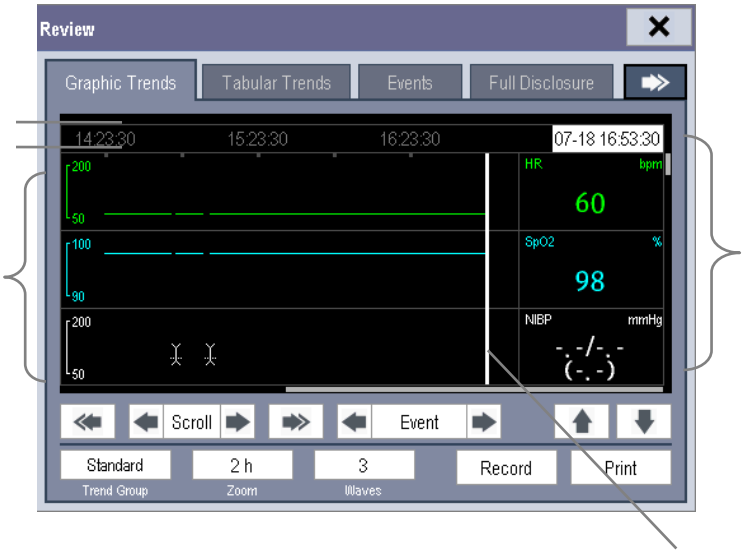
17.1 Accessing Respective Review Windows

. Review , , Main Menu → Review >> .

. Graphic Trends , Tabular Trends , Events , Full Disclosure ,

17.2 Reviewing Graphic Trends

Review Graphic Trends ,



.

/

- Trend Group Custom 1 Custom 2 Define Trend Group .
- Zoom .
- Waves .
-
  - Scroll ,
  -

- **Event**,
- **Record**.

17.3 Reviewing Tabular Trends

Review **Tabular Trends**

- **Trend Group** **Custom 1** **Custom 2** **Define Trend Group**.
- **Interval**
  - **5 s** **30 s**
  - **1 min**, **5 min**, **10 min**, **15 min**, **30 min**, **1 h**, **2 h** **3 h**
  - **NIBP**
- **Scroll**

- **Event**,
- **Record**. **Record Setup** **Record**,

17.4.2 Reviewing Events

Review **Events**

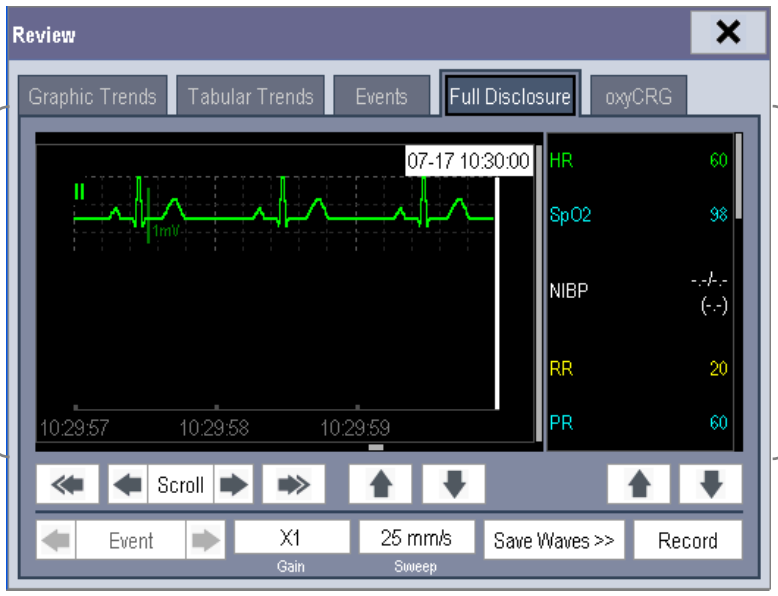
- **Event** .
- **Level** .

Details

- **Record** .
- **Events List** .

17.5 Reviewing Waveforms

Review **Full Disclosure**



- **Save Waves >>**
-
  - **Scroll** .
  -
- **Gain**
- **Sweep**
- **Record** .
- **Event** .

18 Calculations

18.1 Introduction

-
-
-
-
-

Main Menu → Calc >>, Calculations

NOTE

- **The calculation feature is independent of other monitoring functions and can be therefore used for patients being monitored by other monitors. Any operation in a calculation window does not affect the monitoring by the local monitor.**

WARNING

- **After the calculation is finished, verify the entered values are correct and the calculated values are appropriate. We assume no responsibility for any consequences caused by wrong entries and improper operations.**

18.2 Dose Calculations

18.2.1 Performing Calculations

. Main Menu → Calculations >> → Dose >>, Calculations → Dose >> .

. , Patient Cat. Drug Name

-
-
-
-
-
-

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

18.2.2 Selecting the Proper Drug Unit

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

18.2.3 Titration Table

[illegible] **Titration Table >>** [illegible] **Dose Calculation** [illegible]

[illegible]

- **Reference**
- **Interval**
- **Dose Type**

[illegible]

[illegible]

- [illegible]
- [illegible]

18.2.4 Drug Calculation Formulas

Abbreviation	Unit	Formula

18.3 Oxygenation Calculations

18.3.1 Performing Calculations

. **Main Menu** → **Calculations >>** → **Oxygenation >>** , **Calculations** → **Oxygenation >>** .

. **Calculate** .

- **Range**
- ---.

Oxygenation Calculation

- **Press. Unit** , **Hb Unit** **OxyCont Unit**
- **Record** .
- **Review** .

18.3.2 Entered Parameters

Abbreviation	Unit	Full spelling
	%	
	%	
	%	

Abbreviation	Unit	Full spelling
L		

18.3.3 Calculated Parameters and Formulas

Abbreviation	Unit	Full spelling	Formula
			0.00
( )			
	%		00 ( ) /

Ventilation Calculation

- **Press. Unit**
- **Record**
- **Review**

18.4.2 Entered Parameters

Abbreviation	Unit	Full spelling
	%	
L		

18.4.3 Calculated Parameters and Formulas

Abbreviation	Unit	Full spelling	Formula
			(L) / 00 / 00 (/ 00) /
			00

/

- **Calculate**
- **Range**
- ---

Hemodynamic Calculation

- **Record**
- **Review**.

18.5.2 Entered Parameters

Abbreviation	Unit	Full spelling

18.5.3 Calculated Parameters and Formulas

Abbreviation	Unit	Full spelling	Formula
			0.00
			0.0
			0.0
	%		

18.6 Renal Calculations

18.6.1 Performing Calculations

Main Menu → Calculations >> → Renal >>

18.6.3 Calculated Parameters and Formulas

Abbreviation	Unit	Full spelling	Formula
T	/		T T / 000
T	/		T T / 000
/	%		00 T /T
	/		T T /
	/		T T / (/ .) / 0
	%		00 T) / (T)
	/		T T / / 0
	/		T (T /) /
T			T /
T /	*		000 T /
T /			T /

* T /

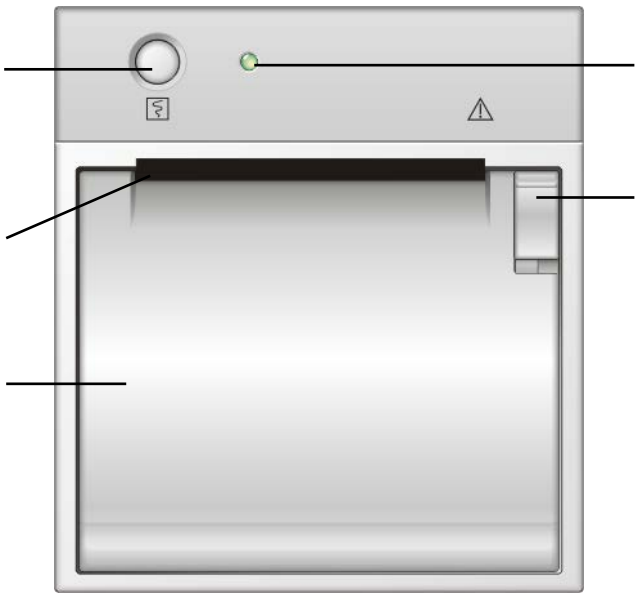
18.7 Understanding the Review Window

Review **Hemodynamic Calculation**

- ◀ ▶ ◀◀ ▶▶
- **Unit** **Unit** **Range** .
- **Original** **Calc** .

19 Recording

19.1 Using a Recorder



19.2 Overview of Recording Types

19.3 Starting and Stopping Recordings

-
- **Record**

-
- **Alarm** **Alm Rec**

-
- **Clear All Tasks** **Record Setup**

-
-
-

-
-

19.4 Setting up the Recorder

19.4.1 Accessing the Record Setup Menu

Main Menu → **Record Setup >>** , **Record Setup** .

19.4.2 Selecting Waveforms for Recording

, **Waveform 1** , **Waveform 2** **Waveform 3** **Record Setup** **Off** .

19.4.3 Setting the Realtime Recording Length

Record Setup , **Length** **8 s** **Continuous** .

- **8 s**
- **Continuous**

19.4.4 Setting the Interval between Timed Recordings

Record Setup **Interval**

19.4.5 Changing the Recording Speed

Record Setup **Paper Speed**

19.6 Removing Paper Jam

19.7 Cleaning the Recorder Printhead

⚠CAUTION

- **Do not use anything that may destroy the thermal element.**
- **Do not add unnecessary force to the thermal head.**

20 Other Functions

20.1 Analog Output

NOTE

- **The analog output feature is seldom applied in clinical applications. You can contact your service personnel for more details.**

20.2 Exporting the Log

T

T T

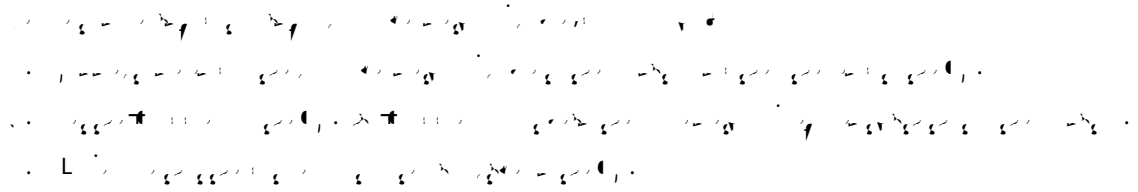
Main Menu → Maintenance >> →

20.3.2 Transferring Data by Different Means

NOTE

- **Never enter the data transfer mode when the monitor is in normal operation or performs monitoring. You must re-start the monitor to exit the data transfer mode.**

Transfer data via a crossover network cable

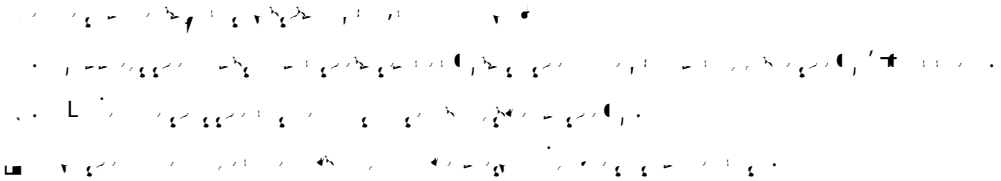


Main Menu → Patient Data >> → Transfer Data .

Yes

Start

Transfer data within a LAN



20.4 Nurse Call

(*PN: 009-003116-00*)

Main Menu → Maintenance >> → User Maintenance >> →

Others >> Osw l] tGhsM>2 2 (-)Tj0.](o)- 0 Tw 47 0 T(s)2/P MCID 27 >>Br a1.Select [

- Contact Type Normally Open Normally Closed .
  - Normally Open.
  - Normally Closed.
- Alm Lev
- Alarm Cat.

-
-
-

WARNING

- **To obtain the nurse call signal, use the nurse call cable (*PN: 009-003116-00*) we supply. Otherwise the nurse call function will not work and the monitor may be damaged.**
- **Do not rely exclusively on the nurse call system for alarm notification. Remember that the most reliable alarm notification combines audible and visual alarm indications with the patient's clinical condition.**

NOTE

- **If no setting is selected from [Alm Lev] or [Alarm Cat.], no nurse call signal will be triggered whatever alarms occur.**

20.5 Network Connection

20.5.1 Setting the Network Type

Main Menu → Maintenance>> → User Maintenance>> → → Network Setup >> → Monitor Network Setup>> Monitor Network Setup>> Network Type WLAN LAN .

20.5.2 Wireless Network

. Main Menu → Maintenance>> → User Maintenance>> → → Network Setup >> .

. Network Type WLAN .

. WLAN Setup >> WLAN Setup .

. Network Name (SSID) , Security Type , User Name [Password .

. Ok

. WLAN Test >> WLAN Setup .

IP Address **WLAN Test >>** .

Connection Test .

20.5.3 Setting the IP Address, Subnet Mask and Gateway

Network Setup

NOTE

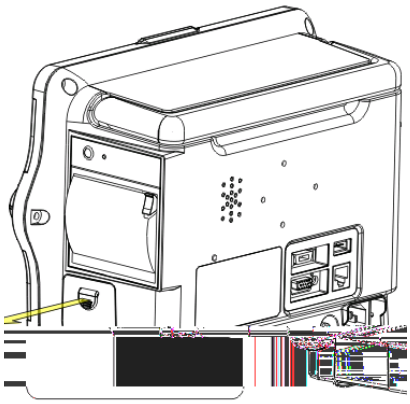
- **The design, installation, restruction and maintenance of the wireless network's distribution shall be performed by authorized service personnel of our company.**
- **The existence of obstacles (such as wall) will exert impact on data transferring or even cause network interruption.**
- **The Central Monitoring System is capable of connecting up to 32 bedside monitors via the wireless network.**

21 Batteries

21.1 Overview

-
-
-
-

21.2 Replacing a Battery



21.3 Battery Guidelines

-
-
-
-
-).
- 0% 0%

⚠WARNING

- **Keep the battery out of the reach of children.**
- **Use only the battery specified by the manufacturer.**
- **If the battery shows signs of damage or signs of leakage, replace it immediately. Do not use a faulty battery in the monitor.**
- **Use only specified batteries.**
- **Charge the batteries in this monitor.**
- **High ambient temperature shortens battery run time.**
- **Extremely high ambient temperature may cause battery overheat protection, resulting the monitor power off.**
- **The Lithium-ion batteries have a service life of three years. Please replace your battery when it reaches the end of its service life. Failure toreplace the battery may cause serious damage to your device from battery overheating.**

21.4 Battery Maintenance

Conditioning a Battery

NOTE

- **The battery charge level indicator does not indicate the capacity or operating time of the battery. It only indicates the current battery charge level. The actual battery capacity decreases over time with the use of the battery. For an old battery, its capacity and operating time may not fulfill battery specifications even the battery charge level indicates the battery is in full charge. Please replace the battery if its operating time is significantly lower than the specified time.**

Checking a Battery

NOTE

- **The battery might be damaged or malfunctioned if its operating time is too short after being fully charged. The operating time depends on the configuration and operation. For example, measuring NIBP more frequently will also shorten the operating time.**
- **When a battery has visual signs of damage, or no longer holds a charge, it should be replaced. Remove the old battery from the monitor and recycle it properly.**

21.5 Battery Recycling

⚠WARNING

- **Do not disassemble batteries, or dispose of them in fire, or cause them to short circuit. They may ignite, explode, leak or heat up, causing personal injury.**

22 Care and Cleaning

22.1 General Points

-
-
-
-
-

- (0%)
- (%)
- (0%)
- (0%)

22.3 Disinfecting

0%, 0%, ( ).

CAUTION

- **Never use EtO or formaldehyde for disinfection.**

23.2 Maintenance and Testing Schedule

Check/Maintenance Item		Recommended Frequency
Preventative Maintenance Tests		
Performance Tests		
Electrical Safety Tests		
Other Tests		

23.3 Checking Monitor and Module Information

Main Menu → Maintenance >> → Monitor Information >> .

Main Menu → Maintenance >> → Software Version >> .

23.4 ECG Verification

23.5 NIBP Leakage Test

23.6 NIBP Accuracy Test

23.7 CO_2 Test

23.8 Calibrating the Touchscreen

. **Main Menu** → **Maintenance >>** → **Cal. Touchscreen** .

. **Screen Calibration Completed!** **Ok**

23.9 Electrical Safety Tests

E Electrical

24 Accessories

[illegible]

WARNING

- **Use accessories specified in this chapter. Using other accessories may cause damage to the monitor or not meet the claimed specifications.**
- **Single-use accessories are not designed to be reused. Reuse may cause a risk of contamination and affect the measurement accuracy.**
- **Check the accessories and their packages for any sign of damage. Do not use them if any damage is detected.**

24.1 ECG Accessories

ECG Electrodes

Model	Quantity	Patient Category	Part No.
/	[illegible]	/	0 - 0- 0

12-Pin Separable Trunk Cables

Leadwire supported	Compatible with	Type	Part No.
- [illegible]	[illegible]	[illegible]	00 0- 0- [illegible] 0
- [illegible]	[illegible]	T -	00 0- 0- [illegible]
- [illegible]	/	[illegible]	0 0-000 -00
/ - [illegible]	[illegible]	[illegible]	00 0- 0- [illegible]
/ - [illegible]	[illegible]	T -	00 0- 0- [illegible]

Cable Sets

3-Electrode Cable Sets					
Type	**Compatible with**	**Model**	**Part No.**	**Length**	**Remark**
			00 0- 0-		
			00 0- 0-	0.	/
			00 0- 0-		
			00 0- 0-		
			0 0-000 -00		

5-Electrode Cable Sets					
Type	**Compatible with**	**Model**	**Part No.**	**Length**	**Remark**
			00 0- 0-	0.	/
			00 0- 0-		
			00 0- 0-		

24.2 SpO_2 Accessories

Extension Cable

Module type	Remarks	Part No.
		00 0- 0-

SpO_2 Sensors

Nellcor SpO_2 Module				
				0 - 0-

-
-
-

24.3 NIBP Accessories

Tubing

Type	Length	Part No.
[illegible]		[illegible] 00- 0-0
[illegible]		[illegible] 00- 0- 0

Reusable Cuff

Model	Limb Circumference (cm)	Bladder Width (cm)	Part No.
/	0[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible]	0 - -000 -0
/	[illegible]	/	0 - -000 -0
/	[illegible]	/	0 - -000 -0

Single-Patient Cuff

Model	Limb Circumference (cm)	Bladder Width (cm)	Part No.
[illegible] L 00[illegible]	[illegible]	[illegible]	00 - 0- 0 [illegible] (0 [illegible])
[illegible] L 00	[illegible] .0	[illegible]	00 - 0- 0 (0 [illegible])
[illegible] L 00[illegible]	[illegible] 0.	[illegible]	00 - 0- 0 (0 [illegible])
[illegible] L 00[illegible]	[illegible]	[illegible]	00 - 0- 0 (0 [illegible])
/	0[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible]	0 - -000 -0
/	[illegible]	[illegible] 0.	0 - -000 -0
/	[illegible]	/	0 - -000 -0
/	[illegible]	/	0 - -000 -0 (0 [illegible])

24.4 Temp Accessories

Temp Cable

Type	Model	Remark	Part No.
[illegible] ([illegible])	L [illegible] 0	[illegible] L [illegible] L [illegible]	00 - 0-
[illegible] L([illegible] (- [illegible])	L [illegible]	/	00 0- 0- 0

Temp Probes

Type	Model	Measurement Site	Part No.
	L 0		00 - 0-
	L 0		00 - 0-
	L 0		00 - 0-
	L 0		00 - 0-
	L		00 - 0- 0
	L		00 - 0- 0

24.5 IBP/ICP Accessories

Material		Part No.
( )		00 0- 0-
Accessories Kit No.	**Components**	**Part No.**
	0	00 - 0- 0
	0	00 - 0- 0
ICP		
Model	**Material**	**Part No.**
		00 0- 0-
		00 0- 0-

*

Manufacturer	Accessories
L (L)	L (00 0- 0-) L 0 L L L L 0 L (L L .)
	(0), (00 0- 0-) L ( ) (00) ( )
L	* (00 0- - 0) L L

Manufacturer	Accessories
T	L T (0- 0) (L T T .) (L T (0- 0) L (0- 00) L (0- 0)
	*T (00 0- -) L (L .) L

24.6 CO_2 Accessories

Sidestream CO_2 module

Material	Remark	Part No.
T		00- 0- 0 0
T		00- 0- 0
		00- 0- 0
		00- 0- 0
		L 0 - 0-
		L 0 - 0-
		L 0 - 0- 0
T		000- 0-0

Mainstream CO_2 Module

Material	Model	Remark	Part No.
	0		00 0- 0-
			00 0- 0-
	00		00 0- 0-
			00 0- 0-
	0		00 0- 0-
L	0	/	00 0- 0- 0
	0		00 0- 0-
	0	/	00 0- 0-
	-00	/	00 0- 0-
		/	00 0- 0-
	0		00- 0- 0 0

24.7 Others

Material	Part No.
[illegible]	0 -00000 -00
T [illegible]	00 -000
[illegible]	000- -00
[illegible]	00 -00 -00
[illegible]	00 -00 -00
[illegible]	00 -00 -00
[illegible]	0000- 0-
T [illegible]	0 -000 -00
[illegible]	- 0- 0
[illegible]	0-00000 ---
[illegible]	0 -000 -00
[illegible]	0 -003428-00
[illegible]	0 -003424-00
L [illegible]	0 -003427-00

A Product Specifications

A.1 Monitor Safety Specifications

A.1.1 Classifications

Type of protection against electrical shock	
Degree of protection against electrical shock	
Mode of operation	
Degree of protection against harmful ingress of water	

A.1.2 Environmental Specifications

Main unit	
Item	

A.4 Hardware Specifications

A.4.1 Display

Host display			
	Screen Size (diagonal)	Screen type	Resolution
iMEC8 Vet	.		00. 00
External display			
		L	

A.4.2 Recorder

L	
	0
	/, 0 /%
	L

A.4.3 LEDs

	( )
	( )
	( )
	( )

A.4.4 Audio Indicator

	( ), 0 0 - - .

A.4.5 Monitor Interface Specifications

	I , 00 - 0.
T	,T .0
L	

A.4.6 Outputs

Analog Output	
	L 00 -
ECG Analog Output	
(- 0_)	0.0 0_ L 0. 0_ 0_ 0.0 0_
	( )
	/ %
	0 %
	00
IBP Analog Output	
(-)	0_
L	0 ( )
	/ 00 %
Nurse Call Signal	
	0 0.
Defib Sync Pulse	
	00
L	(-)
	0 0.
	00 0%
Alarm output (Network connector)	

A.5 Data Storage

	0 L - L
	00
	00
	000

A.6 Wireless Network

A.7 Measurement Specifications

A.7.1 ECG

ECG	

Pace Pulse	
HR	

A.7.3 SpO_2

Alarm limit	Range (%)	Step (%)
	(+) 00	
	L L 0( ) ( )	
	0 ( )	

Mindray SpO_2 Module

	L T
*L	
	0 00%
	%
	0 00% % 0% % .
T	0.0 % 0%

Masimo SpO_2 Module

	L T
	00%
	%
	0 00% % ( ) 0 00% % ( ) % % .
	0
	0.0 % %
	%
T	0.0 0 %

Nellcor SpO_2 Module

	L T
L	0 00%
	%
	0 00% % 0% % .
*	%

A.7.4 PR

Alarm limit	Range (bpm)	Step (bpm)
	(+) 00	
	( )	

PR from Mindray SpO_2 Module

L	0
	( ) (L) ( )

PR from Masimo SpO_2 Module

A.7.5 NIBP

	L 0 0 - 0 , 0 0 - 0 , 0 0 - , 0 0 - , 0 0 - 0
L	L
	, , , , 0 , 0 , 0 , , , , , ,
L	0

L ( )			L	
			0	
		0 0	0 00	
	L	0		0

	L ± L
( )	0 0 0
( )	0 0 0
	0 L 0

PR		
L	0 0	
	%	
Alarm limit	**Range (mmHg)**	**Step (mmHg)**
	(+) 0 L (+) 00 (+)	
	0 (-)	
L	(+) 0 L (+) (+) 0	
L	0 (-)	
	(+) 0 L (+) 0 (+) 00	
	0 (-)	

*L

A.7.6 Temp

	L 0-
L	0 0 ( )
	0.
	0. ( )
L	00 0

Alarm limit	Range	Step
/	(+) 0	0.
/	0. (-)	
	0. 0	

A.7.7 IBP

	L 0 0 - 0 0 - .
IBP	
L	- 0 00
	% ( )
Pressure transducer	
	%
	/
	00 000

Alarm limit	Range (mmHg)	Step (mmHg)
	(+) 00	
L		
	- 0 ( )	
L		

A.7.8 CO_2

L	
	T

Sidestream CO_2 Module

	L
L	0
*	0 0 % 0%
	L
	0 / , 00 /
	% /
	T 0 ,
	L 00 0 / 0 00 / 00 0 / 0 0 /
	L 00 / 0 / 00 /
	0 0
	0 , 0 , 0 , 0 , 0

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

Effect of interference gases on CO_2 measurements		
Gas	**Concentration (%)**	**Quantitive effect***
	0	
T		
* 0- 0 .		

Alarm limit	**Range**	**Step**
	(+)	
	(-)	

	(, , +,) 0	
	0 (, -,)	

Microstream CO_2 Module

	L
L	0
*	0 % +0.0 % (-)
	L
* 0 0 % %.	
	$50^{-7.5}_{+15}$ /
	0 ( )
	L ( ) . (L) ( ) 0 (0% 0%) ( )
	0 0
	0 0 0 0
	0 , 0 , 0 , 0

Alarm limit	Range	Step
	(, , +,)	
	(, -,)	
	(, , +,) 0	
	0 (, -,)	

FOR YOUR NOTES

B EMC and Radio Regulatory Compliance

B.1 EMC

Chapter 25

Note

- **Using accessories, transducers and cables other than those specified may result in increased electromagnetic emission or decreased electromagnetic immunity of the device.**
- **The device or its components should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the device or its components should be observed to verify normal operation in the configuration in which it will be used.**
- **The device needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided below.**
- **Other devices may interfere with this device 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.**
- **Portable and mobile communication equipment may affect the performance of this device.**
- **Other devices that have RF transmitter or source may affect this device (e.g. cell phones, PDAs, and PCs with wireless function).**

Guidance and Declaration - Electromagnetic Emissions		
Emission tests	**Compliance**	**Electromagnetic environment - guidance**

WARNING

- **This equipment/system is intended for use by healthcare professionals only. This equipment/ system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the [ME EQUIPMENT or ME SYSTEM] or shielding the location.**

Guidance and Declaration - Electromagnetic Immunity			
Immunity test	**IEC60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
			0%.
			L 0 0

Guidance and Declaration - Electromagnetic Immunity

Recommended separation distances between portable and mobile RF communications equipment and the device			
Rated maximum output power of transmitter (W)	**Separation distance in meters (m) according to frequency of the transmitter**		
	0 _ 0 L _ $d = 1.2\sqrt{P}$	0 L _ 00 L _ $d = 1.2\sqrt{P}$ (. $d = 3.5\sqrt{P}$)	00 L _ . . $d = 2.3\sqrt{P}$ (. $d = 7\sqrt{P}$)
0.0	0.	0. (0.)	0, (0. 0)
0.	0.	0. (.)	0. (,)
	, 0	, 0 (. 0)	. 0 (.00)
0	. 0	. 0 (.0)	. 0 (.)
00	.00	.00 (.00)	.00 (0.00)
( ) 0 L _ 00 L _			

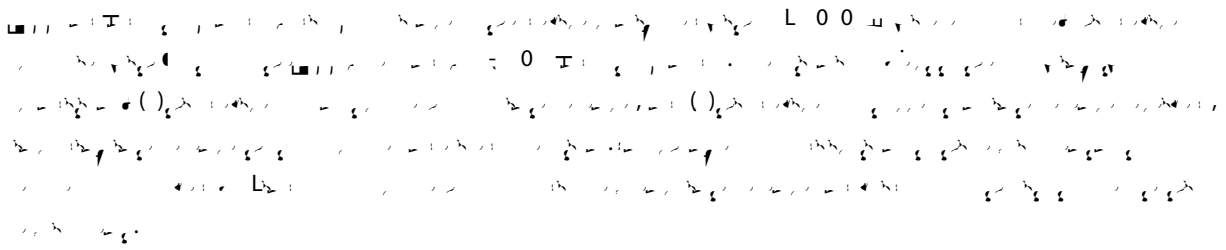
B.2 Radio Regulatory Compliance

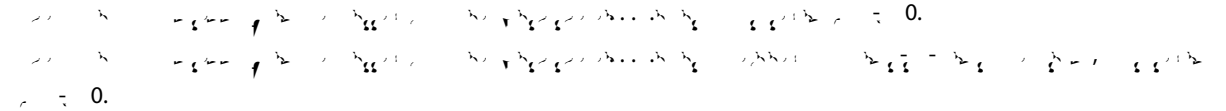
Item	Description		
	IEEE 802.11b	**IEEE 802.11g**	**IEEE 802.11n**
(L _)			
L		L	L
( )	0	0	0

L 0 0

L

-00 L -00 .





WARNING

- **Keep a distance of at least 20cm away from the device when Wi-Fi function is in use.**

FOR YOUR NOTES

C Default Configurations

C.1 Parameters Configuration

C.1.1 ECG

ECG Setup

Item Name	O.M		General	User Defaults
	C	M		
	*	*		

Item Name	O.M		General	User Defaults
T	*	*	- 0	
I				
			I + 0	

Arrh. Analysis

Item Name	O.M		General	User Defaults
	C	M		
Arrhythmia Threshold Settings				
	*	*	0	
	*	*	0	
	*	*	0	
	*	*		
	*	*	0	
	*	*		
L	*	*		
	*	*	0	
	*	*		
	*	*	0	
	*	*		
	*	*		
Arrhythmia Alarm Settings				
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		

* * 0 0 0 0

Item Name	O.M		General	User Defaults
	C	M		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		

C.1.2 RESP

Item Name	O.M		General	User Defaults
	C	M		
	*	*		
	*	*		
	*	*		

C.1.4 SpO_2

Item Name	O.M		General	User Defaults
	C	M		
	*	*		
	*	*		

Item Name	O.M		General	User Defaults
	C	M		

Item Name	O.M		General	User Defaults
	C	M		
	*	*		
	*	*	0	
	*	*		
	*	*	0	
	*	*	0	
PA Alarm Limits				
	*	*	0	
	*	*		
	*	*		
	*	*		
	*	*		
	*	*	-	
CVP, LAP, RAP, ICP, UVP, P3-P4 Venous Pressure Alarm Limits				
	*	*		
	*	*	0	
Art, Ao, BAP, FAP, LV, P1-P2 Arterial Pressure Scale				
	*	*	0- 0	
PA Scale				
	*	*	0- 0	
CVP, LAP, RAP, ICP, UVP Scale				
	*	*	0- 0	
UAP, P3-P4 Venous Pressure Scale				
	*	*	0- 0	
IBP Overlapping Left Scale				
( )	*	*	0- 0	
IBP Overlapping Right Scale				
( )	*	*	0- 0	

C.1.8 CO_2

Item Name	O.M		General	User Defaults
	C	M		
	*	*		
	*	*	L	
L	*	*	L	
	*	*	/	
	*	*	0	
	*	*		
		*		
Sidestream CO_2 Setup				
	*	*	0 /	
	*	*		
	*	*	0	
	*	*		
	*	*	0	
Microstream CO_2 Setup				
		*		
L	*	*	0	
( )	*	*	0	
Alarm Limits				
	*	*		
	*	*	0	
	*	*		
	*	*	00	
	*	*	0	

C.2 Routine Configuration

C.2.1 Alarm

Item Name	O.M		General	User Defaults
	C	M		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*		
	*	*	0	

C.2.2 Screens

Item Name		O.M		General	User Defaults
		C	M		
		*	*		
		*	*	T	
		*		→ → →	
		*	*		
		*	*		

C.2.3 Waveform

Item Name		O.M		General	User Defaults
		C	M		
	( )				
			*		
	( )				

C.2.4 Review

Item Name		O.M		General	User Defaults
		C	M		
		*	*	0	
		*	*		
		*	*		
			*		
		*	*		

C.2.5 Event

Item Name	O.M		General	User Defaults
	C	M		
		*		
		*		
		*		

C.2.6 Record

Item Name		O.M		General	User Defaults
		C	M		
			*		
			*		
			*	/	
			*		

C.2.7 Others

Item Name		O.M		General	User Defaults
		C	M		
			*		
			*		
			*		

C.3

Item Name	O.M		General	User Defaults
	C	M		
		*		
		*		
		*		
		*		
	*	*		
	*	*		
	*	*		
		*		
		*		
		*		
		*		
		*	0 0	
		*		
		*		
		*		
		*		
		*		
		*		
		*		
	*	*	■ **Para Switch Authority** **Protected** ■ **Unprotected**	
		*		
		*		
		*		

D Alarm Messages

Measurement	Alarm Messages	L	Cause and Solution
		L *	
		L *	
		L *	
		L *	
		L *	
		L *	
		L *	
		L *	
		L *	
		–	
		–	
		–	
		–	
		–	

D.2 Technical Alarm Messages

Measurement	Alarm Message	L	I	Cause and Solution
		–		
		–		
		–		
		–		
		–		
		*		
		*		

Measurement	Alarm Message	L	I	Cause and Solution

Measurement	Alarm Message	L	I	Cause and Solution

Measurement	Alarm Message	L	I	Cause and Solution

E Electrical Safety Inspection

E.1 Power Cord Plug

Test Item		Acceptance Criteria

E.2.2 Contextual Inspection

Test Item	Acceptance criteria

E.6 Patient Leakage Current

- (
- (),
- (
- (
- (
- (

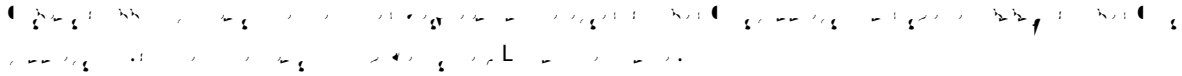
- Q
- Q
- 0Q
- 0Q

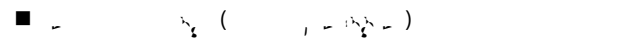
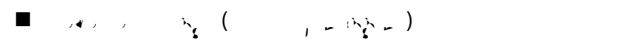
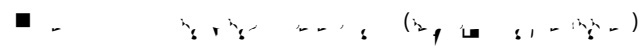
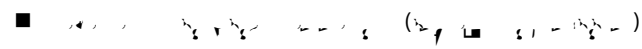
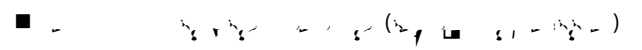
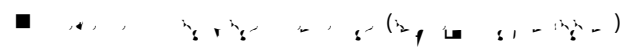
E.7 Mains on Applied Part Leakage

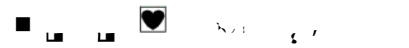
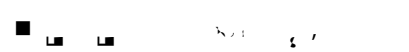
0% (0%),

- 0.
- 000.

E.8 Patient Auxiliary Current



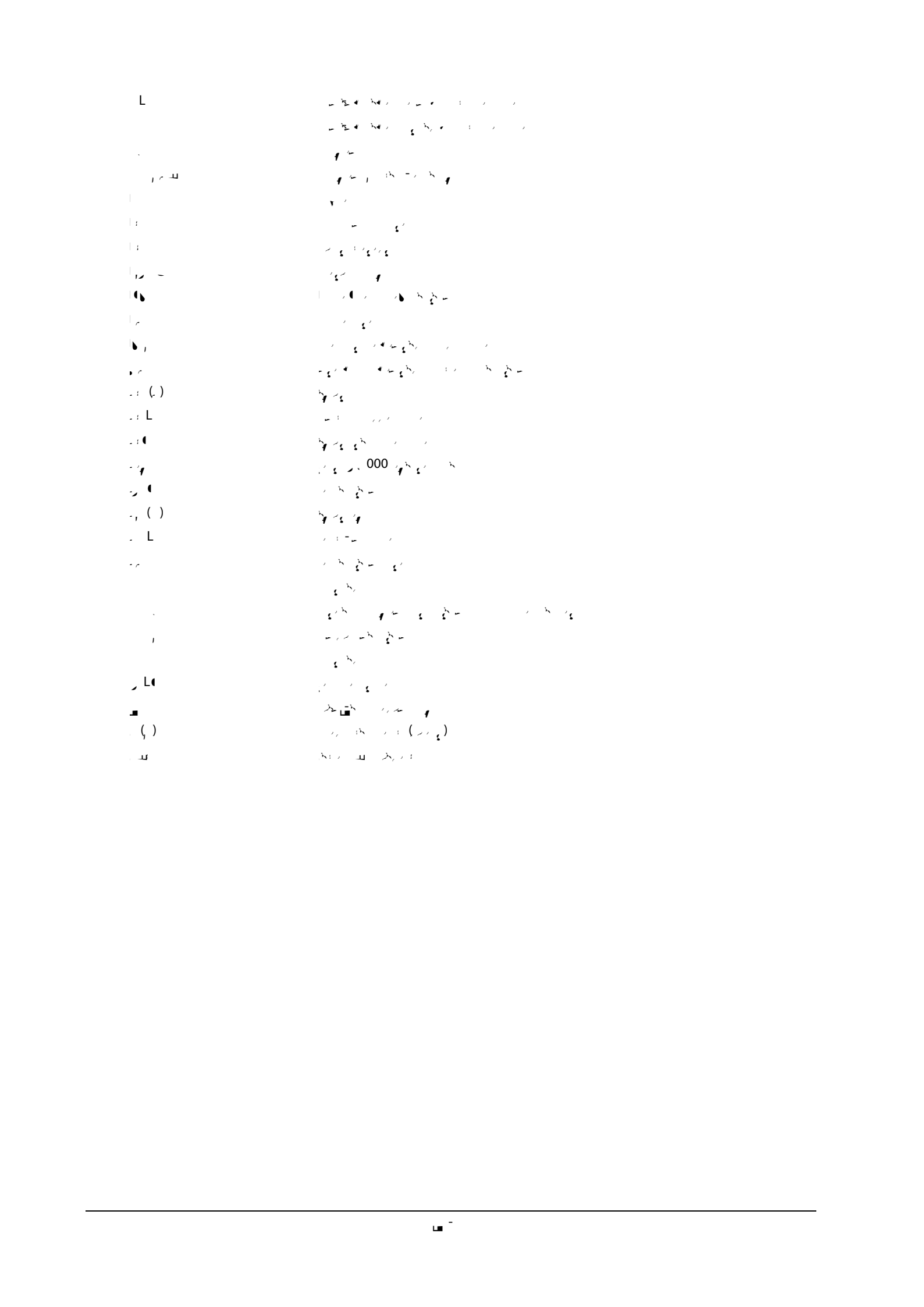
- 
- 
- 
- 
- 
- 

- 
  -
  -
- 
  -
  -

NOTE

- **Make sure the safety analyzer is authorized comply with requirement of IEC61010-1.**
- **Follow the instructions of the analyzer manufacturer.**

F Symbols and Abbreviations

F.1 Symbols

F.2 Abbreviations