Operating Instructions

Passport® V

mindray

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Foreword

The **Passport V** Operating Instructions are intended to provide information for proper operation.

General knowledge of monitoring and an understanding of the features and functions of the **Passport V** monitor are prerequisites for its proper use.

NOTE: Do not operate this monitor before reading these instructions.

Information for servicing this instrument is contained in the **Passport V** Service Manual, part number 0070-00-0705. For additional information or assistance, please contact an authorized service representative in your area.

CAUTION: U.S. Federal Law restricts this device to sale by or on the order of a physician or other practitioner licensed by state law to use or order the use of this device.

NOTE: Figures in this manual are provided for reference purposes only. Screens will likely differ based on the monitoring device configuration, licenses available, parameters selected and patient configuration of the Passport V monitor.

Patents: This device is covered under one or more of the following U.S. Patents: 5,300,859; 5,485,847; 5,657,750; 5,676,141; 5,743,263; 5,758,644; 5,823,950; 5,857,461; 6,011,986; 6,035,223; 6,157,850; 6,226,539; 6,263,222; 6,411,833; 6,422,240; 6,437,316; 6,463,310; 6,501,975; 6,591,123; 6,708,049; 7,016,715; 7,039,538; 7,120,479; 7,120,480; 7,142,142; 7,162,288; 7,190,985; 7,194,293; 7,209,774; 7,212,847; 7,400,919; foreign equivalents; and Masimo patents (www.masimo.com/patents.htm). Possession or purchase of this device does not convey any express or implied license to use the device with replacement parts which would, alone, or in combination with this device, fall within the scope of one or more of the patents relating to this device.

Warnings, Precautions, and Notes

Please read and adhere to all warnings, precautions and notes listed here and in the appropriate areas throughout this manual.

A **WARNING** is provided to alert the user to potential serious outcomes (death, injury, or serious adverse events) to the patient or the user.

A **CAUTION** is provided to alert the user to use special care necessary for the safe and effective use of the device. They may include actions to be taken to avoid effects on patients or users that may not be potentially life threatening or result in serious injury, but about which the user should be aware. Cautions are also provided to alert the user to adverse effects on this device of use or misuse and the care necessary to avoid such effects.

A **NOTE** is provided when additional general information is applicable.

Warnings

WARNING: Use of the Passport V is restricted to one patient at a time.

WARNING: This device is not intended for direct cardiac application.

WARNING: Internal Electrical Shock Hazard - This unit does not contain any user-serviceable parts. Do not remove instrument covers. Refer Servicing to qualified personnel.

WARNING: Do not use this monitor during MRI (Magnetic Resonance Imaging) scanning. Induced current could potentially cause burns. Accuracy of measurements on this unit and the MRI unit may also be affected.

WARNING: To reduce the hazard of burns in the high-frequency surgical neutral electrode connection, the electrodes should not be located between the surgical site and the electro-surgical unit return electrode.

WARNING: Ensure that conductive parts of the ECG electrodes do not contact other conductive parts including earth ground. Do not connect any non-isolated accessories to the Passport V or to the ECG or invasive pressure channel inputs when connected to a patient. Ensure that the total chassis leakage currents of all connected units does not exceed 300μA. Use an IEC 60601-1 approved isolation / separation transformer if required. Do not simultaneously touch the patient and any piece of electrical equipment if any cover has been removed from the equipment.

WARNING: Electrode polarization: some electrodes may be subject to large offset potentials due to polarization. Use only electrodes as recommended by Mindray. Recovery time after application of defibrillator pulses may be especially compromised. Squeeze bulb electrodes commonly used for diagnostic ECG recording may be particularly vulnerable to this effect. Electrodes of dissimilar metals should not be used unless the amplifier can handle polarization potentials as high as 1 volt (V).

WARNING: The AC line cord and interface cables (i.e. non-patient cables) may utilize the same ground. Therefore, removal of the AC line cord does not necessarily isolate the Passport V if non-patient interface cables are attached.

WARNING: Observe extreme caution when a defibrillator is used on a patient. Do not touch any part of patient, table, or monitor when a defibrillator is in use.

WARNING: Do not incinerate battery; possible explosion may occur.

WARNING: To ensure that alarms can sound if the Gas Module/Passport V loses power, at least one charged battery must be installed in the Passport V at all times.

WARNING: Do not put MPSO (Multiple Portable Socket Outlets, i.e. Multiple outlet extension cords) used with the Passport V or its accessories on the floor. Connect only Passport V accessories to the same MPSO as the Passport V. Do not overload the MPSO. Do not connect other equipment to the same MPSO with the Passport V, as it may increase system leakage current.

WARNING: Reliably attach Potential Equalization connector to the safety ground when interconnecting Passport V with other medical or non-medical electrical equipment to minimize the risk of excessive leakage current and/or shock hazard.

WARNING: Do not reuse disposable accessories. Dispose of single use items in accordance with hospital policy.

WARNING: Compressed gasses are considered Dangerous Goods/ Hazardous Materials per I.A.T.A. And D.O.T. regulations. It is a violation of federal and international law to offer any package or over pack of dangerous goods for transportation without the package being appropriately identified, packed, marked, classified, labeled and documented according to D.O.T. and I.A.T.A. regulations. Please refer to the applicable I.A.T.A. Dangerous Goods Regulations and/or the Code of Federal Regulations 49 (Transportation, Parts 171-180) for further information.

WARNING: Route cables neatly. Ensure cables, hoses and wires are kept away from patient's neck to avoid strangulation. Keep floors and walkways free of cables to reduce risk to hospital personnel, patients and visitors.

WARNING: Do not use a damaged or broken unit or accessory. Periodically, check all cables (e.g., AC line cord and patient connection cables) for damage that may occur through normal use. Replace cable if damaged in any way.

WARNING: Ensure that the conductive parts of ECG electrodes do not contact other conductive parts, including earth ground.

WARNING: Pacemaker patients' rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance. See the Appendix section of this manual for disclosure of the pacemaker pulse rejection capability of this instrument.

WARNING: Due to physiologic differences in the patient population, the Passport V may occasionally not alarm or may sound a false alarm for some arrhythmia patterns. The arrhythmia analysis feature is intended to detect ventricular rhythms only. High-risk patients should be kept under close surveillance.

WARNING: Trace Gas Hazard - When using the optional Gas Module, a health hazard exists when trace amounts of vaporized anesthetic agents are chronically inspired by operating room personnel. See Appendix A in NFPA 56A on Inhalation Anesthetics. During any procedure where such agents are employed, the Gas Module exhaust output should be connected to a medical gas-scavenging system.

WARNING: Connection of the Gas Module exhaust port to the hospital's waste gas scavenging system is strongly recommended to prevent exposure of hospital personnel to the patient's respiratory sample. Vacuum (negative pressure) should not exceed 1 mmHg at the Gas Module Pump Exhaust fitting. Excessive scavenge vacuum may result in damage to the Gas Module's internal pump.

WARNING: When monitoring CO_2, the maximum sampling rate at the nasal cannula is 150ml/min with the DPM CO_2 module. This device should not be used on patients whose breathing could be impaired by these vacuum flow rates.

WARNING: When monitoring an anesthesized patient in an operating room environment, connection from the exhaust port of the Passport V to the hospital's waste gas scavenging system is recommended to prevent exposure of hospital personnel to the patient's respiratory sample.

WARNING: When using the Gas Module, the maximum sampling rate at the nasal cannula is 200 ml/min (120 ml/min for Gas Module 3 with a neonatal water trap). This device should not be used on patients whose breathing could be impaired by this vacuum flow rate.

WARNING: Operation of the Passport V below the minimum amplitude or value of PATIENT physiological signal may cause inaccurate results.

WARNING: Use of ACCESSORIES, transducers and cables other than those specified in the manual may result in increased Electromagnetic Emissions or decreased Electromagnetic Immunity of the Passport V. It can also cause delayed recovery of the monitor after the discharge of a cardiac defibrillator.

WARNING: Use of the Passport V in the vicinity of explosive anesthetics and in the presence of electromagnetic interference or power overloads caused by electrosurgical or diathermy instruments could create a potential hazard or could damage the monitor.

WARNING: The use of gas sampling accessories in Gas Module 3 other than those specified may cause significant measurement errors and patient risk.

WARNING: Use of accessories, transducers and cables other than those specified in the manual may result in increased Electromagnetic Emissions or decreased Electromagnetic Immunity of the Gas Module 3.

WARNING: With the exception of stacking on a Gas Module with the appropriate mounting brackets, the Passport V should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the Passport V and Gas Module should be observed to verify normal operation in the configuration in which they will be used.

WARNING: If the water trap breaks or becomes damaged during operation, there is a risk that bacteria and/or mucus may contaminate the Gas Module.

WARNING: The Gas Module must not be used with flammable anesthetic agents.

WARNING: SpO_2 sensors, SpO_2 accessories, and temperature probes should be disposed of in accordance with local regulations.

WARNING: Shut down the monitor and disconnect all power cords from the outlet before cleaning.

WARNING: Connect only DRYLINE™ gas sampling lines to the water trap. Note that there may be other compatible tubes present that must not be used (e.g. IV lines).

WARNING: Do not use DRYLINE™ Neonatal sampling lines (blue Luer lock nuts) with DRYLINE™ Adult/Pediatric water traps. Do not use DRYLINE™ Adult/Pediatric sampling lines (colorless Luer lock nuts) with DRYLINE™ Neonatal water traps. These configurations could result in incorrect measurement data.

WARNING: Do not use Adult/Pediatric type water traps and/or sampling lines with neonates to avoid high sampling flow.

WARNING: The contents of the Gas Module water trap should be handled as a potential infection hazard. The water trap, sampling line and airway adapter should be disposed of in accordance with local regulations for contaminated and biologically hazardous items.

WARNING: CO_2 FilterLines® should be treated as biohazardous waste and disposed of in accordance with local regulations for contaminated and biologically hazardous items.

WARNING: Use the recommended cleaning methods for the DRYLINE™ water traps. Do not clean or wash the filter housing of the water trap. Never allow alcohol to enter the filter housing. Never force air through the water trap.

WARNING: A hazard can exist if different alarm presets are used for the same or similar equipment in any single area.

WARNING: The user should check that the current alarm settings on the Passport V monitor are appropriate prior to use on each patient.

Precautions

CAUTION: Always place the monitor on a rigid, flat surface or on approved mounts. Do not block ventilation or speaker vents.

CAUTION: Do not carry the Passport V using the integrated grip handle if the unit is mounted to another item (e.g., a rolling stand or Gas Module 3).

CAUTION: Never place fluids on top of this monitor. In case of accidental spillage, wipe clean immediately and have the monitor serviced to ensure no hazard exists.

CAUTION: To avoid possible damage to the Passport V, and to provide protection against the effect of the discharge of a cardiac defibrillator and against burns, use only approved ECG cables and approved accessories listed in the Accessories chapter.

CAUTION: To prevent condensation, allow the Passport V to warm up and dry if it is moved from a cold to warm location.

CAUTION: The Passport V may not meet its performance specifications if stored or operated outside of specified temperature and humidity ranges.

CAUTION: Prior to use, be sure the rail supporting the bed rail mounting hook can support the weight of the monitor. Consult the bed manufacturer's specifications if necessary. The Company is not responsible for injury or damage resulting from improper or inadequate support of the monitor.

CAUTION: Use the power cord provided with the product. If a substitute is necessary, use only hospital grade power cords.

CAUTION: Line Isolation Monitor transients may resemble actual cardiac waveforms, thus inhibiting heart rate alarms. Check lead wires for damage and ensure good skin contact prior to and during use. Always use fresh electrodes and follow proper skin preparation techniques.

CAUTION: Blood pressure cuffs must be used with the manufacturer's correct and approved hoses.

CAUTION: Please consult a physician for interpretation of blood pressure measurements.

CAUTION: A blood pressure measurement can be affected by the position of the patient, and his / her physiological condition as well as other factors, such as patient movement.

CAUTION: Observe caution on all patients (Neonates, Pediatrics, and Adults), when NIBP is set to STAT Mode or the 1-minute interval, to minimize the possibility of nerve injury occurring during use of automatically cycled blood pressure cuffs.

CAUTION: Observe caution when NIBP measurement is performed on patients suffering from sickle cell disease, or are expected to have skin injuries.

CAUTION: Observe caution when NIBP measurement is performed on a patient's limb with venous transfusion or catheters.

CAUTION: Tissue damage or inaccurate measurements may be caused by incorrect SpO_2 sensor application or use, such as wrapping too tightly, applying supplemental tape, failing to inspect the sensor site periodically, or failing to position appropriately. Carefully read the sensor directions for use, the Passport V Operating Instructions, and all precautionary information before use.

CAUTION: Inaccurate SpO_2 measurements may be caused by:

- **Incorrect sensor application or use**
- **Significant levels of dysfunctional hemoglobins, (e.g., carboxyhemoglobin or methemoglobin)**
- **Intra-vascular dyes such as indocyanine green or methylene blue**
- **Exposure to excessive illumination such as surgical lamps (especially ones with a xenon light source), bilirubin lamps, fluorescent lights, infrared heating lamps, or excessive ambient light. In such cases, cover the sensor site with opaque material**
- **Excessive patient movement**
- **Venous pulsations**
- **Electro-surgical interference**

- **Placement of a sensor on an extremity that has a blood pressure cuff, arterial catheter, or intra-vascular line**
- **Nail polish or fungus**

CAUTION: **In certain situations in which perfusion and signal strength are low, such as in patients with thick or pigmented skin, inaccurately low SpO_2 readings will result. Verification of oxygenation should be made, especially in preterm infants and patients with chronic lung disease, before instituting any therapy or intervention.**

CAUTION: **Many patients suffer from poor peripheral perfusion due to hypothermia, hypovolemia, severe vasoconstriction, reduced cardiac output, etc. These symptoms may cause a loss in vital sign readings.**

CAUTION: **Prolonged and continuous monitoring may increase the risk of skin erosion and pressure necrosis at the site of the sensor. Check the SpO_2 sensor site frequently to ensure proper positioning, alignment and skin integrity at least every eight (8) hours; with the Adult and Pediatric re-usable finger sensor, check every four (4) hours; for neonates and patients of poor perfusion or with skin sensitive to light, check every 2 - 3 hours; more frequent examinations may be required for different patients. Change the sensor site if signs of circulatory compromise occur.**

CAUTION: **When equipped with Masimo SET® SpO_2, use only Masimo SET Oxygen Transducers including Masimo SET LNOP® and LNCS® Patient Dedicated Adhesive Sensors and Masimo SET PC Series Patient Cables. Use of other oxygen transducers may cause improper oximeter performance.**

CAUTION: **When equipped with Nellcor® SpO_2, use only Nellcor oxygen transducers including Nellcor Oxisensor® and OxiMax® patient dedicated adhesive sensors. Use of other oxygen transducers may cause improper oximeter performance.**

CAUTION: **When equipped with DPM SpO_2, use only DPM oxygen sensors and cables. Use of other oxygen sensors may cause improper oximeter performance.**

CAUTION: **Vacuum (negative pressure) should not exceed 1 mmHg at the Passport V Pump Exhaust fitting. Excessive scavenge vacuum may result in an Occlusion message or damage to the Passport V's internal pump. The scavenging system must be on during calibration.**

CAUTION: **When cleaning SpO_2 sensors, do not use excessive amounts of liquid. Wipe the sensor surface with a soft cloth, dampened with cleaning solution. Do not attempt to sterilize.**

CAUTION: Some disinfectants may cause skin irritation. Please rinse cuff thoroughly with water to remove any residual disinfectants.

CAUTION: The internal sampling system of the Gas Module does not need to be cleaned or sterilized. There is no reverse flow back to the patient. If the internal sampling system is suspected to be clogged or dirty, the module should be serviced by an authorized service person only.

CAUTION: To avoid permanent damage, do not expose metal components (pins, sockets, snaps) to disinfectants, soaps or chemicals.

CAUTION: Do not connect NIBP Luer fittings to Blood Pressure Cuff or Monitor.

CAUTION: Some pacemakers may contain a respiratory sensor that may produce artifact on an ECG waveform.

CAUTION: The monitor display provides data and waveform information over its entire area. Do not cover any part of the monitor display with tape or labels.

CAUTION: A functional tester cannot be used to assess the accuracy of the pulse oximeter probe or a pulse oximeter monitor.

CAUTION: Replace lithium-ion batteries with part number M05-010001-06 (Mindray) or 0146-00-0099 ONLY.

CAUTION: Gas Module 3 must be moisture protected whenever transported. This can be done with a protective plastic bag in which water-absorbing materials (e.g. silica gel) have been included.

CAUTION: Contamination with CO_2, N_2O or Anesthetic Agent in the air surrounding the Gas Module may cause significant measurement errors. The Gas Module exhaust output should be connected to a medical gas-scavenging system.

CAUTION: The Passport V monitor is not compatible with 700 Series temperature probes.

CAUTION: Do not unplug the storage device from any of the SB ports on the Passport V while transferring data, as indicated on the menu or prompt areas of the monitor. Data may be lost or corrupted and the storage device may become damaged.

CAUTION: Devices connected to the Passport V 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 connects devices to the signal input/output port of the Passport V is responsible for providing evidence that the safety certification of the devices has been performed in accordance to the IEC 60601-1-1. Please contact Technical Support if you have any questions about connecting devices to the data port.

CAUTION: The Gas Module must be power cycled if the Passport V monitor is powered off.

Avoid simultaneous contact with the patient and the SP1 and SP2 ports on the Passport V to avoid excessive leakage current.

Notes

NOTE: This unit is not designed to be used with a peripheral pulse sensor. SpO_2 is a standard function in this monitor, and may be used to obtain a plethysmograph waveform and heart rate.

NOTE: The comparison testing conducted via the auscultatory method used both Phase 4 and Phase 5 Korotkoff sounds. Reports of study findings for both the auscultatory method as well as the intra-arterial methods are available by contacting Technical Support (800) 288-2121, ext. 8116 or (201) 995-8237.

NOTE: Potential hazards due to errors in software or hardware have been minimized by actions taken in accordance with IEC 60601-1-4.

Intended Use

The **Passport V** monitor is intended for intra hospital use under the direct supervision of a licensed healthcare practitioner. The indications for use for the **Passport V** monitor include the monitoring of the following human physiological parameters:

- ECG waveform derived from 3- or 5-lead measurements
- Heart Rate derived from selected sources (ECG, IBP, SpO_2)
- Pulse Oximetry (SpO_2)
- ST Segment Analysis derived from 3 or 5 ECG lead measurements
- Arrhythmia Detection derived from 3 or 5 ECG lead measurements
- Non Invasive Blood Pressure (NIBP)
- Invasive Blood Pressure (IBP) - up to two (2) channels
- Respiration Rate/waveform derived from ECG or CO_2
- CO_2, inspired and end tidal waveform
- Anesthetic agents, O_2 (inspired and expired)
- Temperature
- IV Drug Calculations

The target populations are adult, pediatric, and neonate; except Arrhythmia Detection and ST Segment Analysis for which the target populations are adult and pediatric only; and IV Drug Calculations for which the target population is adult only.

Unpacking

Remove the instrument from the shipping carton and examine it for signs of shipping damage. Save all packing materials, invoice and bill of lading. These may be required to process a claim with the carrier. Check all materials against the packing list. Contact the Service Department at (800) 288-2121 or (201) 995-8237 (U.S.A and Canada), or (201) 265-8800 (outside U.S.A. and Canada) for prompt assistance in resolving shipping problems.

Symbols and Descriptions

SYMBOL	DESCRIPTION
	Attention, Consult Accompanying Documents / Refer to Manual
	Electrical Hazard
	Shock Hazard
	Equipotentiality
	Alternating Current (AC)
	Direct Current (DC)
	Power On/Off
	Data Input
	Data Output
	Data Input/Output
	Gas Port Input
	Gas Port Output
	Chart Local Printer Output
	Video Output
	NIBP Connection
	Separate treatment from general waste at end of life

SYMBOL	DESCRIPTION
	Type B Equipment
	Type BF Equipment
	Defibrillator Proof Type BF Equipment
	Defibrillator Proof Type CF Equipment
	Alarm Off Icon
	Alarm Silence Icon
	Alarm Silence Permanently Icon
	Earth (Ground)
	Protective Earth (Ground)
	Full Battery
	Low Battery
	No Battery Present
	Battery Charging
	Manufacturer
	Interference may occur in the vicinity of equipment marked with this symbol

For single-patient use only, do not reuse.

For Neonatal use

Not for Neonatal use

Conformité Européenne (CE) Marking of Conformity to European Medical Device Directive. CE_{XXXX} represents the Notified Body number

CS1 Port Connection

Wireless Enabled and not communicating

Manufacturer's reference/catalogue number

Manufacturer's batch number

Serial number

Classified by Underwriters Laboratories Inc. with respect to electric shock, fire and mechanical hazards, only in accordance with UL 60601-1, CAN/CSA C22.2 NO.601-1, IEC 60601-1-1, IEC 60601-2-25, IEC 60601-2-27, IEC 60601-2-30, IEC 60601-2-34, IEC 60601-2-49.

The wireless status icon indicates that the 2.4 GHz radio is activated.

SB Storage Device Connection

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1.0 *General Product Description*

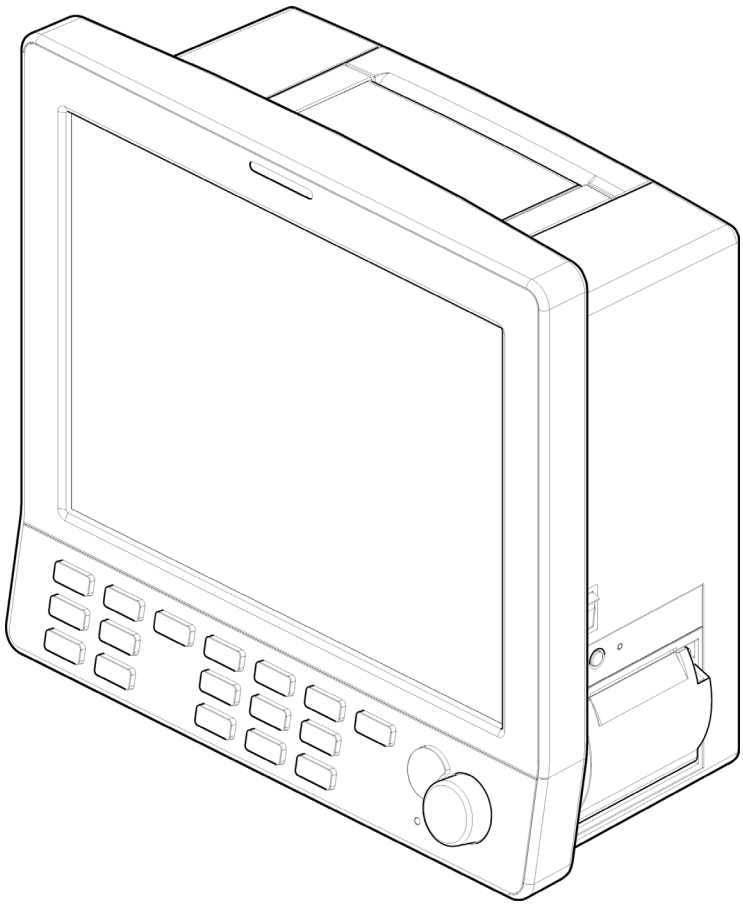

FIGURE 1-1 The **Passport V** Patient Monitor

1.1 General Product Description

The **Passport V** is a vital signs monitor intended for intrahospital use on human patients.

The **Passport V** is a three (3) to eight (8) trace monitor. The unit has many features and functions, yet is easy to use through an integrated keypad, Navigator Knob and an intuitive menu system.

The **Passport V** has a 12.1 inch color display and comes standard with 3 or 5-lead ECG, Masimo SET® SpO_2, Non-invasive Blood Pressure, Respiration, Continuous Temperature and IV Drug Calculations, and support for Gas Module 3 connectivity.

The **Passport V** may be configured to suit your department by adding software and hardware optional features. Optional software features include ST and Arrhythmia analysis. Optional hardware features include up to 2 Invasive Blood Pressure Channels, DPM CO_2, MicroStream® CO_2, Anesthetic Gases, DPM SpO_2, Nellcor® OxiMax® SpO_2, three-trace Local Printer, and 2.4 GHz wireless networking.

Digital displays are provided for Heart Rate, Non-invasive Blood Pressure (NIBP), Pulse Oximetry (SpO_2), Respiration Rate, and Temperature. Optional digital areas provided for Invasive Blood Pressure (up to two), Anesthetic Agents, O_2 and N_2O, ST, CO_2, and MAC. The optional local printer provides hard copies of all digital data and waveforms as well as trend information.

When powered on, the self-check feature of the **Passport V** provides verification of proper operation.

The **Passport V** monitor can be mounted on a rolling stand, a wall mount bracket, gas machine arm, bedrail, Gas Module or operated as a tabletop instrument.

The **Passport V** has the capability of interfacing with Gas Modules, Remote Displays, Defibrillators, and Nurse Call Systems.

The **Passport V** monitor is powered by an AC connection or internal batteries.

The **Passport V** provides Remote View. This feature enables the user to view the numeric and waveform data of another patient who is being monitored at a remote location.

1.2 Key Features

FEATURES	STANDARD	OPTIONAL
Display	12.1 inch color liquid crystal display	External Remote Color Display (SVGA)
	Automatic Sensor Detection and Waveform Display	
	8-trace erase bar refresh	
ECG	3 or 5-lead (I, II, III, aVR, aVL, aVF, V)	ST Analysis
	ECG Cascade	Arrhythmia Analysis
	ESIS Capability (3 or 5-lead)	
Blood Pressure	Non-Invasive Blood Pressure	Up to 2 channels of Invasive Blood Pressure
SpO_2	Masimo SET®	DPM SpO_2, Nellcor® OxiMax® SpO_2
Temperature	One channel for 400 series probes	
Respirations	Lead-selectable Impedance	DPM CO_2, Microstream® CO_2
		Gas Module with Automatic Agent ID
Trend	Tabular and Graphic trends with 6000 trend data entries	
Power	Internal isolated power module	Second lithium-ion battery
	Lithium-ion battery	
Printing		Local Printer, Remote Printer
External Interfaces	Gas Module, Nurse Call systems, DIAP communications, Defibrillator sync, Ethernet network	Wireless network
Calculation	IV drug calculations	
Other	Soft Grip Handle	Mounting kits
	Navigator Knob	Patient and monitor data transfer
	Dedicated keys	
Multi-language supported interface	English, French, German, Italian, Spanish, Brazilian-Portuguese, Russian, Dutch	

1.3 Keys and Front Panel

The front panel keys are used to access many main functions quickly and easily. The figure below shows the keys and a brief explanation follows.

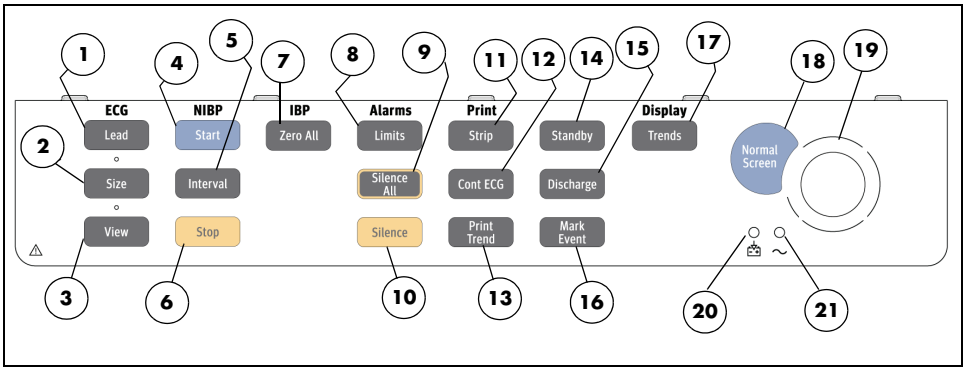

FIGURE 1-2 Front panel keys and Navigator Knob

1. Lead

Press this key to select the next ECG lead to display in Waveform 1. Each time you press this key, the next available ECG lead displays.

2. Size

Press this key to select the next available size of ECG for Waveform 1. Each time you press this key, the next available ECG size displays. When the largest ECG size is displayed, the next key press displays the smallest size.

3. View

Press this key to see multiple leads of ECG when using the 5-lead ECG cable. Press this key repeatedly to toggle between multi-lead view, large numeric display, and normal screen.

4. Start

Press this key to begin an NIBP measurement or to begin or re-start automatic interval measurements.

5. Interval

Press this key to modify the NIBP interval measurement time. The choices are: **Off, STAT, 1 min, 2 min, 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 hr, 2 hr,** or **4 hr**. If **Off** is selected, NIBP measurements can be performed manually only. If **STAT** is selected, measurements will be continuous for a period of 5 minutes. Afterward, the monitor will switch to 5-minute intervals.

6. Stop

Press this key to stop any NIBP measurement. If the interval mode is activated, pressing this key disables the interval mode measurements. An **NIBP: Idle** message displays until the interval mode is restarted.

7. Zero All (with IBP option)

Press this key to set the current pressure for all invasive pressure channels to zero. This key does not affect any channels monitoring pressure. If the zero process is not successful, one of the following messages is displayed: **Pulsatile Pressure. Cannot Zero!** or **Pressure Overrange. Cannot Zero!**

8. Limits

Press this key to display the **Alarm Settings Menu**. The **Alarm Settings Menu** provides access to view or change alarm values.

9. Silence All

Press this key to suspend audio alarms on all parameters. The alarms remain suspended for a user selected amount of time. This amount of time is set in the **Alarm Setup Menu**. While the alarms are suspended, an Alarm Silence icon and message **All Alarms Silenced For X:XX mins** display in the upper area of the screen. X:XX is the time remaining in minutes and seconds. Press this key again during the suspended alarm time to re-enable the audio alarm. If the suspend time was set to **Permanent** in the **Alarm Setup Menu**, the message **All Alarms Silenced Permanently** is displayed. Note that the **Permanent** selection will be available only if **Enable Silence All Permanent Selection** is set to "Yes" in the **Installation Menu**.

10. Silence

Press this key to suspend audio alarms on all currently alarming parameters. The alarms remain suspended for a user selected amount of time as set in the **Alarm Setup Menu** or until the alarm condition is no longer present. Any new alarms that occur while the alarm tone is silenced will disable the silence and sound the alarm tone. While the alarms are suspended, an Alarm Silence icon and message **Alarm Silenced For X:XX mins** display in the upper area of the screen.

11. Strip

Press this key to initiate a printout to the selected device.

- If the print destination is the local printer, then pressing this key will produce a print strip of up to three (3) waveforms. The print length (16 or 32-seconds) can be set in the **Print Setup** menu. Pressing this key during a print job will abort the strip printout.
- If the print destination is a remote Central Station, then pressing this key will initiate a printout at the Central Station.
- If the print destination is a remote printer, then pressing this key will initiate a printout at the remote printer.

12. Cont ECG

Press this key to initiate a continuous ECG 1, 2, or 3 waveform printout from the internal printer. Press this key again to abort printing. The first three ECG waveforms displayed on the screen are printed continuously in real-time. If only one or two ECG waveforms are displayed on the screen, they will be printed.

13. Print Trend

Press this key to initiate printing of the displayed trend. By default, the monitor's stored trend information will be printed by the internal printer. Pressing this key during a print job will abort printing.

- If the print destination is a remote Central Station, then pressing this key will initiate a trend report at the Central Station.
- If the print destination is a remote printer, then pressing this key will initiate a trend report at the remote printer.

14. Standby

Press this key to place the **Passport V** into a STANDBY mode. While in STANDBY mode, monitoring is discontinued and the alarms are in permanent suspension, interval NIBP measurements are placed in idle mode, CO_2 pump is shut off, and the display shuts down. The monitor notifies the central station and other monitors. Except for the power on/off switch and the STANDBY key, all the other hard keys on the front panel are disabled. When in the STANDBY mode, the message **To Begin Monitoring, press Standby.** is displayed.

NOTE: **Trend data is not cleared in the STANDBY mode. When the STANDBY mode is released, NIBP INTERVAL is in IDLE MODE and requires reactivation via the START key. The CO_2 pump automatically reactivates if the DPM or Microstream® sensor is in place.**

Press the **Standby** key to exit the STANDBY mode and return to the normal screen. When exiting from the standby mode to the monitoring mode, the monitor responds as follows:

- Restores parameter measurement: Start arrhythmia relearning. Gas modules recover the working status before the standby mode. NIBP measurement will not start automatically.
- Restores normal data storage.
- All the alarms are activated.
- The screen becomes the one displayed before the standby mode.
- The function of auxiliary output is restored.
- The functions of input devices (such as the hard keys on the front panel) are activated.
- The monitor notifies the central station and other monitors.

15. Discharge

Press this key to discharge a patient.

16. Mark Event

Press this key to cause a time stamp event marker to be noted in the trend memory.

17. Trends

Press this key repeatedly to toggle through the following screens: **Quick Trend**, **List Trend**, **Graphic Trend**, and normal screen (or **OxyCRG**, if the patient size is set to Neonate).

18. Normal Screen

Press this key at any time to return the screen to the normal monitoring mode. All menus are closed.

19. Navigator Knob

Rotate this knob to highlight the various menus or functions on the display. Press the center of the knob to select the highlighted item. Selecting the item may open a menu, perform a function, or select an option.

20. Battery Charging LED

A green LED located above the battery icon indicates that the battery charger is active. The charger will not always be active when AC power is present. It is dependent on the battery charge condition. The LED is not an indication of the condition of the batteries or their charge level. Charged batteries must be installed in the monitor to ensure uninterrupted operation while switching from AC to battery power.

21. AC Power LED

A green LED located above the AC present icon is used to indicate that the unit is connected to the AC power.

1.4 Display

The display of the **Passport V** provides menus, waveforms, parameter information, and messages. The **Passport V** includes a display setup function that allows customization of the display. Preferred setup details can be programmed and saved.

The operator of the **Passport V** should be positioned in front of the monitor at a comfortable distance to view all displayed waveforms and text.

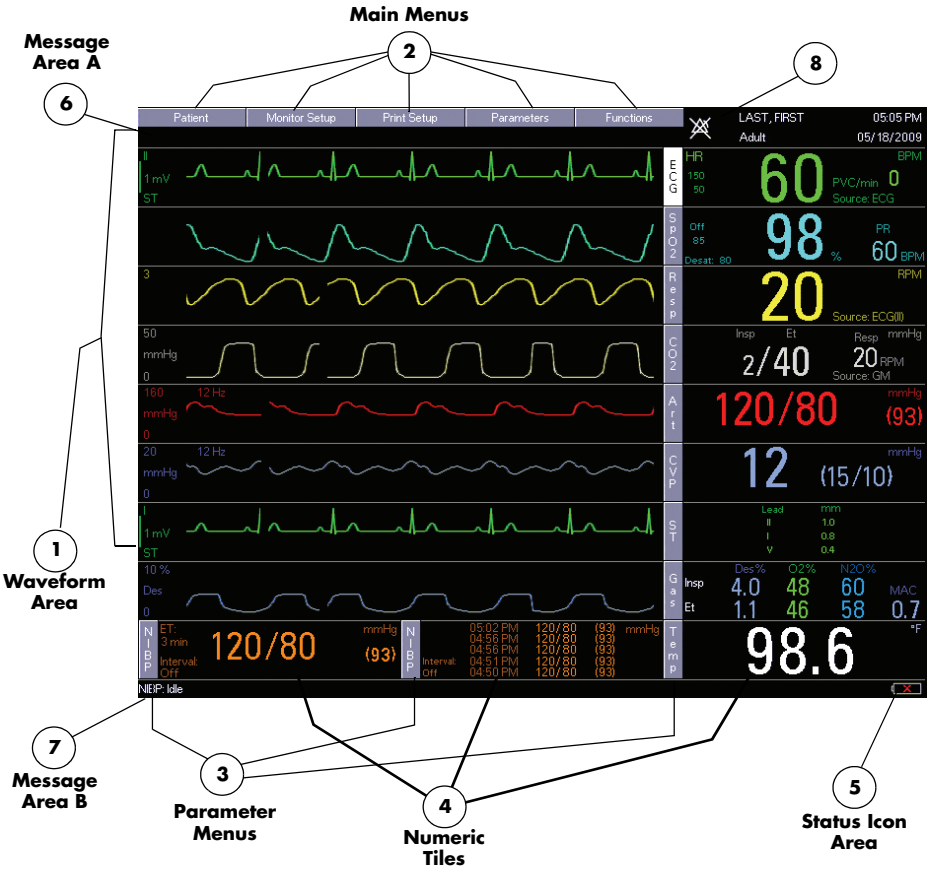

FIGURE 1-3 Normal Screen Display

1. Waveform Area

The waveform area is used to display windows which contain parameter waveforms. Up to 8 waveforms may be displayed. The top waveform is always set to display the ECG waveform and cannot be changed. By default, SpO_2 (Pleth) waveform will appear as the second waveform. Respiration will appear as the third waveform. If pressure transducers are plugged into the P1 and P2 ports, the screen will reformat to display the additional waveforms. CO_2 will display as the fourth waveform; IBP will appear as the fifth and sixth waveform. The setup can be changed to display any of the available parameters and waveforms.

2. Main Menus

The Main Menus of the **Passport V** are always displayed in the upper area of the screen and are accessed using the Navigator Knob. The Main Menu headings are **Patient**, **Monitor Setup**, **Print Setup**, **Parameters**, and **Functions**. These menus enable the user to enter patient specific data, customize the monitor, setup printing or transfer patient data.

The **Functions Menu** provides the following choices: **Normal Screen**, **Remote View**, **Drug Calculator**, **Copy Patient Data to Storage Device**, **Copy Patient Data from Storage Device**, and **System Information**.

The **Normal Screen** selection returns the view to the normal screen.

There are two options for data transfer. **Copy patient data to Storage Device** and **Copy patient data from Storage Device** options allow for the transfer of patient specific data from monitor to monitor.

3. Parameter Menus

The Parameter Menus enable the user to review and customize various parameter display and alarm attributes. Use the Navigator Knob to access these menus. Parameters supported include: ECG, ST, ART, CVP, SpO_2, NIBP, Resp, CO_2 (optional), and Gas (optional).

4. Numeric Tiles

The numeric tiles display digital data for each available parameter.

5. Status Icon Area

Battery Status Icon:
When batteries are installed and the monitor is functioning on battery power, the battery indicator provides a visual reference for the approximate charge level of the batteries. See the following examples.

Full Battery

Low Battery

No Battery Present

When the battery charge is low, but not below the cutoff voltage, a flashing low battery icon is displayed and a special low battery sound is activated.

WARNING: To ensure that alarms can sound if the Gas Module/Passport V loses power, at least one charged battery must be installed in the Passport V at all times.

NOTE: At least 15 minutes is available to turn off the monitor or insert a new battery after the low battery alarm occurs.

CS Status Icon:
If displayed, the CS status icon indicates that the CS1 port is connected to another device.

CS1 Port Connection

Wireless Status Icon:
If displayed, the wireless status icon indicates that the 2.4 GHz radio is activated.

2.4 GHz Radio Activated

If displayed, the wireless status icon indicates that wireless enabled and NOT communicating.

Wireless Enabled

NOTE: It applies to Version 01.04.00 and higher.

SB Status Icon:
If displayed, the SB status icon indicates that a storage device has been connected to the SB port.

SB Storage Device Connection

6. Message Area A

This message area is located above the ECG waveform window. Messages regarding the ECG/heart rate, alarm status, physiological alarms, and technical alarms are displayed here.

- Physiological alarms are located on the left side.
- Technical alarms are located on the right side.
- ECG prompts are located at the top of waveform 1.

7. Message Area B

This message area is located below the last row of numeric tiles. Messages regarding NIBP, IBP, printer status, system status, SpO_2, CO_2, and Gas Module are displayed here.

8. Alarm Status Icon Area

This area displays an Alarm Off icon if any alarm for a monitored parameter has been set to Off. This area will display an Alarm Silence icon if an alarm has been silenced.

1.5 Physical Views

1.5.1 Front View

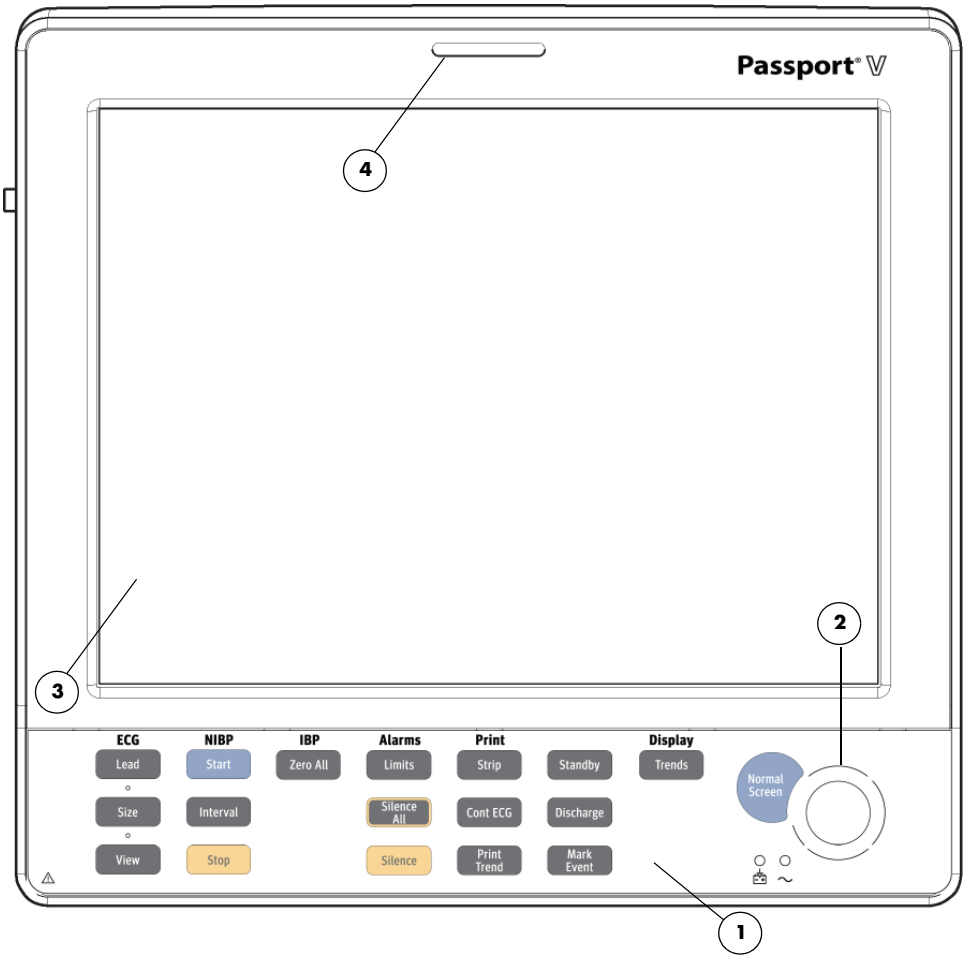

FIGURE 1-4 Front Panel

1. Front Panel Hard Keys

Provides access to most main functions.

2. Navigator Knob

Rotates clockwise and counter-clockwise to navigate through menu selections.
It also can be pressed to select a highlighted item.

3. Display

Displays all waveforms and numeric data.

4. Alarm Light

Indicates that an alarm has been activated.Alarm Light (not shown). The WARNING (or Priority 1) LED is red. The CAUTION (or Priority 2) LED is yellow.

1.5.2 Rear View

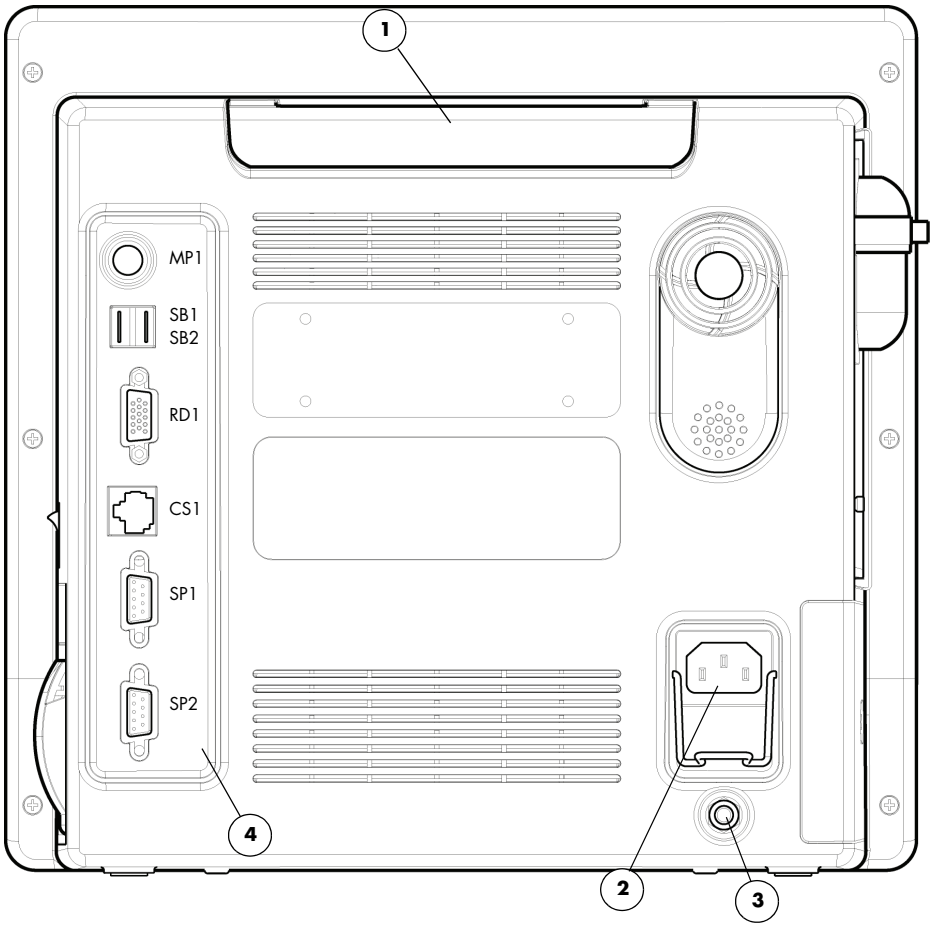

FIGURE 1-5 Rear Panel

1. Soft Grip Handle

Provides a secure method to carry the monitor.

2. AC Receptacle (with an integrated cord retension clip)

Provides an inlet for an AC power cord.

3. Equipotential Lug

Provides equipotential grounding of hospital equipment.

4. Main I/O Connector Ports

Area dedicated for the use of an optional communication port.

- MP1: Allows connectivity to one of the following: Nurse Call or Defibrillator.
- SB1, SB2: Allows copying and transferring of patient data and user settings.
- RD1: Allows duplicate display of the main display on an SVGA-compatible monitor.
- CS1: Allows connectivity via an RJ45-based network.
- SP1, SP2: Allows connectivity to Gas Module 3 and DIAP.

1.5.3 Left Side Panel

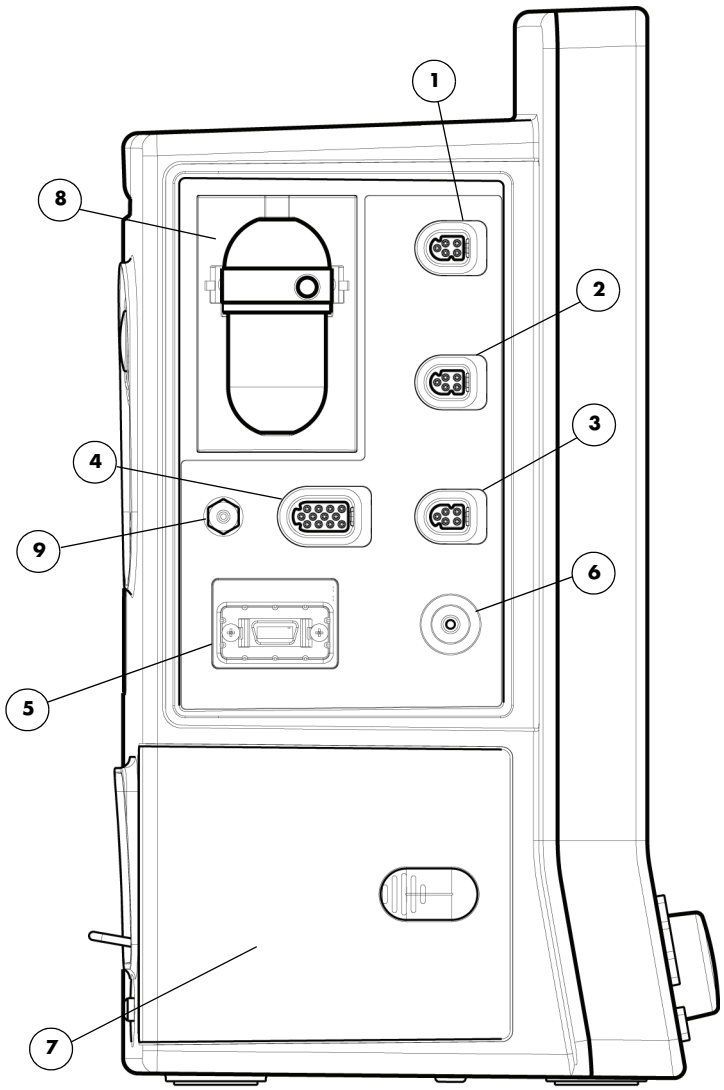

FIGURE 1-6 Left Side Panel

1. **P1 Connector (optional)**
2. **P2 Connector (optional)**
3. **T1 Connector**
4. **ECG/EKG Connector**
5. **SpO_2 Connector (Masimo or Nellcor shown in figure)**
6. **NIBP Rectus Connector**
7. **Battery Compartment**
8. **CO_2 Input (Optional DPM CO_2 shown in figure)**
9. **CO_2 Exhaust Connector**

1.5.4 Right Side Panel

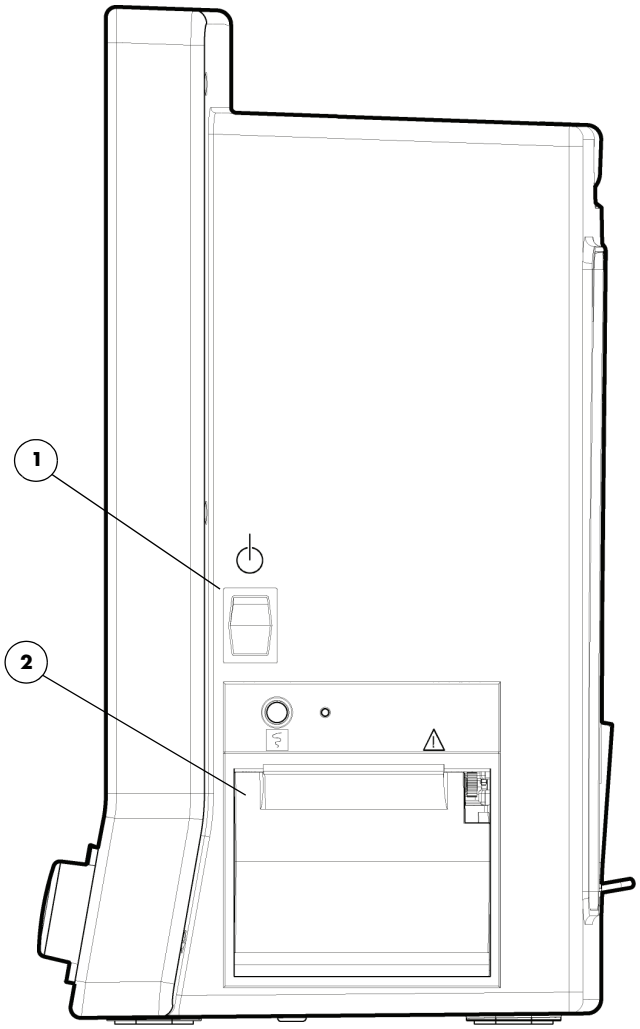

FIGURE 1-7 Right Side Panel

1. Power Switch

A momentary switch that turns power ON or OFF but does not prevent charging of the batteries. Press the top of the switch once to turn the unit ON. Press the top of the switch again to turn the unit OFF.

2. Local Printer (optional)

A thermal strip chart local printer with integral paper spool.

1.5.5 Top View

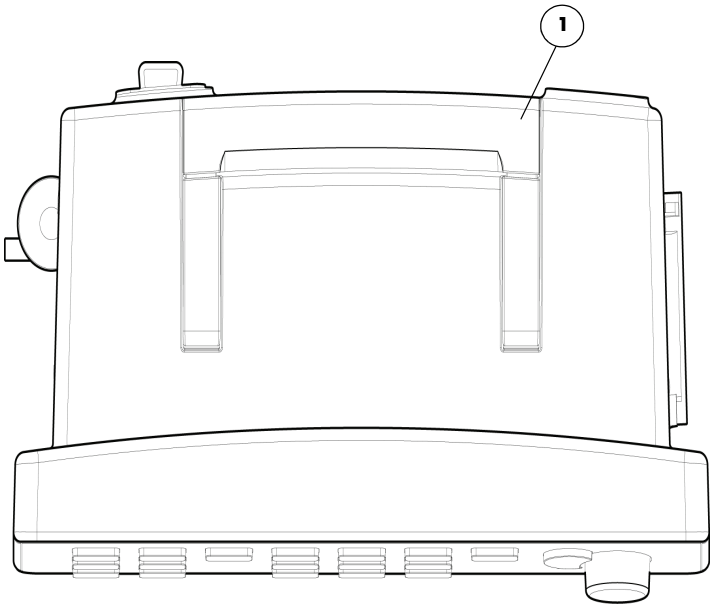

FIGURE 1-8 Top View

1. Soft Grip Module Handle

This integrated grip handle is used for carrying the **Passport V**.

WARNING: Do not carry the Passport V using the integrated grip handle if the unit is mounted to another item (e.g., a rolling stand or Gas Module 3).

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2.0 System Configuration

2.1 Installation Menu

The Installation Menu allows the user to change and save default configuration settings for the **Passport V**, such as date format, time format, and temperature units. All the hard keys are disabled (except the Navigator Knob) in Installation Mode.

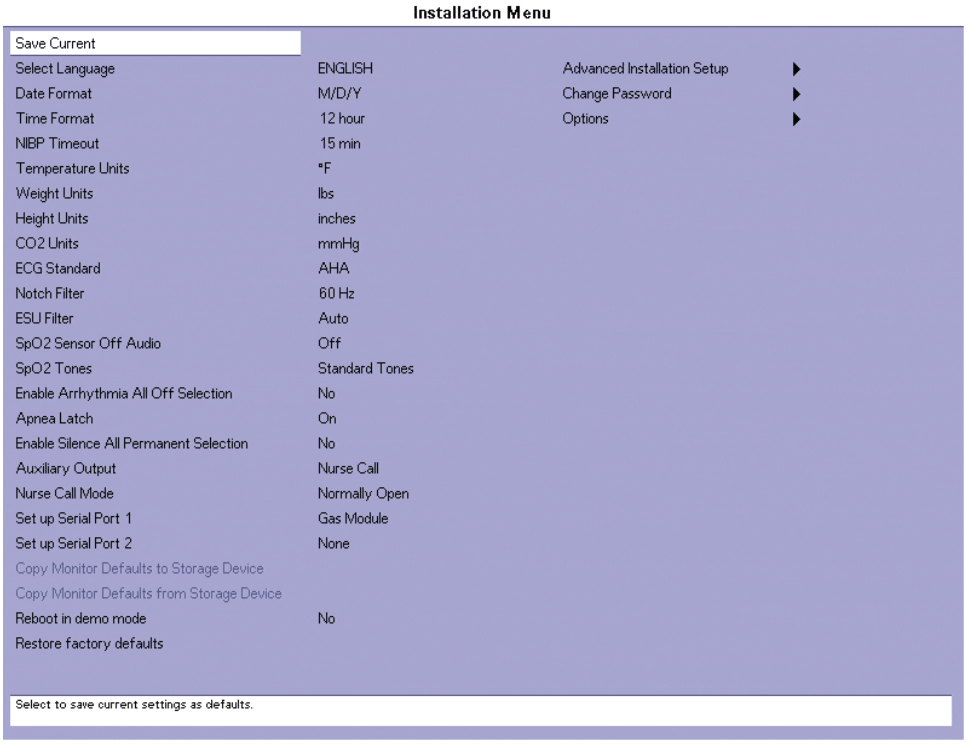

FIGURE 2-1 Installation Menu

To access the Installation Menu:

1. Turn off the **Passport V**.
2. Press and hold the **Discharge** key on the front panel. Simultaneously, power up the **Passport V** monitor.
3. Release the **Discharge** key when the **Installation Menu** is displayed.
4. Set each item as necessary using the Navigator Knob.
5. To save all of the chosen settings, choose "Save Current" before leaving this menu.
6. To return to normal operating mode, cycle power to the **Passport V** monitor.

The following table describes the **Installation Menu** structure:

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	COMMENTS
Save Current			Select to save current settings as defaults.
Select Language	ENGLISH FRENCH GERMAN ITALIAN SPANISH PORTUGUESE RUSSIAN DUTCH	Set up at factory	Select to change language.
Date Format	Y/M/D M/D/Y D/M/Y	M/D/Y	Select to change date format.
Time Format	12 hour 24 hour	12 hour	Select to change time format.
NIBP Timeout	15 min 30 min 45 min 60 min	15 min	Select to change NIBP time out.
Temperature Units	°F °C	°F	Select to change temperature units. Changing temperature units will cause temperature alarm limits to be restored to default values.
Weight Units	lbs kg	lbs	Select to change weight units.
Height Units	inches cm	inches	Select to change height units.
CO_2 Units	mmHg % kPa	mmHg	Select to change CO_2 units. Changing CO_2 units will cause CO_2 alarm limits to be restored to default values.
ECG Standard	AHA IEC	AHA	Select to change standard for ECG.

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	COMMENTS
Notch Filter	50 Hz 60 Hz Off	60 Hz	Select to change notch filter for ECG.
ESU Filter	Auto Disable	Auto	Select to change the ESU filter.
SpO_2 Sensor Off Audio	Off Once Repeat	Off	Select to change the SpO_2 Sensor Off Audio alert type.
SpO_2 Tones	Standard Tones Alternate Tones	Standard Tones	Select to change the SpO_2 tones.
Enable Arrhythmia All Off Selection	Yes No	No	Select to enable or disable the Arrhythmia All Off menu selection.
Apnea Latch	On Off	On	Select to turn apnea alarm latching on or off.
Enable Silence All Permanent Selection	Yes No	No	Select to enable or disable the Permanent Audio Off menu selection.
Auxiliary Output	Nurse call Analog Output Defib Sync	Nurse Call	Select to change the function of the Auxiliary Output interface.
Nurse Call Mode	Normally Open Normally Close	Normally Open	Select to change the type of Nurse Call system
Set up Serial Port 1	None DIAP Gas Module	None	Select to set up comm port.
Set up Serial Port 2	None DIAP Gas Module	None	Select to set up comm port.
Copy Monitor Defaults to Storage Device			Select to copy monitor defaults to Storage Device.
Copy Monitor Defaults from Storage Device			Select to copy monitor defaults from Storage Device.
Re-boot in demo mode	No Yes	No	Set to “YES” to start the monitor in demonstration mode on next power-up. Normal monitoring will resume after cycling power in demonstration mode.
Restore factory defaults			Select to restore factory defaults
Advanced Installation Setup			Select to access Advanced Installation Setup Menu.
Change Password			Select to change password.
Options			Select to add/view options.

2.2 Advanced Installation Setup Menu (Network)

Use the Advanced Installation Setup Menu for network configuration of the **Passport V**.

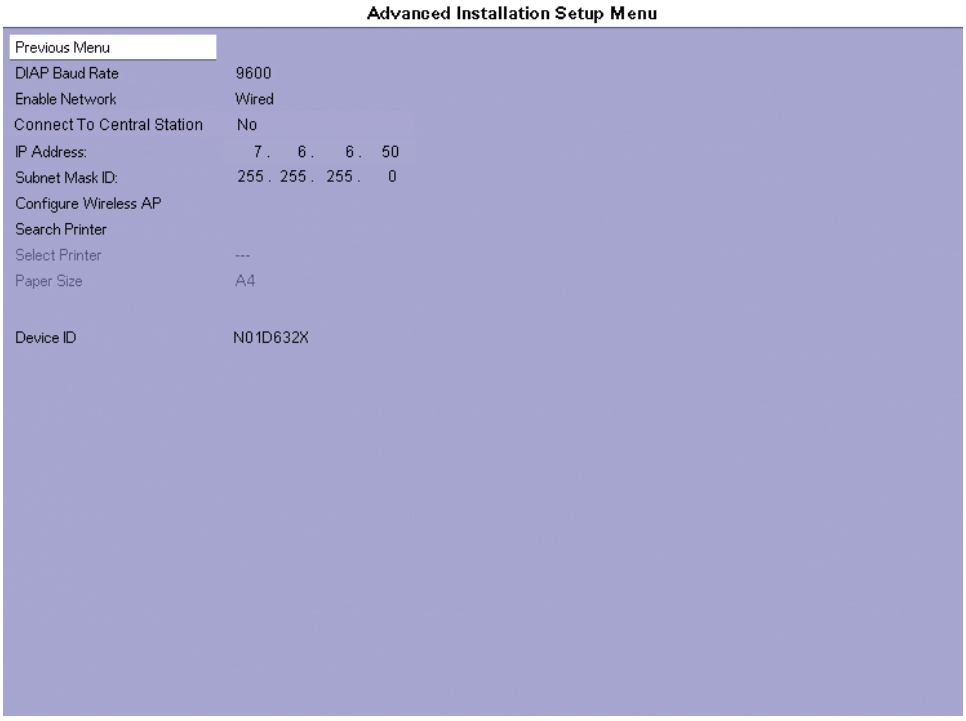

FIGURE 2-2 Advanced Installation Setup Menu

To access the Advanced Installation Setup Menu:

1. Turn off the **Passport V**.
2. Press and hold the **Discharge** key on the front panel. Simultaneously, power up the **Passport V** monitor.
3. Release the **Discharge** key when the **Installation Menu** is displayed.
4. Rotate the Navigator Knob to navigate and select the **Advanced Installation Setup Menu**.
5. Set each item as necessary using the Navigator Knob.
6. To save all of the chosen settings, select **Previous Menu** 〉 **Save Current.**
7. To return to normal operating mode, cycle power to the **Passport V** monitor.

The following table describes the **Advanced Installation Setup Menu** structure:

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	COMMENTS
Previous Menu			Select to return to previous menu.
DIAP Baud Rate	9600 19200	9600	Select to change DIAP protocol baud rate.
Enable Network	Wired Wireless	Wired	Select to change the type of communications with Panorama. Wireless is always displayed as an option, but will function only if the wireless option is installed.
Connect To Central Station	Yes No	No	Select No to disable communication with the Central Station. Select Yes to enable communication with the Central Station. If communication has failed, the message "No Arrhythmia Detection at Central" is displayed.
IP Address		7.6.6.50	Select to set up the IP address.
Subnet Mask ID		255.255.255.0	Select to set up subnet mask ID.
Configure Wireless AP			Press to enable or disable the operation of configuring wireless AP.
Search Printer			Select to search for printers on the network.
Select Printer			Select to change the target printer already found.
Paper Size			Select to change the printer paper size.
Device ID			Set at the factory. Not user-selectable.

2.3 Monitor Setup Menu

Select the Monitor Setup Menu to configure audio and display settings.

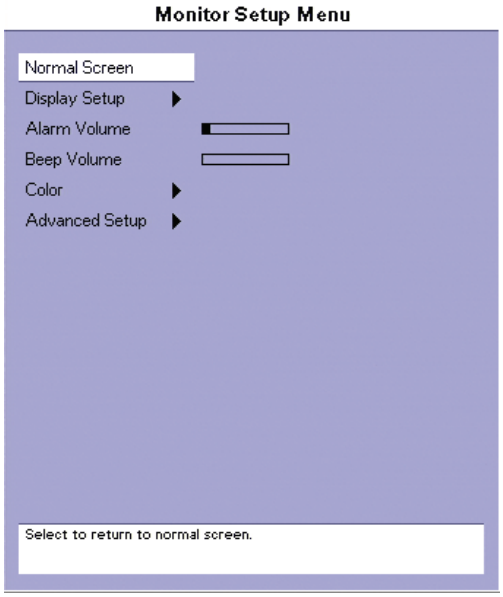

FIGURE 2-3 Monitor Setup Menu

To access the Monitor Setup Menu:

1. Power up the **Passport V**. The normal screen is displayed.
2. Rotate the Navigator Knob to **Monitor Setup**. Press the knob to select it.
3. Configure the settings as desired.
4. To exit, press the **Normal Screen** key on the front panel.

The following table describes the **Monitor Setup Menu** selections:

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	COMMENTS
Normal Screen			Select to return to Normal Screen (or press the **Normal Screen** key on the front panel).
Display Setup			Select to make changes to the display format. Save as defaults if desired.
Alarm Volume	low to high volume	Mid-level	Select to change alarm volume.
Beep Volume	silence to high volume	Mid-level	Select to change systole beep volume.
Color			Select to access Color Setup Menu.
Advanced Setup			Select to access Advanced Setup Menu.

2.4 Advanced Setup

Select the Advanced Setup to configure date, time and other settings.

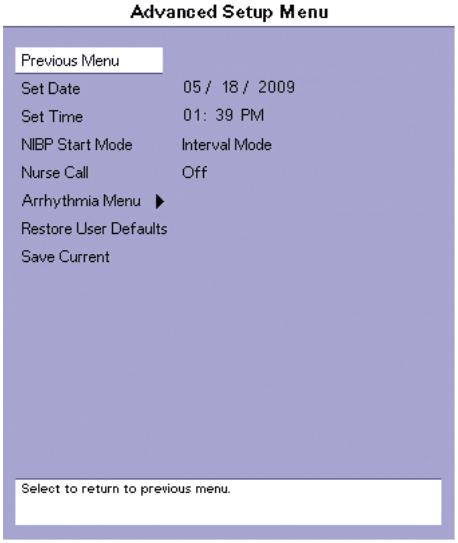

FIGURE 2-4 Advanced Setup

To access the Advanced Setup:

1. Power up the **Passport V**. The normal screen is displayed.
2. Rotate the Navigator Knob to **Monitor Setup** 〉 **Advanced Setup**. Press the knob to select it.
3. Configure the settings as desired.
4. To exit, press the **Normal Screen** key on the front panel.

The following table describes the **Advanced Setup** selections:

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	COMMENTS
Previous Menu			Select to return to the previous menu.
Set Date			Select to set date.
Set Time			Select to set time.
NIBP Start Mode	Interval Mode Timer Mode	Interval Mode	Select Interval mode to synchronize NIBP Start with the integral clock. Select Timer Mode fo synchronize the NIBP start with the interval selected in relation to the real time clock.

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	COMMENTS
Nurse Call	Off 1 second Continuous	Off	Select to choose nurse call activation time.
Arrhythmia Menu			Select to open the Arrhythmia Menu.
Restore User Defaults			Select to load user defaults as current settings.
Save Current			Select to save current settings as defaults. Enter password.

2.4.1 How to Set the Clock / Date and Time

The date and time are set in the **Monitor Setup Menu** 〉 **Advanced Setup**

1. Using the Navigator Knob, highlight **Monitor Setup**. Press the Navigator Knob to open the menu.
2. Use the Navigator Knob to select **Advanced Setup**, then select either **Set Date** or **Set Time**.
3. Turn the Navigator Knob to select a new setting. Once the desired choice is highlighted, press the Navigator Knob.
4. This setting is saved when **Yes** is selected via the confirmation prompt.

2.4.2 Transferring Monitor Default Settings

When installing several **Passport V** monitors with identical display and alarm settings it is not necessary to set each unit separately. A DPM storage device may be used to copy the settings from monitor to monitor.

NOTE: **Use only storage devices supplied by Mindray.**

CAUTION: **Do not unplug the storage device from any of the SB ports on the Passport V while transferring data, as indicated on the menu or prompt areas of the monitor. Data may be lost or corrupted and the storage device may become damaged.**

2.5 Configuration Management

If the monitor is inadvertently powered down (due to power failure or battery depletion), monitor settings are recovered as follows:

- If the monitor is restarted within 60 seconds, the latest user-settings will be restored.
- If the monitor is restarted after 60 but before 120 seconds, the settings restored may be either the latest user-settings or the user-saved settings.
- If the monitor is restarted after 120 seconds, the user-saved configurations will be restored.

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3.0 *Patient Management*

3.1 Description

The **Passport V** comes with default factory settings which enable you to begin monitoring without setting any of the waveforms, parameters, alarms, or functions. However, all of these settings can be changed for specific patient or departmental needs.

Certain operating characteristics are based on the selected patient size (e.g. NIBP start pressure). The patient size selection should be matched to the actual patient before monitoring begins.

3.2 Setting-up Patients

1. Turn the monitor on using the **ON/OFF** switch. Ensure the previous patient's data has been removed from the monitor by discharging previous patient.
2. Connect the patient to the monitor, apply appropriate accessories such as ECG electrodes, blood pressure cuff, etc.
3. Enter patient information into the **Passport V** via the **Patient Menu**, check patient size.
4. If desired, press the **START** key to initiate a non-invasive blood pressure measurement.

3.2.1 Patient Menu

To display the Patient Menu:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Patient** by rotating the Navigator Knob.
3. Use the Navigator Knob to enter patient information. Monitor settings are stored for each patient size.

NOTE: Verify monitoring settings when the patient size is changed.

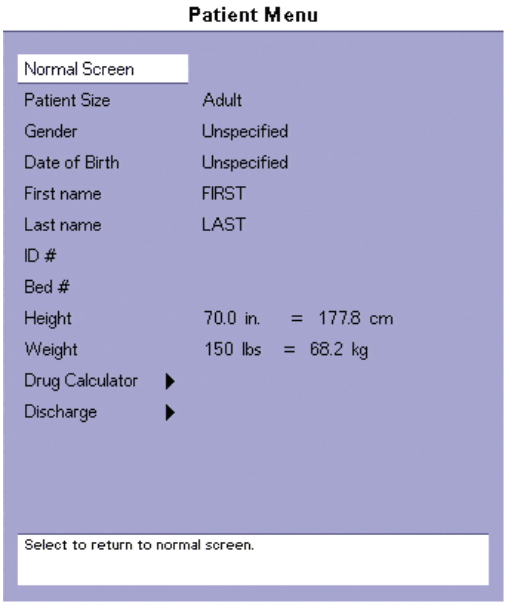

FIGURE 3-1 Patient Menu

Patient Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to Normal Screen (or press the **Normal Screen** key on the front panel).
Patient Size	**Adult** (default) Pediatric Neonate	**Note**: When changing Patient Size, some patient info may need to be re-entered.
Gender	**Unspecified** (default) Male Female	Select to enter or change patient gender.
Date of Birth	**Unspecified** (default)	Select to enter or change date of birth.
First Name		Select to enter or change patient's first name.
Last Name		Select to enter or change patient's last name.
ID #		Select to enter or change Patient ID.
Bed #		Select to enter or change patient bed number.
Height	**Unspecified** (default)	Select to enter or change patient height.
Weight	**Unspecified** (default)	Select to enter or change patient weight.
Drug Calculator		Select to open Drug Calculation Menu.
Discharge		Select to discharge patient from monitor.

Entering a Patient's First / Last Name, ID Number and Bed Number

To enter the patient's **First Name**, **Last Name**, **ID Number** and **Bed Number** complete the following steps:

1. Open the **Patient Menu** and scroll down through the menu using the Navigator Knob.
2. Select the patient data you wish to enter or change.
3. Press the Navigator Knob and a keypad will appear on the screen.
4. To enter patient information highlight the appropriate characters.
5. When finished entering the data select **Done** and press the Navigator Knob to close the keypad.
6. The patient information will appear in the upper right hand corner of the display. This data will also appear on printouts.

NOTE: **Since Remote View requires selecting a "Bed #", a unique number for each bed should be used. The following standard format for this demographic is recommended:**

- Start the Bed # with a room number that has a fixed number of digits. For example, if the maximum number of digits that is used in numbering the rooms is 4, then for room 102, a leading zero would be added to get the 4th digit - 0102.
- Follow the room number with a letter to identify the particular bed within the room. For example, a room with 2 beds would have bed A and bed B.
- An example of a complete "Bed #": Bed B in room 513 (in a facility where there are up to 4 digits in a room number) would be identified as 0513B.

Entering a Patient's Date of Birth

To enter the patient's **Date of Birth** complete the following steps:

1. Open the **Patient Menu** and scroll down through the menu using the Navigator Knob.
2. Select **Date of Birth** from the menu. Press the Navigator Knob and a pop-up window will emerge with day, month and year choices for **Date of Birth.**
3. To enter the patient's **Date of Birth**, turn the Navigator Knob and scroll until you reach the desired dates.
4. When finished with the **Date of Birth**, press the Navigator Knob to return to the **Patient Menu**.

3.3 Discharging a Patient

To discharge a patient from the **Passport V**:

1. On the front panel:
   Press the **Discharge** key
   or
   On the normal screen:
   Select **Patient** 〉 **Discharge**

Discharging a patient from the **Passport V** clears the following:

- Patient information (except Patient Size and Bed No.)
- Physiological alarms and technical alarms
- Prompt messages irrelevent with the patient management
- Corresponding history data (includes Trend data, Events, OxyCRG Trend data, Dose calculations)
- Operations in process (includes local printing and NIBP measurement)

3.4 Data Transfer

3.4.1 Transferring User Configuration

Patient configuration and data can be transferred to and from the **Passport V** via a DPM storage device inserted into the SB1 or SB2 port, located in the back of the unit. The maximum time of data download or upload is about 1 min.

The transferred patient data includes the following:

- Patient demographics (not including Bed No.)
- Trend & Event Data

NOTE: **Newly generated trend or event data, or on-going changed patient demographics may not be transferred during the downloading process.**

CAUTION: **Do not unplug the storage device from any of the SB ports on the Passport V while transferring data, as indicated on the menu or prompt areas of the monitor. Data may be lost or corrupted and the storage device may become damaged.**

3.5 Remote View

The **Remote View** selection enables the user to view the numeric and waveform data of another patient monitored by a different **Passport V** at a remote location.

To display Remote View:

On the normal screen:
Select **Functions** 〉 **Remote View**.

The Remote View feature allows the simultaneous display of data from two patients on a single monitor. The monitor at the user's current location is defined as the host monitor. While maintaining visibility of the primary patient at the host monitor, the **Remote View Menu** enables the user to view the numeric data and two selectable waveforms of another patient who is being monitored at a remote location. The monitor at the remote location is defined as the remote monitor. Visual and audio alarms occurring at the remote monitor are also received through the **Remote View Menu** at the host monitor

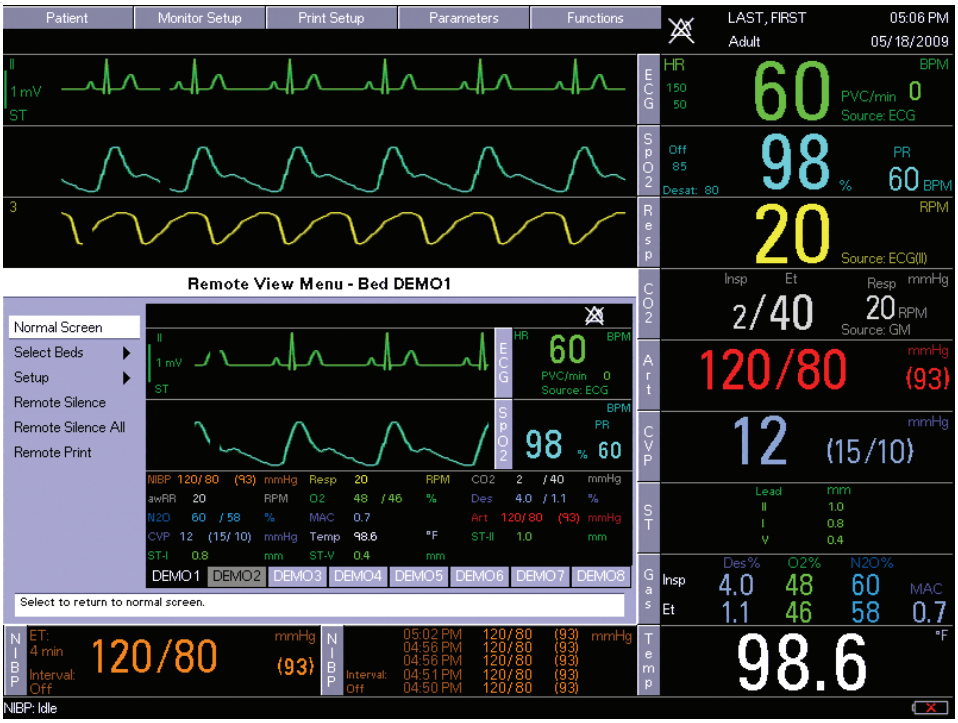

FIGURE 3-2 Remote View Menu on Main Display

The "Enable Network" option in **Installation Menu** 〉 **Advanced Installation Setup Menu** must be set to "Wired" or "Wireless" for Remote View capability to be available. Only **Passport V** monitors on an approved hardwired or wireless network can be viewed remotely.

NOTE: **Unstable wireless signals may be caused by the monitor operating beyond the network coverage, interference from nearby equipment, or by exceeding network capacity limit.**

NOTE: **Remote View function is not available between wireless monitors, nor for wireless monitors to view wired monitors. Remote View function is available between wired monitors, or for wired monitors to view wireless monitors.**

All Remote View controls are contained within the **Remote View Menu**. Opening other menus from the monitor's keypad, or pressing the **Normal Screen** key, will close the **Remote View Menu**.

The **Remote View Menu** displays data as follows:

- The waveforms that are displayed are user-selectable through the **Remote View Setup Menu**, as described in the table on page 3-8. Corresponding numeric tiles are displayed to the right of the waveforms. The numeric data for a maximum of fifteen (15) parameters that are not related to the waveforms is displayed in the "Numeric Data Area" located directly below the waveforms.
- The colors of the waveforms and all numeric data correspond to the settings of the host monitor (not the remote monitor).
- When numeric data for a particular parameter is unavailable, dashes (– – –) are displayed.
- If a high or low alarm limit has not been set, an Alarm Off icon is displayed.
- Remote View alarms follow the alarm settings at the remote monitor, displaying in a priority-appropriate, reverse-video color.
- If the remote monitor is placed into Standby mode, the message "In Standby" is displayed in the Remote View Window.

NOTE: **Respiration alarm text messages are also displayed in the displayed in the message area (upper part) of the Remote View Menu window as follows:**

- If Apnea is detected, the message "APNEA" is displayed.
- If CVA is detected, the message "CVA" is displayed.
- If high impedance is detected from the ECG electrodes, the message "CHK LEAD" is displayed.

The **Remote View Menu** also provides the following menu choices: **Normal Screen**, **Select Beds**, **Setup**, **Remote Silence**, **Remote Silence All**, and **Remote Print**.

1. **Normal Screen** — this selection removes the **Remote View Menu** from the display.
2. **Select Beds** — this selection opens the **Select Beds** menu from which beds may be selected to be included in the care group. All networked beds will be in que but only 8 can be selected.

3. **Setup** — this selection opens the **Remote View Setup Menu** shown in FIGURE 3-3. This menu enables the user to configure the display and functionality of the **Remote View Menu**.

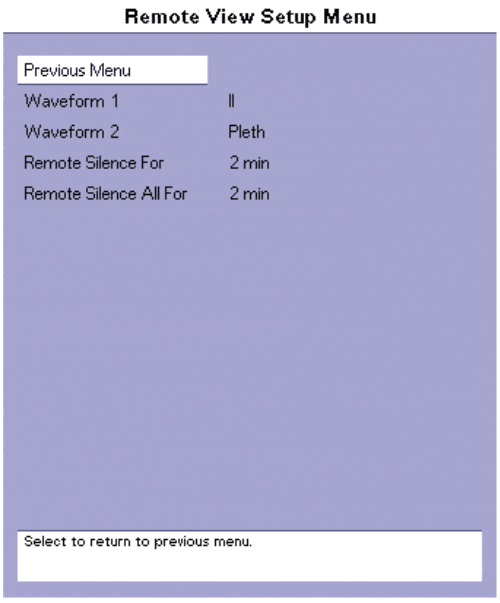

FIGURE 3-3 Remote View Setup Menu

The following table provides a listing of the **Remote View Setup Menu** items:

Remote View Setup Menu

MENU ITEM	SELECTIONS	COMMENTS
Previous Menu		Select to return to previous menu.
Waveform 1	All waveforms available on the remote monitor.	Only waveforms available on the remote monitor will be listed as selections for this menu item. The menu selections for Wave 1 will not include the waveform that is currently selected as Wave 2.
Waveform 2	All waveforms available on the remote monitor.	Only waveforms available on the remote monitor will be listed as selections for this menu item. The menu selections for Wave 2 will not include the waveform that is currently selected as Wave 1.
Remote Silence For	1 min **2 min** (default) 3 min* 5 min* 10 min*	Select to choose duration of Remote Silence.
Remote Silence All For	Permanent* 1 min **2 min** (default) 3 min* 5 min* 10 min*	Select to choose duration of Remote Silence All.

* *These selections will not be available if the language chosen in the Installation Menu is French.*

4. **Remote Silence / Remote Silence All** — this selection silences the audio portion of a remote alarm for the duration that is selected from the **Remote Silence For / Remote Silence All For** list in the **Remote View Setup Menu**. The factory default is 2 minutes. While the audio alarm is silenced:

   - The visual alarm indicators remain displayed.
   - The message **ALARMS SILENCED FOR X:XX mins** is displayed in the message area of the **Remote View Menu**. The **X:XX** in the message is a digital timer for the silence time remaining.
   - If a new remote alarm occurs during this time, the current alarm will remain silenced while its digital timer continues to count down, and the new alarm tone will sound.
   - An Alarm Silence icon is displayed in the top left of the Remote View window.
   - If **Remote Silence** is selected again, the digital timer is reset.

NOTE: **The Remote Silence selection silences only the alarms indicated in the Remote View Menu. It does not silence the primary patient's alarms or alarm sounds at the remote location.**

5. **Remote Print** – Select to request a remote print.
6. **Remote Silence All** — this selection silences the audio alarm tones of all remote alarms for the duration that is selected from the **Remote Silence All For** list in the **Remote View Setup Menu**. The factory default is 2 minutes. While the audio alarms are silenced:

   - the visual alarm indicators remain displayed
   - the message **All Alarms Silenced For X:XX mins** is displayed in the message area of the **Remote View Menu**. The **X:XX** in the message is a digital timer for the silence time remaining

NOTE: **If "Permanent" is selected from the Remote Silence All For list, "All Alarms Silenced Permanently" is displayed in the message area of the Remote View Menu.**

   - an Alarm Silence icon (a crossed bell) is displayed in the numeric tiles and in the "Numeric Data Area"

   If **Remote Silence All** is selected again, the audio alarm tones are re-enabled.

NOTE: **The Remote Silence All selection silences only the alarms indicated in the Remote View Menu. It does not silence the primary patient's alarms or alarm sounds at the remote location.**

7. **Remote Print** — this selection sends a print request to the remote monitor. The printout will be as configured in the **Print Setup** menu of the remote monitor.

NOTE: **When a Remote Print is requested, there is no indication that the printout was completed as requested. The user should verify the successful print at the printer.**

Remote View Message Area

- If more than one message is being received, they are alternately displayed.
- All arrhythmia alarms, priority one alarms, and priority two alarms generate the appropriate audio alerts at the host monitor, and the associated alarm text messages are displayed in the Remote View Message Area. See section 4.7 (pg. 4-25) "Arrhythmia Alarms (optional)" for the specific arrhythmia alarm text messages that can be displayed.

NOTE: **The Lethal Arrhythmia alarms (V-Tach, V-Fib, and Asystole) are latched alarms. They cannot be acknowledged by selecting "Remote Silence "or "Remote Silence All" in the "Remote View Menu". If an alarm is acknowledged while a lethal condition still exists, the audio alert of the alarm will be silenced for XX minutes, where XX is the number minutes selected in "Remote View Menu" 〉 "Setup" 〉 "Remote Silence For" or "Remote Silence All For". However, the visual alert of the alarm and the alarm message will continue to remain active in the Remote View Message Area.**

If a new lethal condition occurs while the initial lethal alarm is silenced, the new lethal alarm will not break through but not be silenced. If the lethal condition is resolved while the alarm is silenced, the alarm will be terminated.

- All alarm messages for parameters are displayed in the Message Area of the **Remote View Menu** window.
- If Apnea is detected, the message "Apnea" is displayed.
- If CVA is detected, the message "CVA" is displayed.
- Remote View displays Technological Alarm messages and Physiological Alarm messages.

3.6 Monitor/Display Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
No trace for a desired parameter	Improper attachment of transducer or cable to monitor.	Check transducer / cable connection.
	Faulty transducer or cable.	Try a new transducer or cable.
Display Appears to be Off	Mains power switch may not be on.	Press mains power switch on side panel.
	Unit may not be plugged into an AC outlet.	Check power cord (Is it plugged in?)
	If used as a portable, battery pack may be drained.	If battery pack is drained, plug into an AC outlet to recharge the battery. A period of 5.5 hours (monitor OFF) or 8.5 hours (monitor ON) is required for a full charge of lithium-ion batteries.
	Monitor or display is damaged.	Contact Customer Support.
Disabled Alarm Tone	**Silence** key pressed.	Check for alarm silence symbol and message.
	Beep volume low.	Increase beep volume.
Cooling Fan Failure	The unit running on AC power and the cooling fan is not operational.	Contact Customer Support.
Patient Information did not appear on display	No data entered.	Enter proper patient data.
	Done was not selected from keypad after entering data.	Go to the proper keypad enter data, select **Done** when finished.
Incorrect Date or Time	Data not entered or entered incorrectly.	Follow instructions from **"How to Set the Clock / Date and Time"**.

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4.0 *ECG Monitoring*

4.1 Description

ECG is a continuous waveform of a patient's cardiac electrical activity. An ECG waveform will display in the first waveform area of the **Passport V**.

The quality of an ECG signal is directly affected by electrode site skin preparation, electrode patch quality and ECG lead placement. If artifact is present on the ECG waveform, then the arrhythmia processing, alarm processing, and quality of the monitoring function may be affected. The presence of artifact can prevent the monitor from establishing an accurate ECG reference waveform, increasing the difficulty experienced in assessing the ECG rhythm.

Optimizing the ECG signal is imperative for accurate monitoring. Use high quality electrodes, designed to acquire the ECG with excellent base line stability, recovery from defibrillation and minimum artifact from patient movement.

With the **Passport V**, ECG can be obtained by using a 3- or 5-lead ECG cable in conjunction with a 3- or 5-lead set and skin electrodes. For best performance and safety, inspect the ECG cables and electrodes daily.

Features:

- Provides the function of ECG1 cascade display on the normally monitored screen.
- The **Passport V** supports the Mortara algorithm (V3.2.8).
- Supports 3- and 5-lead configuration and automatic identification of lead configuration.
- The ECG algorithm includes up to three parts: HR calculation, ST analysis (if installed) and ARR analysis (if installed).
- Displays HR, PVCs and ST segment parameters and ECG waveforms (if installed).
- The ECG waveforms can be displayed normally or in **All ECG View** (via **View** key) when a 5-lead leadset is in use.
- When using a 5-lead cable, 3-lead configuration will be selected automatically if the RL lead becomes detached from the patient.

4.2 ECG Screens

4.2.1 Numeric Tile: ECG

The ECG numeric tile displays the following:

- ECG label
- HR value, HR unit, HR alarm limits
- PVCs parameter name, PVCs value (not displayed when arrhythmia is OFF or not installed)
- ST segment value (not displayed when ST segment analysis is OFF and Combine HR/ST is set to Off or not installed)
- HR source

NOTE: In Large Numeric Screen, ST values and PVC/min are not displayed in the ECG numeric tile.

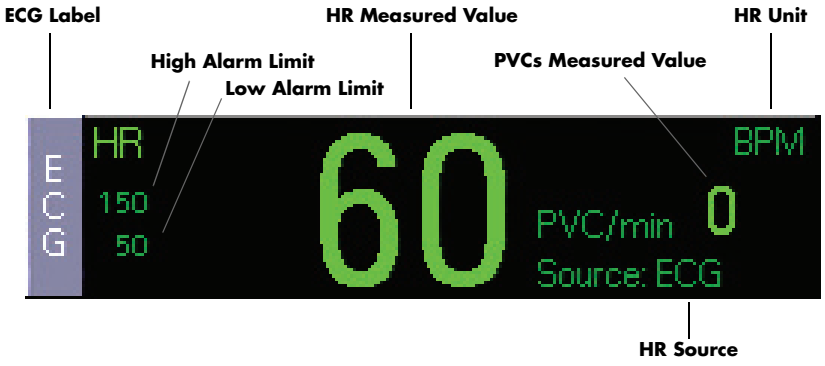


FIGURE 4-1 ECG numeric tile without ST displayed

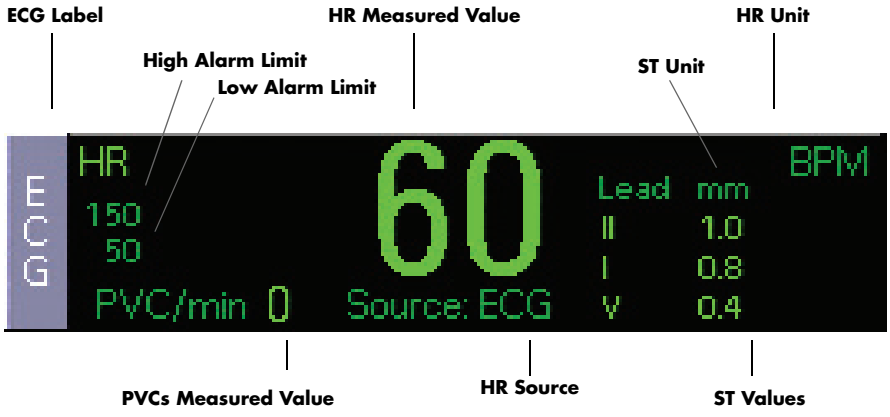


FIGURE 4-2 ECG numeric tile with ST displayed

4.2.2 Waveform: ECG

The ECG waveform tile displays the following:

- Every ECG waveform area displays ECG lead name, ECG scale, and filter mode.
- A pacer marker is displayed when an external pace pulse is detected.
- ECG Prompt Messages are displayed in the top of ECG1 waveform area:
  Message "Pacer Reject On" is displayed in the right top of waveform area.
  Other ECG prompt messages are displayed in the middle top of ECG1 waveform area.

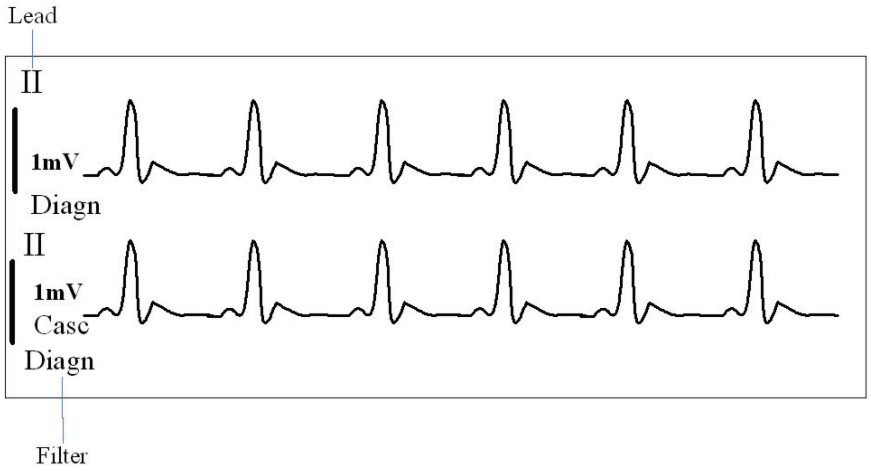


FIGURE 4-3 ECG waveform, 3-lead normal monitoring (cascade is turned on)

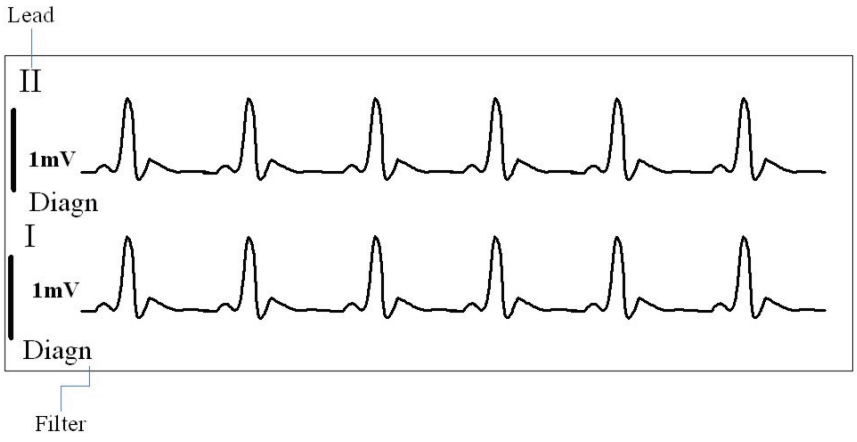


FIGURE 4-4 ECG waveform, 5-lead normal monitoring (2 channel)

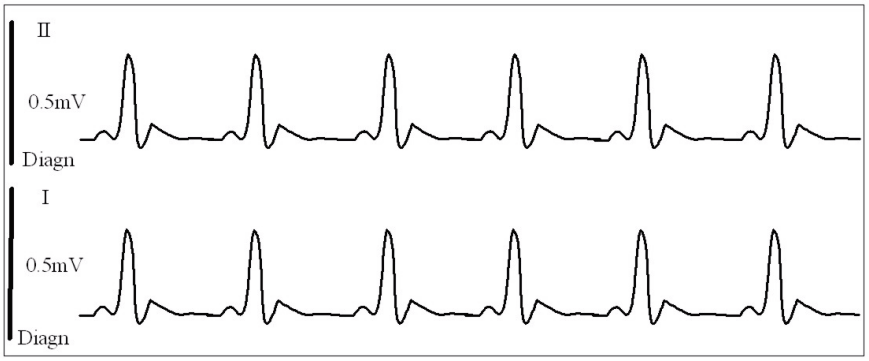


FIGURE 4-5 ECG waveform, 1mV scale overrange

4.3 Front Panel: ECG Keys

ECG Keys (Front Panel)

KEY	COMMENTS
LEAD	Press to change ECG1 lead selection. The ECG1 menu selection in **ECG Menu** has the same function. In **All ECG View**, this key is disabled.
SIZE	Press to change ECG1 waveform size. The ECG1 Size menu option in the **ECG Sizes Menu** has the same function. In All ECG View, this key is disabled.
VIEW	Press to display the **All ECG View** screen. In **All ECG View**, the order of the waveforms displayed is I, II, III, aVR, aVL, aVF, V. Press this key repeatedly to toggle between multi-lead view, large numeric display, and normal screen. When returning to **Normal Screen** from **All ECG View**, the order of the ECG waveforms is displayed as configured in the **ECG Menu**.

4.4 Menus: ECG Main and Submenus

4.4.1 ECG Menu

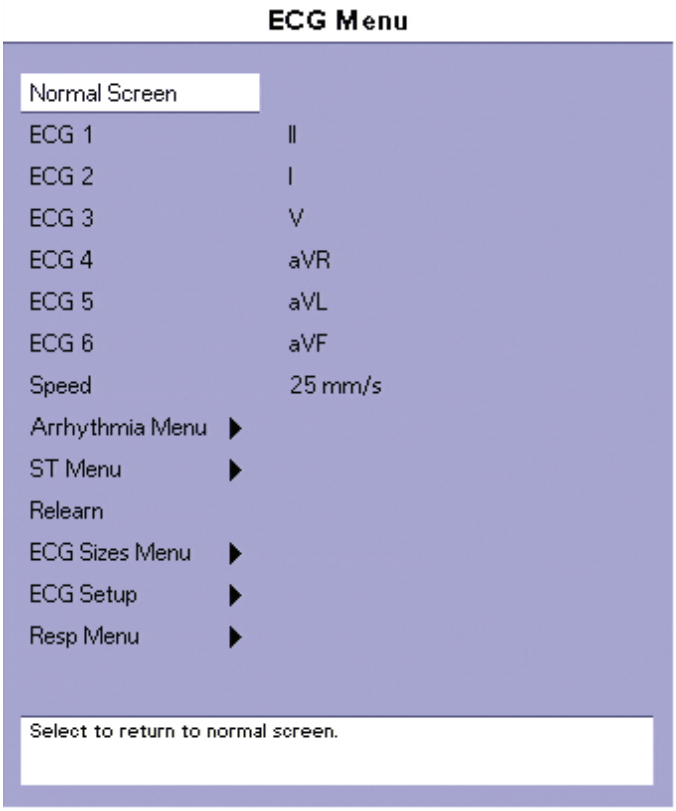


FIGURE 4-6 ECG Menu

To display the ECG Menu:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **ECG**
   or
   Select the **ECG** tile.
3. To exit, press the **Normal Screen** key on the front panel.

ECG Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to Normal Screen (or press the **Normal Screen** key on the front panel).
ECG 1 ECG 2 ECG 3 ECG 4 ECG 5 ECG 6	For 3-lead leadset: I, II, III For 5-lead leadset: I, II, III, aVR, aVL, aVF, V Defaults: ECG 1 = II ECG 2 = I ECG 3 = V ECG 4 = aVR ECG 5 = aVL ECG 6 = aVF	Select to change ECG lead to be analyzed. When a 3-lead configuration is detected, only ECG1 is displayed. When a 5-lead configuration is detected, ECG1 to ECG6 can be displayed. In Normal screen, the ECG lead displayed can be selected as required. In **All ECG View**, the ECG1 to ECG6 options can be selected as required. The effect of 3-lead and 5-lead switchover: 5-lead to 3-lead: If ECG1 is I/II/III, then ECG1 is unchanged. Otherwise, automatically change to II. 3-lead to 5-lead: ECG1to ECG6 are unchanged from the previous 5-lead setting.
Speed	6.25 mm/s 12.5 mm/s **25 mm/s** (default) 50 mm/s	Select to change the trace speed (mm/s) of the ECG waveform. Applies to all ECG leads.
Arrhythmia Menu		Select to open the Arrhythmia Menu. Available only if Arrhythmia option is installed. Disabled if Patient Size = Neonate.
ST Menu		Select to open the ST Menu. Available only if ST option is installed. Disabled if Patient Size = Neonate.
Relearn	—	Select to manually initiate the relearning process for ST Measurements or Arrhythmia Analysis. Relearn is disabled if at least one of the following: • Patient Size = Neonate. • ST Analysis and Arrhythmia = Off. • ST Analysis and Arrhythmia are not configured. After relearning is started, arrhythmia relearning and ST relearning are performed simultaneously. The arrhythmia and ST analysis templates are recreated and the message "Relearning..." is displayed. During relearning, ST and PVCs are displayed as "– – –". Arrhythmia relearning should be automatically started when: • Lead type is changed. • ECG lead wires are reconnected to the patient. • Analysis lead is changed. • Patient size is changed. • Arrhythmia analysis is turned on. • Module is turned on. • Exiting Standby mode.

ECG Menu

MENU ITEM	SELECTIONS	COMMENTS
ECG Sizes Menu	0.125 cm/mV 0.25 cm/mV 0.5 cm/mV **1 cm/mV** (default) 2 cm/mV 4 cm/mV	Select to open the ECG Sizes Menu. Sets the ECG size (waveform gain) for: • ECG1 only if using 3-lead • ECG1 to ECG6 if using 5-lead All ECG waveforms are displayed with 1cm/mV gain in the **All ECG View** (via **View** key). All ECG waveforms are displayed with the user-selected gain after exiting the **All ECG View**. All ECG waveform gains remain unchanged after switchover between 3-lead and 5-lead modes. **NOTE:** The SIZE key on the front panel is used to change ECG1 waveform size. The "ECG1 Size" menu option in the **ECG Sizes Menu** has the same function. (In **All ECG View**, this key is disabled.)
ECG Setup		Select to open the ECG Setup Menu. See section 4.4.4 (pg. 4-12) "ECG Sizes Menu".
Resp Menu		Select to open the Respiration Menu. See section 4.4.5 (pg. 4-12) "ECG Setup Menu".

4.4.2 Arrhythmia Menu (optional)

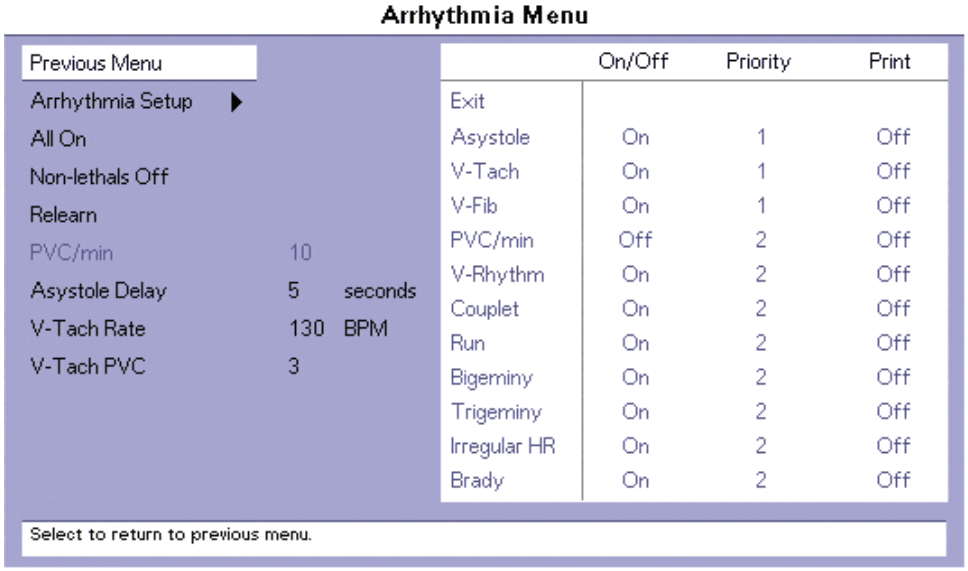


FIGURE 4-7 Arrhythmia Menu

NOTE: The Arrhythmia Menu is disabled if Patient Size = Neonate.

To display the Arrhythmia Menu:

1. On the front panel, press the **Alarms: Limits** key to display the **Alarm Settings Menu**, and select **Arrhythmia Menu**

   or
   On the normal screen:
   Select **Monitor Setup** 〉 **Advanced Setup** 〉 **Arrhythmia Menu**
   or
   Select **Parameters** 〉 **ECG** 〉 **Arrhythmia Menu**
   or
   Select the **ECG** tile 〉 **Arrhythmia Menu**.

2. To exit, press the **Normal Screen** key on the front panel.

Arrhythmia Menu

MENU ITEM	SELECTIONS	COMMENTS
Previous Menu	—	Select to return to previous menu.
Arrhythmia Setup	Asystole V-Tach V-Fib PVC/min V-Rhythm Couplet Run Bigeminy Trigeminy Irregular HR Brady	Select to set individual arrhythmia alarm characteristics. For each arrhythmia selection, choose: Alarm: On or Off Priority: 1 or 2 Print: On or Off Lethal arrhythmias (Asystole, V-Tach, and V-Fib) are Priority 1 and cannot be changed. The factory default for all arrhythmia alarms is On.
All On	—	Select to set all arrhythmia alarms to On.
Non-lethals off	—	Select to set all non-lethal arrhythmia alarms to Off.
All Off	—	Select to set all arrhythmia alarms to Off. "All Off" is displayed only if "Enable Arrhythmia All Off Selection" = Yes in the **Installation Menu**.
Relearn	—	Select to manually initiate the relearning process for ST Measurements or Arrhythmia Analysis. Disabled if Arrhythmia = Off. After relearning is started, arrhythmia relearning and ST relearning are performed simultaneously. The arrhythmia and ST analysis templates are recreated and the message "Relearning..." is displayed. During relearning, ST and PVCs are displayed as "– – –". Arrhythmia relearning should be started when: • Lead type is changed. • ECG lead wires are reconnected to the patient. • Analysis lead is changed. • Patient size is changed. • Arrhythmia analysis is turned on. • Module is turned on. • Exiting Standby mode.
PVC/min	1 to 30 default = 10	Select to change the High PVC/min alarm rate limit. The PVC/min parameter is displayed when PVC/min arrhythmia alarm is set to On.

Arrhythmia Menu

MENU ITEM	SELECTIONS	COMMENTS
Asystole Delay	3 to 10 seconds default = 5	Select to change the Asystole Delay Time.
V-Tach Rate	100 to 180 BPM default = 130	Select to change the V-Tach alarm rate limit.
V-Tach PVC	3 to 15 default = 3	Select to change the required number of PVCs detected in a continuous sequence before V-Tach is detected and labeled.

4.4.3 ST Menu

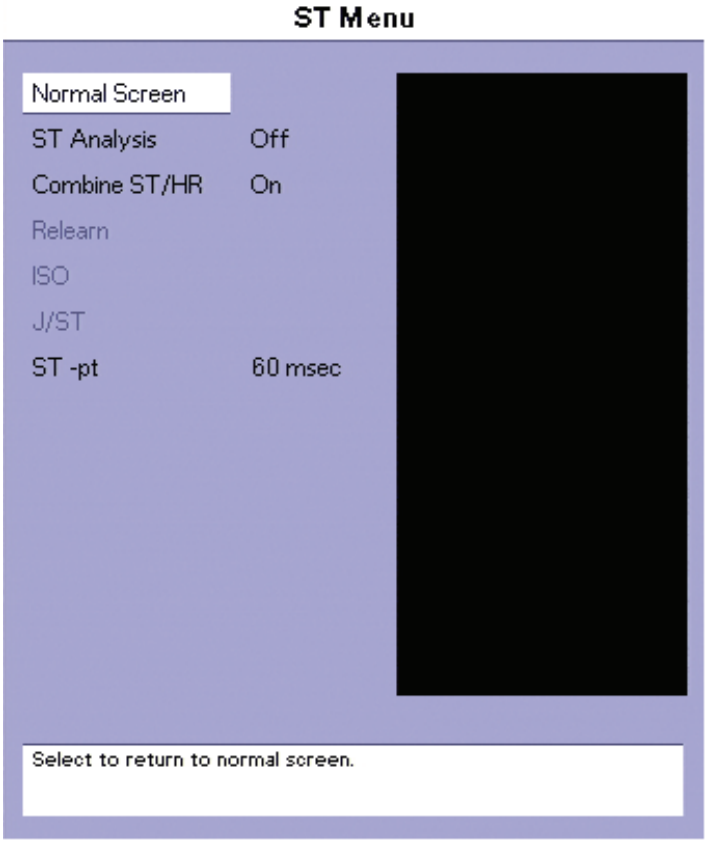


FIGURE 4-8 ST Menu

NOTE: The ST Menu is disabled if Patient Size = Neonate.

To display the ST Menu:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **ST Menu**
   or
   Select the **ECG** tile 〉 **ST Menu**.
3. To exit, press the **Normal Screen** key on the front panel.

ST Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to Normal Screen (or press the **Normal Screen** key on the front panel).
ST Analysis	On **Off** (default)	Select to turn ST analysis on or off. On: ST analysis is active. ST values are displayed. Off: ST analysis is inactive. ST values are not displayed. **Note:** If Filter is set to Surgery or Monitor when ST Analysis is set to On, the ST analysis automatically uses the ST filter without changing the user-selected filter setting. The user can select Diagnostic Filter setting. If Filter is set to ST or Diagnostic when ST Analysis is set to On, the ST analysis uses the Filter setting. The filter displayed in ECG waveform areas is coincident with actual filter mode.
Combine ST/HR	**On** (default) Off	Select to determine location of ST values. Combine moves ST to heart rate window. On: ST values are displayed in the HR numeric tile. Off: ST values are displayed in the ST numeric tile.
Relearn	—	Select to manually initiate the relearning process for ST Measurements or Arrhythmia Analysis. Disabled if ST Analysis = Off. After relearning is started, arrhythmia relearning and ST relearning are performed simultaneously. The arrhythmia and ST analysis templates are recreated and the message "Learning..." is displayed. During relearning, ST and PVCs are displayed as "– – –". Arrhythmia relearning should be started when: • Lead type is changed. • ECG lead wires are reconnected to the patient. • Analysis lead is changed. • Patient size is changed. • Arrhythmia analysis is turned on. • Module is turned on. • Exiting Standby mode.
ISO	-200 to -4 msec	Select to adjust isoelectric point. Adjustable in 8 msec increments.

ST Menu

MENU ITEM	SELECTIONS	COMMENTS
J/ST	4 to 200 msec	Select to adjust J and ST measurement points. Adjustable in 8 msec increments.
ST -pt	40 msec **60 msec** (default) 80 msec 60/80 msec	Select to adjust distance of ST point to the J point.

4.4.4 ECG Sizes Menu

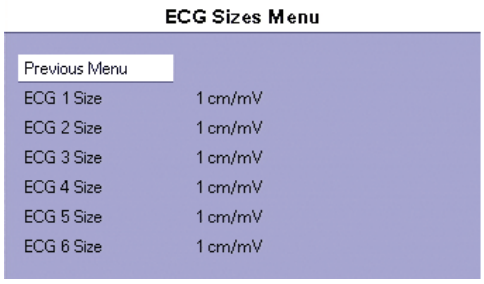


FIGURE 4-9 ECG Sizes Menu

To display the ECG Sizes Menu:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **ECG** 〉 **ECG Sizes Menu**
   or
   Select the **ECG** tile 〉 **ECG Sizes Menu**.
3. To exit, press the **Normal Screen** key on the front panel.

4.4.5 ECG Setup Menu

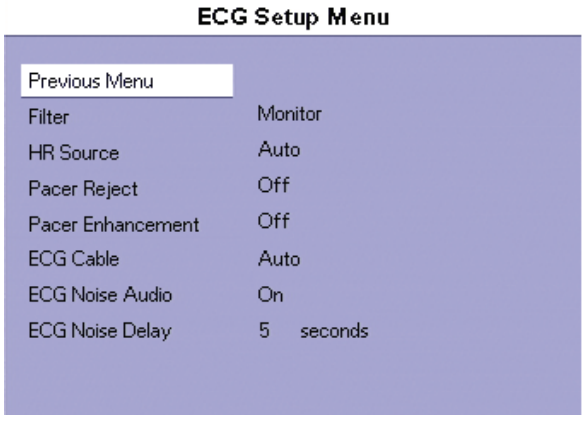


FIGURE 4-10 ECG Setup Menu

To display the ECG Setup Menu:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **ECG** 〉 **ECG Setup Menu**
   or
   Select the **ECG** tile 〉 **ECG Setup Menu**.
3. To exit, press the **Normal Screen** key on the front panel.

ECG Setup Menu

MENU ITEM	SELECTIONS	COMMENTS
Previous Menu	—	Select to return to previous menu.
Filter	Surgery **Monitor** (default) ST Diagnostic	Select to change filter mode for ECG. Diagnostic or ST must be used for ST analysis. Channel Bandwidth: Surgery = 1 to 20 Hz Monitor = 0.5 to 40 Hz ST= 0.05 to 40 Hz Diagnostic = 0.05 to 150 Hz **Note:** If Filter is set to Surgery or Monitor when ST Analysis is set to On, the ST analysis automatically uses the ST filter without changing the user-selected filter setting. If Filter is set to ST or Diagnostic when ST Analysis is set to On, the ST analysis uses the Filter setting. The filter displayed in ECG waveform areas is coincident with the actual filter mode.
HR Source	**Auto** (default) ECG Art UA LV PA SpO_2	Select to change heart rate source. The selections are available if the corresponding parameters are configured. The selections are in order of priority from high to low: Auto, ECG, ART, UA, LV, PA, SpO2. If Auto is selected, the monitor will switch to the current highest-priority measuring module, and will display the actual heart rate source in the numeric tile. If the module for the selected HR source becomes unavailable, the monitor will switch to the next available source.
Pacer Reject	On **Off** (default)	Select to turn pacer reject on (pacer artifact blanked from display) or off (pacer artifact displayed). On: Rejects the pacing pulse, and filters the pacing pulse from the ECG waveforms. The message "Pacer Reject On" is displayed on the top right of the ECG1 waveform area. Off: Pacing pulse is not rejected.
Pacer Enhancement	On **Off** (default)	Select to turn pacer enhancement on or off. On: If there is pacing pulse, a short, straight vertical line is used on all ECG waveforms to mark pacing pulse. Off: Pacing pulse is not rejected

ECG Setup Menu

MENU ITEM	SELECTIONS	COMMENTS
ECG Cable	**Auto** (Default) 3 Lead 5 Lead	Select to change the ECG cable type being used.
ECG Noise Audio	**On** (Default) Off	Select to turn ECG Noise audio signal on or off. On: An audio alarm tone is triggered when ECG Noise is detected.
ECG Noise Delay	3 to 30 seconds Default = 5 seconds	Select to change the number of seconds to delay the ECG Noise Alarm.

WARNING: Ensure that the conductive parts of ECG electrodes do not contact other conductive parts, including earth ground.

CAUTION: To avoid possible damage to the Passport V, and to provide protection against the effect of the discharge of a cardiac defibrillator and against burns, use only approved ECG cables and approved accessories listed in the Accessories chapter.

CAUTION: Line Isolation Monitor transients may resemble actual cardiac waveforms, thus inhibiting heart rate alarms. Check lead wires for damage and ensure good skin contact prior to and during use. Always use fresh electrodes and follow proper skin preparation techniques.

WARNING: This device is not intended for direct cardiac application.

4.5 Preparation and Lead Placement

4.5.1 Skin Preparation

Proper skin preparation is essential in obtaining an accurate ECG reading. Electrode sites should be clean and dry and should provide a smooth flat surface. Incidental electrical activity and inaccurate readings may arise from incorrect skin preparation.

The following procedure is recommended for secure electrode patch application:

1. Shave the chest hair from the electrode sites in a circular area with a diameter of 2 – 4 inches.
2. Use a dry gauze pad to remove excess skin oils, skin cells and residue from the electrode sites. Never rub the skin until it is raw or bleeding.

NOTE: Prepare the electrode site with alcohol only if the skin is extremely greasy. If alcohol is used as a drying agent, always allow the skin to dry before placing the electrode patch on the skin.

4.5.2 Electrode Patch Location

NOTE: Store electrode patches at room temperature and open just prior to use.

NOTE: Avoid more than one type of electrode on a patient because of variations in electrical resistance.

NOTE: Avoid placing electrode patches directly over bone prominences or over any high activity movement areas such as shoulders or arms because muscle motion produces electrical activity. If an electrode patch is placed over a large muscle such as the pectorals, the monitor may detect this additional muscle activity and could lead to false arrhythmia calls.

NOTE: Using a Transcutaneous Electrical Nerve Stimulator (TENS): Since a TENS unit transmits electrical impulses, avoid placing ECG electrode patches near the TENS electrodes. ECG electrode patches may need to be repositioned and the ECG lead viewed may need to be adjusted until the optimum ECG tracing is obtained.

1. To prevent evaporation of the contact gel medium, peel the backing off of the electrode patch only when it is ready for use. Visually inspect the contact gel medium for moistness. If the gel medium is not moist, do not use the electrode patch. Dry electrode patches are not conductive.

NOTE: If using the snap type electrode wires, attach the electrode patch to the lead wire before placing patch on the patient.

2. Attach the electrode patch to the skin at the prepared site. Smooth the electrode patch down in a circular motion to ensure proper skin contact. If using soft gel electrodes, never push down directly over the contact gel medium as this may displace the gel and cause monitoring artifact. If using hard gel electrodes, it is recommended that during application, the center of the electrode should be slightly pressed onto the skin to ensure direct contact. Consult the electrode patch manufacturer's instructions for specific use.
3. Secure the lead wires to the patient according to hospital practice. For additional information see section NOTE:, "It is recommended that electrode patches be changed at least every 24 – 36 hours to maintain proper contact with the skin. Some patients may require electrodes to be changed more often. Electrode patches are disposable and should be applied only once. Try to avoid reusing the exact same electrode site during reapplication. If an electrode becomes wet with fluid, change the electrode patch.".

WARNING: Route cables neatly. Ensure cables, hoses and wires are kept away from patient's neck to avoid strangulation. Keep floors and walkways free of cables to reduce risk to hospital personnel, patients and visitors.

NOTE: It is recommended that electrode patches be changed at least every 24 – 36 hours to maintain proper contact with the skin. Some patients may require electrodes to be changed more often. Electrode patches are disposable and should be applied only once. Try to avoid reusing the exact same electrode site during reapplication. If an electrode becomes wet with fluid, change the electrode patch.

4.5.3 Lead Placement

4.5.3.1 Description

For lead placement, the computerized arrhythmia algorithm works best when the patient's R wave is significantly larger than the P wave or the T wave. If the R wave is not significantly larger than other lower voltage waves on the ECG tracing, the computer may have some difficulty in identifying the appropriate waves. On some patients, electrode patch placement and/or the viewed ECG lead may need to be adjusted in order to obtain a significant R wave.

4.5.3.2 Setting Lead Naming Standard

This manual presents lead placement according to the guidelines of the American Heart Association (AHA) and the International Electro-Technical Commission (IEC).

LEAD NAMING STANDARDS

LEAD POSITION	AHA	IEC
CHEST	V	C
LEFT LEG	LL	F
RIGHT LEG	RL	N
LEFT ARM	LA	L
RIGHT ARM	RA	R

The **Passport V** provides two lead naming standards in the **Installation Menu**: **IEC** and **AHA**.

To set the lead naming standard on the Passport V:

1. Press and hold the **Discharge** key on the front panel. Simultaneously, power up the **Passport V** monitor.
2. Release the **Discharge** key when the **Installation Menu** is displayed.
3. Select **ECG Standard**.
4. Choose **AHA** or **IEC**.
5. Cycle power to the **Passport V** monitor.

4.5.3.3 Lead Placement: Standard 3-wire Lead Sets

A 3-wire lead set can monitor one of three ECG vectors (I, II, or III). The recommended 3-wire lead placement is as follows.

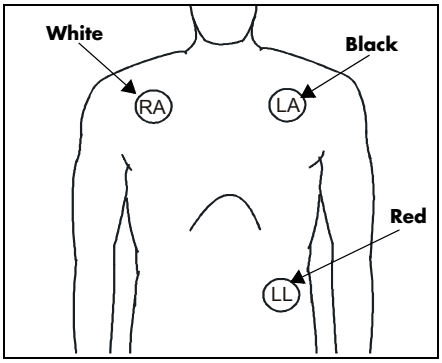


FIGURE 4-11 3-wire Lead Placement (AHA)

- Place the RA (white) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LA (black) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LL (red) electrode on the patient's lower left abdomen within the rib cage frame.

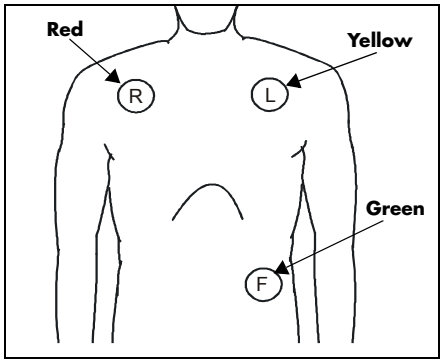


FIGURE 4-12 3-wire Lead Placement (IEC)

- Place the R (red) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the L (yellow) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the F (green) electrode on the patient's lower left abdomen within the rib cage frame.

4.5.3.4 Lead Placement: Standard 5-wire Lead Sets

A 5-wire lead set can monitor seven ECG vectors (I, II, III, aVR, aVL, aVF, and V) simultaneously. The recommended 5-wire lead placement is as follows.

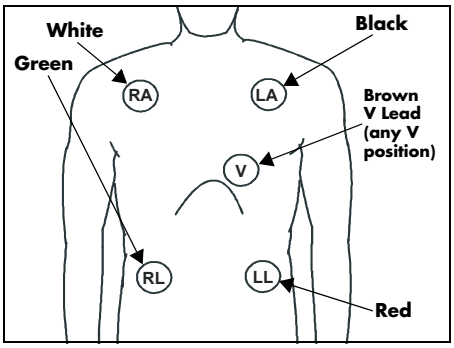


FIGURE 4-13 5-wire Lead Placement (AHA)

- Place the RA (white) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LA (black) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LL (red) electrode on the patient's lower left abdomen within the rib cage frame.
- Place the RL (green) electrode on the patient's lower right abdomen within the rib cage frame.
- Place the V (brown) electrode in one of the V-lead positions (V1 – V6) depicted in the following section.

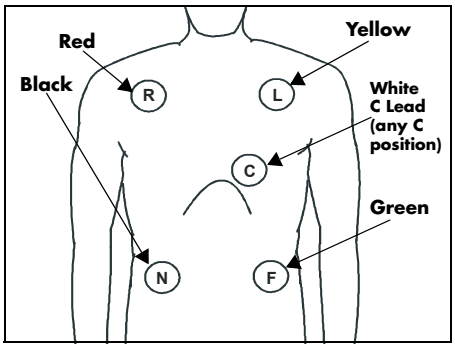


FIGURE 4-14 5-wire Lead Placement (IEC)

- Place the R (red) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the L (yellow) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the F (green) electrode on the patient's lower left abdomen within the rib cage frame.
- Place the N (black) electrode on the patient's lower right abdomen within the rib cage frame.
- Place the C (white) electrode in one of the C-lead (C1 – C6) positions depicted in the following section.

4.5.3.5 Lead Placement: Lead II Monitoring

The recommended lead placement for Lead II monitoring is as follows.

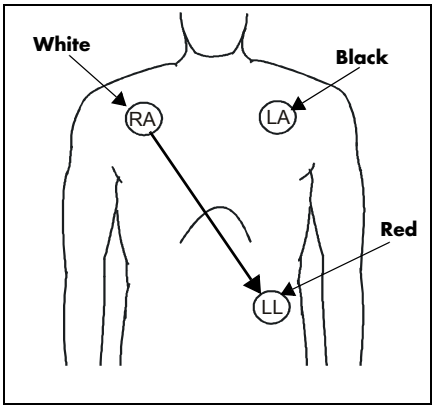


FIGURE 4-15 Lead II Monitoring (AHA)

- Place the RA (white) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LA (black) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LL (red) electrode on the patient's lower left abdomen within the rib cage frame.

Select ECG Lead II on the monitor. Lead II is the direct electrical line between the RA (white) electrode and the LL (red) electrode.

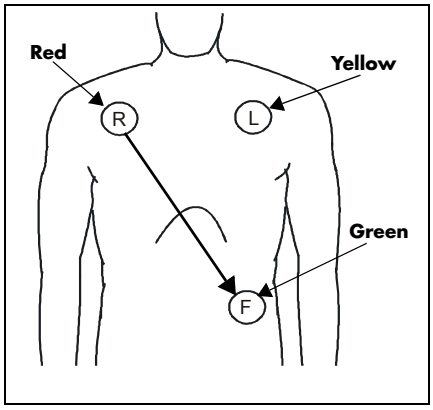


FIGURE 4-16 Lead II Monitoring (IEC)

- Place the R (red) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the L (yellow) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the F (green) electrode on the patient's lower left abdomen within the rib cage frame.

Select ECG Lead II on the monitor. Lead II is the direct electrical line between the R (red) electrode and the F (green) electrode.

4.5.3.6 Lead Placement: Modified Chest Lead (MCL) Monitoring

The recommended lead placement for MCL monitoring is as follows.

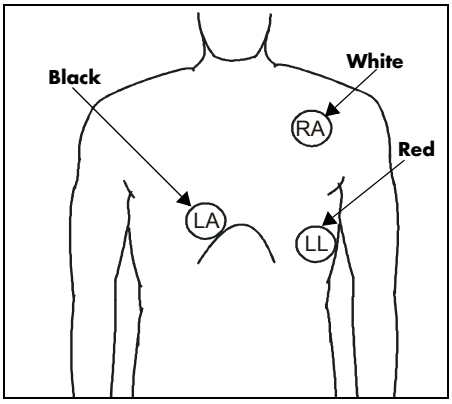


FIGURE 4-17 MCL Monitoring with a 3-wire Lead Set (AHA)

- Place the RA (white) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LA (black) electrode on the right sternal border, at the fourth intercostal space within the rib cage frame.
- Place the LL (red) electrode on the patient's lower left abdomen within the rib cage frame.

Select ECG Lead I for MCL_1 monitoring. Lead I is the direct electrical line between the RA (white) electrode and the LA (black) electrode.

Select ECG Lead II for MCL_6 monitoring. Lead II is the direct electrical line between the RA (white) electrode and the LL (red) electrode.

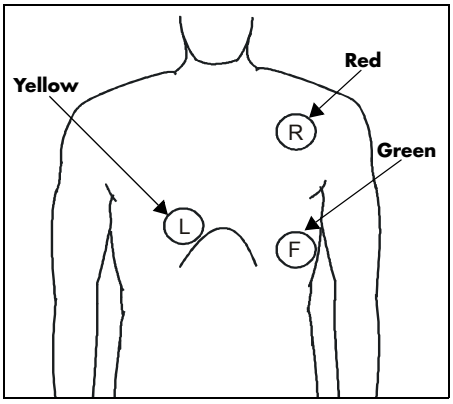


FIGURE 4-18 MCL Monitoring with a 3-wire Lead Set (IEC)

- Place the R (red) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the L (yellow) electrode on the right sternal border, at the fourth intercostal space within the rib cage frame.
- Place the F (green) electrode on the patient's lower left abdomen within the rib cage frame.

Select ECG Lead I for MCL_1 monitoring. Lead I is the direct electrical line between the R (red) electrode and the L (yellow) electrode.

Select ECG Lead II for MCL_6 monitoring. Lead II is the direct electrical line between the L (red) electrode and the F (green) electrode.

4.5.3.7 Lead Placement: Neonates

Using a 3-wire lead set, ECG lead placement on a neonate is usually directed towards obtaining the best possible respiration data through the ECG thoracic impedance technique. Thoracic impedance is usually measured between the Right Arm and Left Arm electrode patches. These patches should be placed on the chest directly across from each other to optimize the measuring of the neonate's chest movement. The recommended lead placement for neonate monitoring is as follows.

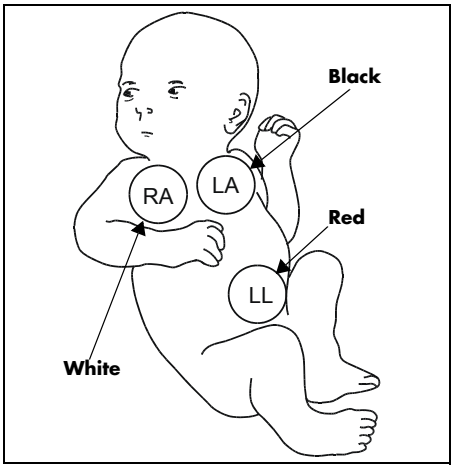


FIGURE 4-19 Neonatal 3-wire Lead Placement (AHA)

- Place the RA (white) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LA (black) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the LL (red) electrode on the patient's lower left abdomen within the rib cage frame.

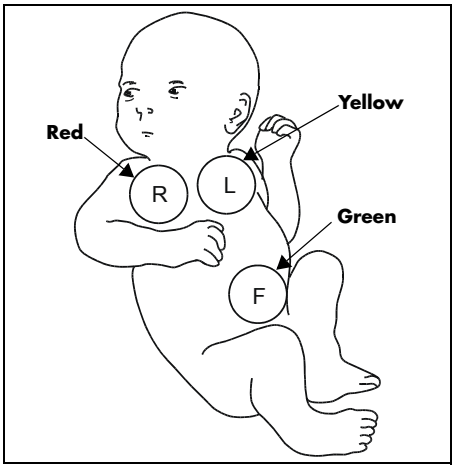


FIGURE 4-20 Neonatal 3-wire Lead Placement (IEC)

- Place the R (red) electrode under the patient's right clavicle, at the mid-clavicular line within the rib cage frame.
- Place the L (yellow) electrode under the patient's left clavicle, at the mid-clavicular line within the rib cage frame.
- Place the F (green) electrode on the patient's lower left abdomen within the rib cage frame.

4.5.3.8 Lead Placement: Pacemaker Patients

The recommended lead placement for monitoring a pacemaker patient is as follows.

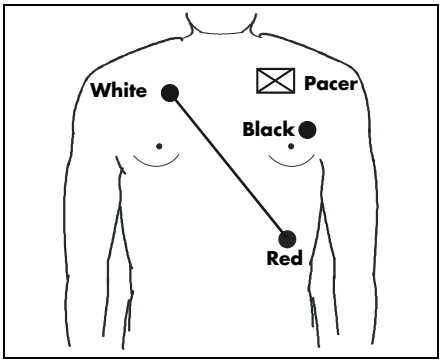


FIGURE 4-21 3-wire Lead Placement for a Pacemaker Patient (AHA)

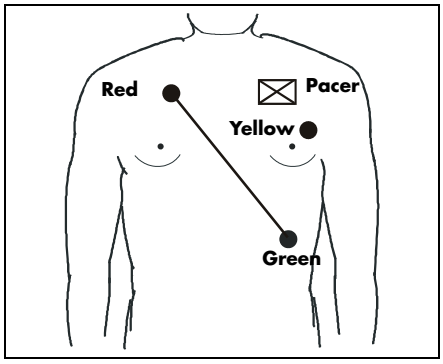


FIGURE 4-22 3-wire Lead Placement for a Pacemaker Patient (IEC)

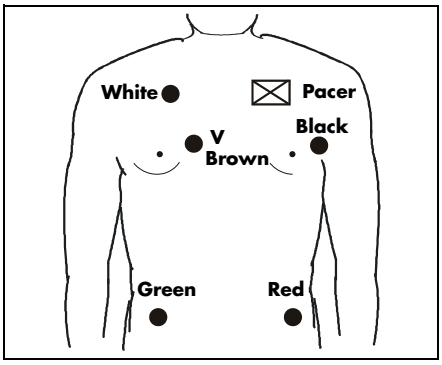


FIGURE 4-23 5-wire Lead Placement for a Pacemaker Patient (AHA)

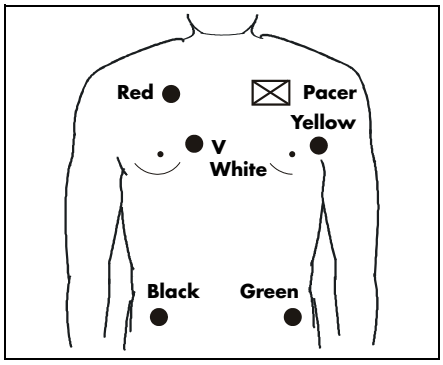


FIGURE 4-24 5-wire Lead Placement for a Pacemaker Patient (IEC)

A pacemaker patient usually requires a different electrode patch placement configuration than a non-pacemaker patient.

Do not place an ECG electrode directly over the pacemaker generator. Place the electrode patches 3 – 5 inches away from the pacemaker generator area. For example, if the pacemaker generator is located in the right subclavian area, relocate the Right Arm electrode closer in towards the center of the chest.

WARNING: Pacemaker patients' rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance. See the Appendix section of this manual for disclosure of the pacemaker pulse rejection capability of this instrument.

CAUTION: Some pacemakers may contain a respiratory sensor that may produce artifact on an ECG waveform.

4.6 Arrhythmia Algorithm

The **Passport V** uses an arrhythmia algorithm to monitor ECG waveform data. The algorithm creates ECG waveform templates based on a patient's normal ECG data and uses them to analyze newly received data. The algorithm verifies that data is free from noise and artifact, and that it does not deviate from the patient's normal ECG rhythms.

A normal ECG waveform typically includes consistent spacing between R waves, a sharp and well defined QRS complex, and an ECG baseline that is free of noise and artifact.

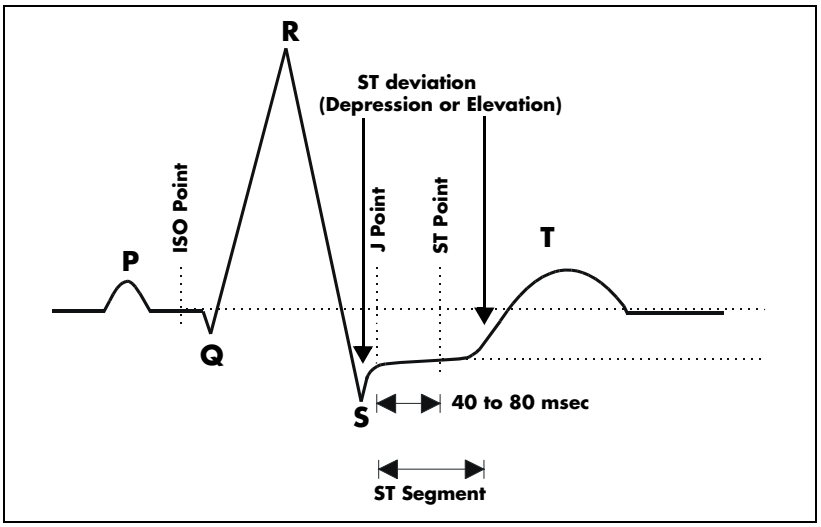


FIGURE 4-25 Sample Waveform

4.6.1 Noise and Artifact

The presence of noise or artifact in an ECG waveform makes the accurate detection and classification of heartbeats difficult. To best optimize performance, all leads should be free of noise.

Some of the causes of ECG noise include poor skin preparation, improperly attached electrodes, dried electrode gel, defective lead wires, and patient movement. The algorithm uses several techniques to differentiate a patient's QRS complexes from noise sources.

If noise levels are too high for a particular lead, a message is posted, and the data is dropped from analysis until the signal quality is re-established.

If noise levels are too high, the following will occur until the signal quality is re-established:

- Beat detection is suspended
- All rhythm calls are suspended
- An **ECG Noise** message is displayed

4.6.2 Heart Rate Average

The heart rate average is computed using the 16 most recent R-R intervals for heart rates above 48 beats per minute. If the heart rate calculated using the last 4 beats is less than 48 beats per minute, then this rate is used. All detected beats are used to compute the heart rate. A separate ventricular rate is used in the algorithm to determine rhythms like ventricular tachycardia and ventricular run.

4.6.3 Filtering Pacer Signals

In order to prevent pacer pulses from being mistaken for QRS complexes, they are removed from the ECG data that is sent to the arrhythmia algorithm for analysis.

4.6.4 ECG Amplitude

The QRS detection threshold algorithm setting is fixed between 0.15 and 0.45 mV to avoid detecting noise spikes or P-waves as valid beats. Changing the display gain on the monitor does not affect the signal that is used by the algorithm for beat detection. For optimal performance, the leads selected for monitoring should have an amplitude of 0.5 to 1 mV or more.

4.6.5 Learning

The process of learning is used to establish a normal beat template for a patient. The learn period is dependent on the heart rate and the dominant pattern. Learning should not be initiated during a primarily ventricular rhythm because an ectopic beat may be established as normal.

A learn should be initiated when beats are not being properly detected, or when they are being erroneously classified. However, if a signal is not strong enough, or lead data is extremely noisy, better signal quality must be established before a learn can be effective.

4.6.6 Beat Detection and Typing

The following table describes the leads that are used to measure beat detection and beat typing.

DESCRIPTION	3-WIRE LEAD SET	5-WIRE LEAD SET
Leads used for Beat Detection	Determined by viewed lead	II and V
Leads used for Beat Typing	Determined by viewed lead	II, V, and I
Leads used for V-Fib Detection	Determined by viewed lead	II and V

The search for the next beat begins after a refractory period to avoid detecting T- waves as valid QRS complexes. For all patient sizes, the minimum QRS amplitude that can be detected is between 0.15 and 0.45 mV depending on the width of the QRS complexes.

Beat typing aligns and compares each new heartbeat to reference templates that were previously stored in the system. A beat typing algorithm classifies the beats.

- If an incoming beat matches a template that has already been classified, it is given the same label as the template. The template parameters are updated with the features from this new beat.

The real time ECG analysis library incorporates ventricular ectopic beat detection as a part of arrhythmia analysis.

- Beats are measured for compensatory pause, QRS width, QRS positive and negative areas, and R wave positive and negative amplitudes. This process uses multiple leads when available.
- A scoring algorithm is then applied to those measurements to determine whether or not a beat is ectopic.

4.7 Arrhythmia Alarms (optional)

Arrhythmia alarms are activated based on the patterns in the patient ECG waveform rhythms. Beat detection for a 5-lead wire set is determined by using a combination of leads II and V. When using a 3-lead wire set, beat detection is determined by using the lead being viewed.

The lethal and non-lethal arrhythmia alarms in this section may be detected by the arrhythmia algorithm.

NOTE: Arrhythmia alarms are not available for the Neonate patient size.

4.7.1 Lethal Arrhythmia Alarms

A lethal arrhythmia is an arrhythmia that can be life threatening to a patient if left untreated. Ventricular Tachycardia (V-Tach), Ventricular Fibrillation (V-Fib), and Asystole alarms are classified as lethal arrhythmia alarms. These alarms automatically default to Alarm Priority 1 and cannot be changed.

NOTE: Lethal arrhythmia alarms are latched alarms. Even after the alarming condition is resolved, a latched alarm will continue until it is acknowledged by pressing the "Silence" or "Silence All" key on the front panel keypad. If the alarm is acknowledged while the lethal condition still exists, the audio portion of the alarm will be silenced for the duration that is selected from the "Silence For" list in the "Alarm Setup" menu, but the alarm message will remain in message area A. If a new lethal condition occurs while the initial lethal alarm is silenced, the new lethal alarm will not break through but not be silenced. If the lethal condition is resolved while the alarm is silenced, the alarm will be terminated.

4.7.1.1 Asystole Alarm

An **Asystole** alarm is activated when no QRS complexes are detected for the configured time period in the absence of Ventricular Fibrillation.

The time period range for an **Asystole** alarm is user-selectable from 3 to 10 seconds.

The Asystole alarm is a Priority 1 alarm event that produces:

- Alarm Priority 1 visual and audio alarm indicators.
- An **Asystole** text message above the ECG1 waveform area.

4.7.1.2 Ventricular-Fibrillation (V-FIB) Alarm

A **V-FIB** alarm is activated when a fibrillated waveform (P, QRS or T waves can no longer be identified) is detected. V-FIB is defined as "irregular, disorganized electrical activity of the heart". The V-FIB detection algorithm runs in parallel to the beat detection algorithm and continuously examines the incoming data.

The V-FIB alarm is a Priority 1 alarm event that produces:

- Alarm Priority 1 visual and audio alarm indicators.
- A **V-FIB** text message above the ECG1 waveform area.

4.7.1.3 Ventricular Tachycardia (V-TACH) Alarm

A **V-TACH** alarm is activated as follows:

- The range of the V-TACH rate is between 100 to 180 beats per minute.

AND

- The V-TACH lethal arrhythmia alarm is activated when the configured number of consecutive PVCs is reached. The range for the V-TACH threshold is 3 – 15 beats per minute.

A **V-TACH** alarm is a Priority 1 alarm event that produces:

- Alarm Priority 1 visual and audio alarm indicators.
- A **V-TACH** text message above the ECG1 waveform area.

4.7.2 Non-Lethal Arrhythmia Alarms

A Non-Lethal Arrhythmia is an arrhythmia that is most likely not life threatening to a patient. Bigeminy, Bradycardia, Couplet, Irregular Heart Rate, PVC/min, Run, Trigeminy, and Ventricular Rhythm (V-Rhythm) alarms are classified as non-lethal arrhythmia alarms. All other Non-Lethal Arrhythmias default to Alarm Priority 2. The Alarm Priority for non-lethal Arrhythmia is user-selectable between 1 and 2.

NOTE: Non-lethal arrhythmia alarms are not latched alarms and can be acknowledged at any time. To acknowledge a non-lethal arrhythmia alarm, press the "Silence" key on the keypad.

4.7.2.1 Bigeminy Alarm

The **Bigeminy** alarm is activated when three or more cycles of one PVC coupled to one normal beat are detected.

The Bigeminy alarm is an alarm event that produces:

- Alarm visual and audio alarm indicators.
- A **BIGEMINY** text message above the ECG1 waveform area.

4.7.2.2 Brady (Bradycardia) Alarm

The **Brady** alarm is activated when the heart rate falls to a value 10% lower than the user selected value for low heart rate alarm.

The **Brady** alarm is an alarm event that produces:

- Alarm visual alarm indicator. Since Bradycardia is always accompanied by a low heart rate alarm, the Priority 1 audio alarm will sound.
- A **Brady** text message above the ECG1 waveform area.

4.7.2.3 Couplet Alarm

The **Couplet** alarm is activated when two consecutive PVCs are detected between normal beats.

The Couplet alarm is an alarm event that produces:

- Alarm visual and audio alarm indicators.
- A **COUPLET** text message above the ECG1 waveform area.

4.7.2.4 Irregular Heart Rate Alarm

The **Irregular Heart Rate** alarm is activated when the measured variations in the R-R interval over a period of time exceeds a preset limit established by the arrhythmia algorithm.

The Irregular Heart Rate alarm is an alarm event that produces:

- Alarm visual and audio alarm indicators.
- An **IRREGULAR HR** text message above the ECG1 waveform area.

4.7.2.5 PVC/minute Alarm

The **High PVC** alarm is activated when the number of PVCs detected per minute exceeds the configured threshold. The PVC limit can be set to Off, or 1 to 30 PVCs per minute.

The **High PVC** alarm is an alarm event that produces :

- Alarm visual and audio alarm indicators.
- A **High PVC** text message above the ECG1 waveform area.

NOTE: PVC/min will not be displayed during periods of Ventricular Rhythms, V-TACH, V-FIB and Asystole.

4.7.2.6 Run Alarm

The **Run** alarm is activated when the number of consecutive PVCs occur at a rate that equals or exceeds the user defined V-Tach Rate. The number of consecutive PVCs that constitute a Run is one beat less than the minimum used to identify V-Tach.

The Run alarm is an alarm event that produces:

- Alarm visual and audio alarm indicators.
- A **RUN** text message above the ECG1 waveform area.

4.7.2.7 Trigeminy Alarm

The **Trigeminy** alarm is activated when three or more cycles of one PVC coupled to two normal beats are detected. This rhythm could also cause an Irregular HR alarm.

The Trigeminy alarm is an alarm event that produces:

- Alarm visual and audio alarm indicators.
- A **TRIGEMINY** text message above the ECG1 waveform area.

4.7.2.8 Ventricular Rhythm (V-Rhythm) Alarm

The **V-Rhythm** alarm is activated when more than 2 consecutive PVCs occur at a rate that is less than the user defined V-Tach Rate.

The V-Rhythm alarm is an alarm event that produces:

- Alarm visual and audio alarm indicators.
- A **VENTRICULAR RHYTHM** text message above the ECG1 waveform area.

4.8 Arrhythmia Analysis (Optional)

NOTE: **Arrhythmia analysis is available for Adult and Pediatric patients only.**

WARNING: **Due to physiologic differences in the patient population, the Passport V may occasionally not alarm or may sound a false alarm for some arrhythmia patterns. The arrhythmia analysis feature is intended to detect ventricular rhythms only. High-risk patients should be kept under close surveillance.**

The **Passport V** is capable of identifying ventricular arrhythmia patterns in Adult and Pediatric size patients. Arrhythmia analysis may be enabled or disabled via the **Arrhythmia Menu**. By default, arrhythmia analysis is enabled if the option is installed.

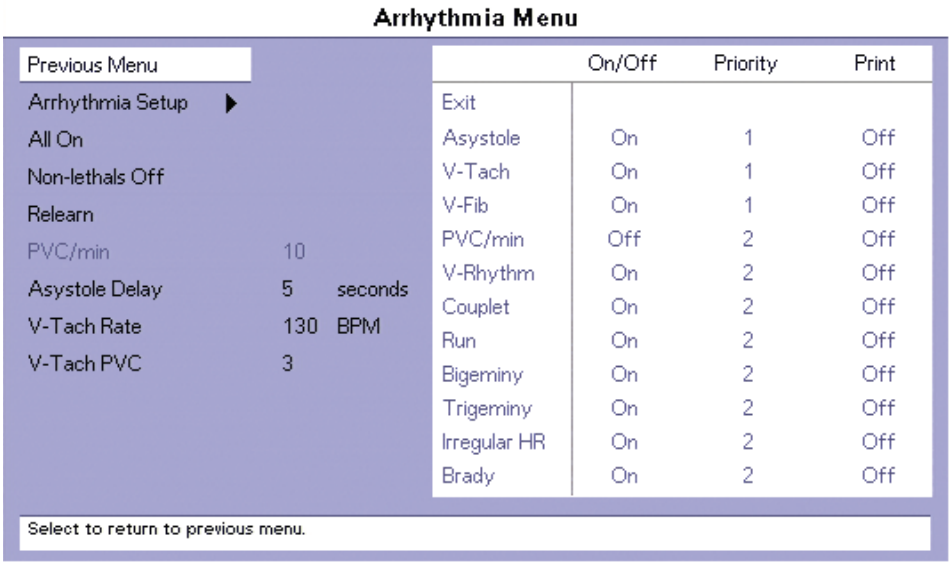


FIGURE 4-26 Arrhythmia Menu

Arrhythmia alarm calls are classified as Priority 1 or Priority 2.

Asystole, Ventricular Tachycardia, and Ventricular Fibrillation are classified as Priority 1 and the priority level cannot be changed by the user. In addition, these alarms will sound continuously until the user presses the **Silence** or **Silence All** key, regardless of whether the patient's condition has improved.

The other arrhythmia alarms (listed below) are classified as Priority 2 by default. The characteristics and priority level of all non-lethal alarms can be changed at the user's discretion via the **Arrhythmia Setup** menu option.

The following alarm calls can be made when Arrhythmia Analysis is set to "All On" (default setting):

- Asystole, Ventricular Tachycardia, Ventricular Fibrillation, Ventricular Rhythm, Run, PVC/Min, Couplet, Bigeminy, Trigeminy, Irregular HR and Bradycardia.

The following alarm calls will be made when Arrhythmia analysis is set to “Non-lethals Off”:

- Asystole, Ventricular Tachycardia, and Ventricular Fibrillation.

When Arrhythmia analysis is set to “All Off,” no arrhythmia alarm calls will be made.

NOTE: The “All Off” selection in the “Arrhythmia Menu” is only available if “Enable Arrhythmia All Off Selection” is set to “Yes” in the Installation Menu.

4.8.1 Arrhythmia Analysis Setup

ARR TYPE	OPTION	DESCRIPTION
Asystole	Asystole Delay	No QRS complex is detected within the set "Asystole Delay", which is judged as one Asystole event.
V-Tach	V-Tach Rate V-Tach PVC	HR is greater than or equal to the set "V-Tach Rate" and the number of continuous PVCs is greater than or equal to the set "V-Tach PVC" threshold, which is judged as one V-Tach event.
Brady	Brady Low	When HR is 10% less than the HR low alarm limit , it is judged as one Bradycardia event.

4.9 ST Analysis (Optional)

NOTE: ST analysis is available for Adult and Pediatric patients only.

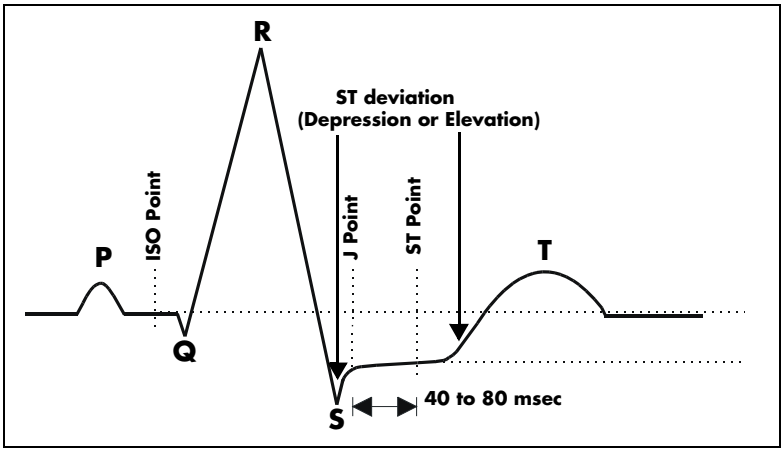


FIGURE 4-27 ST Monitoring

The formula for calculating ST segment offset value is: ST segment offset value = VST-VISO. If 3-lead is detected, analysis provides one ST value from one ECG waveform (ECG1). If 5-lead is detected, analysis provides all seven ST values.

The depression or elevation of the ST segment is measured as the vertical distance between the isoelectric (ISO) point which provides the baseline, and the ST point (See figure above). ST measurements are available on a maximum of three user selected ECG leads at a point situated 80 ms (heart rate 120 bpm or less) or 60 ms (heart rate more than 120 bpm) from the algorithmically determined end point of the QRS (J Point). In addition, the user can also select from three (3) different settings for the ST measurement point (80, 60, or 40 ms) from the J-point and independent of heart rate. These measurements are valid only on normal beats. Abnormal beats, like ventricular beats, are excluded from the analysis of the ST segment. Ventricular paced beats are also rejected from the analysis of the ST segment, because pacemaker tails distort the shape of the ST segment.

ST segment changes are continuously measured by the monitor, but update of the displayed ST data is different depending on the ECG cable in use. When using a 3 or 5-lead ECG cable, the displayed ST data is updated approximately every 10 seconds.

NOTE: The ST algorithm has been tested for accuracy of the ST segment data. The significance of the ST segment changes must be determined by a clinician.

4.9.1 Numeric Tile: ST

The ST numeric tile displays the following:

- ST label
- ST unit
- Lead name and corresponding ST measured value

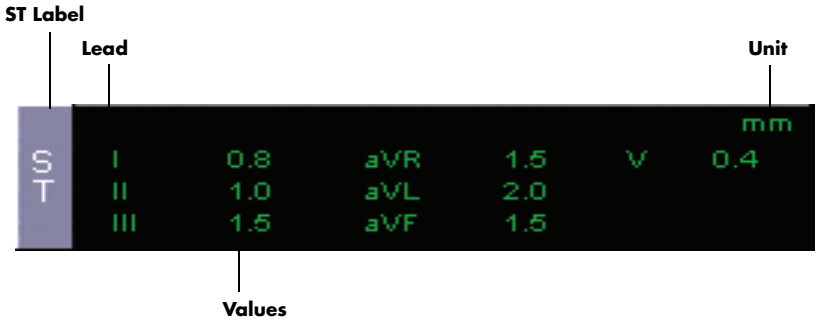


FIGURE 4-28 ST numeric tile. ECG1, ECG2, and ECG3 are displayed from top to bottom with the corresponding ST values. ST values are rounded off to 1 decimal place.

4.9.2 ST Analysis Setup

ST analysis begins when the feature is turned on from **Parameters** 〉 **ST Menu**. By default, ST data will appear in the **Heart Rate Tile**, when using a 3-lead or 5-lead leadset.

When using a 3-lead leadset, ST Analysis is performed on the lead chosen as ECG1. With a 5-lead leadset, ST Analysis is performed on all seven leads.

To display ST data in a separate tile, set a waveform to display any ECG wave (i.e., ECG2, ECG3, etc.), then set **Combine ST/HR** to **OFF**.

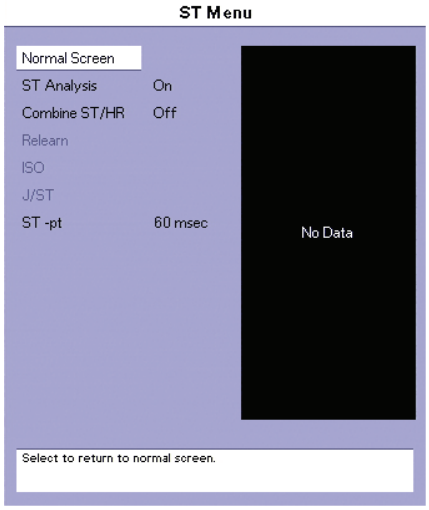


FIGURE 4-29 ST Menu

4.9.2.1 Adjusting the ISO and J/ST Point

1. Open the **ST Menu** by using the Navigator Knob to select the ST parameter heading. **ST Menu** can also be accessed through the **ECG Menu**.
2. Ensure the **ST Analysis** selection in the **ST Menu** is **On**. The **Passport V** will learn the patient's QRS complexes (one for a 3-lead leadset or 3 for a 5-lead leadset). These learned complexes will appear in the **ST Menu** with the monitor-selected **ISO** and **J/ST** points displayed.
3. Scroll to the **ISO** selection to adjust the isoelectric point on the learned QRS complex. The isoelectric point is the area of the QRS complex following the P-wave and before the start of the Q-wave.
4. Adjust the **ISO** point by pressing the Navigator Knob and turning to adjust the white **ISO** reference line. Press the Navigator Knob when the **ISO** point is satisfactory.
5. Scroll to the **J/ST** point heading. Adjust the **J/ST** point by pressing the Navigator Knob and turning to adjust the orange and green **J/ST** reference lines. Press the Navigator Knob when the **J/ST** points are satisfactory.
6. To adjust the **ST-pt**, scroll to the **ST-pt** heading and press the Navigator Knob to display a list of ST measurement point settings. Select the appropriate setting, then press the Navigator Knob when the **ST-pt** choice is satisfactory.

4.9.2.2 Adjusting ST Measurement Points

ST measurement points refer to ISO point (isoelectric reference point) and ST point. The Mortara algorithm uses the J+X method to position the ST point, which is located at X position on the right of J point.

The following table describes the range of ST measurement points and their steps.

POINT	OPTION/RANGE	STEP
ISO	-200 to -4ms	8ms
J/ST	4 to 200ms	8ms
ST-pt	40ms, 60ms, 80ms, 60/80ms	/

ST-pt is set to 60 or 80ms from the J point. When HR is greater than 120 bpm, the distance between ST point and J point is set at 60ms; when HR is lower or equal to 120 bpm, the distance between ST point and J point is set at 80ms.

4.10 Relearning ST or Arrhythmia Analysis

Automatic Relearning

The **Passport V** initiates the learning process for ST measurements or Arrhythmia analysis after one of the following:

- Unit Power-Up
- Return to normal monitoring from **Standby** mode
- Enabling ST or Arrhythmia analysis
- The lead has been changed in ECG 1 waveform (3-lead only)
- **Patient Size** is changed
- Whenever the **Relearn** function is selected from the **ST**, **ECG** or **Arrhythmia Menus**
- The monitor switches between 3-lead and 5-lead mode

Manual Relearning

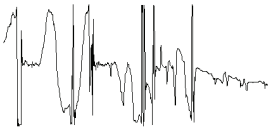
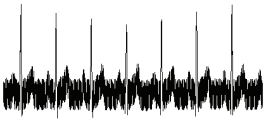
To initiate a manual relearn, select **Relearn** from the **ECG Menu**, **Arrhythmia Menu**, or **ST Menu**.

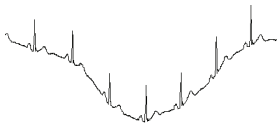
It is recommended to initiate a manual Relearn after one or more of the following:

- The ECG electrodes have been repositioned
- Sufficient time has passed since the last Relearn
- After significant changes to the patient QRS complex
- After significant changes to the patient ECG rhythm
- A clinician has observed clinically questionable arrhythmia calls

A Relearn must be initiated if “Learning” occurred during a “Leads Off” condition.

4.11 ECG Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
Noisy ECG traces 	Loose or dry electrodes.	Apply fresh, moist electrodes.
	Defective electrode wires.	Replace wires as necessary.
	Patient cable or leads are routed too close to other electrical devices.	Eliminate 50-60 Hz interference.
Excessive Electro-surgical Interference	Wrong ECG cable used.	Use ESIS ECG cable with internal filter block. **NOTE:** Respiration monitoring via the ECG electrodes will not be available when using the cable.
Muscle Noise 	Inadequate skin preparation prior to application of electrode, tremors, tense subject, and/or poor electrode placement.	Repeat skin preparation and electrode location procedures. Apply fresh, moist electrodes. Avoid areas of the torso that are very muscular.
Intermittent Signal	Connections not tight and/or properly secured.	Ensure proper connection. (Electrode to lead, lead to cable, cable to monitor).
	Electrodes dry or loose.	Re-prep skin and apply fresh, moist electrodes.
	Cable or lead wires damaged.	Check with continuity tester.
Excessive alarms: heart rate, lead fault	Electrodes dry.	Re-prep skin and apply fresh, moist electrodes.
	Alarm limits set too close to patient's normal heart rate.	Readjust.
	R-wave wrong size.	Must have a higher amplitude than the other ECG waves, like the P and T waves.
	Excessive patient movement or muscle tremor.	Reposition electrodes and secure with tape, if necessary.
Low Amplitude ECG Signal	Gain set too low.	Readjust as required - (Set via the **SIZE** key).
	Electrodes dry / old.	Apply fresh, moist electrodes.
	Skin improperly prepared.	Abrade skin.
	This could be the patient's normal QRS complex.	Verify with a 12-lead electro-cardiogram.
	Electrode could be positioned over a bone or muscle mass.	Move ECG patches closer towards each other.
No ECG Waveform	Gain set too low.	Readjust as required - (Set via the **SIZE** key).
	Lead wires and patient cable not fully or properly inserted.	Check for proper insertion.
	Cable or lead wires damaged.	Check with lead continuity tester.

MESSAGE/PROBLEM	REASON	SOLUTION
Base Line Wander 	Patient moving excessively.	Secure lead wires and cable to patient.
	Patient's respiration.	Reposition electrodes.
	Electrodes dry or loose.	Re-prep skin and apply fresh, moist electrodes.
	Static build up around patient.	Check with local biomedical personnel.
	ECG Filter set to “ST” or “Diagnostic” mode.	Set ECG Filter to “Monitor” mode.

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5.0 *Respiration Monitoring*

5.1 Description

Intended patient types: Adult, Pediatric, Neonate.

Respirations, or the amount of breaths per minute, are measured by two methods in the **Passport V**:

The first method is thoracic impedance through the ECG signal. The respiration signal is measured between two ECG electrodes:

- RA and LA of ECG Lead I, or
- RA and LL of ECG Lead II

The second is by CO_2 exchange via internal CO_2 or via the external Gas Module. Section 5.3.1 discusses the monitoring of CO_2 with thoracic impedance. Chapter 10.0 discusses the monitoring of CO_2 with Sidestream and Microstream capnography.

5.2 Resp Screens

5.2.1 Numeric Tile: Resp

The **Resp** numeric tile displays the following:

- Parameter name: Resp
- Measured value (RR is " – – –" for CVA or Apnea)
- Respiration Source: ECG
- Alarm limits
- RR unit: RPM

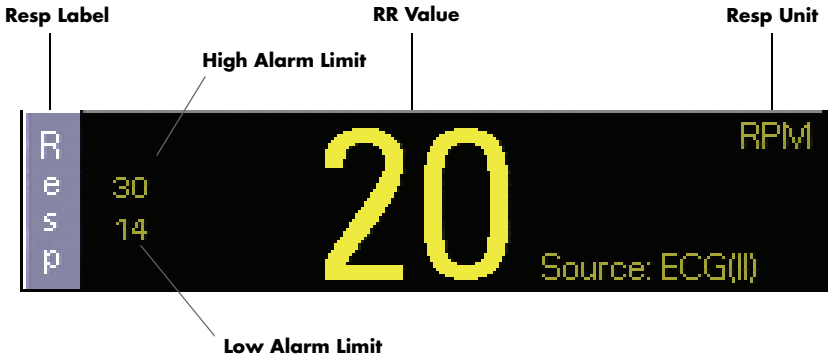


FIGURE 5-1 Resp Numeric Tile

5.2.2 Waveform: Resp

- The Resp waveform tile displays the following: Resp waveform
- Waveform size

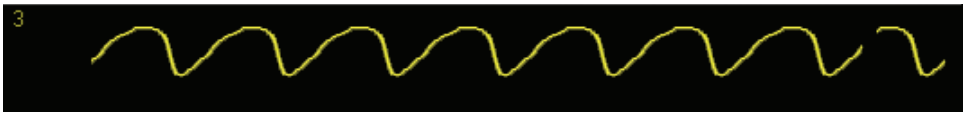


FIGURE 5-2 Resp Waveform Tile

5.3 Resp Menu

To display the **Resp Menu**:

On the normal screen:
Select **Parameters** 〉 **Resp**
or
Select the **ECG** tile 〉 **Resp Menu**
or
Select the **Resp** tile

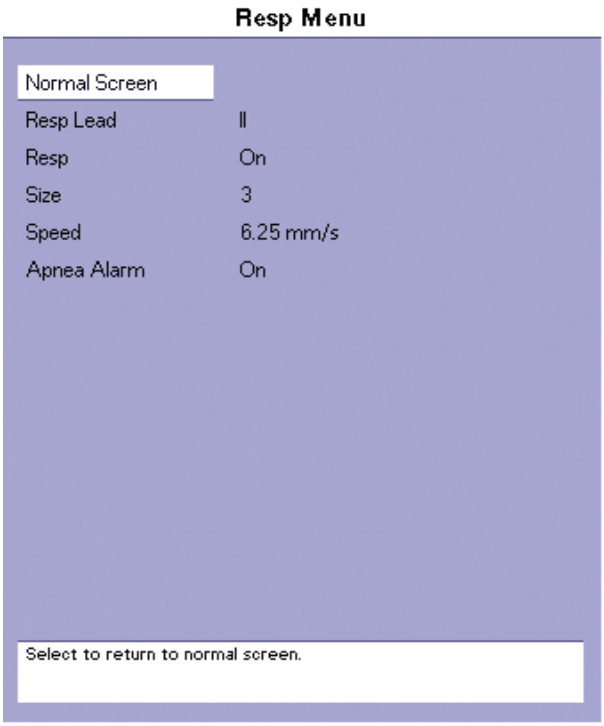


FIGURE 5-3 Respiration Menu

Resp Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to Normal Screen (or press the **Normal Screen** key on the front panel).
Resp Lead	I **II** (default)	Select to change respiration lead for ECG. When the current Resp Lead drops, the Resp waveform will be a straight line.
Resp	**On** (default) Off	Select to turn respiration on or off. On: Opens the Resp Module to start respiratory measurement. Off: Closes the Resp Module to stop respiratory measurement. Displays "OFF" in **Resp** numeric tile.

Resp Menu

MENU ITEM	SELECTIONS	COMMENTS
Size	1 2 **3** (default) 4 5	Select to change respiration size. After the wave Size is changed, the current wave is displayed at the selected size.
Speed	3.125 mm/s **6.25 mm/s** (default) 12.5 mm/s 25 mm/s	Select to change respiration trace speed. After the wave speed is changed, the waveform area is refreshed and the wave sweeps at the selected speed.
Apnea Alarm	**On** (default) Off	Select to turn respiration apnea alarm on or off. Off: Apnea Alarm will not be activated. On: Apnea Alarm will be activated when the delay time is equal to or exceeded. **Note:** This setting is only valid for the Resp module. If Patient Size = Neonate, the Apnea Alarm is always on and cannot be changed by the user.

5.3.1 Thoracic Impedance

The **Passport V** monitor presents a small electrical signal across the RA and LA ECG limb leads. This signal changes as the patient's chest wall rises and falls during the breath cycle. The advantage of the thoracic impedance method is that respiration is obtained non-invasively. It is important to use cables with internal resistors for thoracic impedance.

ECG ESIS choke block cables have electrical filters that may be used in electro-cautery environments where ECG interference can be substantial. These filters remove the electro-cautery noise, but also block the signal used by the **Passport V** monitor to measure respiration.

The filling and emptying of the heart chambers can interfere with the thoracic impedance signal, so called cardiovascular artifact (CVA), such that the respiratory signal matches the heart rate. The **Passport V** warns the operator when the respiration value equals the heart rate by displaying "**CVA**".

If the patient's airway is obstructed and the patient attempts to breath, then the chest wall can move and create a respiratory signal even though no gas flow is occurring in the patient.

CAUTION: Some pacemakers may contain a respiratory sensor that may produce artifact on an ECG waveform.

5.4 Respiration and CO_2 Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
Resp. Waveform Too Large	Scales set inappropriately.	Change lead selection. Change Respiration scale.
Resp. Waveform Too Small	Patient breathing is shallow or patient is turned on side.	Change lead selection.
	Scale set inappropriately.	Change respiration scale.
False Apnea Alarm	Apnea delay may be improperly set.	Choose another apnea delay
	Patient may be having frequent episodes of CVA.	Reposition electrodes to better detect respirations.
	Scale size may be too low.	Change Respiration scale
No Resp. Waveform or Rate Displayed	Respiration turned **Off.** (**Off** will be displayed in Resp. tile).	Turn respiration **On**
	Patient connected using ESIS choke cable.	Check that proper patient cable is used. Use approved non-ESIS patient cable.
	Cable not connected.	Check cable.
	CO_2 not selected in **Display Setup Menu**.	Set CO_2 in **Display Setup Menu**.
"CHK Lead" Message	Increased impedance caused by one of the following:	
	Chest hair under electrodes.	Prep chest.
	Dried electrode gel.	Change electrodes.
	Electrode off.	Replace electrode.
	Lead off.	Replace lead.
	Cracked lead wires.	Replace lead wires.
	Poor skin prep.	Clean and abrade skin before applying electrodes.
"CVA" Message	Can be caused by shallow breathing or an apnea event.	Check the patient.
	Patient HR and respiratory rate identical.	Adjust scales or leads if necessary.

MESSAGE/PROBLEM	REASON	SOLUTION
Resp Disturbed	Patient Movement External Interference.	Check patient For impedance - Check Electrode Contacts / reposition electrodes/cable Check environment for source of interference.
Resp Rate Overrange	Respiration Outside of measureable range	Check patient.
Resp: Initialization Error	During the Resp module power-on,as the Resp module communication stops,system fails to communicate with module.	Contact Technical Support.
Resp: Communication Error	System can't communicate correctly with Resp module,and receive the error data packets.	Restart the monitor.If the error still appears,please contact Technical Support.
Resp: Communication Stop	As the Resp module communication stops, the data packets sent by the module can not be received.	Contact Technical Support.
Resp: High Impedance	Connections not tight and/or properly secured. Electrodes dry or loose. Cable or lead wires damaged.	Ensure proper connection. (Electrode to lead, lead to cable, cable to monitor). Re-prep skin and apply fresh, moist electrodes. Check with continuity tester

6.0 *SpO_2 Monitoring*

6.1 Description

The **Passport V** supports the following SpO_2 modules:

- Masimo SpO_2 Module
- DPM SpO_2 module
- Nellcor SpO_2 module

SpO_2 measurement provides two parameters (SpO_2 and PR) and one waveform (Pleth).

6.2 SpO_2 Screens

6.2.1 Numeric Tile: SpO_2

The **SpO_2** numeric tile displays the following:

- SPO_2 & PR label
- SPO_2 & PR Value
- SPO_2/PR unit
- SpO_2 High and Low Alarm Limits
- Sat-seconds Icon (Nellcor)
- Desat alarm limit

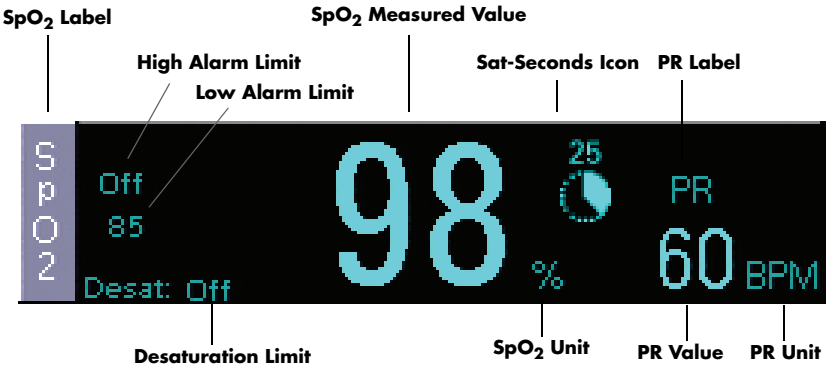


FIGURE 6-1 SpO_2 Numeric Tile

The display rules of Sat-Seconds Icon:

- If Sat-Seconds is set to 10 seconds, 25 seconds, 50 seconds, or 100 seconds, the Sat-Seconds icon will be displayed.
- The Sat-Seconds icon displays and fills when the low SpO_2 limit is violated. When the set amount of time has been reached, the SpO_2 alarm will sound.
- The Sat-Seconds icon displays and fills regardless of the "NIBP Simultaneous" setting.

6.2.2 Waveform: SpO_2

- The SpO_2 waveform tile displays the following: Pleth waveform

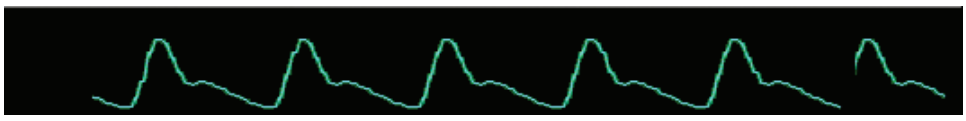


FIGURE 6-2 SpO_2 Pleth Waveform

NOTE: Wave speed: The Passport V does not provide a separate Pleth speed setting. ECG speed setting is valid for both Pleth and ECG waveforms. After ECG waveform speed is changed, the Pleth shall be refreshed as the speed setting.

NOTE: Scale: The amplitude of the Pleth wave is self-adjusted according to the height of the waveform area.

6.3 SpO_2 Menu

To display the **SpO_2 Menu**:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **SpO_2**
   or
   Select the **SpO_2** tile

The **Passport V** displays different SpO_2 menus according to the SpO_2 module type.

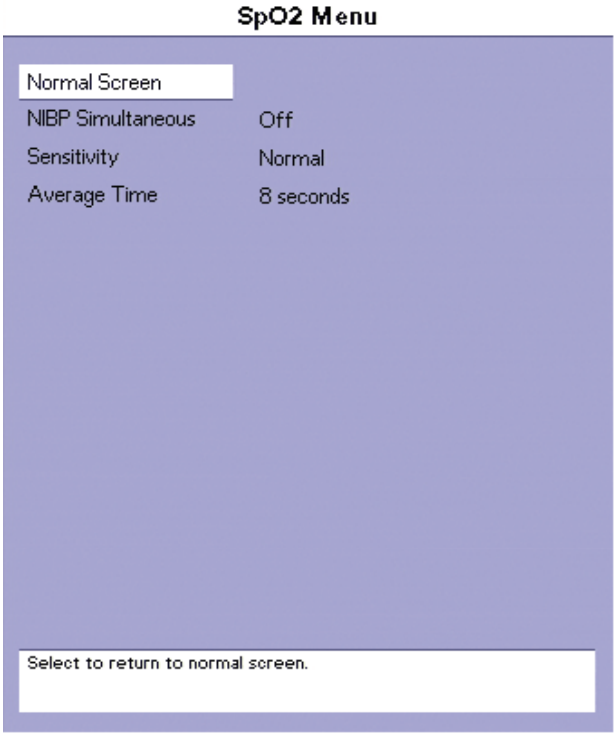


FIGURE 6-3 SpO_2 Menu (Nellcor SpO_2)

SpO_2 Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to normal screen (or press the **Normal Screen** key on the front panel).
NIBP Simultaneous	**Off** (default) On	Select On when monitoring SpO_2 and NIBP on the same limb simultaneously. On: During NIBP measurement, SpO_2 and PR alarm status is locked until the end of the NIBP measurement. Off: SpO_2 and PR alarm status is not affected by the NIBP measurement.

SpO_2 Menu

MENU ITEM	SELECTIONS	COMMENTS
SpO_2 sensitivity (DPM)	High **Medium** (default) Low	High = 7 sec Medium = 9 sec Low = 11 sec
SpO_2 sensitivity (Masimo)	**Normal** (default) High	Normal: Intended for most clinical conditions, when the patient needs normal examination. High: Intended when patient is in recovery, low perfusion conditions.
SpO_2 average time (Masimo)	2–4 seconds 4–6 seconds **8 seconds** (default) 10 seconds 12 seconds 14 seconds 16 seconds	SpO_2 average time refers to a specific time (X seconds) within which the SpO_2 data collected is averaged for display.
Sat-Seconds (Nellcor)[1]	**0 second** (default) 10 seconds 25 seconds 50 seconds 100 seconds	Sets the Sat-Seconds limit. When Sat-Seconds reaches or exceeds the set limit, the low SpO_2 alarm is triggered. If SpO_2 measurement fluctuates outside the set limit for three times within 1 minute, the low SpO_2 alarm will be triggered even though the set Sat-Seconds limit is not reached. The Sat-Seconds function does not affect the Desat alarm. Once the SpO_2 is below the Desat limit, the Desat will be triggered.

[1] *Sat-Seconds (Nellcor only) is calculated as follows:*

$$Sat\text{-}Seconds = \sum_{i=1}^{n} [|Sp02(i) - Sp02(lim)| \times t(i))]$$

where,

n represents the number of SpO_2 values that falls outside the alarm limit.
SpO_2 (i) represents each SpO_2 value that violates the alarm limit.
SpO_2 (lim) represents the corresponding high or low alarm limit.
t (i) is the time that SpO_2 (i) lasts, and the unit is s.

6.4 SpO_2 Pulse Oximetry

Pulse oximetry is a continuous and non-invasive measurement of the amount of oxygen attached to the hemoglobin in red blood cells. SpO_2 is an estimation of arterial oxygen saturation, SpO_2 may be used interchangeably with SaO_2. The **Passport V** comes standard with Masimo SET® SpO_2. Nellcor® OxiMax® SpO_2 and DPM SpO_2 are options.

SpO_2 Measurements

1. Select the appropriate sensor for the patient.
2. Attach the SpO_2 patient cable to the sensor and plug the other end of the patient cable into the SpO_2 connector located on the left side panel of the monitor.

NOTE: Do not place the sensor on an extremity with an IV catheter or blood pressure cuff in place.

3. The pleth waveform and digital SpO_2 value will be displayed by default in the second waveform and parameter area. If desired, enter the **Display Setup Menu** to position Pleth waveform and data in an alternate location.

Calibration

The oximetry sub-system incorporates automatic calibration mechanisms. No other calibration is required.

Auto Scaling

The pleth waveform is automatically scaled and is not proportional to the patient's pulse volume. There is no adjustment that can be made to the pleth waveform.

CAUTION: Tissue damage or inaccurate measurements may be caused by incorrect SpO2 sensor application or use, such as wrapping too tightly, applying supplemental tape, failing to inspect the sensor site periodically, or failing to position appropriately. Carefully read the sensor directions for use, the Passport V Operating Instructions, and all precautionary information before use.

CAUTION: Inaccurate SpO2 measurements may be caused by:

- **Incorrect sensor application or use**
- **Significant levels of dysfunctional hemoglobins, (e.g., carboxyhemoglobin or methemoglobin)**
- **Intra-vascular dyes such as indocyanine green or methylene blue**
- **Exposure to excessive illumination such as surgical lamps (especially ones with a xenon light source), bilirubin lamps, fluorescent lights, infrared heating lamps, or excessive ambient light. In such cases, cover the sensor site with opaque material**
- **Excessive patient movement**
- **Venous pulsations**
- **Electro-surgical interference**

- **Placement of a sensor on an extremity that has a blood pressure cuff, arterial catheter, or intra-vascular line**
- **Nail polish or fungus**

CAUTION: In certain situations in which perfusion and signal strength are low, such as in patients with thick or pigmented skin, inaccurately low SpO2 readings will result. Verification of oxygenation should be made, especially in preterm infants and patients with chronic lung disease, before instituting any therapy or intervention.

CAUTION: Many patients suffer from poor peripheral perfusion due to hypothermia, hypovolemia, severe vasoconstriction, reduced cardiac output, etc. These symptoms may cause a loss in vital sign readings.

CAUTION: Prolonged and continuous monitoring may increase the risk of skin erosion and pressure necrosis at the site of the sensor. Check the SpO2 sensor site frequently to ensure proper positioning, alignment and skin integrity at least every eight (8) hours; with the Adult and Pediatric re-usable finger sensor, check every four (4) hours; for neonates and patients of poor perfusion or with skin sensitive to light, check every 2 - 3 hours; more frequent examinations may be required for different patients. Change the sensor site if signs of circulatory compromise occur.

CAUTION: When cleaning SpO2 sensors, do not use excessive amounts of liquid. Wipe the sensor surface with a soft cloth, dampened with cleaning solution. Do not attempt to sterilize.

6.4.1 Masimo SET® SpO_2

Passport V monitors equipped with Masimo SET SpO_2 allow the user to adjust **Sensitivity** and **SpO_2 Average Time**. The user should choose the sensitivity mode depending upon signal quality and patient motion. In most cases, the normal setting is appropriate. If patient motion is limited, high sensitivity can be used.

It is also possible to change the averaging time of the **Saturation** and **Pulse Rate** measurements. The **SpO_2 Average Time** can be changed to **2-4**, **4-6, 8**, **10**, **12**, **14**, **or 16 seconds**.

CAUTION: When equipped with Masimo SET® SpO2, use only Masimo SET Oxygen Transducers including Masimo SET LNOP® and LNCS® Patient Dedicated Adhesive Sensors and Masimo SET PC Series Patient Cables. Use of other oxygen transducers may cause improper oximeter performance.

Masimo SET Sensors

Masimo SET provides a family of sensors suitable for a wide variety of clinical settings and patients. Specific sensors have been developed for neonates, infants, children, and adults. All sensors are indicated for continuous non-invasive monitoring of arterial oxygen saturation (SpO_2) and pulse rate, all sensors are non-sterile and usable during patient movement.

The Adult Reusable Finger Sensors can also be used for spot check applications if needed. All sensors are intended for single-patient use only unless indicated as “reusable.”

6.4.2 Nellcor® SpO$_2$

CAUTION: When equipped with Nellcor® SpO2, use only Nellcor oxygen transducers including Nellcor Oxisensor® and OxiMax® patient dedicated adhesive sensors. Use of other oxygen transducers may cause improper oximeter performance.

Nellcor Sensors

Nellcor provides a family of sensors suitable for a wide variety of clinical settings and patients. Specific sensors have been developed for neonates, infants, children, and adults. Oxisensor® and OxiMax® oxygen transducers are sterile adhesive sensors with optical components mounted on adhesive tape. Oxiband® oxygen transducers and the Duraform® oxygen transducer system are reusable sensors that are applied with disposable adhesive. The Durasensor DS-100A Adult Digit Oxygen Transducer is a reusable sensor with its optical components mounted in a plastic casing. The Nellcor RS-10 and Max-Fast® oxygen transducers are adhesive sensors for application on the forehead or temples.

Packaging of sterile sensors shall ensure sterile conditions until opened or damaged or until expiration date is reached.

NOTE: Consideration should be given to the disposal of packaging waste.

To order all Nellcor accessories and sensors call **1-888-744-1414.**

Selecting a Nellcor Sensor

Sensors are designed for specific sites on patients with designated weight ranges. To select the appropriate sensor, consider the patient's weight, level of activity, adequacy of perfusion, which sensor sites are available, whether sterility is required, and the anticipated duration of monitoring.

NOTE: Only Nellcor oxygen transducers should be used with the Passport V monitors with Nellcor OxiMax® pulse oximetry.

Sat-Seconds Alarm Management

With traditional alarm management, high and low alarm limits are set for monitoring oxygen saturation. During monitoring, as soon as an alarm limit is violated, an audible alarm immediately sounds. When the patient % SpO$_2$ fluctuates near an alarm limit, the alarm sounds each time the limit is violated. Such frequent alarm can be distracting. Nellcor's Sat-Seconds alarm management technique is used to reduce these nuisance alarms.

The Sat-Seconds feature is available with the Nellcor SpO$_2$ module to decrease the likelihood of false alarms caused by motion artifacts. To set the Sat-Seconds limit, select **Sat-Seconds** in the **SpO$_2$ Setup** menu and then select the appropriate setting.

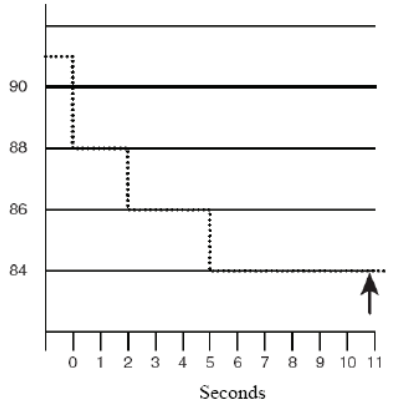
With Sat-Seconds alarm management, high and low alarm limits are set in the same way as traditional alarm management. A Sat-Seconds limit is also set. The Sat-Seconds limit controls the amount of time that SpO_2 saturation may be outside the set limits before an alarm sounds. The method of calculation is as follows: the number of percentage points that the SpO_2 saturation falls outside the alarm limit is multiplied by the number of seconds that it remains outside the limit. This can be stated as the equation:

Sat-Seconds= Points × Seconds

Only when the Sat-Seconds limit is reached, the monitor gives a Sat-Seconds alarm. For example, the figure below demonstrates the alarm response time with a Sat-Seconds limit set at 50 and a low SpO_2 limit set at 90%. In this example, the patient % SpO_2 drops to 88% (2 points) and remains there for 2 seconds. Then it drops to 86% (4 points) for 3 seconds, and then to 84% (6 points) for 6 seconds. The resulting Sat-Seconds are:

% SpO2	Seconds	Sat-Seconds
2×	2=	4
4×	3=	12
6×	6=	36
Total Sat-Seconds=		52

After approximately 10.9 seconds, a Sat-Second alarm would sound, because the limit of 50 Sat-Seconds would have been exceeded.



Saturation levels may fluctuate rather than remaining steady for a period of several seconds. Often, the patient % SpO_2 may fluctuate above and below an alarm limit, re-entering the non-alarm range several times. During such fluctuation, the monitor integrates the number of %SpO_2 points, both positive and negative, until either the Sat-Seconds limit is reached, or the patient %SpO_2 re-enters the non-alarm range and remains there.

6.4.3 DPM SpO_2

The digital SpO_2 value displays on the SpO_2 LED (7), and the SpO_2 Pulse Rate displays on the Pulse Rate LED (6).

CAUTION: When equipped with DPM SpO2, use only DPM oxygen sensors and cables. Use of other oxygen sensors may cause improper oximeter performance.

NOTE: Refer to instructions included with each SpO_2 sensor and cable for proper placement and use.

NOTE: Consideration should be given to the disposal of packaging waste.

1. Select an SpO_2 sensor that is appropriate for the patient size.
2. Attach the connector of the SpO_2 sensor to the SpO_2 extension cable.
3. Attach the SpO_2 sensor to the patient's finger (or other appropriate site).
4. Align the key slot on the connector on the end of the SpO_2 extension cable with the SpO_2 receptacle on the right side panel of the **Passport V**. Push the connector into the SpO_2 receptacle until a "click" is heard. The SpO_2 measurement displays when the **Passport V** detects that the sensor is connected to the patient. A plethysmogram displays to the left of the SpO_2 numeric tile (if SpO_2 is selected in the TRACE SETUP menu).

NOTE: To disconnect the cable from the Passport V, pull straight out on the collar of the connector marked with two arrows.

Monitoring with a Reusable Y Sensor (Adult and Pediatric)

The reusable Y SpO_2 sensor consists of the sensor and its sheath. One side of the sensor has an LED with an infrared detector and the other side has a pulse detector.

1. Insert the LED and pulse detector ends of the Y SpO_2 sensor into the respective grooves of the sheath (see FIGURE 6-4 and FIGURE 6-5).

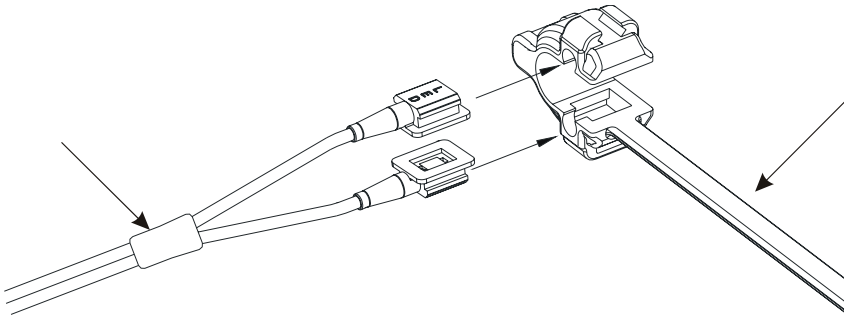


FIGURE 6-4 Inserting the Y SpO_2 sensor into the sheath

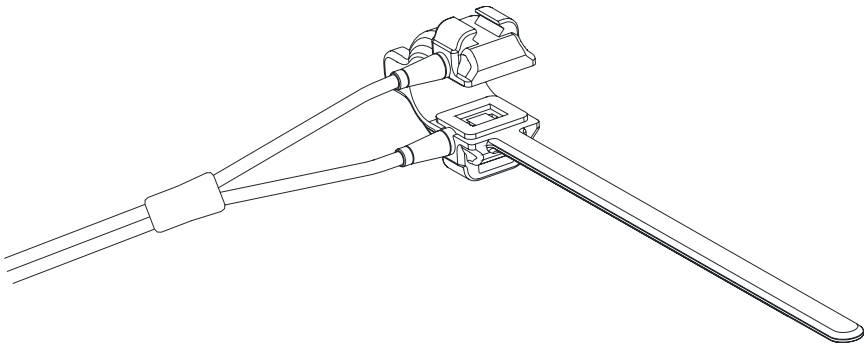


FIGURE 6-5 The Y SpO_2 sensor inserted in the sheath

2. Once inserted, place the sensor on the patient's finger, hand or foot. Check sensor position before securing it to the patient.
3. To secure the sensor, place the side of the sensor belt with V edge into the V groove on the corresponding side of the sheath. Repeat with the other side, ensuring the belt is secure, but comfortably placed on the patient. If necessary, adjust the belt using the second lock bar.
4. Ensure the sensor's LED and pulse detector sides are opposite each other.
5. Check sensor site frequently. If the sensor is too tight it may cause venous pulsation and therefore result in inaccurate measurement. Perform frequent site checks to verify skin integrity is not compromised.

6.5 SpO_2 Troubleshooting and SpO_2 Menu Performance Considerations

To ensure optimal performance, use an appropriate sensor, apply it as directed and observe all warnings and cautions.

If excessive ambient light is present, cover the sensor site with opaque material. Failure to do so may result in inaccurate measurements. Light sources that can affect performance include surgical lights, especially those with a xenon light source, bilirubin lamps, fluorescent lights, infrared heating lamps, and direct sunlight.

In the event that you are unable to get a reading, or the reading you get is inaccurate, consider the following:

- If your patient is poorly perfused, try applying the sensor to another site - such as a different finger or toe.
- Check that the sensor is properly aligned.
- In electrosurgery, make sure sensor is not too close to ESU devices or cables.
- Check to make sure the site area is clean/non-greasy. Clean site and sensor if needed.

CAUTION: A functional tester cannot be used to assess the accuracy of the pulse oximeter probe or a pulse oximeter monitor.

NOTE: If the supply mains has been interrupted during SpO_2 monitoring, the Passport V will switch power to battery backup if at least one battery has been installed and charged. If power has been completely interrupted, SpO_2 monitoring will continue when the supply mains is restored or a fully charged battery is installed, and power has been recycled to the monitor.

PROBLEM	REASON	SOLUTION
Unable to obtain SpO_2 reading	Patient has poor perfusion.	Switch limbs / Notify physician.
	Sensor not on Patient.	Reapply sensor.
	Cables loose / not connected.	Check connections, switch cable.
	Ambient light.	Switch limbs and cover sensor with opaque material.
No SpO_2 waveform	Waveform not selected to Display.	Go to the **Display Setup Menu**, choose to display **Pleth** in the waveform area.
	Cable or sensor not plugged in.	Check cable and sensor.

PROBLEM	REASON	SOLUTION
Low amplitude SpO_2 signal	SpO_2 sensor on same limb as cuff. Patient has poor perfusion.	Check sensor placement, move as necessary. Switch limb / Notify physician.
"– – –" in Digital Data	Data is above maximum value. Data is below maximum value. Parameter is not available. Lead or sensor is off.	Check sensor placement, move as necessary. Switch limb/Notify physician.

Refer to Chapter 14.0 Messages for Physiological Alarm Messages, Technical Alarm Messages, and Prompt Messages.

7.0 *NIBP Monitoring*

7.1 NIBP Description

Intended patient types: adult, pediatric, neonatal.

The **Passport V** calculates NIBP values using the oscillometric method of noninvasive blood pressure measurement. The NIBP measurement includes Systolic (Sys), Diastolic (Dia) and Mean Blood Pressure. These measurements correspond to comparisons with auscultatory values, measured using the fifth Korotkoff sound within ANSI/AAMI SP10 standards for accuracy.

Blood pressure measurements determined with the **Passport V** are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method, within the limits prescribed by the American National Standard, Electronic or automated sphygmomanometers.

7.1.1 Displaying Measured Pressure

A valid value is displayed as Sys/Dia(Mean). When a reset is performed or the patient size is changed, the data is displayed as dashes. Upon measurement failure, "XXX" will be displayed. During an NIBP measurement the real-time cuff pressure is displayed in the Mean pressure area.

When a valid measurement is completed, the Elapsed Time display begins counting. Initial display is "ET:– – – min".

7.1.2 Display Time-out for NIBP Measurement

Provides time-out for the NIBP readings display. Options are 15 min, 30 min, 45 min, 60 min. When Display Time-out occurs the NIBP values display invalid data "– – –". If the NIBP values have trigged the physiological alarms,the alarms are stopped when the NIBP Display time-out occurs.

7.1.3 Measurement Modes

The **Passport V** Provides three measurement modes: Manual, Automatic, STAT modes.

Manual mode: When NIBP Interval is set to off, then the NIBP is in manual mode and "Off" appears in the NIBP numeric tile, the message "NIBP: Manual Mode" is displayed in message area B.

Press START key to start an NIBP measurement. The message "NIBP: Measuring" is displayed. When the measurement is completed, the measured results are displayed and the monitor enters the NIBP waiting status and prompt message "NIBP: Idle" is displayed.

During the manual measurement, pressing the STOP key on the front panel, stops the manual measurement and prompt message "NIBP: Idle" is displayed until START is pressed again.

Automatic Mode: When NIBP Interval is set to anything other than Off, the NIBP is in automatic mode. Once the Automatic mode interval is selected, the prompt message "NIBP: Press the START key" is given in message area B.

Press START key to start the first NIBP measurement and prompt "NIBP: Measuring". When this time measurement is completed, the measured results are displayed and the prompt message "NIBP: Interval" is displayed. The next measurement will start after the selected interval has expired.

If the automatic interval is set at 1 minute, then after 10 minutes of automatic measurements the interval will change to a 10 minute interval.

During the automatic measurement, pressing the STOP key on the front panel, will stop the automatic measurement. The message "NIBP: Idle" will be displayed until START is pressed again.

NOTE: If the interval is changed during the Automatic measurement interval, the new interval starts from the time when such change is made.

NOTE: In Automatic Mode, a measurement can be started manually during the interval between two timed measurements. If STOP key is pressed, both the manual mode measurement and automatic mode measurement are stopped.

NOTE: When the system time is changed during the automatic measurement, it will enter idle mode after completing the current measurement. Press the START key on the front panel if it is necessary to start measurement.

STAT Mode: When NIBP Interval is set to STAT mode, "STAT" appears in the NIBP numeric tile and the prompt message "NIBP: STAT" is displayed in message area B.

Press the START key to start the STAT measurement sequence and the message "NIBP: Measuring" appears in message area B. When this measurement is completed, the results are displayed. STAT measurements will continue for a period of 5 minutes. Afterward, the monitor will switch to 5-minute intervals.

During the STAT measurement, press STOP key on the front panel, stop the STAT measurement and the prompt message "NIBP: Idle" will be displayed until START is pressed again.

NOTE: If the 5 minute STAT cycle expires and a measurement is in progress, the STAT cycle will end at completion of the measurement that is in progress.

7.2 NIBP Screens

7.2.1 NIBP Numeric Tile

The **NIBP** numeric tile displays the following:

- NIBP label
- The measured results (Sys, Dia and Mean)
- Unit of measurement
- Interval
- Elapsed time from the last successful measurement.
- The cuff pressure
- Alarm limits for Sys, Dia, and Mean BP

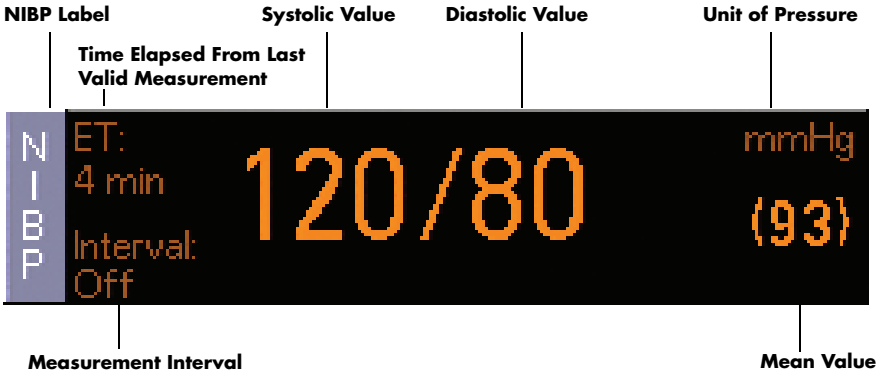


FIGURE 7-1 NIBP Numeric Tile

7.2.2 NIBP List Display

Displays the last 5 NIBP measurements. Contents to display:

- NIBP label
- Systolic pressure /Diastolic pressure (Mean pressure)
- Interval Time
- Unit of measure
- Time measurement was completed.

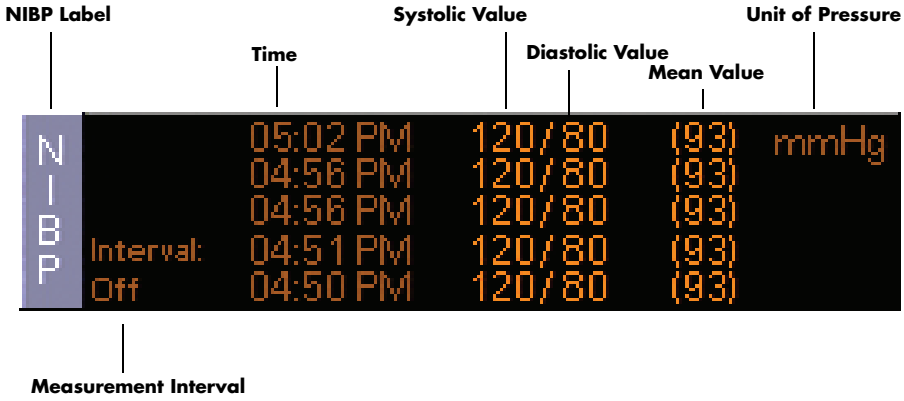


FIGURE 7-2 NIBP List Display

7.3 NIBP Menu

To display the **NIBP Menu**:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **NIBP**
   or
   Select the **NIBP** tile

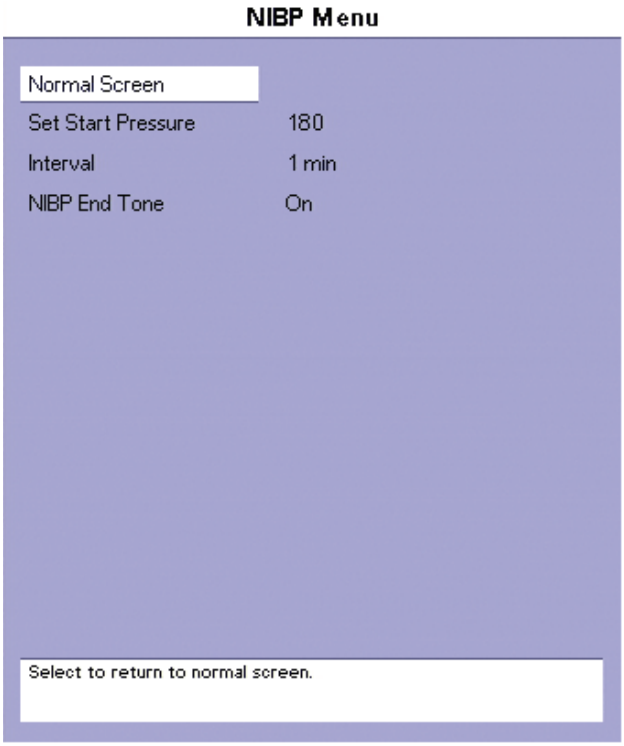


FIGURE 7-3 NIBP Menu

NIBP Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to normal screen (or press the **Normal Screen** key on the front panel).
Set Start Pressure	Adult: 100 to 280 (default = 180) Pediatric: 60 to 180 (default = 140) Neonate: 40 to 120 (default = 100)	Select to adjust initial NIBP pump up pressure in increments of 5. The selection range varies according to the Patient Size. The Set Start Pressure cannot be changed during an NIBP measurement or the five minutes STAT measurement.

NIBP Menu

MENU ITEM	SELECTIONS	COMMENTS
Interval	Off (default) STAT, 1 min, 2 min, 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 hr, 2 hr, 4 hr	Select to change NIBP measurement interval. Off: manual mode. The message "NIBP: Manual Mode" is displayed at the bottom of the screen. STAT: STAT measurement. The message "NIBP: STAT" is displayed at the bottom of the screen. **Note**: The Interval cannot be changed during an NIBP measurement or the five minutes STAT measurement.
NIBP End Tone	**On** (default) Off	Select to turn NIBP End Tone On or Off. On: A dual beep tone sounds on completion of a successful NIBP measurement. Off: Tone does not sound after the measurement. **Note**: A single beep tone will always sound in the event of an unsuccessful measurement, after all retries have been attempted. The NIBP End Tone does not sound if the user stops the measurement by pressing the NIBP STOP key. NIBP End Tone audio volume is controlled by the alarm audio volume.

7.4 NIBP Measurements

7.4.1 Manual NIBP Measurements

1. Select a blood pressure cuff that is appropriate for the size of the patient. Measure limb for the best results.

NOTE: **A cuff that is too narrow for the limb will result in erroneously high readings. The correct size of the pressure cuff for a given patient has, among other considerations, a direct bearing on the accuracy of the obtained NIBP measurements. Base selection of the cuff size on the limb circumference of the patient. The design dimensions of the cuffs and their intended uses are based on recommendations of the American Heart Association.**

NOTE: **Cuffs become brittle as they age and sometimes develop permanent folds that can leave temporary marks on the limb. Any cuffs that exhibit this effect should be replaced.**

NOTE: **Ensure that the pressure tubes are not compressed or restricted.**

NOTE: **The pressure on the limb may not fall to zero between measurements if the cuff is wrapped too tightly. Therefore, ensure that the cuff is properly applied.**

NOTE: **The skin is sometimes fragile (i.e., on pediatrics, geriatrics, etc.). In these cases, a longer interval between measurements should be considered to decrease the number of cuff inflations over a period of time. In extreme cases, a thin layer of soft roll or cotton padding may be applied to the limb in order to cushion the skin when the cuff is inflated. This measure may affect NIBP performance and should be used with caution.**

2. Attach cuff hose to NIBP Connector.

3. Apply the cuff to the patient. To reduce errors, the cuff should be adjusted for a snug fit. Little or no air should be present within the cuff. Be sure the cuff lies directly against the patient's skin. No clothing should come between the patient and the cuff.

NOTE: **The NIBP cuff should not be placed on a limb that is being utilized for any other medical procedure. For example, an IV catheter or an SpO_2 sensor.**

4. If not already selected, select the **Patient Size** through the **Patient Menu**. Choices are **Adult**, **Pediatric** or **Neonate**.

5. If necessary, change the initial cuff inflation pressure through the **NIBP Menu**. Initial cuff inflation pressures depend on the **patient size** setting. The values for cuff inflation are identified in the following table:

PATIENT SIZE SETTING	INITIAL CUFF INFLATION VALUES	DEFAULT SETTING	MAXIMUM INFLATION VALUES
Adult	100 - 280 mmHg	180 mmHg	295 mmHg
Pediatric	60 - 180 mmHg	140 mmHg	190 mmHg
Neonate	40 - 120 mmHg	100 mmHg	145 mmHg

6. Press **START** to begin an NIBP measurement.

CAUTION: Blood pressure cuffs must be used with the manufacturer's correct and approved hoses.

CAUTION: Please consult a physician for interpretation of blood pressure measurements.

CAUTION: A blood pressure measurement can be affected by the position of the patient, and his / her physiological condition as well as other factors, such as patient movement.

NOTE: Inflate the cuff only after proper application to the patient's limb. Cuff damage can result if the cuff is left unwrapped and then inflated.

NOTE: Changing the patient size, during measurement will stop the current measurement and the cuff shall be deflated.

7. The cuff begins to inflate to the selected cuff pressure. After reaching the selected value the cuff begins to slowly deflate and the **Passport V** collects oscillometric pulsations.

8. If the initial cuff inflation is found to be inadequate, the unit retries with a higher inflation pressure (+50 mmHg in adult or pediatric mode; +40 mmHg in neonate mode).

9. The patient should remain still to avoid the introduction of unnecessary motion artifact. After the cuff pressure drops below the diastolic pressure, the results of the measurement are displayed.

10. If **NIBP End Tone** is set to **On** in the **NIBP Menu**, a double tone will sound to indicate a successful NIBP measurement.

The NIBP measurement will be automatically removed from the display after a predetermined time interval. The NIBP timeout interval is 15 minutes by default and can be set to a different value through the **Installation Menu**.

7.4.2 Automatic Interval NIBP Measurements

There are two modes available for automatic NIBP measurements. They are the **Interval Mode** and the **Timer Mode**. The **Interval Mode** allows you to set the interval between measurements. For example, if the interval is set to 10 minutes and the **START** key is pressed at 10:12, the measurements will be taken at 10:12, 10:22, 10:32, etc. The **Timer Mode** allows you to set an interval that is synchronized with the real time clock. For example, if the timer is set to 30 and the **START** key is pressed at 10:12, the measurements will be taken at 10:12, 10:30, 11:00, 11:30, etc.

1. Select the **Interval Mode** or the **Timer Mode** in the **Monitor Setup Menu** 〉 **Advanced Setup**.
2. Select the **NIBP** tile (or **Parameters**) 〉 **NIBP** 〉 **Interval**. Rotate the Navigator Knob to the desire selection. The selections are: **OFF**, **STAT**, **1**, **2**, **3**, **5**, **10**, **15**, **20**, **30**, **1 hr**, **2 hr** and **4 hours**.
3. Press the **Start** key to begin taking interval measurements.

NOTE: If the monitor is in the interval mode when it is turned ON, no measurement will be taken until the Start key is pressed.

Automatic Adjustment in the Interval Mode

In the **Interval Mode**, the unit adjusts the inflation pressure according to the previous reading of the systolic pressure. After the first measurement in the timer mode, the inflation pressure is the previous systolic +50 mmHg in the **Adult Mode** or **Pediatric Mode** and +40 mmHg in the **Neonate Mode**.

7.4.3 Suspension of NIBP Measurements

1. Press **STOP** to suspend an automatically timed measurement sequence or to end a measurement cycle already in progress (deflate cuff).
2. Press **START** to take an immediate measurement and resume a suspended timed measurement sequence.

NOTE: You can press STOP at any time to postpone a scheduled measurement or to terminate a measurement cycle already in progress.

CAUTION: Observe caution on all patients (Neonates, Pediatrics, and Adults), when NIBP is set to STAT Mode or the 1-minute interval, to minimize the possibility of nerve injury occurring during use of automatically cycled blood pressure cuffs.

7.4.4 Retry measurement

If an NIBP measurement fails, the measurement is retried up to three times. The message "NIBP: Retry" is displayed after the cuff deflates. If the measurement fails all three retries, the Display shows the Sys, Dia, and Mean values as "XXX".

7.4.5 Reset

Reset can occur as NIBP module error(e.g. communication error). If the cuff is being inflated, it will deflate as soon as it receives the reset signal.

When the module resets, the prompt message "NIBP: Resetting..." is displayed in the message area B.

7.4.6 NIBP Pressure Limit Fail Safe

If the cuff is over-pressurized, the cuff will automatically vent to atmosphere.

7.4.7 Cuff Inflation Timeout

If the cuff pressure does not attain 15mmHg within 20 seconds for adult and pediatric, or 15mmHg within 10 seconds for neonate, then the cuff is vented and the message **NIBP: Retry** or **NIBP: Unable to Measure** message is displayed in the lower left corner of the screen.

The cuff will inflate to 15mmHg within 20 seconds for adult and pediatric, and 15mmHg within 10 seconds for neonate.

7.4.8 Start and Stop Keys

The **Start** and **Stop** keys on the front panel have the following effects on the timed measurement sequence (**Interval** or **Timer Mode**).

Interval Mode is set and you press the **Start** key:

- An unscheduled measurement is made. Taking this unscheduled measurement does not affect the timing of the interval cycle, therefore, the scheduled measurements will be taken as if there were no interruptions. Only one measurement is taken for each measurement cycle - therefore, if the unscheduled measurement coincides with the scheduled measurement, it counts as the scheduled measurement. If the interval is changed without pressing the **Stop** key, interval measurements will continue at the newly chosen interval.

Interval Mode is set and you press the **Stop** key during the measurement:

- The cuff deflates and interval measurements are suspended.

Interval Mode is set and you change the interval:

- The measurement cycle is reset with the new interval. A measurement will be taken after you press the **Start** key.

7.4.9 NIBP Auto Time Out Functions

The NIBP data will time out on the display under the following conditions:

- When the elapsed time exceeds the pre-set time out in the installation mode
- If a measurement is unsuccessful, the display values are replaced with "**XXX**" and a tone sounds.

7.4.10 Indirect BP Measurements and Associated Errors

Place the patient in a supine position to obtain true physiological pressure. If the cuff is not at the patient's heart level, the pressure values obtained will not reflect the true physiological pressure. Instead, the readings will be decreased by 1.86 mmHg for every inch the cuff is placed above the heart level and increased by 1.86 mmHg for every inch the cuff is placed below the heart level. This effect is due to hydrostatic pressure.

Blood weight influences blood pressure readings. The value of the weight of blood depends on where the measurement is taken with respect to the heart. When the patient is supine, on a flat surface, the arm is near enough to the heart level that no adjustment of the NIBP readings is necessary.

7.4.11 Recommendations for Automatic Blood Pressure Measurements

The following practices are recommended when making automatically cycled blood pressure measurements:

- Position and support the limb in such a way as to minimize stretching of and weight exertion on affected nerves
- Avoid cuff placement that applies pressure on the ulnar nerve. Cuff tubing should not exit the cuff over the course of the ulnar nerve at the elbow
- Select a measurement interval that provides adequate venous drainage during cuff deflation
- Periodically inspect the limb bearing the cuff in order to detect venostasis
- If necessary move cuff to another limb to relieve single-limb stress

7.4.12 Cuff Size

Using a narrow cuff gives erroneously high pressure readings. If a standard cuff is applied to an obese patient or a patient with large biceps, the extra tissue and fat will dissipate the applied pressure requiring an additional pressure increase to collapse the artery. On the other hand, over-wrapping a slender arm gives erroneously low pressure readings because too much force per unit area is exerted. This requires less pressure to collapse the artery.

7.4.13 Other Factors

An accurate determination of blood pressure by the **Passport V** can be difficult if cardiac rhythm is irregular. Irregular cardiac rhythm changes the stroke volume from beat to beat. This changing stroke volume may increase the time it takes the **Passport V** to take a measurement. The **Passport V** makes up to four successive attempts to obtain a measurement. If a measurement cannot be taken after four tries, the numeric displays are zeroed.

7.4.14 User Verification of Passport V Blood Pressure Measurements

Regular service to blood pressure equipment will help ensure accurate measurements. Consult your Service Manual for appropriate information. If you question the accuracy of the **Passport V**, verify the blood pressure with a manometer.

Auscultatory verification can be made at the same time the **Passport V** is taking a measurement. Apply a bell stethoscope over the brachial artery. Do not allow the stethoscope to touch either the patient's clothing or the pressure cuff.

7.4.15 Newborn NIBP Technique

Newborn patients present unique obstacles to NIBP measurement. Their vital signs can change from moment to moment, and their tiny physiological signals are very prone to noise interference. The following suggestions will help you to obtain the best possible NIBP measurement:

1. Try to measure infants when they are calm. A kicking/crying baby may disturb or jiggle the cuff, causing noise within the system and resulting in unstable blood pressure readings. If necessary, hold the cuffed limb steady, without impeding circulation. Do not hold onto the cuff and do not pat the cuffed limb to comfort the child.

2. Try the calf. Irritable newborns will react to the cuff pressure but may tolerate the calf better than the arm. Place the cuff just above the ankle.
3. Use the correct **Newborn** and **Infant** size cuffs. When applying, verify the cuff's **Index** line falls between the **Range** lines.
4. Try disposable cuffs. Disposable cuffs are more pliant than reusable ones. They generally fit smaller infants better.
5. Place the cuff lightly. If the cuff is too snug, it won't work properly. On infants, you should be able to easily move the cuff over the limb.

NOTE: NIBP cannot be taken under all conditions. Even manual methods, employing a sphygmomanometer and stethoscope, will not work on unstable or active patients.

7.4.16 NIBP List Tile

The NIBP List tile can display up to five of the most recent NIBP measurements in row form. These measurements are displayed from newest (in the top row) to oldest (in the bottom row). As shown in the example of **FIGURE 7-4**, each row displays a time stamp, the three digit systolic and diastolic pressures separated with a "/", and the three digit mean pressure in parentheses.

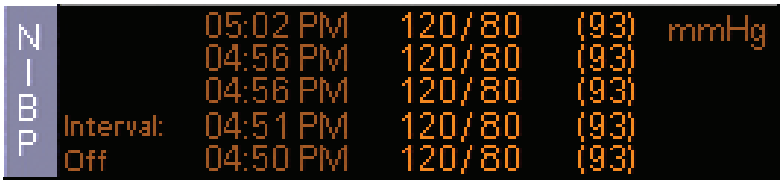


FIGURE 7-4 Example NIBP List Tile

The NIBP List tile can be configured from the **Display Setup Menu** to display in one of the numeric tiles (1 - 5) and it has a menu target labeled "NIBP" that opens the **NIBP Menu**.

7.4.17 Adaptive Inflation Pressure

During Interval or STAT mode, the inflation pressure is adjusted according to the previous reading of the systolic pressure. After the first successful measurement, the inflation pressure is the previous systolic +50 mmHg in the adult mode, +50 mmHg in the pediatric mode, and +40 mmHg in the neonate mode.

If a manual measurement is taken between interval readings, the manual measurement uses Adaptive Inflation because the unit is in Interval Mode.

7.5 NIBP Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
Unable to obtain a BP	Patient movement	Wait until patient is calm or gently hold limb.
	Cuff or hose NOT attached / leaking	Check all connections.
	HR irregular / arrhythmia present	Check Patient and notify Physician.
	Blood pressure is out of range.	Check Patient and verify BP with manual method.
	Improper cuff size / brand	Measure patient limb. Use only properly sized approved accessories.
Reading too high or too low	Incorrect cuff size	Measure Patient limb, use correct cuff.
	Patient movement	Wait until patient is calm or gently hold limb.

Refer to Chapter 14.0 Messages for Physiological Alarm Messages, Technical Alarm Messages, and Prompt Messages.

NOTE: Always have an alternate method of BP verification available.

NOTE: On vasoconstricted patients, failure to evacuate air from the cuff can distort BP measurement.

NOTE: Cuff should be at heart level.

NOTE: The presence of an arrhythmia may increase the time required to complete a measurement and may cause measurement cycle to extend beyond a point where a measurement can be completed.

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8.0 *Temperature Monitoring*

8.1 Description

Intended patient types: Adult, Pediatric, Neonate.

The temperature measurement function of the **Passport V** is designed to take a continuous temperature reading from 400 series or compatible probes.

Temp units of " C" and " F" are available. The temperature units can be adjusted in the **Installation Menu**.

8.2 Temperature Screens

8.2.1 Numeric Tile: Temp

The **Temp** numeric tile displays the following:

- Parameter label (Temp)
- Measurement results
- Temp unit
- Alarm limits

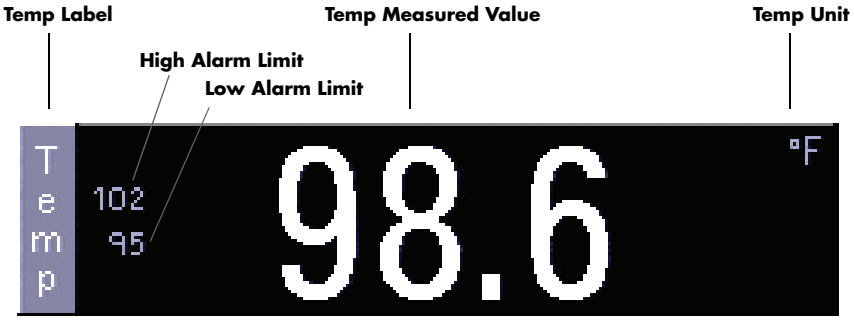

FIGURE 8-1 Temperature Numeric Tile

If a temperature transducer cable is plugged into the T1 port, but no measurement is performed or the measured value is invalid, dashes "- - -" are displayed in the Temp numeric tile. If a cable is not plugged into the T1 port, the Temp numeric tile is not displayed at all.

8.3 Temperature Probes

CAUTION: The Passport V monitor is not compatible with 700 Series temperature probes.

8.3.1 Skin Temperature Sensor with 400 Series Thermistor

Description (0206-03-0300-02)

Monitoring of skin surface temperature is a well accepted procedure for the detection of hypothermic and hyper thermic conditions. The Skin Temperature Sensor is designed for placement on the surface of the skin. The skin temperature sensor consists of a thermistor embedded in an adhesive backed foam disk. One side of the foam disk is covered by a metallic film. The opposite surface of the foam is coated with a medical grade hypo-allergenic adhesive suitable for skin application. The hypo-allergenic adhesive holds the sensor in situ. The foam thermally insulates the sensor and the metallic layer reflects external infrared heat energy thus providing accurate measurement of body temperature.

The temperature transducer is in the form of an electrically insulated 400 series thermistor. The accuracy of the thermistor is ± 0.2° Celsius in the range of 5° Celsius to 45° Celsius. The assembly is disposable, single use only, and packaged sterile.

This device is intended for use with electronic temperature monitors accepting 400 series thermistor sensors or equivalent that are equipped with alarms. To interconnect the probe with the instrument, use cable part number 0012-00-0975.

Electrical leakage current of the device, when used with the monitor and cable, comply with IEC 601-1/EN60601-1.

Indications

The Skin Temperature Sensor is indicated for use in the routine monitoring of skin temperature.

Contraindications

The Skin Temperature Sensor may be contraindicated over traumatized areas.

Adverse Reactions

Adverse reactions reported during applications of Skin Temperature Sensors include: skin abrasions and tissue burns due to aberrant electro-cautery current pathways.

Directions For Use And Precautions

1. Dry skin completely in the area intended for sensor placement.
2. Remove the protective backing and place the sensor onto the previously dried skin area.
3. Align the sensor's connector with the monitor cable's connector and push firmly to assure full contact. Forced mating of the connectors without proper alignment may cause damage to the connectors and interruption in electrical continuity.

WARNING: During procedures employing electro-cautery, use currently acceptable procedures to minimize conditions of the thermistor and lead wires functioning as an alternate path for radio-frequency current to return to ground, causing localized tissue burns. Procedures which may minimize risk of electro-surgical burns are: keep both active and ground electrodes of the electro-cautery system in close proximity so that the temperature sensor is outside the radio-frequency current field. Keep temperature monitor with its associated cables separated from electro-cautery systems. Unusual, fast artificial variations in temperature readings may occur with concomitant applications of the electro-cautery system.

WARNING: Sterile unless unit container is opened or damaged.

CAUTION: Single use.
Destroy after single use.
Do not resterilize.
Federal (U.S.A.) law restricts this device to sale by or on the order of a physician.

8.3.2 Esophageal Stethoscope with 400 Series Thermistor Temperature Sensor

Description (0206-03-0112-02, 0206-03-0118-02)

The esophageal stethoscope with temperature sensor is a disposable device which provides for accurate measurement of core body temperature as well as transmission of heart and lung sounds. Heart and lung sounds are transmitted across a thin cuff wall, through the side and distal openings of the tube. Made of a special material which optimizes sound transmission and remains both durable and flexible, the cuff maintains its integrity and prevents secretion from entering the tube. For connection to any standard ear piece, a male luer adaptor is attached to the proximal end of the esophageal stethoscope. The stethoscope is 19 inches (48.3cm) long. The tube, the cuff and luer adaptor are made of lightweight, non-toxic, implant tested material.

The temperature transducer is in the form of an electrically insulated “400” series thermistor, which is permanently secured within the lumen of the esophageal stethoscope. The thermistor is placed at the distal end of the tube. The accuracy of the thermistor is ±0.2°C in the range of 5 - 45°C.

The assembly is disposable, single use only, and packaged sterile. It is available in sizes 12 and 18 French.

This device is intended for use with electronic temperature monitors accepting 400 series thermistor sensors or equivalent that are equipped with alarms. To interconnect the probe with the instrument, use cable part number 0012-00-0975.

Electrical leakage current of the device (sensor and esophageal stethoscope) when used with monitor and cable, comply with IEC 601-1/EN 60601-1.

Indications

The esophageal stethoscope with temperature sensor is indicated where patient temperature monitoring is desired along with accurate heart and lung sound monitoring. The sensor is designed for insertion into the esophagus.

Contraindications

The use of the esophageal stethoscope may be contraindicated in neonates and small infants undergoing tracheostomy or internal jugular artery catheterization or remote surgical procedures.

Adverse Reactions

Adverse reactions reported during applications of esophageal stethoscopes with or without temperature sensors include accidental tracheal or bronchial intubation accompanied with airway obstruction, esophageal abrasion and or perforation, pharyngeal abrasion and tissue burns due to aberrant electro-cautery radiofrequency current pathways.

Directions for Use and Precautions

1. If a patient has to be intubated with an endotracheal tube, perform the intubation prior to the placement of the esophageal stethoscope.
2. Lubricate the stethoscope prior to the insertion and place the stethoscope in accordance with currently acceptable medical procedures.
3. Verify position of the stethoscope by direct laryngoscopy or other acceptable medical techniques.
4. Align the sensor's connector with the monitor cable's connector and push firmly to assure full contact. Forced mating of the connectors without proper alignment may cause damage to the connectors and interruption in electrical continuity.

WARNING: During the surgical procedures which employ electro-cautery, use currently acceptable procedures to minimize conditions of the thermistor and lead wires functioning as an alternate path for radio-frequency current to return to ground, causing localized tissue burns. Procedures which may minimize risk of electro-surgical burns are: keep both active and ground electrodes of the electro-cautery system in close proximity so that the sensor is outside the radio-frequency current field; keep temperature monitor with its associated cables separated from electro-cautery systems. Unusual, fast artificial variations in temperature readings may occur with concomitant applications of the electro-cautery system.

WARNING: Sterile unless unit container is opened or damaged.

CAUTION: Single use.
Destroy after single use.
Do not resterilize.
Federal (U.S.A.) law restricts this device to sale by or on the order of a physician.

8.3.3 Esophageal/Rectal Temperature Probe with 400 Series Thermistor

Description (0206-03-0209-02, 0206-03-0212-02)

Hypothermia and hyperthermia are well recognized clinical conditions necessitating temperature monitoring. The economical and disposable Esophageal/Rectal Temperature Probe is a sensitive and accurate temperature transducer, to be used clinically where continuous temperature monitoring is required.

The temperature sensor is in the form of an electrically insulated "400" series thermistor, which is permanently secured within a PVC tube. The bullet tipped PVC tube provides for atraumatic insertion. The thermistor is placed at the distal end of the tube. The accuracy of the thermistor is ± 0.2°C in the range of 5 - 45°C.

The assembly is disposable, single use only, and packaged sterile. It is available in sizes 9 and 12 French.

This device is intended for use with electronic temperature monitors accepting 400 series thermistor sensors or equivalent that are equipped with alarms. To interconnect the probe with the instrument, use cable part number 0012-00-0975.

Electrical leakage current of the device (sensor and PVC tube) when used with monitor and cable, comply with IEC 601-1/EN 60601-1.

Indications

The Esophageal/Rectal Temperature Probe is indicated where continuous patient temperature monitoring is desired. The sensor is designed for insertion into the esophagus, nasopharynx, or rectum.

Contraindications

The use of the esophageal/rectal sensor may be contraindicated in neonates and small infants undergoing tracheostomy or internal jugular artery catheterization and remote surgical procedures.

Adverse Reactions

Adverse reactions reported during applications of these sensors include: accidental tracheal or bronchial intubation accompanied with airway obstruction, esophageal or rectal abrasion and/or perforation, pharyngeal abrasions and tissue burns due to aberrant electro-cautery radio-frequency current pathways.

Directions For Use And Precautions

1. If a patient has to be intubated with an endotracheal tube, perform the intubation prior to placing the temperature probe into esophagus.
2. Lubricate the temperature probe prior to insertion and place the probe in accordance with currently acceptable medical procedures.
3. Verify position of the probe by acceptable medical procedures.
4. Align the sensor's connector with the monitor cable's connector and push firmly to assure full contact. Forced mating of the connectors without proper alignment may cause damage to the connectors and interruption in electrical continuity.

WARNING: During the surgical procedures which employ electro-cautery, use currently acceptable procedures to minimize conditions of the thermistor and lead wires functioning as an alternate path for radio-frequency current to return to ground, causing localized tissue burns. Procedures which may minimize risk of electro-surgical burns are: keep both active and ground electrodes of the electro-cautery system in close proximity so that the temperature sensor is outside the radio-frequency current field; keep the temperature monitor with its associated cables separated from electro-cautery systems. Unusual, fast artificial variations in temperature readings may occur with concomitant applications of the electro-cautery system.

WARNING: Sterile unless unit container is opened or damaged.

CAUTION: Single use.
Destroy after single use.
Do not resterilize.
Federal (U.S.A.) law restricts this device to sale by or on the order of a physician.

8.3.4 Reusable DPM Temperature Probes

WARNING: SpO2 sensors, SpO2 accessories, and temperature probes should be disposed of in accordance with local regulations.

8.4 Temperature Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
Temperature Probes not Working	Poor contact from probes to body	Check the body surface contact at the probe tip. Reposition or apply thermoconductive gel.
Temperature not displayed	Improper display setup	Check **Display Setup** in **Monitor Setup Menu** and change as desired.
	Cable not plugged in	Check the cable.

9.0 *IBP Monitoring (optional)*

9.1 IBP Description

Intended patient types: adult, pediatric, neonatal.

Invasive Blood Pressure (IBP) is a direct measurement of the patient's arterial or venous blood pressure. IBP utilizes a catheter that is inserted directly into a vein, artery or other pressure access areas, and is connected to a transducer for interpretation of Systolic (Sys), Diastolic (Dia), and Mean blood pressures. Up to two Invasive Blood Pressure channels are available.

Invasive Blood Pressure measurement is an option for the **Passport V**.

The **Passport V** supports the measurements of two invasive blood pressures. It provides systolic pressure, diastolic pressure and mean pressure values.

When measuring Art/UA/LV/PA pressure, the channel can serve as an HR source.

- When displaying a pulsatile pressure, the format shall be SYS/DIA (MEAN)
- When displaying non-pulsatile pressure, the format shall be MEAN (SYS/DIA)
- When displaying ICP, the format shall be MEAN CePP.

9.1.1 Pressure Labels

IBP1, IBP2 waveforms may be labeled according to the site of insertion. The labels are identified in the following table:

LABEL	DEFINITION
Art	Arterial Blood Pressure
UA	Umbilical Artery Pressure
LV	Left Ventricular Pressure
PA	Pulmonary Artery Pressure

LABEL	DEFINITION
CVP	Central Venous Pressure
ICP	Intracranial Pressure
LA	Left Atrial Pressure
RA	Right Atrial Pressure
P1, P2	Not specified pressure labels

The Default labels: Art, CVP.

The pressure labels for each channel cannot be the same. That is, if a pressure label is selected in one channel, it will not appear among the available label options for the other channel.

P1 and P2 can be set to Pulsatile or Mean. The default setup is Pulsatile.

- When 'Pulsatile' is selected, the channel displays data in pulsatile pressure format SYS/DIA (MEAN) and the waveform scale defaults to 0-160 mmHg. The measured systolic value is displayed.
- When 'Mean' is selected, the channel displays data in non-pulsatile pressure format MEAN (SYS/DIA) and the waveform scale defaults to 0-20 mmHg. The measured mean pressure value is displayed.
- For all other pressure labels, the data will be displayed in a fixed format, depending on the Measure Pressure selection in the IBP Menu. If “Pulsatile” is selected, the measured systolic (SYS/DIA (MEAN)) is displayed. If “Mean” is selected, the measured mean pressure value (MEAN (SYS/DIA)) is displayed.

9.2 IBP Screens

9.2.1 IBP Numeric Tile

The **IBP** numeric tile displays the following:

- IBP pressure label
- Measured values for systolic pressure, diastolic pressure, mean pressure (pulsatile: Sys/Dia(Mean), non-pulsatile: Mean(Sys/Dia))
- Alarm limits
- Unit of measurement - mmHg

Display requirements:

- Resolution: 1 mmHg

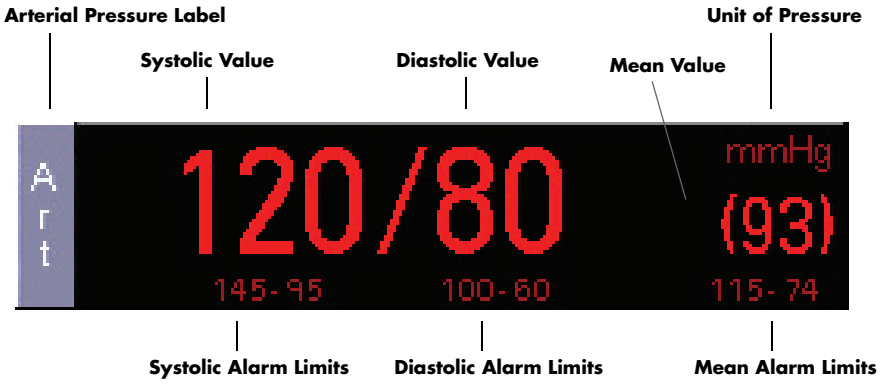

FIGURE 9-1 Arterial Pressure Numeric Tile (Art)

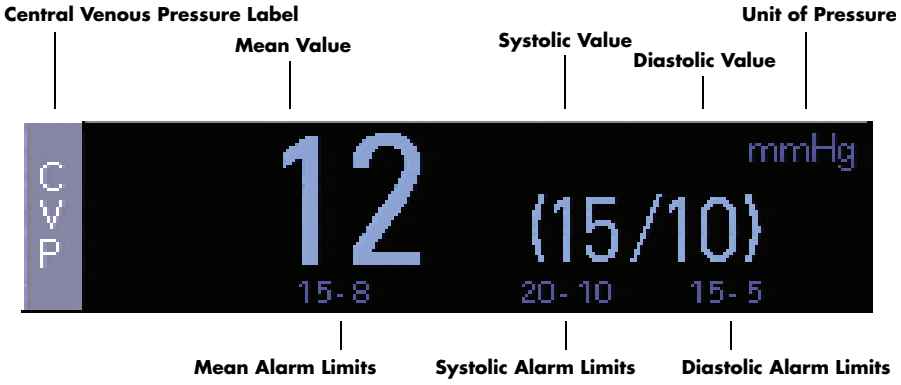

FIGURE 9-2 Central Venous Pressure Numeric Tile (CVP)

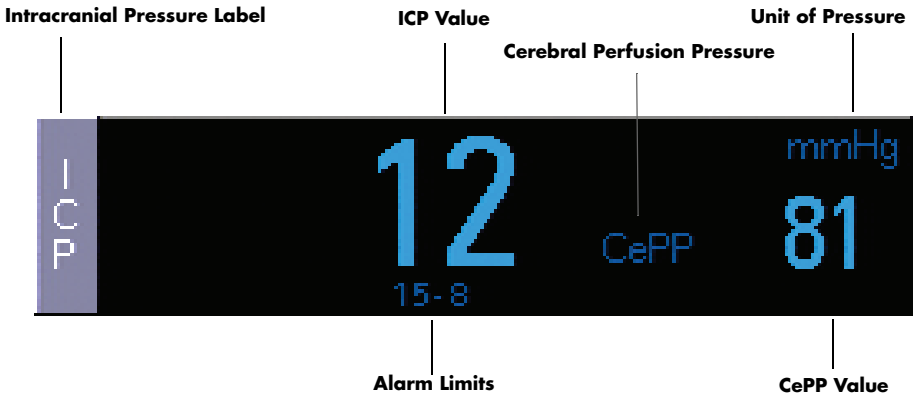

FIGURE 9-3 ICP Numeric tile (with Cepp parameter)

9.2.2 IBP Waveform

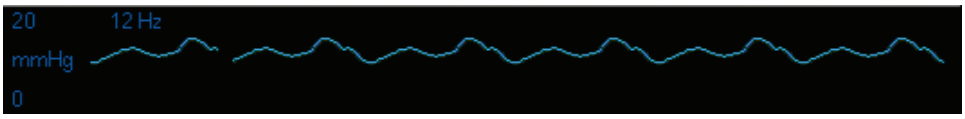

FIGURE 9-4 IBP waveform tile (Art)

9.3 IBP Menu

To display an **IBP Menu**:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 [**IBP Label**] (for example, **Art** or **CVP**)
   or
   Select the [**IBP Label**] tile (for example, **Art** or **CVP**)

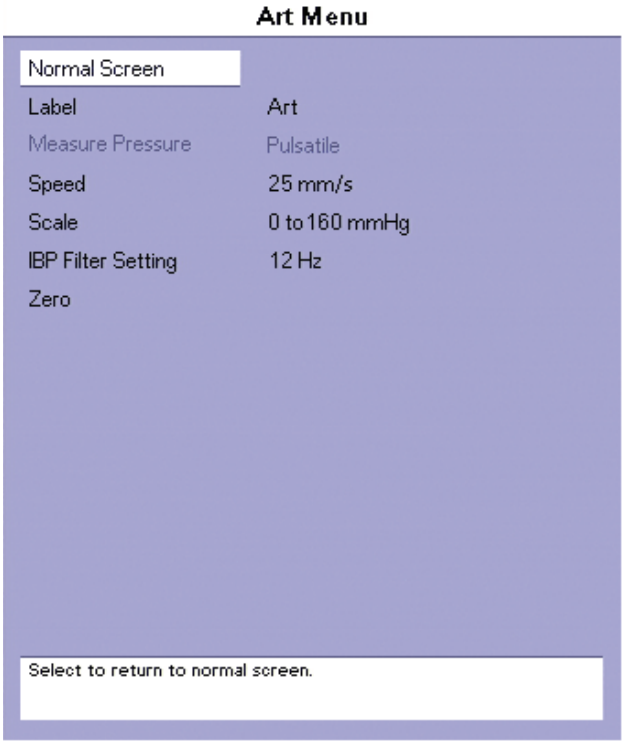

FIGURE 9-5 IBP Menu (Art)

IBP Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to normal screen (or press the **Normal Screen** key on the front panel).
Label	Art, PA, UA, CVP, LV, LA, RA, ICP, P1, P2	P1 default: Art P2 default: CVP
Measure Pressure	Pulsatile Mean	Select to change measure pressures for P1/P2. Available when pressure channel is labeled P1 or P2.
Speed	12.5 mm/s **25 mm/s** (default)	Select to change invasive pressure trace speed. Adjustments affect both IBP channels.

IBP Menu

MENU ITEM	SELECTIONS	COMMENTS
Scale	-10 to 10 mmHg 0 to 20 mmHg 0 to 40 mmHg 0 to 60 mmHg 0 to 80 mmHg 0 to 140 mmHg 60 to 140 mmHg 0 to 160 mmHg 0 to 225 mmHg 0 to 320 mmHg	Select to change IBP scale. Defaults: Art: 0 to 160 mmHg UA: 0 to 80 mmHg LV: 0 to 160 mmHg PA: 0 to 40 mmHg CVP: 0 to 20 mmHg ICP: 0 to 20 mmHg LA: 0 to 20 mmHg RA: 0 to 20 mmHg P1, P2: If Measure Pressure is All, default is 0 to 160 mmHg. If Measure Pressure is Mean, default is 0 to 20 mmHg.
IBP Filter Setting	8 Hz **12 Hz** (default) 20 Hz	Select to change IBP filter settings. The filter setting is linked to both IBP channels.
Zero	—	Select to zero IBP channel. The IBP transducer must be zeroed before initial measurements during setup to obtain correct pressure value. If the transducer is not zeroed the measured value will be displayed as "XXX". Implement IBP zeroing when any of the following occurs: • Use of new sensor or sensor cables • Reconnection of the sensor with the monitor • After monitor restart • Occurrence of incorrect pressure readings "Zero ALL" key on the front panel is to zero all IBP channels. The zero key for a single channel is available in each IBP menu. The zero key is disabled until zeroing is completed. In some conditions, zeroing can not be completed, and message shall be displayed. • Pulsatile Pressure. Cannot Zero! • Pressure Overrange. Cannot Zero!

9.4 Measuring IBP

1. Plug the pressure transducer cable into the IBP port(s) on the left side panel.
2. The IBP1 and IBP2 waveforms will appear by default as the fifth and sixth waveforms on the display with their associated data to the right of the waveforms. The waveforms may be moved to another location or turned off by accessing the **Display Setup Menu**.

NOTE: The arterial pressure catheter should not be used on a limb that is being utilized for any other medical procedure. For example, an IV Catheter, NIBP Cuff or an SpO_2 sensor.

3. Connect catheter line with flushing device to a pressure transducer.
4. Zero pressure transducer as follows:
   a. Open transducer vent to atmosphere.
   b. Press the **IPB: Zero All** key on the front panel, or individually zero pressure lines by opening individual IBP menus.

After the automatic zero process is complete, the pressure display should indicate zeros.

NOTE: If an IBP channel zeroing failed, for Pulsatile Pressure or Pressure Overrange, the message "Pulsatile Pressure. Cannot Zero!" or "Pressure Overrange. Cannot Zero!" is displayed.

5. Close the pressure transducer vent from atmosphere.
6. Select the desired pressure scale in the **IBP Menu**.
7. Zero and flush the pressure line at regular intervals per standard hospital procedure.

NOTE: Pressure transducers are protected against the effects of defibrillation and electrocautery.

9.5 IBP Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
Damped Invasive Waveform	Air bubbles in tubing.	Eliminate air from tubing.
	Kinked catheter.	Change position of catheter, check patient.
	Catheter against wall of blood vessel.	Check for leaks at connector, flush catheter.
	Blood in tubing.	Pump pressure bag up to 300 mmHg.
	Catheter partially occluded with clot.	Consult physician.
IBP not Displayed / No IBP Waveform	Improper Setup.	Check display setup in monitor setup.
	Cable not plugged in.	Check cable.
	Transducer not connected.	Check transducer connection.
	Stopcock turned improperly.	Check transducer.
	Transducer not zeroed.	Check and zero the transducer.
Dashes are displayed	The measured result is invalid or out of range.	
	IBP might be set to non-pulsatile labels like CVP, LA, RA, and ICP.	
Abnormally High or Low readings	Transducer too HIGH or to LOW.	Check patient adjust transducer rezero.
Unable to Zero	Stopcock not open to atmosphere.	Check transducer.

10.0 *CO_2 Monitoring (optional)*

10.1 Description

Intended patient types: Adult, Pediatric, Neonatal. The **Passport V** supports the following CO_2 modules:

- Sidestream–DPM CO_2 module (M02B)
- Microstream–Oridion Medical mini$MediCO_2$ module

The **Passport V** provides three parameters (ET CO_2, InspCO_2, and awRR) and a CO_2 waveform for CO_2 measurement.

10.2 CO_2 Screens

10.2.1 Numeric Tile: CO_2

The **CO_2** numeric tile displays the following:

- Parameter name of CO_2 module
- Units of measure
- Measured values of ET CO_2, InspCO_2 and awRR
- High and low alarm limits for ET CO_2
- CO_2 Source (Int. CO_2 or GM)

FIGURE 10-1 CO_2 Numeric Tile

10.2.2 Waveform: CO_2

The CO_2 waveform tile displays the following:

- Waveform
- Waveform scale values
- Unit of measurement

FIGURE 10-2 Resp Waveform Tile

10.3 CO_2 Menu

To display the **CO_2 Menu**:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **CO_2**
   or
   Select the **CO_2** tile.

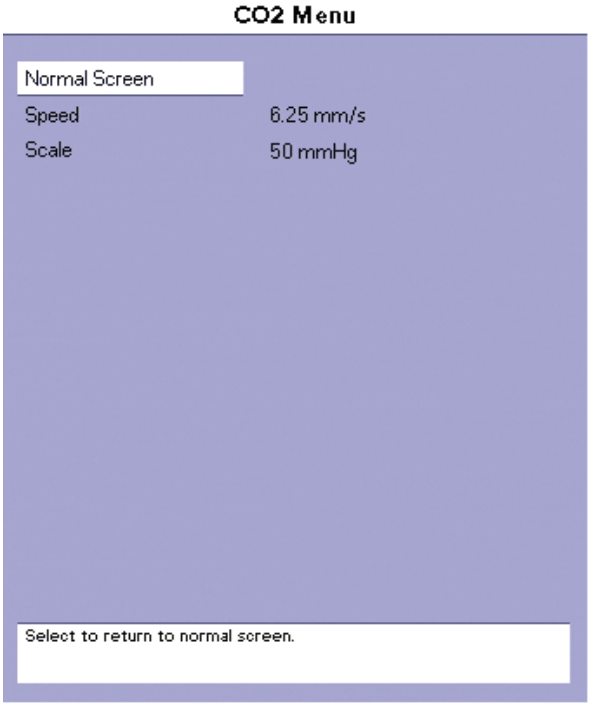

FIGURE 10-3 CO_2 Menu (DPM Sidestream CO_2)

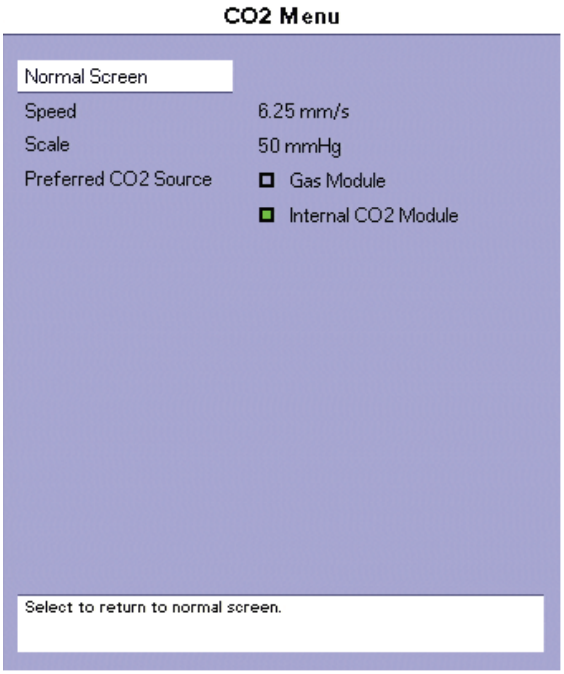

FIGURE 10-4 CO_2 Menu (Oridion Microstream CO_2)

CO_2 Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to normal screen (or press the **Normal Screen** key on the front panel).
Speed	3.125 mm/s **6.25 mm/s** (default) 12.5 mm/s 25 mm/s	Select to adjust waveform speed.
Scale	mmHg: 15 mmHg, 20 mmHg, 25 mmHg, **50 mmHg** (default), 80 mmHg, %: 2.0%, 2.5%, 3.5%, **7.0%** (default), 10.0% kPa: 2.0kPa, 2.5kPa, 3.5kPa, **7.0kPa** (default), 10.0kPa	Select to change CO2 scale. The unit of measure for CO_2 can be selected in the **Installation Menu**. The choices are: mmHg, kPa and %.
Preferred CO_2 Source	**Gas Module** (default) Internal CO_2 Module	If a CO_2 source Module is OFF, that Module option shall be disabled and appear grey. No matter if the source Module is ON or OFF, the selection status of the preference source shall not change.

CO_2 Menu

MENU ITEM	SELECTIONS		COMMENTS	
	Selection	**Gas Module 3 Status**	**Internal CO_2 Module Status**	**Active CO_2 Source**
	Gas Module	OFF	OFF	None
	Gas Module	OFF	ON	Internal CO_2 Module
	Gas Module	ON	OFF	Gas Module
	Gas Module	ON	ON	Gas Module
	Internal CO_2 Module	OFF	OFF	None
	Internal CO_2 Module	OFF	ON	Internal CO_2 Module
	Internal CO_2 Module	ON	OFF	Gas Module
	Internal CO_2 Module	ON	ON	Internal CO_2 Module
	Note: ON/OFF Status of the Module: If the Gas Module is connected to a serial port configured to 'Gas Module', and the power is switched on, the module is considered to be ON. Otherwise it is considered to be OFF. If the Oridion CO_2 Module is installed and a Filterline is connected, the module is considered to be ON. Otherwise it is considered to be OFF. If the DPM CO_2 Module and water trap are installed, the module is considered to be ON, Otherwise it is considered to be OFF.			
Flow Rate	70 ml/min **100 ml/min** (default) 120 ml/min 150 ml/min		Applicable to DPM Sidestream CO_2 module only. **Note**: For Oridion Microstream CO_2, the flow rate is 50ml/min. It is not user adjustable.	

10.3.1 CO_2 Setup Menu (DPM Sidestream Only)

To display the **CO_2 Setup Menu**:

1. On the front panel:
Press the **Normal Screen** key to return to the normal screen.

On the normal screen:

Select **Parameters** 〉 **CO_2** 〉 **CO_2 Setup**

or

Select the **CO_2** tile 〉 **CO_2 Setup**.

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.

NOTE: The watertrap collects water drops condensed in the sampling line and therefore prevents them from entering the module. It is important to periodically drain the watertrap to avoid water blocking the airway.

NOTE: **The watertrap has a filter to prevent 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 every month, or when the watertrap is found leaky, damaged, or contaminated.**

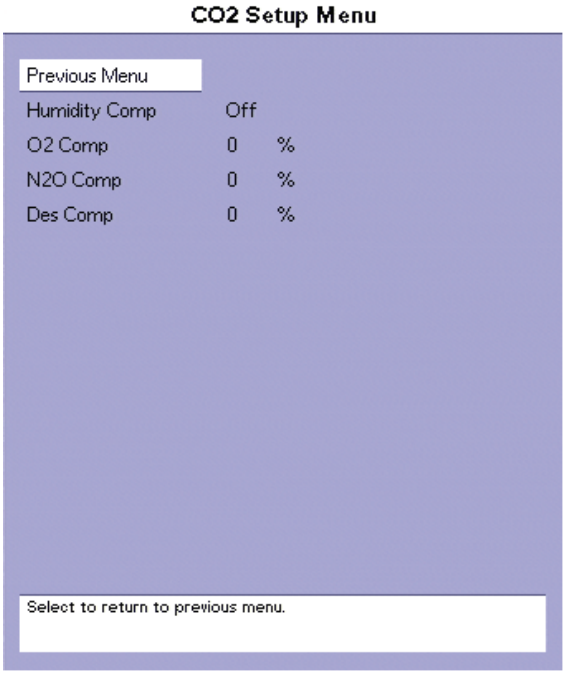

FIGURE 10-5 CO_2 Setup Menu (DPM Sidestream Only)

CO_2 Setup Menu (DPM Sidestream Only)

MENU ITEM	SELECTIONS	COMMENTS
Previous Screen	—	Select to return to the previous menu.
Humidity Compensation	On **Off** (default)	Select On for Body Temperature Pressure Saturation (BTPS). Select Off for Ambient Temperature and Pressure Dry (ATPD). **Note**: If using the Oridion Medical miniMediCO$_2$ module, the humidity compensation is always on.
O_2 Compensation	**0** (default) to 100%	Select the O_2 level used for O_2 compensation. **Note**: The sum of compensation values input for oxygen, nitrous oxide and desflurane must not be greater than 100%.

CO_2 Setup Menu (DPM Sidestream Only)

MENU ITEM	SELECTIONS	COMMENTS
N_2O Compensation	**0** (default) to 100%	Select the N_2O level used for N2O compensation. **Note**: The sum of compensation values input for oxygen, nitrous oxide and desflurane must not be greater than 100%.
Desflurane Compensation	**0** (default) to 24%	Select the Des level used for Des compensation. **Note**: The sum of compensation values input for oxygen, nitrous oxide and desflurane must not be greater than 100%.

10.3.2 Microstream® CO_2 Monitoring (Optional)

Microstream CO_2 modules provide **Expired CO_2**, **Inspired CO_2** and **Respiration Rate** monitoring utilizing a small lumen FilterLine®. Microstream capnography is accomplished via a nasal cannula (non-intubated) or through an adapter set for use in a breathing circuit (intubated). Microstream can be used on adult, pediatric and neonatal patients.

WARNING: When monitoring an anesthesized patient in an operating room environment, connection from the exhaust port of the Passport V to the hospital's waste gas scavenging system is recommended to prevent exposure of hospital personnel to the patient's respiratory sample.

To begin monitoring Microstream CO_2:

1. Open CO_2 input door and connect the proper FilterLine® to the Monitor. Connect the opposite end to the patient.

NOTE: Ensure all tubing connections are secure.

NOTE: Consideration should be given to the disposal of packaging waste.

CAUTION: When connecting a sampling line to the monitor, screw the sampling line connecter clockwise into the monitor CO_2 port until it can no longer be turned to ensure that it is connected securely to the monitor. This will assure that there is no leak of gases during measurement at the connection point and that measurement accuracy is not compromised. Loose or damaged connections may compromise ventilation or cause an inaccurate measurement of respiratory gases. Securely connect all components and check connections for leaks according to standard clinical procedures.

CAUTION: If too much moisture enters the sampling line (i.e., from ambient humidity or breathing of unusually humid air), the message "Clearing FilterLine" will appear in the message area. If the sampling line cannot be cleared, the message "FilterLine Blockage" will appear in the message area. Replace the sampling line once the "FilterLine Blockage" message appears.

10.4 CO_2 Troubleshooting

Refer to Chapter 14.0 Messages for Physiological Alarm Messages, Technical Alarm Messages, and Prompt Messages.

11.0 *Gas Monitoring (optional)*

11.1 Description

The Gas Module functionality is applicable to adult, pediatric and neonatal patients.

The indications for use for the Gas Module include monitoring of airway gases during anesthesia and/or assisted respiration. The intended environment of use is the anesthesia department, including the Operating Room (OR), post anesthesia care units (PACU), and equivalent.

Refer to the Gas Module Operating Instructions (0070-00-0696-XX) for further operation and performance specifications.

The **Passport V** supports the Artema Gas Module-3. Anesthetic gases are identified automatically.

- **Passport V**

The following parameters are measured:

- Expired (Et) and inspired (Insp) values for CO_2, N_2O, O_2, and Agent
- MAC value
- awRR

CO_2, O_2 and Agent waveforms are displayed.

The Gas Module measures the inspired and expired concentrations of anesthetic gases, O_2, N_2O and CO_2 for display in a numeric tile. The inspired and expired concentrations of CO_2 are displayed in the CO_2 tile. Measurements can be acquired via a nasal cannula (non-intubated) for oxygen and CO_2 only or through a sampling line connected to a breathing circuit (intubated).

The Minimum Alveolar Concentration (MAC) is also displayed in the Gas tile. MAC is a calculated value defined in ISO 21647:2004(E) as follows:

> **MAC - alveolar concentration of an inhaled anesthetic agent that, in the absence of other anesthetic agents and at equilibrium, prevents 50% of subjects from moving in response to a standard surgical stimulus.**

The MAC value is calculated using the following formula:

$$MAC\ (AA) = \frac{\%\ (ET\ AA)}{x(AA)} + \frac{\%\ (ET\ N2O)}{x(N2O)}$$

where AA is the anesthetic agent in use, ET AA is the end-tidal agent concentration, x(AA) is a clinically-derived coefficient based on anesthetic agent (known as 1MAC values), ET N_2O is the end-tidal N_2O concentration and x(N_2O) is a clinically-derived coefficient for N_2O (also known as the 1MAC value). From ISO 21647:2004(E), the 1MAC values used in the calculation are:

HALOGENATED AGENT	1MAC (IN OXYGEN) % VOLUME FRACTION
Halothane	0.77
Enflurane	1.7
Isoflurane	1.15
Desflurane	7.3
Sevoflurane	2.1
N_2O	105
With the exception of Desflurane, the 1MAC values shown in this table apply to an age sample of 40-years-old. The Desflurane 1MAC value applies to an age sample of 25-years-old.	

NOTE: The calculated MAC value is not corrected for ambient pressure (altitude & barometric effects), patient age, patient core temperature or any other individual factors influencing the effect of volatile anesthetic agents.

NOTE: If mixed agents are detected, the MAC value is invalidated (displayed as dashes).

11.2 Gas Screens

To display the desired numeric and waveform tiles:

1. From the normal screen, select **Monitor Setup** 〉 **Display Setup**.
2. Rotate the Navigator Knob to the desired tile location and press the knob to open a selection of parameters.
3. Rotate the Navigator Knob to the desired parameter and press the knob to select it.

11.2.1 CO_2 Numeric Tile

The CO_2 Numeric Tile displays the following:

- CO_2 parameter name
- Inspired measurement of CO_2
- Expiratory measurement of CO_2
- CO_2 unit of measurement
- Insp/ET labels
- Alarm limits
- Respiration Source
- Respiration Rate measurement
- Respiration Rate unit of measurement

FIGURE 11-1 CO_2 Numeric Tile

11.2.2 Gas Numeric Tile

The Gas Numeric Tile displays the following:

- Gas parameter name;
- Insp and Exp labels for Agent, O_2, and N_2O
- Units of measurement for Agent, O_2, and N_2O
- Measured Values for Agent, O_2, and N_2O
- MAC Label
- Measured value of MAC

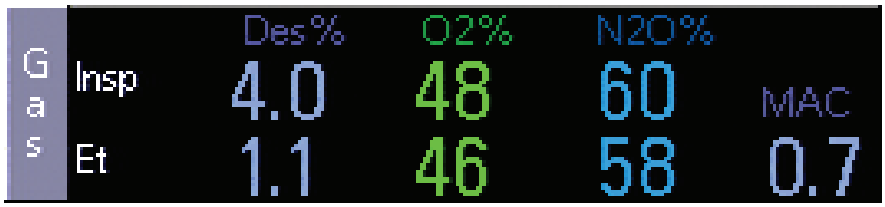

FIGURE 11-2 Gas Numeric Tile

11.2.3 Gas Waveform

The CO_2, O_2, or Anesthetic Agent waveform tile displays the following:

- Waveform
- Scale Values
- Unit of measurement

FIGURE 11-3 Gas waveform (CO_2)

11.3 Gas Menu

To display the **Gas Menu**:

1. On the front panel:
   Press the **Normal Screen** key to return to the normal screen.
2. On the normal screen:
   Select **Parameters** 〉 **Gas**
   or
   Select the **O_2**, **N_2O**, or **Gas** tile

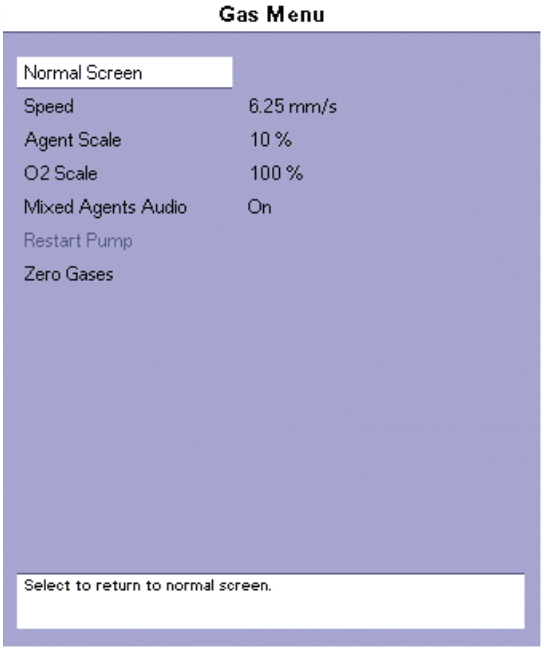

FIGURE 11-4 Gas Menu

Gas Menu

MENU ITEM	SELECTIONS	COMMENTS
Normal Screen	—	Select to return to **Normal Screen** (or press the **Normal Screen** key on the front panel).
Speed	3.125mm/s **6.25mm/s** (default) 12.5mm/s 25mm/s	Select to change respiration trace speed. The CO_2, Gas, and O_2 waveform speed settings change simultaneously.
Agent Scale	1% 2.5% 5% **10%** (default) 15% 20%	Select to change agent scale. The lower limit of all of the gas waveform scales is fixed to "0". The upper limit of the gas waveform scale is user adjustable.
O_2 Scale	30% 60% **100%** (default)	Select to change O2 scale. The lower limit of all of the O_2 waveform scales is fixed to "0". The upper limit of the O_2 waveform scale is user adjustable.

Gas Menu

MENU ITEM	SELECTIONS	COMMENTS
Mixed Agent Audio	**On** (default) Off	Select to turn mixed agents audio alarm on or off. On: If Mixed agents are detected, the "Mixed Agent" alarm tone will sound. Off: If Mixed agents are detected, the "Mixed Agent" alarm tone will not sound.
Pump Restart		Select to restart the Gas Module pump. This selection is not available while the pump is functioning normally. The system shuts off the pump and gives a pump off alarm when a pneumatic error occurs. The pump can be restarted manually after the pump is shut off.
Zero Gases		Select to zero gas module. Zeroing is performed to eliminate the effects of baseline drift occurring during measurement. Manual zeroing is supported. A zeroing prompt should be provided during zeroing. A zeroing error alarm should be given in the case of zeroing failure.

11.3.1 Measure Unit

The unit of measurement for CO_2 can be manually selected in the **Installation Menu**. The choices are: mmHg, %, and kPa. The unit of measurement for O_2, N_2O and Anesthetic Agent is %.

11.3.2 Automatic identification of Anesthetic Agents

If Mixed Agents are identified, then the MAC value are invalidated and dashes are displayed. The actual value of primary agent concentration,N_2O, CO_2 and O_2 data is displayed as usual.

When the Anesthetic Agent is not identified the agent is labeled as "AGENT", no Anesthetic Agent related physiological alarms are activated.

Menus and the corresponding display areas are refreshed once the Anesthetic Agent is identified.

WARNING: When using the Gas Module, the maximum sampling rate at the nasal cannula is 200 ml/min (120 ml/min for Gas Module 3 with a neonatal water trap). This device should not be used on patients whose breathing could be impaired by this vacuum flow rate.

NOTE: The Gas Module 3 is equipped with automatic barometric pressure compensation.

NOTE: The Gas Module 3 uses a fixed correction of 11 hPa to compensate for the influence of water vapor in the gas sample, when converting the gas readings to ATPD. An increase in the ambient H_2O partial pressure to 30 hPa (i.e. 28 °C, 80% RH or 33 °C, and 60% RH) will cause a general error for all gases of only -2% REL.

Monitoring Anesthetic Gases, O_2, N_2O and/or CO_2

NOTE: To prevent moisture from entering the pneumatic system, ensure that the Gas Module is always installed and operated in the horizontal orientation shown in all graphical depictions.

1. Power ON the Gas Module.
2. Power ON the patient monitor while holding down the **Discharge** key to enter into its Installation Mode.
3. From the patient monitor **Installation Menu**, set the correct serial port to "Gas Module" and then select "Save Current".
4. Restart the patient monitor to enter normal monitoring mode.
5. Set alarms as desired.

NOTE: DRYLINE™ Sample Lines are for use with Gas Module 3 only.

6. For non-intubated patients, apply the nasal cannula to the patient. For intubated patients connect the sample line to the breathing circuit. Refer to instruction provided in the sample line packets.
7. Connect the other end of the nasal cannula or sample line to the Gas Module at the input port.

WARNING: Connection of the Gas Module exhaust port to the hospital's waste gas scavenging system is strongly recommended to prevent exposure of hospital personnel to the patient's respiratory sample. Vacuum (negative pressure) should not exceed 1 mmHg at the Gas Module Pump Exhaust fitting. Excessive scavenge vacuum may result in damage to the Gas Module's internal pump.

CAUTION: Contamination with CO2, N2O or Anesthetic Agent in the air surrounding the Gas Module may cause significant measurement errors. The Gas Module exhaust output should be connected to a medical gas-scavenging system.

8. Check for a clean water trap.
9. Observe the capnogram on the monitor's display. On **Passport V** powerup, O_2, Agent and N_2O numbers will display. CO_2 numbers will be displayed when a valid breath is detected.

NOTE: The Gas Module 3 must be warmed up a minimum of 45 seconds for ISO accurate CO_2, O_2, N_2O, and agent readings.

NOTE: Consideration should be given to the disposal of packaging waste.

10. If not already set, use the **Display Setup Menu** to select the gas waveforms to be displayed.

11. If desired, the gas waveform speed and scale can be changed in the **Gas Menu**.

11.3.3 Gas Module 3 Pre-use Test

Prior to each use, perform the following test with the Gas Module 3 to verify that the gas analyzer and sample system are functioning properly:

1. Verify that the appropriate water trap is properly installed and that the appropriate sampling line is connected.

- DRYLINE™ Adult/Pediatric water trap used with DRYLINE™ Adult/Pediatric sampling line (colorless Luer lock nut)
- DRYLINE™ Neonatal water trap used with DRYLINE™ Neonatal sampling line (blue Luer lock nut)

2. Verify that the water trap container is less than half full.

3. Occlude the sampling line and verify that the occlusion alarm functions properly.

4. Breathe into the sampling line and verify that a CO_2 waveform is correctly displayed on the monitor.

5. Sample room air for 30 seconds and verify that the monitor oxygen output is 21% (± sensor inaccuracy).

11.4 Gas Module Troubleshooting

Refer to Chapter 14.0 Messages for Physiological Alarm Messages, Technical Alarm Messages, and Prompt Messages.

12.0 *Drug Calculations*

12.1 Description

The **Passport V** supports drug calculations, accessible through the **Functions Menu**.

The **Drug Calculator** selection opens the (IV) **Drug Calculation Menu**. This menu calculates both the infusion rate and the concentration rate of IV medications.

12.1.1 Drug Calculations

The **Passport V** has the ability to calculate and display IV drug infusion rate and concentration based upon patient weight and/or drug dosage.

Drug calculations may also be accessed through the **Patient Menu**. Drug calculations are only available if the **Patient Size** is set to **Adult**.

Drug Calculation Formulas

For Drug Concentration, the **Passport V** uses the following formula:

$$\frac{\text{(Drug Amount)}}{\text{(Solution Volume)}} = \text{Concentration}$$

For a weight-based Drug Infusion Rate, the **Passport V** uses the following formula:

$$\frac{\text{(Dose Ordered)} \times \text{(Weight in kg)} \times \text{(Solution Volume)}}{\text{(Drug Amount)}} = \text{Infusion Rate (ml/hr)}$$

For a non-weight-based Drug Infusion Rate, the **Passport V** uses the following formula:

$$\frac{\text{(Dose Ordered)} \times \text{(Solution Volume)}}{\text{(Drug Amount)}} = \text{Infusion Rate (ml/hr)}$$

Drug Calculator

When "Drug Calculator" is chosen from the **Patient Menu** or the **Functions Menu**, the **Drug Calculator** is displayed. An example **Drug Calculator** that is set for a weight-based drug is shown in FIGURE 12-1.

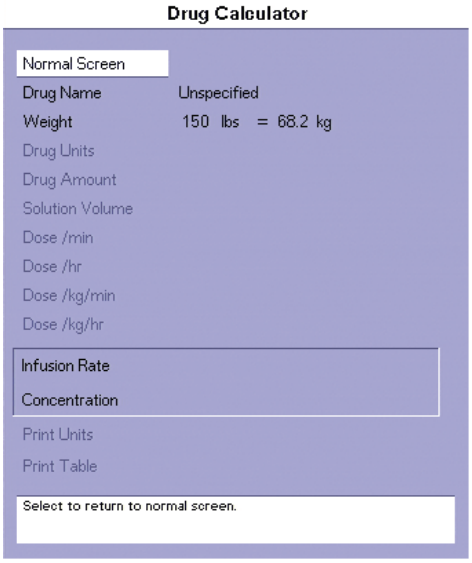

FIGURE 12-1 Drug Calculator set for a weight-based drug

The following table describes the menu structure of the Drug Calculator:

Drug Calculator Menu Structure

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	ACTIONS/ COMMENTS
Normal Screen			Select to return to normal screen (or press the **Normal Screen** key on the front panel).
Drug Name	See the "GENERIC NAME" and "BRAND NAME" columns of the table in the **Adult Medication Choices** subsection. The Drug A – D choices are for drugs that are not listed in the table.	Unspecified	Select to choose medication.
Weight	1 to 1100 lbs or 1 to 500 kg	Unspecified	Select to enter or change patient weight.

* *When any one of the menu items marked with an asterisk (*) is changed, the others are automatically updated.*

Drug Calculator Menu Structure (Continued)

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	ACTIONS/ COMMENTS
Drug Units	mcg, mg, g, units, mU	mcg for Drug A, B, C or D. For drugs listed in the table in the **Adult Medication Choices** subsection, see the "DEFAULT UNITS" column.	Select to change drug units. This menu item is only selectable if Drug A, B, C or D is chosen. Otherwise, the default unit for the specified drug is used. If Drug Units are changed for Drug A, B, C or D, Drug Amount, Solution Volume, Dose/ min, Dose/hr, Dose/kg/ min and Dose/kg/hr will be reset to blank fields and Infusion Rate and Concentration will be invalidated.
Drug Amount	Based on current Drug Units setting.		Select to enter amount of drug in IV bag.
Solution Volume	10 to 1000 ml		Select to enter volume of solution in IV bag.
Dose/min*	0.01 to 10000.00	If the chosen drug is Vasopressin, the Default is 0.200 For all other drugs, the Default is 1.00	Select to enter dosage of drug to be infused per minute.
Dose/hr*	0.01 to 10000.00	If the chosen drug is Vasopressin, the Default is 12.00 For all other drugs, the Default is 60.00	Select to enter dosage of drug to be infused per hour.
Dose/kg/min*	If the chosen drug is Milrinone, 0.005 to 2.000 For all other drugs, 0.01 to 10000.00	If the chosen drug is Milrinone, the Default is 0.375 For all other drugs, the Default is 1.00	Select to enter dosage of drug to be infused per minute based upon patient weight. Please verify patient weight.
Dose/kg/hr*	If the chosen drug is Milrinone, 0.300 to 120.000 For all other drugs, 0.01 to 10000.00	If the chosen drug is Milrinone, the Default is 22.500 For all other drugs, the Default is 60.00	Select to enter dosage of drug to be infused per hour based upon patient weight. Please verify patient weight.
Infusion Rate			This menu item is automatically calculated as previously described in this section using the values entered for other menu items.

* *When any one of the menu items marked with an asterisk (*) is changed, the others are automatically updated.*

Drug Calculator Menu Structure (Continued)

MENU TITLE ON SCREEN	MENU CHOICES	DEFAULT	ACTIONS/ COMMENTS
Concentration			This menu item is automatically calculated as previously described in this section using the values entered for other menu items.
Print Units	Dose/min, Dose/hr, Dose/kg/min, Dose/kg/hr	Dose/kg/min (when the chosen drug is weight-based)	Select to choose which unit of measurement will be printed when you select Print Table.
		Dose/min (when the chosen drug is non-weight-based)	This menu item is automatically populated with the appropriate default when: 1) a Drug Name is chosen, 2) the patient Weight is specified (for a weight-based drug), and 3) Dose/min, Dose/hr, Dose/kg/min or Dose/kg/hr is specified. If the dose is entered as Dose/min, then the menu choices will be Dose/min or Dose/hr. If the dose is entered as Dose/kg/min, then the menu choices will be Dose/kg/min or Dose/kg/hr. If the dose is entered as Dose/hr, then Dose/hr will be the only menu choice for the Print Units. If the dose is entered as Dose/kg/hr, then Dose/kg/hr will be the only menu choice for the Print Units. If the chosen drug is Milrinone, then Dose/kg/min will be the only menu choice for the Print Units.
Print Table			Select to print Drug Calculation data.

* *When any one of the menu items marked with an asterisk (*) is changed, the others are automatically updated.*

The following table details adult medication choices:

Adult Medication Choices

GENERIC NAME	BRAND NAME	IS THE PATIENT'S WEIGHT USED IN THE CALCULATION?	DEFAULT UNITS	DEFAULT SOLUTION VOLUME	DEFAULT DRUG AMOUNT
Aminophylline[1]	Theophylline	Y	mg	500 ml	500 mg
Diltiazem[1]	Cardizem	N	mg	125 ml	125 mg
Dobutamine[1]	Dobutrex	Y	mcg	250 ml	500 mg
Dopamine[1]	Inotropin	Y	mcg	250 ml	400 mg
Epinephrine HCL[1]	Adrenalin	N	mcg	250 ml	1mg
Esmolol HCL[1,2]	Brevibloc	Y	mcg	500 ml	5000 mg
Fentanyl Citrate[1]	Sublimaze	Y	mcg	100 ml	5 mg
Heparin Sodium[1]	Heparin	N	units	250 ml	12,500 units
Inamrinone Lactate[1]	Inocor	Y	mcg	250 ml	500 mg
Insulin, Regular[1]	Humulin	N	units	100 ml	100 units
Isoproterenol HCL[1]	Isuprel HCL	N	mcg	500 ml	2 mg
Labetalol HCL[1,2]	Normodyne	N	mg	200 ml	200 mg
Lidocaine HCL[1,2]	Xylocaine HCL	N	mg	500 ml	2000 mg
Lorazepam	Ativan	N	mg	500 ml	40 mg
Midazolam HCL[1,2]	Versed	Y	mg	125 ml	125 mg
Milrinone Lactate[1,2]	Primacor	Y	mcg	200 ml	20 mg
Nicardipine HCL[1]	Cardene	N	mg	250 ml	25 mg
Nitroglycerin[1]	Tridil	N	mcg	250 ml	50 mg
Nitroprusside Sodium[1]	Nipride	Y	mcg	250 ml	50 mg
Norepinephrine[1]	Levophed	N	mcg	250 ml	4 mg
Phenylephrine[1]	Neosynephrine	N	mcg	250 ml	10 mg
Procainamide HCL[1]	Pronestyl	N	mg	500 ml	2000 mg
Propofol[1]	Diprivan	Y	mcg	50 ml	500 mg
Vasopressin[2]	Pitressin	N	units	250 ml	250 units

1 Gahart B and Nazareno A. 2002 Intravenous Medications. St. Louis: Mosby, 2001.

2 Algozzine G, Algozzine R, and Lilly D. Critical Care Intravenous Infusion Drug Handbook. St. Louis: Mosby, 2002.

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13.0 *Alarms*

13.1 Alarms

The **Passport V** monitor provides a broad range of alarm settings.

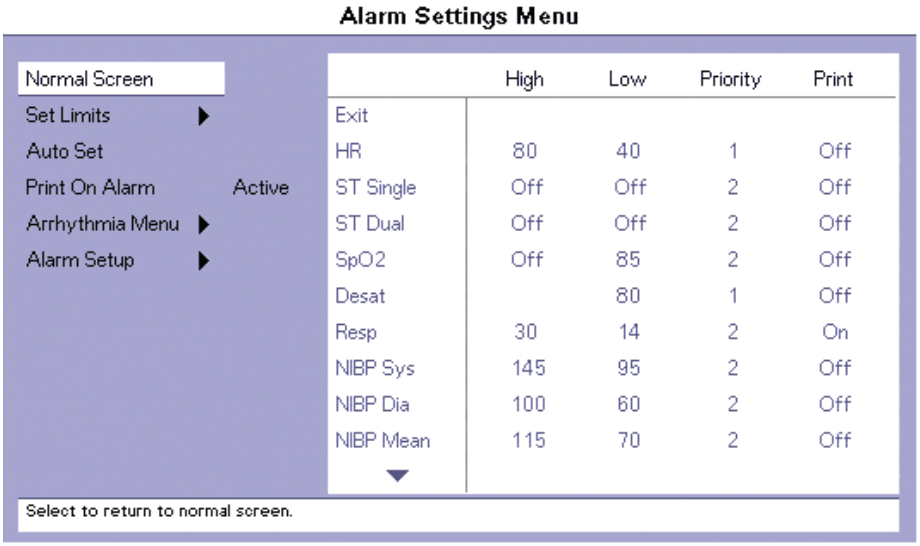

FIGURE 13-1 Alarm Settings Menu

13.1.1 Adjusting Alarms

WARNING: The user should check that the current alarm settings on the Passport V monitor are appropriate prior to use on each patient.

Setting Parameter Alarm Limits

1. To access the **Alarms Settings Menu** press the **ALARMS LIMITS** key. The main **Alarm Settings Menu** displays.
2. Use the Navigator Knob to set alarm limits as desired for currently monitored parameters.

NOTE: Alarm Limits are not saved when the monitor is turned off for more than 2 minutes, unless you select Save Current from the Advanced Setup Menu.

3. The **Alarm Setup** menu also provides options for setting alarm delay times and alarm silence features.

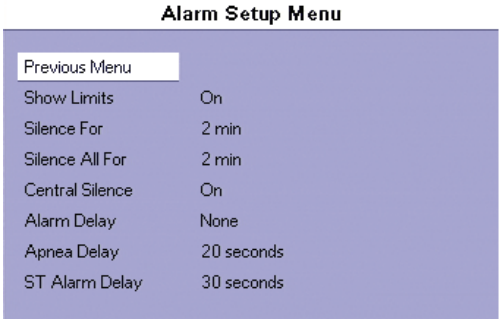

FIGURE 13-2 Alarm Setup Menu

Alarm Setup Menu

MENU ITEM	SELECTIONS	COMMENTS
Previous Menu		Select to return to previous menu.
Show Limits	**Off** (default) On	Select to display or remove alarm limits from parameter files.
Silence For	1 min **2 min** (default) 3 min* 5 min* 10 min*	Select to choose time period for an individual alarm to be silenced.
Silence All For	Permanent* 1 min **2 min** (default) 3 min* 5 min* 10 min*	Select to choose time period for all alarms to be silenced.
Central Silence	Off (default) **On** (default)	Select to control audio alarm at central activated by Silence key.

* *These selections will not be available if the language chosen in the Installation Menu is French.*

Alarm Setup Menu

MENU ITEM	SELECTIONS	COMMENTS
Alarm Delay	**None** (default) 1 second 2 seconds 3 seconds 4 seconds 5 seconds 6 seconds 7 seconds 8 seconds	Select to adjust audio alarm delay time.
Apnea Delay	10 seconds 15 seconds **20 seconds** (default) 25 seconds 30 seconds 35 seconds 40 seconds 45 seconds 50 seconds 55 seconds 1 min	Select to adjust apnea delay time.
ST Alarm Delay	**30 seconds** (default) 45 seconds 1 min 90 seconds 2 min 3 min	Select to adjust ST alarm delay time.

* *These selections will not be available if the language chosen in the Installation Menu is French.*

13.1.2 Alarm Limits

A separate table of alarm limit settings is maintained for each patient size. When the patient size is changed, the corresponding selections are automatically used. See table below for alarm ranges. Default settings appear in bold text

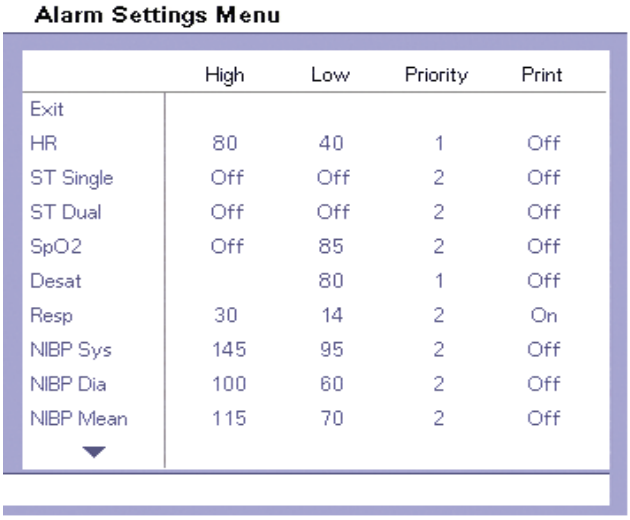

FIGURE 13-3 Alarm Settings Menu - Set Limits

	HIGH			LOW		
PARAMETERS	**ADULT**	**PED**	**NEONATE**	**ADULT**	**PED**	**NEONATE**
HR (bpm) Except France	**150**, Off, 60-250	**180**, Off, 100-300	**200**, Off, 100-350	**50**, Off, 30-120	**80**, Off, 30-150	**100**, Off, 30-200
HR (bpm) France	**120**, Dés, 60-250	**150**, Dés, 100-300	**175**, Dés, 100-350	**30**, Dés, 30-120	**50**, Dés, 30-150	**70**, Dés, 30-200
ST Single Lead (mm)	**Off**, +0.5 to +10.0	**Off**, +0.5 to +10.0	—	**Off**, -0.5 to -10.0	**Off**, -0.5 to -10.0	—
ST Dual Lead (mm)	**Off**, +0.5 to +10.0	**Off**, +0.5 to +10.0	—	**Off**, -0.5 to -10.0	**Off**, -0.5 to -10.0	—
SpO_2 (%)	**Off**, 80-100	**Off**, 80-100	**Off**, 80-100	**85**, 76-99	**90**, 76-99	**92**, 76-99
Desat (%)	—	—	—	**80**, 75-98	**80**, 75-98	**80**, 75-98
Resp (RPM)	**Off**, 10-100	**Off**, 15-150	**Off**, 30-200	**Off**, 5-30	**Off**, 5-40	Off, **5**-50
NIBP Sys (mmHg)	**Off**, 70-240	**Off**, 40-180	**Off**, 40-180	**Off**, 50-150	**Off**, 15-130	**Off**, 15-130
NIBP Dia (mmHg)	**Off**, 40-130	**Off**, 50-100	**Off**, 50-100	**Off**, 30-120	**Off**, 10-50	**Off**, 10-50
NIBP Mean (mmHg)	**Off**, 60-200	**Off**, 50-180	**Off**, 40-160	**Off**, 40-140	**Off**, 10-100	**Off**, 10-70
Temp (°F)	**Off**, 95-110	**Off**, 95-110	**Off**, 95-110	**Off**, 80-100	**Off**, 80-100	**Off**, 80-100
Temp (°C)	**Off**, 35-43	**Off**, 35-43	**Off**, 35-43	**Off**, 26-38	**Off**, 26-38	**Off**, 26-38
IBP1 Sys (mmHg)	**Off**, 5-300	**Off**, 5-240	**Off**, 5-180	**Off**, 0-150	**Off**, 0-130	**Off**, 0-130
IBP1 Dia (mmHg)	**Off**, 0-140	**Off**, 0-100	**Off**, 0-70	**Off**, 0-120	**Off**, 0-100	**Off**, 0-50
IBP1 Mean (mmHg)	**Off**, 5-150	**Off**, 5-100	**Off**, 5-100	**Off**, 2-100	**Off**, 2-50	**Off**, 2-50
IBP2 Sys (mmHg)	**Off**, 5-300	**Off**, 5-240	**Off**, 5-180	**Off**, 0-150	**Off**, 0-130	**Off**, 0-130
IBP2 Dia (mmHg)	**Off**, 0-140	**Off**, 0-100	**Off**, 0-70	**Off**, 0-120	**Off**, 0-100	**Off**, 0-50
IBP2 Mean (mmHg)	**Off**, 5-150	**Off**, 5-100	**Off**, 5-100	**Off**, 2-100	**Off**, 2-50	**Off**, 2-50
ET CO_2 (mmHg)	**60**, Off, 20-80	**60**, Off, 20-80	**60**, Off, 20-80	**Off**, 5-50	**Off**, 5-50	**Off**, 5-50
ET CO_2 (%)	**8.0**, Off, 2.0-10.0	**8.0**, Off, 2.0-10.0	**8.0**, Off, 2.0-10.0	**Off**, 1.0-6.0	**Off**, 1.0-6.0	**Off**, 1.0-6.0
ET CO_2 (kPa)	**8.0**, Off, 2.0-10.0	**8.0**, Off, 2.0-10.0	**8.0**, Off, 2.0-10.0	**Off**, 1.0-6.0	**Off**, 1.0-6.0	**Off**, 1.0-6.0
Insp CO_2 (mmHg)	**10** Off, 5-30	**10** Off, 5-30	**10** Off, 5-30	—	—	—

Default values in bold.

	HIGH			LOW		
PARAMETERS	**ADULT**	**PED**	**NEONATE**	**ADULT**	**PED**	**NEONATE**
Insp CO_2 (%)	**1.0**, Off, 1.0-4.0	**1.0**, Off, 1.0-4.0	**1.0**, Off, 1.0-4.0	—	—	—
Insp CO_2 (kPa)	**1.0**, Off, 1.0-4.0	**1.0**, Off, 1.0-4.0	**1.0**, Off, 1.0-4.0	—	—	—
ET O_2 (%)	**Off**, 40-100	**Off**, 40-100	**Off**, 40-100	**Off**, 10-60	**Off**, 10-60	**Off**, 10-60
Insp O_2 (%)	**Off**, 40-100	**Off**, 40-100	**Off**, 40-100	**18**-60	**18**-60	**18**-60
ET N_2O (%)	**Off**, 10-80	**Off**, 10-80	**Off**, 10-80	**Off**, *5-70*	**Off**, *5-70*	**Off**, *5-70*
Insp N_2O (%)	**80**, Off,10-80	**80**, Off,10-80	**80**, Off,10-80	**Off**, *5-70*	**Off**, *5-70*	**Off**, *5-70*
ET Des (%)	**Off**, 2.0-20.0	**Off**, 2.0-20.0	**Off**, 2.0-20.0	**Off**, 0.5-10.0	**Off**, 0.5-10.0	**Off**, 0.5-10.0
Insp Des (%)	**Off**, 2.0-20.0	**Off**, 2.0-20.0	**Off**, 2.0-20.0	**Off**, 0.5-10.0	**Off**, 0.5-10.0	**Off**, 0.5-10.0
ET Hal (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0
Insp Hal (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0
ET Iso (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0
Insp Iso (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0
ET Enf (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0
Insp Enf (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0
ET Sev (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0
Insp Sev (%)	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 2.0-10.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0	**Off**, 0.5-5.0

Default values in bold.

13.1.3 Auto Set Alarms

The alarm Auto Set function automatically sets High and Low alarm limits for active parameters as follows:

- +/- 20% of the absolute value for: CO_2, Gases, IBP's and NIBP
- +/- 30% of the value for: HR and Respiration
- +/- 3.0% of the value for: Temperature

When **Auto Set** is chosen from the **Alarm Settings Menu**, a Confirmation Dialog is displayed. Choosing **Yes** will initiate the alarm Auto Set.

13.1.4 Alarm Violations

Passport V alarm violations are classified by severity:

For priority 1 "Warning" alarms,

- The red alarm light flashes.
- The data in violation of the alarm flashes over a red background.
- The priority 1 audio alarm sounds. The priority 1 audio alarm is a pattern of 10 tones repeated every 10 seconds.

For priority 2 "Caution" alarms,

- The yellow alarm light flashes.
- The data in violation of the alarm flashes over a yellow background.
- The priority 2 audio alarm sounds. The priority 2 audio alarm is a pattern of 3 tones repeated every 10 seconds.

If the "Print on Alarm" feature has been enabled and a priority 1 or priority 2 alarm violation occurs,

- The local printer will print a strip of up to two (2) waveforms on a Print on Alarm. The print length of the strip (16 or 32-seconds) can be set in the Print Setup menu.
- Any other printing in process at the time of the alarm will be aborted.
- An alarm recording is stored in the message queue if the alarm happened when a recording is preceding.
- An asterisk (*) will be marked after the corresponding parameter value.

For priority 3 "Technical" alarms, SpO_2 Sensor Off, and Low Battery:

- The description of the alarm appears over a light blue background in message area A.
- The priority 3 audio sounds:
  For Technical alarms: The priority 3 audio alarm is a single tone repeated every 10 seconds.
  For SpO_2 Sensor Off: When enabled in Installation Mode, the sensor off audio signal is a pattern of 3 quick tones. The signal may be set to repeat.
  For Low battery: The low battery audio signal is a pattern of 2 tones repeated every 20 seconds.

NOTE: Priority 3 also includes Prompt messages. However, these are informational messages and not alarm messages.

A. Parameter Alarms

Individual alarm levels are adjustable for most of the parameters **Passport V** is capable of monitoring. In addition, these alarms may be set by the user to either priority level 1 or 2 as desired.

NOTE: **The Heart Rate Alarm can be triggered only by the source identified in the Heart Rate data tile. In some circumstances, the pulse rate displayed in the SpO_2 data tile may differ from the heart rate displayed in the heart rate data tile. When the Passport V detects that the SpO_2 pulse rate is in violation of the heart rate limit settings, the pulse rate data will flash over a red background, but the audio alarm will not sound.**

B. Invalid Heart Rate Alarm

The Invalid Heart Rate Alarm occurs if the selected heart rate source is no longer able to detect a heart rate. The **Passport V** may display a message to help identify the cause of the alarm (e.g., **"Lead Off"**, **"Sensor Off"**). The Invalid Heart Rate Alarm is a priority 1 alarm.

C. Apnea Alarm

The Apnea Alarm is active when respiration is being monitored. The Apnea Alarm will be triggered if respiration is not detected for a time period longer than set in the **Alarm Setup** menu. The Apnea Alarm can be set as a "Latched" or "Non-latched" alarm via the **Installation Menu**.

When "Apnea Latch" is set to "Off", the Apnea Alarm will silence and cancel itself if patient breathing is again detected.

When "Apnea Latch" is set to "On" (default), the Apnea Alarm will not be silenced unless the operator acknowledges the alarm by pressing the **Silence** or **Silence All** keys. The visual Apnea Alarm indications will not be cancelled unless patient breathing resumes.

The Apnea Alarm is a priority 1 alarm.

D. Arrhythmia Alarms

Arrhythmia Alarms are identified in the upper area of the screen.

"Lethal" Arrhythmia Alarms ("Asystole", "V-Fib", and "V-Tach") are priority 1 alarms that are latched. Even after the alarming condition is resolved, a latched alarm will continue until it is acknowledged by pressing the **Silence** or **Silence All** key on the front panel keypad. If the alarm is acknowledged while the lethal condition still exists, the audio portion of the alarm will be silenced for the duration that is selected from the "Silence For" list in the **Alarm Setup** menu, but the alarm message will continue displaying in the message area in the upper part of the screen. If a new lethal condition occurs while the initial lethal alarm is silenced, the new lethal alarm will not break through but not be silenced. If the lethal condition is resolved while the alarm is silenced, the alarm will be terminated.

"Non-Lethal" Arrhythmia Alarms are priority 2 alarms by default. These alarms will silence and cancel automatically if the patient's condition is corrected.

E. ST Alarms

ST alarms can be set for either single lead alarm or dual lead alarm. The ST single lead alarm will be initiated if one ST lead has exceeded the set alarm parameters. The ST dual lead alarm will be initiated if two ST leads have exceeded the set alarm parameters.

ST alarms are latching alarms. They will not be silenced unless the operator acknowledges the alarm by pressing the **Silence** or **Silence All** keys.

F. Indications of Disabled or Silenced Alarms

ALARM OFF ICON

If any alarm for a monitored parameter is not set, an **Alarm Off Icon**, a triangle with an "X" through it, will be displayed in the upper area of the screen.

VOLUME - The audio level of the alarm can be adjusted through the **Monitor Setup Menu**.

ALARM SILENCE

One or more alarms can be silenced for a programmable length of time. The following is a description of how to enable the different silence modes.

Silence - This key silences alarms on parameters for a programmed length of time (default is 2 minutes), or until the alarm condition is no longer present, whichever is shorter. Any new alarms that occur during the silenced period will disable the silence and the alarm will sound the tone. An **Alarm Silence Icon**, a bell with an "X" through it, is displayed in the upper area of the screen. A message and digital timer counts down in the upper message area. Pressing **Silence** again does not re-enable audio alarms.

Silence All - This key suspends alarms on all parameters for a programmed period of time (default is 2 minutes). An **Alarm Silence Icon**, a bell with an "X" through it, is displayed in the upper area of the screen. A message and timer appear in the upper message area showing the time remaining. Pressing **Silence All** at any time re-enables audio alarm tones. If **Silence All For** is set to **Permanent** in the **Alarm Setup** menu, the message **All Alarms Silenced Permanently** is displayed. Note that the **Permanent** selection will be available only if **Enable Silence All Permanent Selection** is set to "Yes" in the **Installation Menu**.

The time period for **Silence** and **Silence All** is adjustable via the **Alarm Setup** menu.

13.1.5 Verifying Alarm Functionality

Self-Test of Alarm System

The alarm system will perform a self-test of alarm tones and alarm lights after the **Passport V** monitor has been powered on.

Alarms also can be verified by creating an alarm condition on the **Passport V** and verifying the corresponding alarm indicators are present on the monitor.

Alarm Delay

- Apnea Alarm Delay settings are: Adult/Pedatric: 10/15/20/25/30/35/40/45/50/ 55 seconds, 1 min
  Neonate: 10/15/20 sec
- ST Alarm Delay settings are:
  30 seconds/45 seconds/ 1 min/90 seconds/2 min/3 min.
- Alarm delay settings are:
  None/1s/2s/3s/4s/5s/6s/7s/8s.

Audio alarm can be delayed for a predetermined time period, with the exception of Apnea, ST alarm, lethal Arrhythmia alarms, SpO_2 Desat and Insp O_2 shortage.

When alarm is triggered, the alarm tone will not be presented, but the visual signal will be presented during delay time.

13.1.6 Alarm Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
High or Low or No Alarm Sound	Alarm limits not set	Go to **Alarm Setup** and adjust alarms
	Alarm **Silence All, On** time has not expired	Press **SILENCE ALL** to reactivate alarms
No Arrhythmia Alarm Sound	Arrhythmia option not installed	Call Sales Rep to purchase option
	Arrhythmia Alarms off	Go to **Monitor Setup** 〉 **Advanced Setup** to activate alarm
	Monitor is in learning mode	Wait until learning is concluded and monitor patient closely
Alarms continue to Sound despite pressing **SILENCE**	More than one alarm is active	Press **SILENCE** or **SILENCE ALL** key to silence
		Check Patient
No Alarm printout with Alarm violation	**Print on Alarm** is set to **Suspend**	Go to **Print Menu** and set **Print on Alarm** to **Active**

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14.0 *Messages*

14.1 Physiological Alarm Messages

14.1.1 HR

ALARM MESSAGE	PRIORITY	COMMENTS
High Heart Rate	1	Can occur from ECG, SpO_2, or IBP measurement.
Low Heart Rate	1	Can occur from ECG, SpO_2, or IBP measurement.
Dual ST Elevation	options: 1, **2** (default)	
Dual ST Depression	options: 1, **2** (default)	
ST Elevation	options: 1, **2** (default)	
ST Depression	options: 1, **2** (default)	
High PVC/min	options: 1, **2** (default)	Occurs when Arrhythmia analysis is ON, and PVC/min high alarm limit is not set to Off.

14.1.2 Arrhythmia

ARRHYTHMIA MESSAGE	PRIORITY	COMMENTS
Asystole	1	
V-Tach	1	
V-Fib	1	
Bigeminy	options: 1,**2**	
Trigeminy	options: 1,**2**	
Couplet	options: 1,**2**	

Irregular HR	options: 1,**2**
Brady (Bradycardia)	options: 1,**2**
Run	options: 1,**2**
V-Rhythm (Ventricular Rhythm)	options: 1,**2**

14.1.3 RESP

ECG (Impedance) module, Internal CO_2 module and attached GM can provide Respiration measurement.

ALARM MESSAGE	PRIORITY	COMMENTS
High Respiration	options: 1,2	
Low Respiration	options: 1,2	
Apnea	1	

14.1.4 TEMP

ALARM MESSAGE	PRIORITY	COMMENTS
High Temperature	options: 1,**2**	
Low Temperature	options: 1,**2**	

14.1.5 SpO_2

ALARM MESSAGE	PRIORITY	COMMENTS
High SpO_2	options: 1,**2**	
Low SpO_2	options: 1,**2**	
SpO_2 Desat	1	

14.1.6 NIBP

ALARM MESSAGE	PRIORITY	COMMENTS
High NIBP Diastolic	options: 1,**2**	
Low NIBP Diastolic	options: 1,**2**	
High NIBP Mean	options: 1,**2**	
Low NIBP Mean	options: 1,**2**	
High NIBP Systolic	options: 1,**2**	
Low NIBP Systolic	options: 1,**2**	

14.1.7 IBP

ALARM MESSAGE	PRIORITY	COMMENTS
High <IBP label> Diastolic	options: 1,**2**	
Low <IBP label> Diastolic	options: 1,**2**	
High <IBP label> Mean	options: 1,**2**	
Low <IBP label> Mean	options: 1,**2**	
High <IBP label> Systolic	options: 1,**2**	
Low <IBP label> Systolic	options: 1,**2**	

14.1.8 CO_2

Internal CO_2 Module and attached GM can provide $EtCO_2$ and Inspired CO_2 measurement.

ALARM MESSAGE	PRIORITY	COMMENTS
High Inspired CO_2	options: 1,**2**	
High End Tidal CO_2	options: 1,**2**	
Low End Tidal CO_2	options: 1,**2**	

14.1.9 GAS

ALARM MESSAGE	PRIORITY	COMMENTS
High End Tidal Agent	options: 1,**2**	
Low End Tidal Agent	options: 1,**2**	
High Inspired Agent	options: 1,**2**	
Low Inspired Agent	options: 1,**2**	
High End Tidal N_2O	options: 1,**2**	
Low End Tidal N_2O	options: 1,**2**	
High Inspired N_2O	options: 1,**2**	
Low Inspired N_2O	options: 1,**2**	
High End Tidal O_2	options: 1,**2**	
Low End Tidal O_2	options: 1,**2**	
High Inspired O_2	options: 1,**2**	
Low Inspired O_2	options: 1,**2**	
Inspired O_2 Shortage	1	
GM: Mixed Agents	2	Occurs when more than one anesthetic agent is detected by the system. Message will disappear when a single agent is detected again.
MAC > 3	2	Occurs when a single agent is detected and MAC > 3.

14.2 Technical Alarm Messages

14.2.1 ECG Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
LA Lead Off	3	LA lead off the patient.	Connect lead wires.
LL Lead Off	3	LL lead off the patient.	Connect lead wires.
RA Lead Off	3	RA lead off the patient.	Connect lead wires.
V Lead Off	3	V lead off the patient.	Connect lead wires.
C Lead Off	3	C lead off the patient.	Connect lead wires.
F Lead Off	3	F lead off the patient.	Connect lead wires.
L Lead Off	3	L lead off the patient.	Connect lead wires.
R Lead Off	3	R lead off the patient.	Connect lead wires.
ECG Noise	3	External interference. Patient movement.	Check patient Check Electrode Contacts / reposition electrodes /cable. Check environment for source of interference.
ECG Artifact	3	External Interference Patient movement.	Check patient Check Electrode Contacts / reposition electrodes /cable. Check environment for source of interference.
HR Overrange	3	Heart rate outside of measureable range	Check patient.
ST-<*X*> Overrange	3	ST deviation outside of measureable range.	Check patient.
ECG Weak Signal	3	ECG signals are too weak to be analyzed.	Check ECG leads to see if there is good contact between the leads and the patients skin.

14.2.2 RESP Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
CVA	3	Can be caused by shallow breathing or an apnea event. Patient HR and respiratory rate identical.	Check the patient. Adjust scales or leads if necessary.

Resp Disturbed	3	Patient Movement External Interference.	Check patient For impedance - Check Electrode Contacts / reposition electrodes/cable Check environment for source of interference.
Resp Rate Overrange	3	Respiration Outside of measureable range	Check patient.

14.2.3 TEMP Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
Temp Overrange	3	Temperature Outside of measureable range	Check patient, Check sensor

14.2.4 SpO_2 Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
SpO_2: Sensor Off	3	Sensor Off	Check Patient, Apply Sensor Note that the alarm is only active after the sensor has been on a patient.
SpO_2: Overrange	3	SpO_2 outside of measurable range	Check patient
SpO_2: PR Overrange	3	PR outside of measurable range	Check patient

14.2.5 NIBP Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
NIBP: Systolic Overrange	3	NIBP systolic pressure exceeds the measurement range.	Check Patient. Ensure that the measured pressure label is within the measurement range.
NIBP: Diastolic Overrange	3	NIBP diastolic pressure exceeds the measurement range.	Check Patient. Ensure that the measured pressure label is within the measurement range.
NIBP: Mean Overrange	3	NIBP mean pressure exceeds the measurement range.	Check Patient. Ensure that the measured pressure label is within the measurement range.

14.2.6 IBP Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
<IBP Label>: Systolic Overrange	3	IBP systolic pressure exceeds the measurement range.	Ensure that the measured pressure label is within the measurement range.
<IBP Label>: Diastolic Overrange	3	IBP diastolic pressure exceeds the measurement range.	Ensure that the measured pressure label is within the measurement range.
<IBP Label>: Mean Overrange	3	IBP mean pressure exceeds the measurement range.	Ensure that the measured pressure label is within the measurement range.

14.2.7 CO_2 Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
CO_2: $ETCO_2$ Overrange	3	Et CO_2 outside of measurable range	Check patient
CO_2: InspCO_2 Overrange	3	Insp CO_2 outside of measureable range	Check patient
CO_2: Resp Rate Overrange	3	The measured RR value exceeds the measurement range.	Check Patient. Check Airway.

14.2.8 GAS Alert Message

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
GM: $ETCO_2$ Overrange	3	The measured ExpCO_2 value exceeds the measurement range.	Check Patient. Check Airway.
GM: InspCO_2 Overrange	3	The measured InsCO_2 value exceeds the measurement range.	Check Patient. Check Airway.
GM: Resp Rate Overrange	3	The measured RR value exceeds the measurement range.	Check Patient. Check Airway.
GM: Disconnected	2	Appears when the **Passport V** cannot detect signals being sent by the Gas Module.	Ensure Gas Module is turned on and interface cable is properly connected. If problem persists, contact Technical Support.

14.2.9 System Level

ALARM MESSAGE	PRIORITY	REASON	SOLUTION
Low Battery	3	The battery capacity is lower than the set alarm limit value.	Change the battery, or use the AC mains.
12V Too High	1	The monitoring of the internal voltage finds that 12V voltage is too high.	Contact Technical Support.
12V Too Low	1	The monitoring of the internal voltage finds that 12V voltage is too low.	Contact Technical Support.
5V Too High	1	The monitoring of the internal voltage finds that 5V voltage is too high.	Contact Technical Support.
5V Too Low	1	The monitoring of the internal voltage finds that 5V voltage is too low.	Contact Technical Support.
3.3V Too High	1	The monitoring of the internal voltage finds that 3.3V voltage is too high.	Contact Technical Support.
3.3V Too Low	1	The monitoring of the internal voltage finds that 3.3V voltage is too low.	Contact Technical Support.

14.3 Prompt Messages

14.3.1 ECG Prompt Message

ALARM MESSAGE	REASON	SOLUTION
ECG Self Test Error	During Power cycle unit, if ECG module can not self test succussfully, this message will display.	Power cycle unit. If message reappears, contact Technical Support.
ECG: Communication Stop	As the ECG module communication stops, the data packets sent by the module can not be received.	Contact Technical Support.
ECG: Communication Error	The ECG module communication error, the command can not be send correctly.	Contact Technical Support.
Leads Off	Leads off patient.	Connect lead wires.
ESU-Resp Off	The high frequency electrosurgery Unit Interference signal is detected.	Wait that the high frequency electrosurgery Unit Interference disappears.
ECG Signal Invalid	Poor leads connection.	Check Patient. Check Leads and leadlines.
Pacer Rejection On	When Pacer Reject is set to On.	This is normal operation. When Pace Reject is set to Off, this message disappears.
Learning	Displayed when a learning cycle has been requested for Arrhythmia or ST.	/
No Arrhythmia Detection at Central	Central Station does not have arrhythmia Analysis capability.	/
ECG: Initialization Error	During the ECG module power-on,as the ECG module communication stops,system fails to communicate with module.	Contact Technical Support.

14.3.2 Resp Prompt Message

ALARM MESSAGE	REASON	SOLUTION
Resp: Initialization Error	During the Resp module power-on,as the Resp module communication stops,system fails to communicate with module.	Contact Technical Support.
Resp: Communication Error	System can't communicate correctly with Resp module,and receive the error data packets.	Restart the monitor.If the error still appears,please contact Technical Support.

Resp: Communication Stop	As the Resp module communication stops, the data packets sent by the module can not be received.	Contact Technical Support.
Resp: High Impedance	Connections not tight and/or properly secured. Electrodes dry or loose. Cable or lead wires damaged.	Ensure proper connection. (Electrode to lead, lead to cable, cable to monitor). Re-prep skin and apply fresh, moist electrodes. Check with continuity tester
CHK LEAD	Increased impedance caused by one of the following: Chest hair under electrodes. Dried electrode gel. Electrode off. Lead off. Cracked lead wires. Poor skin prep.	Prep chest. Change electrodes. Replace electrode. Replace lead. Replace lead wires. Clean and abrade skin before applying electrodes.

14.3.3 SpO_2 Prompt Message

ALARM MESSAGE	REASON	SOLUTION	COMMENTS
SpO_2: No Pulse	No pulse. Low pulse due to poor perfusion. External interference.	Check Patient Reposition sensor. Check for source of external interference.	DPM/Nellcor
SpO_2: Sensor Fault	Defective sensor	Replace sensor	Masimo/DPM/ Nellcor
SpO_2: Board Fault	There is a problem with the SpO_2 measurement board.	Contact Technical Support.	Masimo
SpO_2: Initialization Error	No response after send order during initialization.	Contact Technical Support.	Masimo/DPM/ Nellcor
SpO_2: Communication Error	The monitor and the SpO_2 modules are not communicating properly.	Contact Technical Support.	Masimo/DPM/ Nellcor
SpO_2: Communication Stop	As the SpO_2 module communication stops, the data packets sent by the SpO_2 module can not be received.	Contact Technical Support.	Masimo/DPM/ Nellcor
SpO_2: Low Perfusion	Low pulse amplitude	Check patient Reposition sensor	Masimo/DPM
SpO_2: Too Much Light	Ambient light interfering with signal	Cover sensor site or reposition sensor	Masimo
SpO_2: Unrecognized Sensor	The sensor is not recognized by the Monitor.	Replace the sensor with a recommended sensor. Contact Technical Support	Masimo

SpO_2: Interference	Patient Movement. External interference. Noise detected on the pulse signal prevents pulse discrimination.	Decrease patient motion,check sensor. Contact Technical Support.	Masimo/Nellcor
SpO_2: No Sensor	No sensor	Apply sensor	Masimo/DPM/ Nellcor
SpO_2: Weak Pulse	Low pulse amplitude	Check the condition of poor perfusion for patient. Contact Technical Support.	Nellcor
SpO_2: Low Signal	The SpO_2 signal is too low or too weak.	Check sensor placement, move as necessary. Switch limb / Notify physician.	Nellcor
SpO_2: Weak Signal	The SpO_2 signal is too low or too weak.	Check patient Reposition sensor Change sensor	Masimo
SpO_2: Check Sensor	Possible Faulty sensor	Replace Sensor	Nellcor
SpO_2: Motion	Patient movement	Check patient	Nellcor
SpO_2: Pulse Search	Monitor searching for pulse. Sensor just applied Poor perfusion at sensor site.	Check patient. Reposition sensor.	Masimo/DPM/ Nellcor

14.3.4 Temp Prompt Message

ALARM MESSAGE	REASON	SOLUTION
Temp: Communication Stop	As the Temp module communication stops, the data packets sent by the Temp module can not be received.	Contact Technical Support.
Temp: SelfTest Error	Module send out error during selftest because of some unspecified reasons.	Contact Technical Support.
Temp: Calibration Error	A calibration failed.	Restart the monitor. Contact Technical Support.
Temp: Initialization Error	During the Temperature module power-on,as the Temperature module communication stops,system fails to communicate with module.	Contact Technical Support.

14.3.5 NIBP Prompt Message

ALARM MESSAGE	REASON	SOLUTION
NIBP: Self Test Error	Failed self-test. Sensor or A/D sampling may have an error.	Power cycle unit. If message reappears, contact Technical Support.
NIBP: Communication Error	NIBP module communicatuon error, the command can not be sent correctly.	Power cycle unit. If message reappears, contact Technical Support.
NIBP: System Error	System error. After start-up, the inflating pump, A/D sampling unit, pressure sensor have an error or the pointer has an error when the software is in running process. Power supply is not stable or circuit failure leads to voltage error.	Power cycle unit. If message reappears, contact Technical Support.
NIBP: Cuff Overpressure	The hardware overpressure limit has been exceeded. Overpressure. The cuff pressure exceeds 297 mmHg in ADU mode, 240 mmHg in PED mode or 147 mmHg in NEO mode.	Power cycle unit. If message reappears, contact Technical Support.
Pneumatic Leak	Leakage. In Pneumatic check, air leakage is found in hose.	Change the cuff.
NIBP: Unable to Measure	Unable to make measurement after three automatic retries.	Check Patient. Retry measurement. If message reappears, power cycle unit. If message reappears, contact Technical Support.
NIBP: Resetting...		/
NIBP: Reset Failed	Reset has failed.	Power cycle unit. If message reappears, contact Technical Support.
NIBP: Idle	Appears when NIBP measurement is completed and enters the wait status.	This is normal operation. Press 'Start' key to start a measurement, the message is cleared.
NIBP: Press the START key	Appears when NIBP Interval is set to anything other than Off or STAT.	This is normal operation. Press 'START' key to start automatic measurement.
NIBP: Manual Mode	Displayed while system is idle. Note: This is not displayed while in the interval mode.	Press **START** to take a single measurement. Select an interval and start timed measurements.
NIBP: Interval	Displayed during the interval between two timed measurements.	Press **STOP** to suspend timed measurements. Change timer to **OFF** to stop timer.
NIBP: Measuring	Displayed during a measurement. Cuff pressure is also displayed.	Press **STOP** to suspend a measurement and deflate the cuff.

NIBP: STAT	Displayed while the Interval is set to STAT.	Press START to initiate a STAT measurement sequence or use the 'Interval' key to change the setting to Off or a timed interval value.
NIBP: Warming Up	Warming Up	This is normal operation. Wait for message to clear.
NIBP: Retry Pump Higher	A measurement has been attempted but no reading was possible. This results from inadequate cuff inflation pressure.	Retry will be attempted. Check that appropriate patient size is set. Preset initial inflation pressure.
NIBP: Retry	Cuff is loosely wrapped. The cuff may be too loosely wrapped or not attached at all. Weak signal. The pulse of the patient may be too weak or the cuff is loosely wrapped. Excessive motion. In measurement, signals contain motion artifact or too much interference. Timeout. Measurement takes more than 120 seconds in ADU/PED mode and 90 seconds in NEO mode. Retry Overpressure or bad measurement.	Retry will be attempted. Check for leaks and quality of peripheral pulses. Decrease patient movement. Switch cuff to another limb.
Accuracy Testing...	Appears when press Accuracy Test button in Calibrate NIBP Menu.	/
Accuracy Testing Complete.	During the accuracy testing, press Stop Accuracy Test button in Calibrate NIBP Menu, this message will display.	/
Leakage Testing...	Appears when press Leakage Test button in Calibrate NIBP Menu.	/
Leakage Testing Complete	During the leakage testing, press Stop Leakage Test button in Calibrate NIBP Menu, this message will display.	/
Calibrating...	Occurs when NIBP module is calibrating.	Wait until calibration is completed
Calibration Failed	During calibration, departure occurs between the measurement pressure and reference pressure due to improper operation or measurement error.	Repeat calibration procedure.

14.3.6 IBP Prompt Message

ALARM MESSAGE	REASON	SOLUTION
<IBP Label>: Communication Error	IBP communicatuon error, the command can not be send correctly.	Power cycle unit. If message reappears, contact Technical Support.
<IBP Label>: Communication Stop	As the IBP module communication stops, the data packets sent by the IBP module can not be received.	Power cycle unit. If message reappears, contact Technical Support.
Pulsatile Pressure. Cannot Zero!	Input the pulsatile pressure, can not zero IBP channel.	Input the static pressure, re-zero IBP channel.
Pressure Overrange. Cannot Zero!	The pressure is overange, can not zero IBP channel.	Check the static pressure value, re-zero IBP channel.

14.3.7 CO_2 Prompt Message

ALARM MESSAGE	REASON	SOLUTION	COMMENTS
CO_2: Calibration Required	Calibration required after 4000 operating hours	Recalibrate miniMediCO2. Contact Technical Support.	Oridion
CO_2: Filterline Disconnected	Filterline disconnected	Connect Filterline to monitor	Oridion microstream
CO_2: Gas Can Be Removed	CO_2 gas can be removed.	—	Oridion
CO_2: Purge	Sample line is blocked or kinked	Wait several seconds. The **Passport V** will return to monitoring, or display the message: "CO_2: Occlusion". If message is displayed: Check sample line. Clear blockage or kink or replace with a new sample line.	Oridion microstream
CO_2: Occlusion	Sample line is blocked or kinked	Check sample line. Clear blockage or kink or replace with a new sample line.	Oridion microstream
CO_2: Sensor High Temperature	Temperature overranges high limit checked by module.	Check,stop using or replace the sensor.	DPM
CO_2: Sensor Low Temperature	Temperature overranges low limit checked by module.	Check,stop using or replace the sensor.	DPM
CO_2: High Airway Press.	Measurement of Flux Sensor in module is higer than 790 mmHg.	Check airway's output and connection. If problems remain exist, return it to factory for maintaining.	DPM

CO_2: Low Airway Press.	Measurement of Flux Sensor in module is less than 400 mmHg.	Check airway's output and connection. If problems remain exist, return it to factory for maintaining.	DPM
CO_2: High Barometric	Atmospheric pressure is too high(higher than 790mmHg).	Check the CO_2 connections,make sure that the monitor application site meets the requirements, and check for special sources that affect the ambient pressure. Restart the monitor.	DPM
CO_2: Low Barometric	Atmospheric pressure is too low(lower than 428mmHg).	Check the CO_2 connections,make sure that the monitor application site meets the requirements, and check for special sources that affect the ambient pressure. Restart the monitor.	DPM
CO_2: FilterLine Error	Filterline is leaked or blocked.	Check if there is a leak in the CO_2 sample line or the CO_2 sample line has been occluded.	DPM
CO_2: Initialization Error	No response after send order during initialization.	Contact Technical Support.	1DPM 2Oridion
CO_2: SelfTest Error	Module can not work because of software fault,circuit error etc.	Contact Technical Support.	1DPM 2Oridion
CO_2: Communication Error	The monitor receives wrong responsion from CO_2 module.	Contact Technical Support.	1DPM 2Oridion
CO_2: Communication Stop	Sending out order is failed during work.	Contact Technical Support.	1DPM 2Oridion
CO_2: Main Board Error	Module has problems.	Reset the module. Contact Technical Support.	Oridion
CO_2: Replace Scrubber & Pump	Module has problems.	Restart the monitor. Contact Technical Support.	Oridion
CO_2: 15V Overrange	Power supply to module is out of range.	Check power supply. Restart the monitor. Contact Technical Support.	Oridion
CO_2: Hardware Error	Module has problems.	Restart the monitor. Contact Technical Support.	DPM
CO_2: No Watertrap	Not water trap on CO_2 module	Make sure to plug-in water trap, and make sure it is firmly connected and fastened.	DPM

CO_2: Temperature Overrange	Temperature sensor installed in the gas cell has read temperature value below 0C or above 65C .	Make sure the device is not working in extreme hot or cold condition. Apply cooling or heating if possible.	Oridion
CO_2: Check Sensor	Possible Faulty sensor.	Replace the module. Contact Technical Support.	Oridion
CO_2: Warming up	The CO_2 sensor has not reached its operating temperature.	It takes typically 30 seconds for the sensor to warm up. Wait for the message to go away.	DPM/Oridion
CO_2: Startup	The CO_2 is starting up.	Wait for the message to go away.	DPM
Calibration Completed Successfully	Calibration finished and successful.	/	DPM/Oridion
Not Ready For Calibration	Module in unable to initialize calibration.	Repeat calibration procedure. If problem persists, contact Technical Support.	Oridion
CO_2: Zeroing...	The CO_2 module is performing zero.	Wait for zeroing to complete.	DPM/Oridion
CO_2: Zero Failed	Signal cannot be adjusted to predefined range within zeroing duration.	Check the CO_2 connections. After the sensor's temperature becomes stabilized, perform a zero calibration again. If problem persists, contact Customer Support.	DPM/Oridion
Calibration Error	The actual concentration of calibration gas applied is in wide discrepancy with the concentration value entered by the user in the Calibration dialog.	Make sure the concentration value entered is the same as the calibration gas applied. Repeat calibration procedure. If problem persists, contact Customer Support.	DPM/Oridion
Caused by no gas or wrong gas concentration	No gas or wrong gas concentration.	Check the gas connections or gas concentration . Repeat calibration procedure. If problem persists, contact Technical Support.	Oridion

Caused by Measurement Error	Measurement Error	Repeat calibration procedure. If problem persists, contact Technical Support.	Oridion
Caused by no stable gas flow	No stable gas flow	Check the gas connections or gas concentration. Repeat calibration procedure. If problem persists, contact Technical Support.	Oridion

14.3.8 GAS Prompt Message

ALARM MESSAGE	REASON	SOLUTION
GM: Agent Uncalibrated	Appears after an unsuccessful calibration attempt of the agent sensor. The numeric data for all agents will appear as XXX, and the agent waveform will be a flatline.	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Technical Support.
GM: CO_2 Uncalibrated	Appears after an unsuccessful calibration attempt of the CO_2 sensor. The numeric data for CO_2 will appear as XXX, and the CO_2 waveform will be a flatline.	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Mindray Technical Support.
GM: N_2O Uncalibrated	Appears after an unsuccessful calibration attempt of the N_2O sensor. The numeric data for N_2O will appear as XXX, and the N_2O waveform will be a flatline.	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Mindray Technical Support.
GM: O_2 Uncalibrated	Appears after an unsuccessful calibration attempt of the O_2 sensor. The numeric data for O_2 will appear as XXX, and the O_2 waveform will be a flatline.	Ensure proper gas mixture is attached tightly and regulator is on. Repeat calibration procedure. If problem persists, contact Mindray Technical Support.
GM: Agent Zero Error	Appears when the system has been unable to successfully zero the anesthetic agent sensor.	Manually start zeroing the system again. If problem persists, contact Mindray Technical Support.
GM: CO_2 Zero Error	Appears when the system has been unable to successfully zero the CO_2 sensor.	Manually start zeroing the system again. If problem persists, contact Mindray Technical Support.
GM: N_2O Zero Error	Appears when the system has been unable to successfully zero the N_2O sensor.	Manually start zeroing the system again. If problem persists, contact Mindray Technical Support.

GM: O_2 Zero Error	Appears when the system has been unable to successfully zero the O_2 sensor.	Manually start zeroing the system again. If problem persists, contact Mindray Technical Support.
GM: Cannot Zero...Retrying	Appears when the **Passport V** requests **Zeroing** (either on the automatic cycle or by a user request) and the Gas Module is unable to initialize the cycle.	Allow system to retry without intervention. If problem persist, contact Mindray Technical Support
GM: Zero In Progress	Appears when the system is zeroing all of its channels. This appears whether initiated by the user or is automatic.	This is normal operation. Wait for message to clear.
GM: Warming Up	Appears when the system has been turned on, and the sensors have not reached their stable operating temperature.	Wait for the message to go away. It takes up to five minutes for the device to warm up.
GM: Air Leak	Appears when the system detects a pneumatic leak. Also may appear when the Gas Module has been turned on without a sample line attached. Gas Module has been on for a long period of time without the **Passport V** monitor being on.	Turn Gas Module and **Passport V** Off. Install/check sample lines, filters, water trap and electrical connections. Turn off Gas Module.Turn on Gas Module and **Passport V** monitor
GM: Replace Trap	Indicates residue build-up on the water trap membrane that is decreasing air flow.	Replace water trap reservoir.
GM: Exhaust Blocked	Appears when the system detects a blockage at the exhaust gas outlet, as indicated by an increase in internal pressure.	Remove waste gas scavenging assembly, check if message disappears. Check exhaust line for blockage and clear if possible. If message persists contact Mindray Technical Support.
GM: Failed	Appears when the Gas Module detects an unrecoverable error in its own operation.	Contact Mindray Technical Support.
GM: Occlusion	Appears when the system detects an obstruction in the sampling line or the water trap bottle is full.	Empty and rinse water trap. Change water trap if necessary. Check sampling line and filter for blockage, clear sampling line if possible. Replace sampling line and/or filter if necessary. Check exhaust line for blockage and clear if possible. If problem persists, contact Mindray Technical Support.
GM: Pump Off	Appears when the system has turned off the pump due to a pneumatic error.	Restart the pump from the **Gas Menu**. If problem persists, contact Mindray Technical Support.

GM: Unknown Agent	Appears when the system detects a gas that does not match the spectroscopic signatures of the five known anesthetic agents.	Use recognized agent.
Sampling Error	Appears when a sampling error occurs on one or more Gas Module channels during calibration.	Repeat calibration procedure. If problem persists, contact Technical Support.
Not Ready For Calibration	Appears when the Gas Module is unable to initialize calibration.	Repeat calibration procedure. If problem persists, contact Technical Support.
Zeroing Error	Appears when the Gas Module cannot perform a **Zeroing** during calibration.	Repeat calibration procedure. If problem persists, contact Technical Support.
GM: Communication Error	System can't communicate correctly with Resp module,and receive the error data packets.	Restart the monitor.If the error still appears,please contact Technical Support.
GM: Disconnected	Appears when the **Passport V** cannot detect signals being sent by the Gas Module.	Ensure Gas Module is turned on and interface cable is properly connected. If problem persists, contact Technical Support.

14.3.9 Main Control System

ALARM MESSAGE	REASON	SOLUTION
Power Board Communication Error	Abnormal power board communication.	Contact Technical Support.
Power Board Initialization Error		Contact Technical Support.
Power Board SelfTest Error		Contact Technical Support.
Power Board Communication Stop		Contact Technical Support.
RT Clock Need Reset	The real time clock need be reset, as the data read out is the chip's default value.	Contact Technical Support.
RT Clock Not Exist	The data written in the real time clock chip is inconsistent with the data read out.	Contact Technical Support.
Host Temp Too High	Internal temperature of the host is too high. This may result from too high room temperature, abnormal fan heat dissipation, or abnormal internal circuits.	Turn off the host until its internal temperature reduces to the safe temperature range.
Data Card Error	Data storage card abnormal	Contact Technical Support.
Cooling Fan Failure	The unit running on AC power and the cooling fan stop work.	Contact Technical Support.
Keyboard Communication Error		Contact Technical Support.
Keyboard Communication Stop		Contact Technical Support.

Keyboard Initialization Error		Contact Technical Support.
Keyboard SelfTest Error		Contact Technical Support.
Defib Sync signal error		Contact Technical Support.
CF card format complete	CF card format complete successfully.	
CF card format error	CF card occur error.	Contact Technical Support.

14.3.10 Power Supply

ALARM MESSAGE	REASON	SOLUTION
12V Too High	The monitoring of the internal voltage finds that 12V voltage is too high.	Contact Technical Support.
12V Too Low	The monitoring of the internal voltage finds that 12V voltage is too low.	Contact Technical Support.
5V Too High	The monitoring of the internal voltage finds that 5V voltage is too high.	Contact Technical Support.
5V Too Low	The monitoring of the internal voltage finds that 5V voltage is too low.	Contact Technical Support.
3.3V Too High	The monitoring of the internal voltage finds that 3.3V voltage is too high.	Contact Technical Support.
3.3V Too Low	The monitoring of the internal voltage finds that 3.3V voltage is too low.	Contact Technical Support.

14.3.11 Data Management

Prompt messages Concerning Patient Data Transfer

MESSAGE	REASON	SOLUTION
Patient data transfer error.	Patient data transfer error.	Check the storage device and retransfer patient data.
Downloading Patient Data	Remain in the state of patient data downloading.	No handling needed.
Uploading Patient Data	Remain in the state of patient data uploading.	No handling needed.
Patient data download complete.	Patient data downloading finishes.	No handling needed.
Patient data upload complete.	Patient data uploading finishes.	No handling needed.

Exported Logs

MESSAGE	REASON	SOLUTION
Monitor log export error	Exporting log error.	Check the storage device and retransfer log data.
Exporting Monitor Logs	Remain in the state of exporting logs..	No handling needed.
Monitor log export complete	Exporting log data finishes.	No handling needed.

14.3.12 Configuration Management

Table of Configuration Transfer Messages

MESSAGE	REASON	SOLUTION
Monitor defaults transfer error	Configuration data transfer error.	Check the storage device and retransfer the configuration data.
Downloading Monitor Defaults	Remain in the state of configuration data downloading.	No handling needed.
Uploading Monitor Defaults	Remain in the state of configuration data uploading.	No handling needed.
Monitor defaults download complete	Configuration data downloading finishes.	No handling needed.
Monitor defaults upload complete	Configuration data uploading finishes.	No handling needed.
Loading configuration failed.	Loading user configuration or latest configuration failed.	No handling needed.

14.3.13 Network

ALARM MESSAGE	REASON	SOLUTION
IP Address Conflict	The IP address set in the monitor is same with that set in other monitors covered in the same network.	Change the IP address of the monitor.
Viewed Monitor is Currently in Demo Mode.	Viewed bed is in demo mode.	No handling needed.

14.3.14 Print

ALARM MESSAGE	REASON	SOLUTION
Local Printer Comm Error		Contact Technical Support.
Local Printer SelfTest Error		Contact Technical Support.
Thermal Printhead Overheated		
Printer Initializing		
Printer Searching...		
Local Printer Busy	Printer received multiple print requests at one time.	Wait until the printer is not busy.
Local Printer Out Of Paper	Printer out of paper.	Replace with a new roll of paper.
Local Printer Unable To Print	The system has detected an unrecoverable printer failure.	Power cycle unit. If message reappears, contact Mindray Technical Support.
No printer selected or available	No printer selected is available from the network.	Check the selected printer from the network and make sure the printer model is supported by **Passport V** monitors.
Printing...	The printer is printing.	
Printer Buffer Full	The printer buffer is full.	
Local Printer Communication Error	Local Printer communication is interrupted.	
Remote Printer Not Available	This message is displayed in the case of a printer error.	Fix the printer.
Printing Complete	The printing is completed.	

14.3.15 Alarm Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
High or Low or No Alarm Sound	Alarm limits not set	Go to **Alarm Setup** and adjust alarms.
	Alarm **Silence All, On** time has not expired	Press **SILENCE ALL** to reactivate alarms.
No Arrhythmia Alarm Sound	Arrhythmia option not installed	Call Sales Rep to purchase option.
	Arrhythmia Alarms off	Go to **Monitor Setup** 〉 **Advanced Setup** to activate alarm.
	Monitor is in learning mode	Wait until learning is concluded and monitor patient closely.
Alarms continue to Sound despite pressing **SILENCE**	More than one alarm is active	Press **SILENCE** or **SILENCE ALL** key to silence.
		Check Patient.
No Alarm printout with Alarm violation	**Print on Alarm** is set to **Suspend.**	Go to **Print Menu** and set **Print on Alarm** to **Active**.

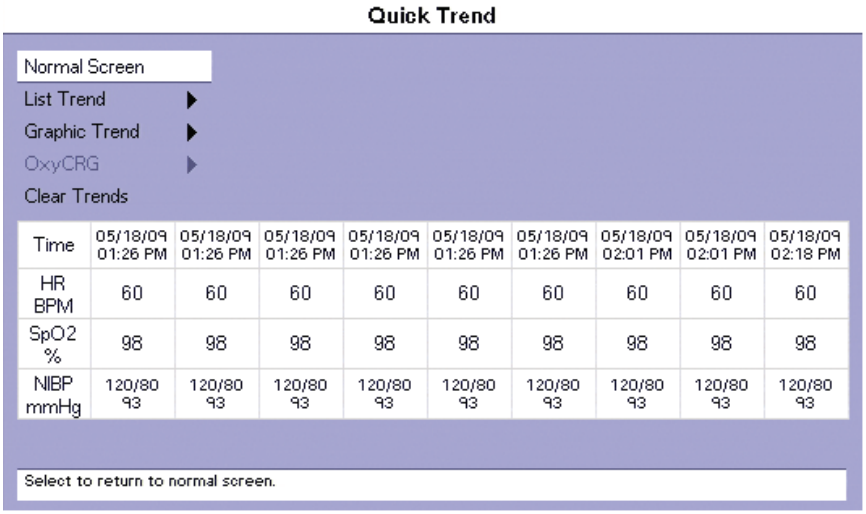
15.0 *Trends*

15.1 Description

Four types of trend displays are available with the **Passport V**: Quick Trend, List Trend, Graphic Trend, and OxyCRG (if patient is neonate). All trends are accessed via the **TRENDS** key and can be printed via the local printer.

15.2 Quick Trends

The **Quick Trend** display allows the user to view an abbreviated numeric listing of HR, SpO_2 and NIBP data only. To access this display from the normal monitoring screen, press the **TRENDS** key once. This display may also be accessed from the other trend displays via a menu choice. A maximum of 9 time-stamped entries may be stored. When the maximum number of entries has been reached, the oldest entry will be deleted from the trend record in order to allow storage of a new entry.



Time	05/18/09 01:26 PM	05/18/09 01:26 PM	05/18/09 01:26 PM	05/18/09 01:26 PM	05/18/09 01:26 PM	05/18/09 01:26 PM	05/18/09 02:01 PM	05/18/09 02:01 PM	05/18/09 02:18 PM
HR BPM	60	60	60	60	60	60	60	60	60
SpO2 %	98	98	98	98	98	98	98	98	98
NIBP mmHg	120/80 93	120/80 93	120/80 93	120/80 93	120/80 93	120/80 93	120/80 93	120/80 93	120/80 93

FIGURE 15-1 Quick Trends

Clearing Trend Data

To manually clear all trend data, including Graphic Trends, choose **Clear Trends** from the menu. A confirmation prompt will appear. Once cleared, the data cannot be restored.

- All trend data is automatically cleared when the patient is discharged from the monitor.
- All trend data is also cleared if the monitor's displayed time or date is changed.

Removing the Quick Trend Display

The **Quick Trend** display does not automatically time-out and must be manually removed to return to the normal waveform display. To remove the **Quick Trend** display, choose **Normal Screen** from the menu, or press the **NORMAL SCREEN** key.

15.3 List Trends

The **List Trend** display allows the user to view a tabular list of stored patient vital signs and anesthetic gas data. To access this display from the normal monitoring screen, press the **TRENDS** key twice. To access this display from the **Quick Trend** display, press the **TRENDS** key once. This display may also be accessed from the other trend displays via a menu choice. When the maximum number of entries has been reached, the oldest entry will be deleted from the trend record in order to allow storage of a new entry.

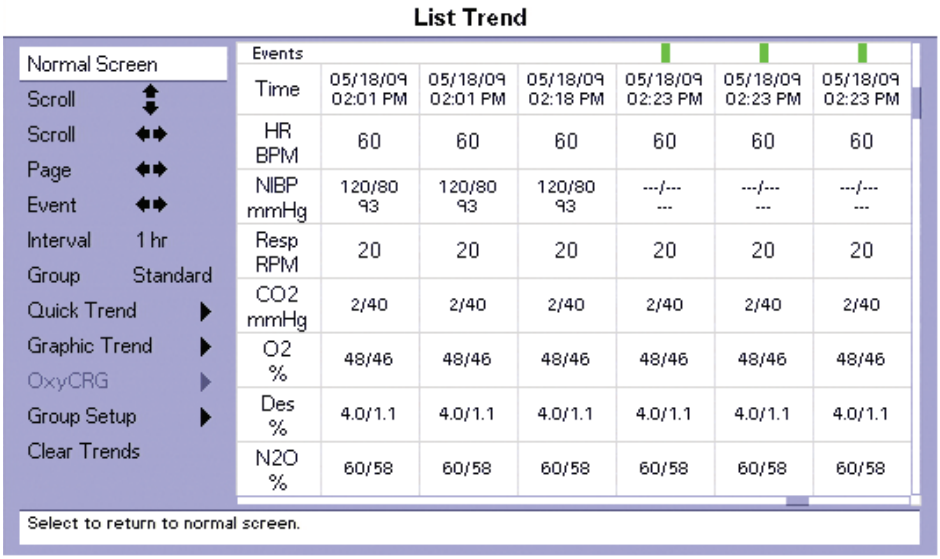


FIGURE 15-2 List Trends

The left side of the **List Trend** display contains menu items for scrolling and access to other displays. Trend data is listed from newest to oldest. Use the horizontal scroll feature to view older data. Use the vertical scroll feature to view all the rows of data.

NOTE: When scrolling vertically, the first row of data (HR) remains displayed and does not scroll.

Scroll bars along the right and bottom sides of the trend display indicate the position of viewed data in relation to the rest of the database.

The top row of the **List Trend** display contains markers which indicate that the entry was triggered by an alarm violation or by pressing the **MARK EVENT** key. These markers are red for priority 1 alarms, time adjusted events, and data transfered events; yellow for priority 2 alarms; and green if initiated by pressing the **MARK EVENT** key.

Trend data in violation of an alarm is also highlighted according to the priority of the alarm. The data is red for priority 1 alarms and yellow for priority 2 alarms.

If data for a parameter is not available at the time of the trend entry, the data field will be dashed. If an NIBP reading could not be obtained or an invasive pressure channel was not zeroed at the time of the trend entry, the data field will contain **"XXX"**.

Modification of Parameters Displayed

The parameters displayed always include the currently active parameters and any others used since the time the patient was admitted to the monitoring system. The default order of parameters displayed from top to bottom is: HR, SpO_2, NIBP, Resp, CO_2, O_2, Des, N_2O, MAC, P1, P2, Temp, and PVC.

To enable/disable the display (and subsequent ability to print) of specific parameters in List Trend, select **Group Setup** from the **List Trend** menu. From the **Group Setup** menu, select one of two custom groups. To change the order in which parameters are displayed in each of the first 6 rows, set **Param 1** through **Param 6** to the desired parameters.

Filtering of List Trend Data Displayed

Data corresponding to **MARK EVENT** key presses, alarms, and NIBP measurements will be included in the displayed data.

Trend entries triggered by **Interval** may be filtered out from the displayed **List Trend** data. To change the amount of interval entries displayed, select **Interval** and set as desired.

Transferring List Trend Data Between Different Passport V Monitors

List and **Graphic Trend** data, along with patient name and demographics may be transferred between **Passport V** monitors with a DPM storage device.

Clearing Trend Data

To manually clear all trend data, including Graphic Trends, choose **Clear Trends** from the menu. A confirmation prompt will appear. Once cleared, the data cannot be restored.

- All trend data is automatically cleared when the patient is discharged from the monitor.
- If the monitor's displayed time or date is changed, an event will be marked but not clear all trend data.

Removing the List Trend Display

The **List Trend** display does not automatically time-out and must be manually removed to return to the normal waveform display. To remove the **List Trend** display, choose **Normal Screen** from the menu, or press the **Normal Screen** key.

15.4 Graphic Trends

The **Graphic Trend** display allows the user to view a graphic summary of stored patient vital signs and anesthetic gas data. To access this display from the normal monitoring screen, press the **TRENDS** key three times. To access this display from the **Quick Trend** display, press the **TRENDS** key twice. To access this display from the **List Trend** display, press the **TRENDS** key once. This display may also be accessed from the other trend displays via a menu choice.

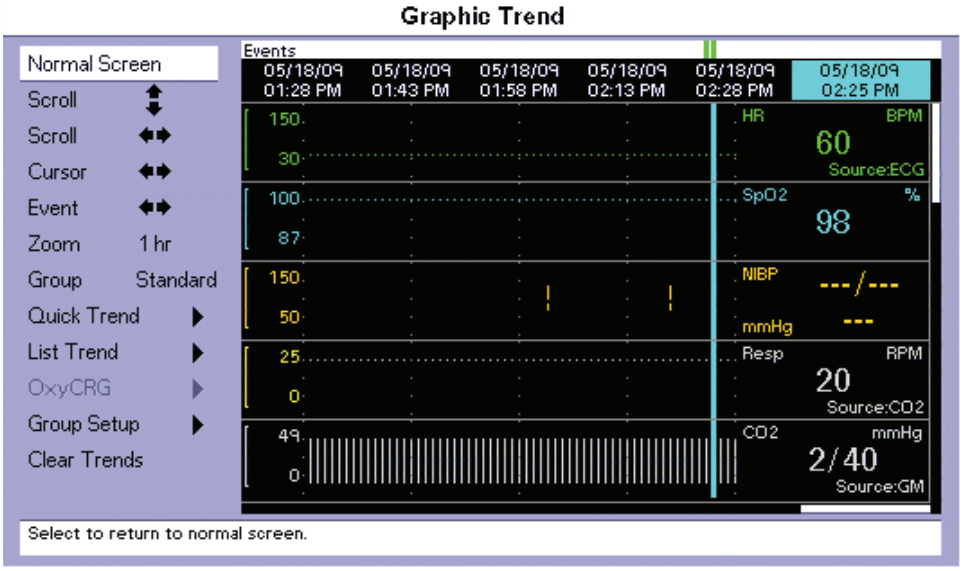


FIGURE 15-3 Graphic Trends

The left side of the **Graphic Trend** display contains menu items for **scrolling, setup** and **access to other displays**. The **Graphic Trend** data window contains up to 5 parameter displays. Use the vertical **Scroll** feature to view other parameters.

NOTE: When scrolling vertically, the topmost parameter (HR) remains displayed and does not scroll.

Time stamps are included in the upper area of the window, with the most recent data appearing with the cursor at the right end. Use the horizontal **Scroll** feature to move the display window through time. Scroll bars along the right and bottom sides of the **Graphic Trend** display indicate the position of viewed data in relation to the rest of the database. The **Event** feature may be used to scroll quickly between clock adjusted events and data transfer events (caused by alarm violations and **MARK EVENT** keypresses).

The **Zoom** feature may be used to adjust the amount of time shown in the trend window.

The top line of the **Graphic Trend** display contains markers which indicate if the entry was triggered by an alarm violation or by pressing the **MARK EVENT** key. These markers are red for priority 1 alarms, yellow for priority 2 alarms, and green if initiated by pressing the **MARK EVENT** key. Clock adjusted events and data transfer event will be marked as well.

As the cursor is scrolled horizontally, the digital data corresponding to the points in the graph is shown at the right side of the window. Trend data in violation of an alarm is highlighted according to the priority of the alarm.

On color displays:

- Priority 1 alarm data is shown in inverse video with red background.
- Priority 2 alarm data is shown in inverse video with yellow background.

If data for a parameter is not available at the time of the trend entry, the data field will be dashed. If an NIBP reading could not be obtained or an invasive pressure channel was not zeroed at the time of the trend entry, the data field will contain **"XXX"**.

Modification of Parameters Displayed

The parameters displayed always include the currently active parameters and any others used since the time the patient was admitted to the monitoring system. The default order of parameters displayed from top to bottom is: HR, SpO_2, NIBP, Resp, CO_2, O_2, Des, N_2O, MAC, P1, P2, Temp, and PVC. To change the order in which parameters are displayed in each of the top 5 rows, select **Group Setup** from the **Graphic Trend** menu. Then, set **Param 1** through **Param 6** to the desired parameters.

Modification of Trend Entry Conditions

The **Graphic Trend** data is the same as that stored for **List Trends**, arranged graphically. (If data is not available for time period, it appears as a gap in the **Graphic Trend**.) Refer to the previous section (**List Trend**) for modification of trend entry conditions.

Transferring Graphic Trend Data Between Different Passport V Monitors

Graphic Trend data is transferred together with **List Trend** and patient name and demographics. Refer to the **List Trend** section for details.

Clearing Trend Data

To manually clear all trend data, including List trends, choose **Clear Trends** from the menu. A confirmation prompt will appear. Once cleared, the data cannot be restored.

- All trend data is automatically cleared when the patient is discharged from the monitor.
- If the monitor's displayed time or date is changed, an event will be marked but not cleared of all trend data.

Removing the Graphic Trend Display

The **Graphic Trend** display does not automatically time-out and must be manually removed to return to the normal waveform display. To remove the Graphic Trend display, choose **Normal Screen** from the menu, or press the **Normal Screen** key.

15.5 OxyCRG

The OxyCRG function is available for neonatal patients only.

The OxyCRG display allows the user to view a graphic summary of 5 specific patient parameters, including HR, SpO2, Resp Wave, Temp and IBP1.

To access this display from the normal screen, press the **TRENDS** key four times (Patient Size must be set to Neonate to view OxyCRG). This display may also be accessed from the other trend displays via a menu choice.

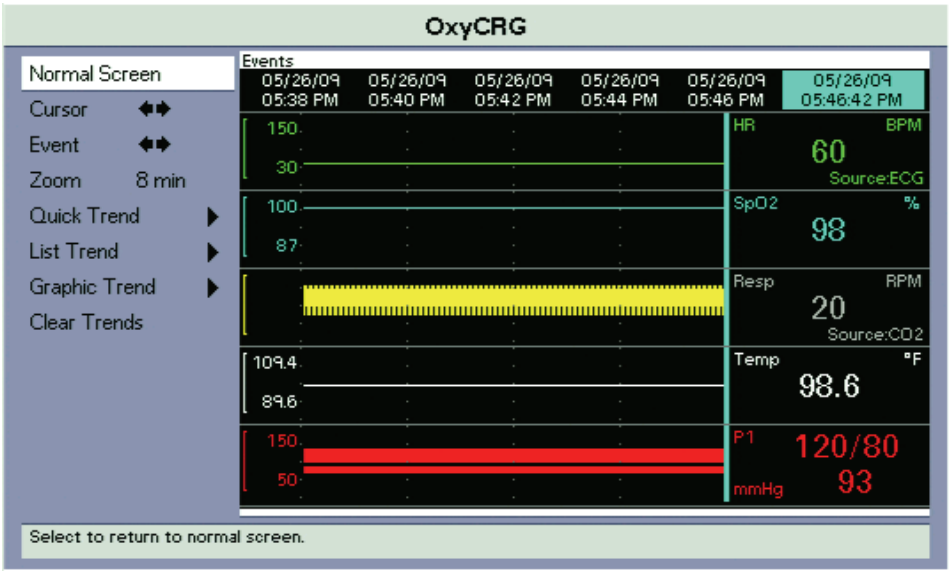


FIGURE 15-4 OxyCRG Display

The events that trigger the storage of OxyCRG data are Interval events, Alarm events, and Manually marked events. The interval for triggering the interval event is 2s maximally.

The parameters stored for the OxyCRG are instantaneous values of HR, SpO2, RR, Resp Wave, Temp, and IBP1. The time marker is one second. Trended data includes the Time marker, Parameter value, and Event type.

OxyCRG screen displays the trend graph, parameter values, and events. The rules for displaying trend graph are as follows:

- The x-axis is time, and the y-axis is parameters.
- The most recent trend data is shown at the rightmost end.
- The time marker is exact to minute.
- Parameters in OxyCRG screen are displayed in the order of HR, SpO2, Resp Wave, Temp and IBP1.
- The alarmed parameters are marked with different color under the OxyCRG graph to match the alarm level.
- 1 level alarms: Red
- 2 level alarms: Yellow
- The parameters' trend graph is the same color as the parameter's color.

The rules for displaying parameter values are as follows:

- The color of the alarmed parameter is the same as the color of the alarm priority.
- one level alarms: Red
- two level alarms: Yellow
- The invalid parameter data is shown as "– – –" in the parameter area of the OxyCRG screen.
- The IBP parameter value in which the IBP channel isn't zeroed shall be displayed as "– – –" in the parameter area of the OxyCRG screen.

The rules for displaying events are as follows:

Manually marked events are marked in green in the Event row.

- Alarm events are marked in different colors in the Event row to match the alarm priority.
- 1 level alarm: red
- 2 level alarm: yellow
- If multiple events happen during a time interval, the color of the event with the highest priority is shown.
- The order of event priority is: manually marked event, one level alarm, two level alarm.

Viewing Trend Data

The start time for OxyCRG trends is related to the way the user accesses the OxyCRG trends:

- If the user enters the OxyCRG trends by pressing the Trend key 4 times in normal screen, the start time for the OxyCRG trend display is accurate to the minute of the time when the user accesses the OxyCRG trends. (The method for obtaining the integrated start time of the OxyCRG trends is the same with that of the List trends.)
- If the user accesses the OxyCRG trend by pressing the OxyCRG button in the Quick Trend screen, the cursor time of OxyCRG is accurate to minute of the time of most recent trend data in the Quick Trends.
- If the user accesses OxyCRG trends by pressing the OxyCRG button in the List Trend screen, the cursor time of OxyCRG trends is accurate to minute of the time of rightmost column in the List Trend.
- If the user accesses OxyCRG trends by pressing the OxyCRG button in the Graph Trend screen, the cursor time of OxyCRG trends is accurate to minute of the time to which the cursor point in the Graph Trends.

Scrolling the cursor

Scroll the cursor to view the parameter values corresponding to cursor position.The step for cursor scrolling is one pixel.

Scrolling the events

The objects of Event view are alarm events and manually marked events. The step of event scroll is a single event.

Zoom Settings

The time span of the OxyCRG screen can be adjusted. Options for Zoom are 8min, 16min, 32min, 64min, and 128min.

Clearing Trend Data

Trend data can be cleared manually.

Refreshing

The OxyCRG display is refreshed according to the Zoom setting of displayed OxyCRG as follows:

zoom setting	refresh time
8min	2s
16min	4s
32min	8s
64min	16s
128min	32s

Menus and Screens

The OxyCRG screen consists of the following items:

1. Menu area: Allows operations in the OxyCRG display.
2. Event area: Shows events markers.
3. Time area: Shows the time marker of trend entries and cursor in time area:
   - There five time markers for trend entries that divide the OxyCRG graph into four equal sections.
   - The time marker of entries is accurate to the minute.
   - The time marker of the cursor is accurate to the second.
   - The date and time format are consistent with that of the system setting.
4. OxyCRG graph and parameter values area: Displays the trend graphs and parameter values corresponding to the cursor:
   - The graphic trends are blank corresponding to the state of standby.
   - For clock adjusted event, the time tag of old trend entry shall be synchronized with new time start.

15.6 Trends Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
No Trends displayed	No Trend triggers set	Go to the **Monitor Setup Menu** and set **NIBP Trend, Trend Interval** or **Alarm Trend** as desired
	Trend page is scrolled	Use scroll arrows in **Trend Menu** to scroll to top of **Trend Menu**

16.0 *Printing*

16.1 Description

Passport V data and waveforms may be printed to the following destinations: local printer, remote printer, or remote central station.

16.2 Print Setup Menu

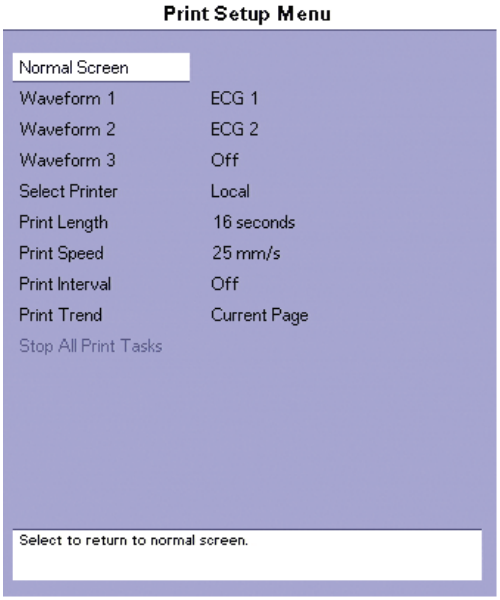


FIGURE 16-1 Print Setup Menu

Printing of Waveform Data

The **Print Setup Menu** allows the user to set up waveforms for printing and gives the user the ability to change the print destination.

Waveforms may be printed at the time of an alarm by selecting **Active** in response to **Print On Alarm** in the **Alarm Setup Menu**, which can be accessed by pressing the **Alarms: Limits** key. Waveforms may also be printed at regular intervals by selecting **Print Interval**. Available selections are **OFF, 1 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 hr,** and **2 hr**.

To choose which waveform will print to the local printer select **Waveform 1, 2, or 3** and then select any of the available choices.

The following printer options may be available: **Local**, **Remote, and Local/Remote**. A default printer or combination of printers can be set.

Local printing will initiate a printout delivered via the local printer.

Remote printing will send a printout to a remote printer (HP1505N, HP4015N) connected to the **Passport V**.

During printing, if the operator changes a setting (e.g., scale, lead name), the report will mark the change at the changed time.

16.2.1 Local Printer (Optional)

The **Passport V** local printer can provide a printed record of all patient parameters. It is a three-trace thermal strip chart local printer with an integral paper spool. The local printer uses plain white thermal paper, 5 cm wide.

NOTE: All grid patterns and data are printed by the local printer.

Operation of the Local Printer

1. Select the waveforms to print to the local printer via the **Print Setup Menu** using the Navigator Knob. To change the waveforms that appear, select **Waveform 1, 2, or 3** and choose from the available parameters.
2. To print, select a printer from **Print Setup Menu** 〉 **Select Printer**. The printer selection is **Local** by default.
3. Press the **STRIP** key to initiate printing.
4. Press the **STRIP** key again to abort the printout. Select printouts will also require the use of alternate menus or keys.

During a waveform printout, tic marks appear at one second intervals, for reference.

Printouts from the Local Printer

Strip Printing

When the **STRIP** key is pressed a 16 or 32 second strip is printed, acccording to the "Print Length" setting. The source of the printout is indicated on the strip as **REALTIME REPORT**.

Continuous ECG Printing

If a real-time, continuous printing of ECG data is required, press the **Cont ECG** key. To abort printing, press the **Cont ECG**, **Strip**, or **Print Trend** key.

Print on Alarm

If a waveform is initiated by an alarm violation, then the local printer will initiate a 16-second or 32-second waveform strip. The print length (16 or 32-seconds) can be set in the Print Setup menu. To activate this feature, from the front panel, select **Alarms: Limits** 〉 **Print On Alarm** 〉 **Active**. Then select each parameter for which the feature should be enabled. During an alarm printout, the data for the parameter which violated the alarm will be marked with an asterisk. The alarm trigger for the printout is indicated on the strip with the name of the violated alarm.

Interval Printing

To print waveform strips at regular intervals, go to the **Print Setup Menu,** highlight **Print Interval** and select a time interval to print. The selections are **Off, 1 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 hr** and **2 hr**. The source of the printout is indicated on the strip as **AUTO REALTIME REPORT**.

Trend Printing

To print **Quick Trend**, **List Trend**, **OxyCRG,** or **Graphic Trend** data to the local printer, press the **Print Trend** key while the trend is displayed. To abort printing, press the **Cont ECG**, **Strip**, or **Print Trend** key.

Quick Trend and List Trend print digital data information while Graphic Trend print graphic representations of the data in the respective menus. Quick Trend entries are only recorded upon NIBP readings.

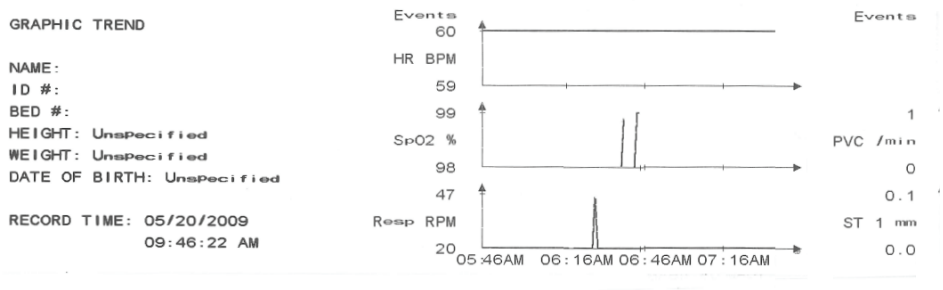


FIGURE 16-2 Graphic Trend Format

FIGURE 16-3 List Trend Format

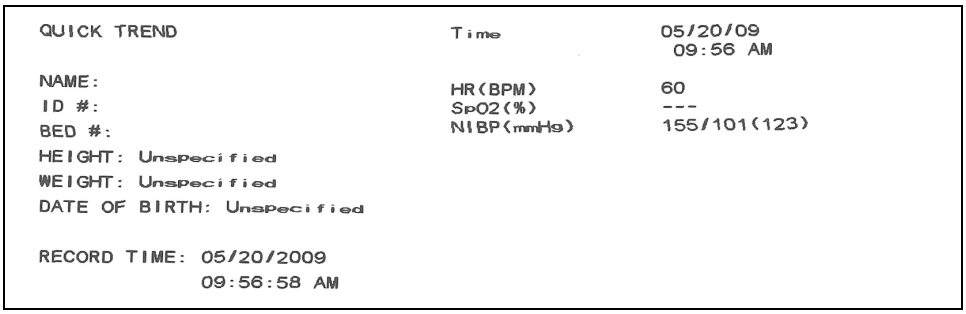


FIGURE 16-4 Quick Trend Format

Calculations

IV Drug printouts are initiated in **Functions** 〉 **Drug Calculator** by using the Navigator Knob and scrolling to the **Print Units** or **Print Table** function. The printout data will include patient demographic data, date / time of printout, data used to calculate the information and the calculated data. Drug Calculations will include the patient weight, IV fluid infusion rate and medication concentration.

16.2.2 Remote/Local Printer Troubleshooting

MESSAGE/PROBLEM	REASON	SOLUTION
Local Printer report appears totally blank	Thermal paper may be installed incorrectly (up-side down).	Remove paper and re-install with paper feeding off of the spool from the bottom.
Local Printer Out Of Paper	Printer out of paper or the printer door is open.	Replace with a new roll of paper and close the door.
No print on Alarm	Alarm printing not active.	From the front panel, select **Alarms: Limits** 〉 **Print on Alarm** 〉 **Active**.
Trends not printing	Print Trend not pressed.	Press **PRINT TREND** when trend window is open.
	No Trends displayed.	Use **scroll** feature to scroll to the top of the trend then press **PRINT TREND**.
	No paper.	Check / Replace paper.

17.0 *User Maintenance*

17.1 Description

This section of the manual outlines routine user maintenance guidelines.

The **Passport V** monitor is designed for stable operation over long periods of time. Under normal circumstances the monitor should not require technical maintenance beyond that described in this section. However, routine maintenance, calibration and safety checks are recommended at least once a year or more often as required by local statutory or hospital administration practice.

17.2 Care and Disinfection of the Passport V Monitor

WARNING: Shut down the monitor and disconnect all power cords from the outlet before cleaning.

The equipment should be cleaned regularly. Please consult your hospital's policy for the recommended frequency for cleaning and disinfecting equipment.

The exterior surfaces of the equipment may be cleaned with a clean and soft cloth, sponge or cotton ball, dampened with either of the following cleaning solutions:

- Mild soap (diluted)
- Sodium hypochlorite bleach (10%)
- Isopropyl alcohol (70%)
- Super sani-cloth (0.5% quaternary ammonia + 55% isopropyl alcohol)
- Virkon

To avoid damage to the equipment:

- ALWAYS use solutions in accordance with the manufacturer's instructions.
- ALWAYS wipe off the excess cleaning solution with a dry cloth after cleaning.
- NEVER submerge the equipment into water or an cleaning solution, or pour or spray water or any cleaning solution on the equipment.
- NEVER permit fluids to run into the casing, switches, connectors, or any ventilation openings on the equipment.

17.3 Care and Cleaning of SpO_2 Sensors

NOTE: Refer to the individual instruction sheets that are packaged with each sensor.

- Check sensors and cables daily for signs of damage. Replace as required.
- Sensors should be cleaned before and after each new patient.
- Wipe the patient contact area using a soft cloth with mild soap and water solution or isopropyl alcohol. Hydrogen peroxide can be used to remove dried blood.
- Allow the sensor to completely dry before using.

CAUTION: When cleaning SpO2 sensors, do not use excessive amounts of liquid. Wipe the sensor surface with a soft cloth, dampened with cleaning solution. Do not attempt to sterilize.

Cleaning and Re-use of a Nellcor® Sensor

Sensors may be reattached to the same patient if the emitter and detector windows are clear and the adhesive still adheres to the skin. The adhesive can be partially rejuvenated by wiping with an alcohol wipe and allowing the sensor to thoroughly air dry prior to replacement on the patient.

Do not immerse any Oxisensor®, OxiMax®, Durasensor®, Oxiband®, or Duraform® oxygen transducers, the Nellcor® RS-10 or Max-Fast® oxygen transducers, or any Nellcor® adhesive in water or cleaning solution. Clean Durasensor®, Oxiband®, and Duraform® oxygen transducers, and the Nellcor® RS-10 or Max-Fast® oxygen transducers by wiping with a disinfectant such as a solution containing 70% alcohol. Do not sterilize by irradiation, steam, or ethylene oxide. Use a new Oxiband® adhesive wrap or FORM-A adhesive bandage for each patient. Do not re-sterilize Oxisensor® or OxiMax® oxygen transducers.

17.4 Care and Cleaning of Reusable Temperature Probes

NOTE: Refer to the individual instruction sheets that are packaged with each temperature probe for additional information.

- Check temperature probes and cables daily for signs of damage. Replace as required.
- Probes should be cleaned before and after each new patient.
- Wipe the patient contact area using a soft cloth with mild soap and water solution or isopropyl alcohol.
- Allow the probe to completely dry before using.

17.5 Care and Cleaning of Reusable Cuffs

NOTE: Accuracy of cuff-pressure transducers/indicators is to be verified at intervals specified by the manufacturer.

17.5.1 Reusable Cuffs with Bladders

Take out the bladder before cleaning and disinfecting the cuff.

Cleaning

The cuff can be hand washed or machine washed in warm water or with mild detergent. The bladder can be cleaned with a damp cloth. Air dry the cuff thoroughly after washing.

NOTE: Machine washing may shorten the service life of the cuff.

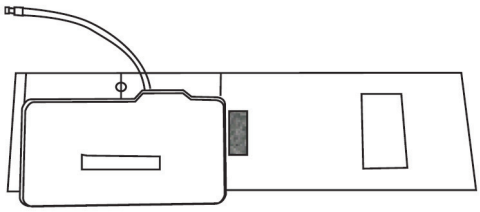
Disinfection

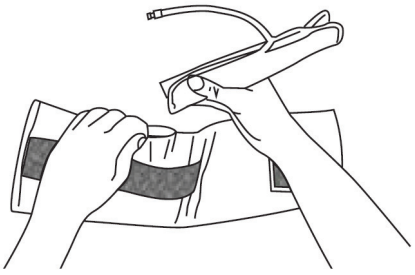
The cuff may be disinfected with a damp cloth with 70% isopropanol and water. It may also be disinfected with ultraviolet. The bladder can only be disinfected with ultraviolet.

NOTE: Prolonged use of disinfectant may cause discoloration of the cuff.

Replace the bladder after cleaning and disinfecting the cuff, as follows:

1. Place the bladder on the top of the cuff, as the figure shows.
2. Roll the bladder lengthwise and insert it into the large opening. See the figures below.
3. Hold the hose and the cuff and shake the complete cuff until the bladder is in position.
4. Thread the hose from inside the cuff, and out through the small hole under the internal flap.





CAUTION: Do not dry clean the cuff.
Do not press the cuff with a hot iron.
Do not use detergent and disinfectant other than than 70% ethanol or 70% isopropanol.
Clean and disinfect the cuff according to the instructions.

17.5.2 Reusable Bladderless Cuffs

Clean cuffs with warm water and a mild detergent. Do not use a detergent containing hand conditioners, softeners, or fragrances.

NIBP cuffs can be sterilized with gamma sterilization without affecting the repeated performance of the cuff. Steam sterilization is not recommended. Use of a washing liquid containing bleach is not recommended because chlorine will chemically break down the urethane on the inside of the cuff.

Antimicrobial Definition

Bladderless cuffs are treated with an antimicrobial coating. Antimicrobial technology effectively controls a broad spectrum of bacteria, fungi, algae and yeasts on a wide variety of treated substrates.

17.6 Battery Replacement and Maintenance

Battery Replacement

1. Open battery compartment door, on left side of unit, by pressing the finger grip area and sliding the door to the rear.
2. Slide the release located at the top of the installed battery. This will eject the battery. Slide out and remove battery.
3. Slide in replacement battery until it clicks into place.
4. Close battery compartment door by sliding the door to the right until it firmly clicks into place.

CAUTION: Replace lithium-ion batteries with part number M05-010001-06 (Mindray) or 0146-00-0099 ONLY.

NOTE: Mindray PM batteries (0146-00-0069) may fit inside the Passport V monitor but they will not properly report charging status.

Battery Maintenance

The batteries may be subject to local regulations regarding disposal. At the end of the battery life, dispose of the batteries in accordance with any local regulations.

NOTE: Passport V batteries may only be charged within a Passport V monitor. Do not attempt to use commercial rechargers.

Lithium-Ion

Storage of the lithium-ion batteries depends on temperature, time period and the degree of cell charging state. After 6 months of storage at 23°C, fully charged lithium-ion batteries have a retention capacity of 93%.

17.7 Local Printer Paper Replacement

The instructions below describe the replacement of local printer paper. Use only recommended local printer paper, P/N 0683-00-0505-02. This ensures that the print quality is acceptable and reduces print head wear.

1. Open local printer door by pulling the paper eject lever.
2. Remove empty paper spool.
3. Insert new paper roll into the paper holder with the sensitive (shiny) side of the paper facing the print head at the top of the local printer (paper feeding off of the spool from the bottom).
4. Unroll approximately 4 inches of paper.
5. Align the paper across the top of the roller.
6. Holding the paper in place, close local printer door.
7. To ensure that the paper is aligned properly and has not been pinched in the door, pull the loose edge out a couple of inches. If the paper jams, open the door and return to step 5.

17.8 Care and Storage of Thermal Chart Paper

Thermal Chart Paper is chemically treated and the permanency of a recording is affected by storage and handling conditions. These conditions are:

- Ultraviolet Light

  We recommend storing the recordings in a filing cabinet within a few days of printing. Long term exposure to natural or artificial U.V. sources is detrimental.

- Storage Temperature and Humidity

  Keep the recordings in a cool and dry area for a longer lasting image. Extreme temperature and humidity (above 80° F/26° C and 80% Humidity) should be avoided.

- Solvent Reactions

  Do not store the recordings in plastic bags, acetate sheet protectors, and similar items made from petroleum products. These products emit a small amount of vapor which will, over a period of time, deteriorate the image on the chart paper.

- Adhesive Tape

  Never place adhesive tape over recordings. The reaction between the adhesive compound and the chemical/thermal paper can destroy the image within hours.

- Archives

  We recommend that if long term archives are required, make a photocopy of the recordings as back-up. Under normal office filing conditions the recordings should retain acceptable image quality for about 5 years.

17.9 Care and Cleaning of 3- and 5-lead ECG Cables and Lead wires

Recommended cleaning method of ECG cables and lead wires is a cloth wipe using ordinary alcohol-free hand soap or USP green soap tincture. When disinfection is required, a cloth wipe using disinfectants such as isopropyl alcohol, chlorine bleach in water (1:10 mixture) or 2% Glutaraldehyde solution (i.e., Cidex) is recommended. After cleaning, the ECG cables and lead wires should be wiped with water using a clean damp cloth then dried with a clean dry cloth. The ECG cables and lead wires must be allowed to dry thoroughly before use.

CAUTION: To avoid permanent damage, do not expose metal components (pins, sockets, snaps) to disinfectants, soaps or chemicals.

NOTE: ECG cables and lead wires must never be immersed, soaked in any fluids, and they should not be cleaned with harsh chemicals such as acetone or non-diluted bleach.

NOTE: Do not autoclave, radiation or steam sterilize ECG cables or lead wires.

NOTE: Extended exposure to Ethylene Oxide gas may shorten life of the ECG cables and lead wires, leading to poor signal quality.

18.0 *Accessories*

18.1 ECG

18.1.1 ECG Electrodes

DESCRIPTION	PART NUMBER
Disposable pre-gelled ECG Electrodes, foam base and Hydrogel conductive adhesive, Box of 60	0681-00-0100-02
Disposable pre-gelled ECG Electrodes, foam base and Hydrogel conductive adhesive, 1 case of 600 (10 boxes of 60)	0681-00-0100-01
Dual Snap Electrodes (Box of 200)	0683-00-0449-01
Radio Opaque, Neonatal Pre-wired, 3 Lead ECG Electrodes, AAMI, 18" (45.7cm), Box of 100 packs (each pack contains 3 electrodes)	0681-00-0098-01
Radio Tranlucent, Neonatal Pre-wired, 3 Lead ECG Electrodes, AAMI, 18" (45.7 cm), Box of 100 Packs (each pack contains 3 electrodes)	0681-00-0098-02

18.1.2 ECG Cables

DESCRIPTION	PART NUMBER
ECG Cable, 3/5 lead, 10′ (3.1 m), Reusable	0012-00-1745-01
ECG Cable, 3/5 lead, 20′ (6.1 m), Reusable	0012-00-1745-02
ECG Cable, 3/5 lead, ESIS, 10′ (3.1 m), Reusable	0012-00-1745-03
ECG Cable, 3/5 lead, ESIS, 20′ (6.1 m), Reusable	0012-00-1745-04
Neonatal ECG Patient Cable, 10′ (3.1 m), Reusable	040-000072-00

18.1.3 ECG Leadsets

DESCRIPTION	PART NUMBER
ECG Lead Wires, 5 Lead, Snap, 18" (45.7 cm), AAMI, Reusable	0012-00-1503-01
ECG Lead Wires, 5 Lead, Snap, 24" (61.0 cm), AAMI, Reusable	0012-00-1503-02
ECG Lead Wires, 5 lead, Snap, 36" (101.6 cm), AAMI, Reusable	0012-00-1503-03
ECG Lead Wires, 5 lead, Snap, 18" (45.7 cm), IEC, Reusable	0012-00-1503-10
ECG Lead Wires, 5 lead, Snap, 24" (61.0 cm), IEC, Reusable	0012-00-1503-11
ECG Lead Wires, 5 lead, Snap, 36" (101.6 cm), IEC, Reusable	0012-00-1503-12
ECG Lead Wires, 3 lead, Snap, 18" (45.7 cm), AAMI, Reusable	0012-00-1503-04
ECG Lead Wires, 3 lead, Snap, 24" (61.0 cm), AAMI, Reusable	0012-00-1503-05
ECG Lead Wires, 3 lead, Snap, 36" (101.6 cm), AAMI, Reusable	0012-00-1503-06
ECG Lead Wires, 3 lead, Snap, 18" (45.7 cm), IEC, Reusable	0012-00-1503-13
ECG Lead Wires, 3 lead, Snap, 24" (61.0 cm), IEC, Reusable	0012-00-1503-14
ECG Lead Wires, 3 lead, Snap, 36" (101.6 cm), IEC, Reusable	0012-00-1503-15

18.2 SpO_2

18.2.1 Masimo SpO_2 Module

DESCRIPTION	PART NUMBER
LNCS® Adult/Pediatric reusable/single patient adhesive sensor starter kit (one adult reusable sensor, one adult and one pediatric single patient adhesive sensor, and one 3.04m/10′ cable)	0020-00-0154
LNCS® Adult/Pediatric single patient adhesive sensor starter kit (one adult and one pediatric single patient adhesive sensor, and one 3.04m/10′ cable)	0020-00-0156
LNCS® Neonate single patient adhesive sensor starter kit (one neonate and one neonate pre-term sensor, and one 3.04m/10′ cable)	0020-00-0155
LNCS® DCI Adult Reusable Finger Sensor, patient weight range > 30 kg (20/box)	0600-00-0126
LNCS® DCIP Pediatric Reusable Finger Sensor, patient weight range 10 to 50 kg (20/box)	0600-00-0127
LNCS® Adtx - Adult Single Patient Adhesive Sensors, patient weight range > 30 kg (20/box)	0600-00-0121
LNCS® Pdtx- Pediatric Single Patient Adhesive Sensors, patient weight range 10 to 50 kg (20/box)	0600-00-0122
LNCS® INF-L - Infant Single Patient Adhesive Sensors, patient weight range 3 to 20 kg (20/box)	0600-00-0123
LNCS® NEO-L Neonatal single patient adhesive sensors, patient weight range <3 kg and > 40 kg (20/box)	0600-00-0124
LNCS® NEO PT-L Neonatal preterm single patient adhesive sensors, patient weight range < 1 kg (20/box)	0600-00-0125
LNC-4, Masimo LNCS SpO2 Patient Cable, 4' (1.22m)	0012-00-1652
LNC-10, Masimo LNCS SpO2 Patient Cable, 10' (3.05m)	0012-00-1599
LNC-14, Masimo LNCS SpO2 Patient Cable, 14' (4.27m)	0012-00-1653
Masimo LNCS® to LNOP® Patient Cable Adapter (Connects LNCS sensors to LNOP cables)	0012-00-1651
Masimo LNOP MAC-1 Adapter Cable (Connects LNOP Sensors to LNCS Cables)	0012-00-1656
LNOP® DCI Adult/Pediatric starter kit (one reusable adult sensor, 2 adult and 1 pediatric single patient adhesive sensors and one 3.66 m/12′ cable)	0020-00-0130
LNOP® DCI-Adult Reusable Finger Sensor (with added "flaps" for ambient light shielding and 3′ cable), patient weight range > 30 kg	0600-00-0047
LNOP® DCIP-Pediatric/Slender Digit Reusable Finger Sensor, patient weight range 10 to 50 kg	0600-00-0063
LNOP® TCI Reusable Tip-Clip Ear Sensor, patient weight range > 30 kg	0600-00-0110
Ear Clip, Reusable	0600-00-0086
Ear Hanger (pkg of 5), Reusable	0600-00-0087

LNOP® YI Multisite Reusable Sensor, patient weight range > 1 kg	0600-00-0078
Masimo Multisite Wrap (box of 100)	0600-00-0081
Masimo Multisite Foam Wrap (pkg of 12)	0600-00-0083
LNOP® DCSC-Adult Spot Check Reusable Sensor, patient weight range > 30 kg	0600-00-0077
Masimo LNOP PC08 SpO_2 Cable, 8' (2.4m)	0012-00-1099-01
Masimo LNOP PC12 SpO_2 Cable, 12' (3.7 m)	0012-00-1099-02
LNOP® Adt-Adult Single Patient Adhesive Sensors, patient weight range > 30 kg (pkg of 20)	0600-00-0043-01
LNOP® Pdt-Pediatric/Slender Digit Single Patient Sensors, patient weight range > 10 kg and < 50 kg (pkg of 20)	0600-00-0044-01
LNOP® II Inf-L-Infant L Single Patient Adhesive Sensors, patient wieght range > 3 kg and < 10 kg (pkg of 20)	0600-00-0100
Masimo Tape, Infant, L-Series (Package of 100)	0600-00-0108
LNOP® Neo-Neonatal Y Single Patient Adhesive Sensors, patient weight range > 1 kg and < 10 kg (pkg of 20)	0600-00-0045-01
Adhesive Tapes for Neonatal Y Single Patient Adhesive Sensors (pkg of 100)	0600-00-0065
LNOP® II Neo-Neonatal L Single Patient Adhesive Sensors, patient weight range > 1 kg and < 10 kg (pkg of 20)	0600-00-0099
Adhesive Tapes for Neonatal L Single Patient Adhesive Sensors (pkg of 100)	0600-00-0096
LNOP® NeoPt-Preterm Neonatal Y Single Patient Adhesive Sensors, patient weight range < than 1 kg (pkg 20)	0600-00-0046-01
Posey Wraps for Preterm Neonatal Y Single Patient Adhesive Sensors (pkg of 12)	0600-00-0064
LNOP® II NeoPt-L-Preterm Neonatal L Single Patient Adhesive Sensor, patient weight range < 1 kg (pkg 20)	0600-00-0098
Posey Wraps for Preterm Neonatal L Single Patient Adhesive Sensors (pkg of 12)	0600-00-0097
LNOP Adult/Pediatric Masimo SpO_2 starter kit (two adult and two pediatric single patient adhesive sensors and one 3.66 m./12' cable)	0020-00-0123-01
LNOP Neonatal Y Masimo SpO_2 starter kit (two neonatal and two preterm neonatal Y single patient adhesive sensors and one 3.66 m./12' cable)	0020-00-0123-02
Clothing Clips (pkg of 5)	0600-00-0084
Adhesive squares, Disposable, 12 cards (12 squares per card)	0600-00-0085

18.2.2 Nellcor SpO_2 Module

DESCRIPTION	PART NUMBER
Nellcor Durasensor DS100A Adult Reusable Sensor	0600-00-0051
Nellcor OxiMax® DOC-10 SpO_2 Cable	0012-00-1464
Disposable Nellcor OxiMax Sensor Kit (2 adult/2 neonatal)	0600-00-0103

18.2.3 DPM SpO_2 Module

DESCRIPTION	PART NUMBER
DPM SpO_2 518B Reusable Sensor, Neonatal, Foot (Adult/Pediatric, finger or toe)	518B-30-72107
DPM SpO_2 512F Reusable Sensor, Adult, Finger	512F-30-28263
DPM SpO_2 512H Reusable Sensor, Pediatric, Finger	512H-30-79061
DPM SPO_2 Cable, 6 Pin	0010-20-42594
DPM SpO_2 520A Single Patient Use sensor, Adult > 30 kg (pkg of 20)	520A-30-64101
DPM SpO_2 520I Single patient use sensor, Infant, 3 to 20 kg, 20 pcs/box	520I-30-64301
DPM SpO_2 520N Single patient use sensor, Neonatal, <3kg, 20 pcs/box	520N-30-64401
DPM SpO_2 520P Single patient use sensor, Pediatric, 10 to 50 kg, 20 pcs/box	520P-30-64201

18.3 NIBP

DESCRIPTION	PART NUMBER
Reusable NIBP cuff, Child, 10 to 19cm, quick connect	0683-15-0001-01
Reusable NIBP cuff, Small Adult, 18 to 26cm, quick connect	0683-15-0002-01
Reusable NIBP cuff, Adult, 25 to 35 cm, quick connect	0683-15-0003-01
Reusable NIBP cuff, Large Adult, 33 to 47cm, quick connect	0683-15-0004-01
Reusable NIBP cuff, Thigh, 46 to 66cm, quick connect	0683-15-0005-01
Reusable NIBP Cuff, Adult Long, 25 – 35 cm (limb circumference), latex free	0683-15-0006-01
Reusable NIBP Cuff, Large Adult Long, 33 – 47 cm (limb circumference), latex free	0683-15-0007-01
Disposable NIBP cuff, Child, 10 to 19cm, quick connect, box of 10	0683-14-0001-01
Disposable NIBP cuff, Small Adult, 18 to 26cm, quick connect, box of 10	0683-14-0002-01
Disposable NIBP cuff, Adult, 25 to 35 cm, quick connect, box of 10	0683-14-0003-01
Disposable NIBP cuff, Large Adult, 33 to 47cm, quick connect, box of 10	0683-14-0004-01
Disposable NIBP cuff, Thigh, 46 to 66cm, quick connect, box of 10	0683-14-0005-01
Disposable NIBP Cuff, Adult Long, 25 – 35 cm, quick connect	0683-14-0006-01
Disposable NIBP Cuff, Large Adult Long, 33 – 47 cm, quick connect, box of 10	0683-14-0007-01
Neonatal Size 1: limb circumference 3 – 6 cm, box of 10	0683-23-0001-01
Neonatal Size 2: limb circumference 5 – 8 cm, Box of 10	0683-23-0002-01
Neonatal Size 3: limb circumference: 7 – 10 cm, Box of 10	0683-23-0003-01
Neonatal Size 4: limb circumference 9 – 13 cm, Box of 10	0683-23-0004-01
Neonatal Size 5: limb circumference 12 – 17 cm, Box of 10	0683-23-0005-01
NIBP Hose, 5' (1.5 m), Quick Connect to Quick Connect	0683-04-0003
NIBP Hose, 10' (3.5 m), Quick Connect to Quick Connect	0683-04-0004

18.4 Temperature

18.4.1 Disposable 400 Series Temperature Probes

DESCRIPTION	PART NUMBER
Esophageal Stethoscope, 400 Series Disposable Temperature Probe, 12 Fr, ES 400-12	0206-03-0112-02
Esophageal Stethoscope, 400 Series Disposable Temperature Probe, 18 Fr, ES 400-18	0206-03-0118-02
Esophageal/Rectal, 400 Series Disposable Temperature Probe, 9 Fr, ER 400-9	0206-03-0209-02
Esophageal/Rectal, 400 Series Disposable Temperature Probe, 12 Fr, ER 400-12	0206-03-0212-02
Skin, 400 Series Disposable Temperature Probe, SK 400	0206-03-0300-02
Reusable Instrument Cable, 400 Series	040-000091-00

18.4.2 Reusable DPM Temperature Probes

DESCRIPTION	PART NUMBER
Reusable Temperature Probe, Adult, Esophageal/Rectal,	040-000055-00
Reusable Temperature Probe, Adult, Skin	040-000057-00
Reusable Temperature Probe, Pediatric Esophageal/Rectal	040-000056-00
Reusable Temperature probe, Pediatric/Neonatal, Skin	040-000058-00

18.4.3 Disposable DPM Temperature Probes

DESCRIPTION	PART NUMBER
Reusable Instrument cable for MR411, MR412 disposable probes	040-000224-00
MR411 Disposable Temp probe, Adult/Pediatric/Neonatal, Esophageal/ Rectal, 2-pin	0011-30-90446
MR412 Disposable Temp probe, Adult/Pediatric/Neonatal, Skin, 2-pin	0011-30-90447

18.5 IBP

DESCRIPTION	PART NUMBER
IBP Cable, BD P10EZ-1, P23XL-1, DTX/Plus, 12ft	040-000053-00
IBP Cable, Edwards Life Sciences TruWave PX, 12ft	040-000054-00
IBP Cable, Hospira Transpac IV, 12ft	040-000052-00
IBP Cable Adapter	040-000096-00

18.6 CO_2

18.6.1 Oridion Microstream CO_2 Module

DESCRIPTION	PART NUMBER
Adapter assembly, CO_2 Exhaust	0997-00-0648
Calibration Gas	0075-00-0033-01
Microstream CO_2 Starter Kit, Adult	0020-00-0188-01

18.6.2 DPM Sidestream CO_2 Module and Gas Module 3

DESCRIPTION	PART NUMBER
Nasal Cannula, CO_2/O_2, 7' (2.1 m) (box of 10)	0683-00-0452-10
Dryline water trap, Adult/Pediatric, box of 10	9200-10-10530
Dryline water trap, Neonatal, box of 10	9200-10-10574
Sampling line, Adult, 2.5 m, box of 25	9200-10-10533
Sampling line, Neonatal, 2.5 m, box of 25	9200-10-10555
CO_2 Nasal sample cannula, Adult with 7' line, box of 25	M02A-10-25937
CO_2 Nasal sample cannula, Pediatric with 7' line, box of 25	M02A-10-25938
CO_2 Nasal sample cannula, Infant with 7' line, box of 25	M02B-10-64509
Dryline airway adapter, straight, box of 10	9000-10-07486
DPM Sidestream CO_2 Kit, Adult (Includes 2 adult/pediatric airway adapter, 2 adult/pediatric watertraps, 2 adult/pediatric airway sampling lines, 2 Adult Nasal Sample Cannula, 2 Pediatric Nasal CO_2 Sample Cannula)	6800-30-50618
DPM Sidestream CO_2 Kit, Neonate (Includes 2 Airway Adapters, straight (2 Sampling Line. DRYLINE,Neonate,2.5m,60-15300-00), 2 neonate watetraps, (60-13200-00), 2 Sample Cannula, InfantNasal CO_2, with 7'line, Sidestream CO_2 Accessory Specifications	6800-30-50467

18.6.3 Gas Module 3 Accessories

DESCRIPTION	PART NUMBER
Wall Mount	0436-00-0169
Mounting Plate to Gas Module 3	0386-00-0344
Cable, Serial Port to Gas Module, 12" (30.48 cm)	0012-00-1276-01
Cable, Serial Port to Gas Module, 72" (182.88 cm)	0012-00-1276-02
Power Cord, 120 Volt	0012-00-1081-01
Kit, Acc, Gas Mod / **Passport V**, 110V	0020-00-0119-10
Kit, Acc, Gas Mod / **Passport V**, 120V	0020-00-0119-11
Kit, Acc, Gas Mod / **Passport V**, 240V	0020-00-0119-12

18.7 Mounting Kits, Rolling Stands, and Accessories

DESCRIPTION	PART NUMBER
Bedrail Mounting Kit	6100-30-86358
Mounting Plate, Gas Module to Rolling Stand	0386-00-0232
Mounting Plate Kit, Bedside to Rolling Stand and Wall Mount	115-003234-00
Quick Release Mounting Kit	115-003237-00
Transport Rolling Stand with Mounting Plate	PASSVROLLSTD
Transport Rolling Stand with Quick Release Mount	PASSVROLLSTDQR
VHM Wall Mount with Mounting Plate	PASSVVHMMT
VHM Wall Mount with Quick Release Mount	PASSVVHMMTQR
Wall Mount with Mounting Plate	PASSVWALLMT
Wall Mount with Quick Release Mount	PASSVWALLMTQR
Mount Kit, **Passport V** to Gas Module 3	0020-00-0202-01

18.8 Cables and Networking

DESCRIPTION	PART NUMBER
12 Port Hub	0992-00-0085-03
Nurse Call Cable	8000-21-10361
IABP Interface Cable	6100-20-86360
Defib Interface Cable	6100-20-86361
Cable, Interface, PC, Serial Port to Serial Port	0012-00-1275-01
Cable, VGA Extension, Male D to Female D, 6' (1.83 m)	0012-00-0852-01
Cable, VGA Male to Male, 10' (3.05 m)	0012-00-0994-01
Cable, VGA Male to Male, 25' (7.62 m)	0012-00-0994-02
Cable, VGA Male to Male, 50' (15.24 m)	0012-00-0994-03
Cable, VGA Male to Male, 75' (22.86 m)	0012-00-0994-04
CAT 5 Ethernet Cable, Patch, STP, 6' (1.83 m)	0012-00-1274-01
CAT 5 Ethernet Cable, Patch, STP, 25' (7.62 m)	0012-00-1274-02
CAT 5 Ethernet Cable, Patch, STP, 50' (15.24 m)	0012-00-1274-03
CAT 5 Ethernet Cable, Crossover, STP, 3' (0.91 m)	0012-00-1392-05
CAT 5 Ethernet Cable, Crossover, STP, 6' (1.83 m)	0012-00-1392-06
CAT 5 Ethernet Cable, Crossover, STP, 10' (3.05 m)	0012-00-1392-07
CAT 5 Ethernet Cable, Crossover, STP, 20' (6.10 m)	0012-00-1392-08
Installation charge per bed	4900-LP-0000
*Networking Installation charge (2-5 beds)	0002-CC-0005
*Networking Installation charge (6-11 beds)	0006-CC-0011

** The Networking Installation charge includes appropriate interface cables, jacks, wall plates, certification and labor for a certified contractor. Does not include remote printer, hub or comm-ports.*

18.9 Battery and Miscellaneous

DESCRIPTION	PART NUMBER
Lithium Ion Battery	M05-010001-06
Lithium Ion Battery	0146-00-0099
Power Cord, 110 Volt	0012-25-0001
Power Cord, 220 Volt	0012-25-0002
Power Cord, 240 Volt (UK)	0012-25-0003
Power Cord, 250 Volt (Brazil)	009-001075-00
SB Storage Device	0992-00-0295-001
Paper, Thermal Strip Local Printer, 12 rolls	0683-00-0505-02

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19.0 *Appendix*

19.1 Equipment Environment and Safety Specifications

Passport V Environment

Temperature range	Operating:	0°C to 40°C
	Non-operating (storage):	-20°C~+60°C
Humidity range	Operating:	15% to 95 %, non-condensing
	Non-operating (storage):	10% to 95 %, non-condensing
Altitude range	Operating:	(-1,000 to 9,841 feet ASL) 1,051hPa to 700 hPa (788 mmHg to 525 mmHg)
	Non-operating (storage):	(-1,000 to 15,000 feet ASL) 1,051 hPa to 571 hPa (788 mmHg to 428 mmHg)

GAS Module Environment

Temperature range	Operating:	10°C to 40°C
	Non-operating (storage):	-40°C to 70°C
Humidity range	Operating:	10% to 95 %, non-condensing
	Non-operating (storage):	5% to 100 %, condensing
Altitude range	Operating:	Sea Level to 8,000 feet (2438m)

Transport

Complies with the requirements of ISTA transport test procedure 2A (for shipping cargos in containers).

Noise Level

- The patient monitor complies with the requirements of ISO 3744 in normal operation.
- Temperature controlled fan is used.

Below and equal to 27 degree ambient temperature, noise ≤ 35 dBA measured at a distance of one meter from the device.

- Below and equal to 33 degree ambient temperature, noise ≤ 40 dBA measured at a distance of one meter from the device.
- Below and equal to 40 degree ambient temperature, noise ≤ 46 dBA measured at a distance of one meter from the device.
- Conditions: NIBP pump and valves not operational, local printer not operational, CO_2 not operational.
- SPL range does not include patient heartbeat tone, key-pressing tone and alarm tone.

19.2 Power Specifications

Power Supply Type

- AC power, battery
- Whole-system consumption:
  average consumption of less than 50 W and maximum of 70 W.

AC Mains Power Source

- AC power: 100 - 240VAC (±10%)
- Current: 1.2 - 0.6 Amps
- AC input power frequency: 50 Hz/60 Hz

Internal User-Removable Battery

- Lithium-ion battery (M05-010001-06, Mindray)
- Number of batteries: 2 (maximum), one battery operation supported

Lithium Battery Index

- Voltage: 11.1VDC
- Rated Battery capacity: 4.4 Ah (one battery)
- Battery run time: >270min (two batteries), >130 min (one battery)

Operating conditions: 25°C for new fully-charged battery. Equipment configuration: 5-lead ECG, Impedance Repiration, Masimo SpO_2, Temperature, IBP1, IBP2, and NIBP in 15-min Interval mode.

Battery charge time:

- 3.5 hours for 90% charge and 5.5 hours for full charge (equipment powered off)
- 5.5 hours for 90% charge and 8.5 hours for full charge (equipment powered on)

19.3 Clock

Accuracy
±60 sec/30 days in case of 21±3°C of operating conditions

Range
Jan. 1, 2001 to Dec 31, 2099

Operating Time
Realtime clock is powered by an independent battery which runs for over 5 years.

19.4 Weight and Dimension

Dimension
<30.0 cm (H) x <18.0 cm (D) x <32.0cm (W)

Weight
< 11 lb. (5.0kg) (standard configuration, including one battery, local printer)

19.5 Display Specifications

Display Type
Color anti-glare TFT display

Rated display Resolution
800×600(Pixels)

Rated display size
12.1" (246 x 184.4 mm)

Data Update Frequency
≥ 60Hz
Accuracy:+/-2Hz

19.6 Sound

- Power-on self test tone
- Alarm tone
  - IEC alarm tone (high, medium, low; complies with the requirements of IEC60601-1-8)
  - Provides 1 to 10 levels of alarm tone adjustment.
  - Sound Pressure Range: 45 to 85 dB
- Key-pressing prompt tone
  - Provides hard key tones
- Systole heartbeat tone/pulse beat tone (Pitch tone)
  - Provides 0 to 10 levels of tone adjustment. "0" stands for no sound.
  - Provides Pitch Tone based on the SpO_2 value

19.7 Marking

Marking complies with the requirements of the following standards:

- UL 969:2006
- 21 CFR 801.1:2007
- ISO 15223:2000+A1:2001+A2:2004
- ISO 7000:2004

19.8 Performance Characteristics

19.8.1 ECG Specifications

Regulations

Complies with the following regulations:

- ANSI/AAMI EC11 / EC13:2001/2002*
- ANSI/AAMI EC57:1998 (R2003)
- IEC 60601-2-27:2005 / EN60601-2-27:2006
- IEC 60601-2-25:1993 + A1:1999 / EN60601-2-25:1995 + A1:1999

** Accuracy of input signal reproduction: Methods A & D were used, as prescribed in section 3.2.7.2 and 4.2.7.2 of this standard, to establish overall system error and frequency response. Because of the sampling characteristics and the asynchronism between sample rate and signal rate, the Passport V may produce a noticeable modulating effect from one cycle to the next, particularly in pediatric recordings. * Heart Rate Meter Accuracy and Response to Irregular Rhythm: Ventricular bigeminy: 80 bpm; Slow alternating ventricular bigeminy: 60 bpm; Rapid alternating ventricular bigeminy: 120 bpm; Bidirectional systoles: 90 bpm. * Response time to HR change: From 80 to 120 bpm: less than 11 s; From 80 to 40 bpm: less than 11 s * Time to alarm for tachycardia: <11s (measured in accordance with EC 13 and IEC 60601-2-27)*

ECG Function and Specifications

Measured Parameters:

- HR
- ST value
- PVCs
- Arrhythmia events

ST Unit

- mm
- The unit conversion of ST value: 10mm/mV

Lead Type (Optional 3- and 5-lead sets)

- 3-lead: displays I, II or III
- 5-lead: displays I, II, III, aVR, aVL, aVF, and V

Intelligent Detection of Lead Sets

- Automatic detection of 3- or 5-lead ECG lead when ECG leads are connected to the patient.

Waveform Sweep Velocity

- 6.25mm/s, 12.5mm/s, 25.0mm/s, 50mm/s; its accuracy complies with 50.102.7 of IEC60601-2-27:2005.

Display Size

The accuracy error above is less than ±5%; the change in display sensitivity complies with 50.102.6 of IEC 60601-2-27:2005.

- 1.25mm/mV (×0.125)
- 2.5mm/mV (×0.25)
- 5mm/mV (×0.5)
- 10mm/mV (×1)
- 20mm/mV (×2)
- 40mm/mV (×4)

ECG Signal Range

- +/- 8mV (peak-to-peak value); the output accuracy of signals complies with 50.102.1 of IEC60601-2-27:2005.

Calibration Signal

- 1mV (peak-to-peak value)
- Accuracy: 5% or 40µV, whichever is greater

Detected RTI Range of Measured ECG Signals

- 4.88 uV, ±8 mV when gain is ×0.125, ×0.25, ×0.5, ×1, ×2, ×4.

ECG Calibration mode

- Manual Calibration

Input Impedance

> 5 Mohms

Bandwidth (-3dB)

- Surgical mode: From 1 to 20 Hz
- Monitor mode: From 0.5 to 40 Hz
- ST Mode: From 0.05 to 40 Hz
- Diagnostic mode: From 0.05 to 150 Hz

Common Mode Rejection Ratio

- Monitor mode: >105 dB measured at 50 and 60 Hz
- Surgical mode: >105 dB measured at 50 and 60 Hz
- ST mode: > 105 dB measured at 50 and 60 Hz
- Diagnostic mode: >90 dB measured at 50 and 60 Hz

Notch Filter

- Notch filter settable to 50 Hz or 60 Hz

Input Bias Current

- ≤ 0.1 µA .
- Complies with 4.2.5 of ANSI/AAMI EC13:2002.

Electrode Offset Potential Tolerance

- +/- 500 mV
- Complies with 4.2.9.1 of ANSI/AAMI EC13:2002

RTI Noise

- ≤ 30 µV (p-v RTI)
- Complies with 4.2.9.3 of ANSI/AAMI EC13:2002.

ESU (Electrosurgical Unit) Interference Suppression

- Incision mode: 300W
- Coagulation mode: 100W
- Recovery time : ≤ 10s
- Complies with 4.2.9.14 of ANSI/AAMI EC13:2002.

RTI Suppression of ESU (Electrosurgical Unit)

- ESIS ECG cable is used.
- ECG lead wires complying with AAMI is used; compared with ECG baseline, the peak-to-peak RTI value: ≤ 2mV.
- The testing method complies with 5.2.9.14 of EC13:2002.

ESU Filter Control

- Auto / Off indications:
  - Auto: ESU detection shall engage the surgical mode filter if the ESU detection measures ESU pulses at a rate > 50 Hz or > 50 spikes per second. ESU detection shall stop the surgical mode filter if the ESU detection measures ESU pulses at a rate < 10 Hz or < 10 spikes per second.
  - Off: ESU filter is off.

Baseline Recovery Time

- <5s after defibrillation (in monitor and surgical mode)

Defibrillation Protection

- Withstand discharged current at 360J and keep undamaged.
- Complies with 17h.101.1of IEC 60601-2-27

AC Overload Protection

- 50 Hz/60 Hz, 1Vp-p, lasting10s; when the overload voltage is removed, the monitor will return back to normal within 3 seconds

Defib. Synchronous Pulse

- The time interval between the peaks of R-waves to the start of synchronous pulses is ≤ 35ms.

Multi-leads Display Interruption

- ≤ 5%; Complies with 50.201.5 of IEC60601-2-27:2005.

PACE Pulse Display

- On/Off indications:
  - When "Paced" is set to "On", the PACE marker is displayed.
  - When "Paced" is set to "Off", the PACE marker is not displayed.
- Pace pulse markers:
  - PACE markers are displayed on screen for pulses meeting the following requirements:
  - Amplitude: From ±2mV to ±700mV
  - Width: From 0.1 ms to 2.0 ms
  - Rise time: From 10µs to 100µs
  - Pacer tails with amplitudes < 2.0mV and time constants from 4 to 100 ms.

HR Mean Value

- Complies with 4.1.2.1 d of ANSI/AAMI EC13-2002.
- HR mean value is derived from the average RR intervals of the recent 16 beat.
  - 4 beat average and 16 beat averages are calculated at all times.
  - If 4 beat average is less than 48 BPM, then the 4 beat average is displayed.
  - If the 4 beat average is greater than or equal to 48 BPM then the 16 beat average is displayed.
- Displayed HR value is refreshed every 1 second.

Pace Pulse Rejection

- HR calculation rejects pulses with amplitude between ±2mV to ± 700 mV and width between 0.1 ms and 2 ms (no tails).
- To enable about 50% pace pulses with fig.5d (EC13, at page 28) waveforms to trigger pace pulse detector, the minimum input waveform change rate is 50 V/s RTI.

ECG Specifications

Mortara Arrhythmia (V3.2)

- HR range
  - 15 BPM to 300 BPM Adult,
  - 15 BPM to 350 BPM pediatric,
  - 15 BPM to 350 BPM neonatal

  Accuracy: '+/- 5 % for heart rates between 251 BPM' and 350 BPM, the greater of '+/- 3 BPM' or 3% for heart rates between 30 BPM and 250 BPM'

Tall T waves Rejection

- Complies with 4.1.2.1 c of ANSI/AAMI EC13-2002.
- HR calculation is not affected for T-waves whose QRS complex is 100ms, QT interval is 350ms, lasting time is 180ms and amplitude less than 1.2mv.

ST Segment Analysis

- Scope: ST analysis is available for Adult and Pediatric patients only.
- ST Measurement Point
  - ST measurement point can be manually adjusted: J+60 and J+80 (default: J+60 ms).
  - ISO point can be manually adjusted: from 4 to 200 ms before R waves (default: 80ms) and adjusted interval: 4ms.
  - J point can be manually adjusted: from 4 to 200 ms after R waves (default: 48ms).
- Real Time Reference of ST Segment Analysis: Supported.
- Refresh Rate of ST Reference: 16 beats.

Arrhythmia Analysis

- Scope: Arrhythmia analysis is available for Adult and Pediatric patients only.
- Arrhythmia Type: 11 kinds of Arrhythmia events are included:
  ASYSTOLE, V-FIB, V-TACH, VRHYTHM, COUPLET, RUN, BIGEMINY, TRIGEMINY, IRREGULAR HR, BRADY, PVCs per minute

Screen Display and UI Element

ECG Normal Display

- Lead Set
  - 3-, 5-lead set
- Waveform Display
  - One ECG waveform is displayed for 3-lead lead set.
  - Up to 7 waveforms are optionally viewable using a 5-lead lead set. Default two waveforms are II, V.
- Displayed Parameters
  - HR label
  - HR value
  - HR source
  - HR alarm limit
  - PVCs
  - ST value and unit

ECG Multi-leads Display

- Lead Set
  - 5-lead
- Screen Display
  - Full screen display of seven ECG waveforms: I, II, III, aVR, aVL, aVF, and V

Data Storage

Physiological Parameters

- HR
- PVCs
- ST for 3-lead, ST one value of I, II or III is stored.
- For 5-lead, ST values of I, II, III, aVL, aVR, aVF and V are stored.

19.8.2 RESP

Function and Specification

- Measured Parameters: RR, Waveform
- Measurement Method: Trans-thoracic impedance
- Intended Patient: Adult, Pediatric, Neonatal
- Measured Lead: Optional RA-LA or RA-LL; default RA-LL
- Waveform Gain Adjustment: Optional 1, 2, 3, 4, and 5
- Waveform Refresh Velocity: Optional 3.125, 6.25, 12.5 and 25.0mm/s
- Differential Input Impedance: More than 5Mohms
- Excitation Current: < 620 µA RMS
- Baseline Impedance Range: From 200 to 2500 ohms (use the ECG cable with 1 kohms resistance)
- Respiration Impedance Range: From 0.3 to 5 ohms
- Linear Signal Range: Minimum 3 ohms p-p
- Bandwidth: From 0.2 to 2 Hz (-3 dB)
- RTI Noise: < 0.1 ohms (peak value) (with standard ECG cables and patient impedance 500 ohms)
- RR spec
  - Range
  - Adult: From 0 to 120 RPM
  - Pediatric and neonatal: From 0 to 150 RPM
  - Resolution: 1 RPM
  - Accuracy: From 6 to 150 RPM: ±2 RPM or ±2%, whichever is greater
  - From 0 to 5 RPM: not specified
- Apnea Alarm
- Artifact (CVA) Notification

Screen Display and UI Element

RESP Normal Display

- Waveform Display
  - Respiration waveform (thoracic impedance)
  - Waveform label
  - Waveform gain
  - Lead selected
- RR Source

Data Storage

- Respiration Rate

19.8.3 IBP

Regulations

EN60601-2-34 / IEC60601-2-34:2000

Function and Specifications

- Measured Parameters: Systolic pressure, diastolic pressure, means pressure, PR
- Intended Patient: Adult, Pediatric, Neonatal
- Measurement Method: Direct invasive measurement
- Pressure label (default: Art and CVP):

Art	Arterial pressure	PA	Pulmonary artery
CVP	Central venous pressure	RA	Right atrial pressure
ICP	Intracranial pressure	LA	Left artrial pressure
LV	Left ventricular pressure	UA	Umbilical arterial pressure
P1~P2	Unspecified pressure labels		

- Pressure Unit: mmHg
- Calibration Accuracy Range: ± 200 mmHg
- Calibration Accuracy: ± 1 mmHg
- RTI: <0.5 mmHg RTI, 300 Ohm source resistance
- Drift: <0.15 mmHg/°C; less than ± 1 mmHg within 24 hours
- Pressure Transducer:
  - Excitation voltage: 5VDC, ±2%
  - Sensitivity: 5 uV/mmHg/Volt
  - Resistance range: From 300 to 3000 ohms
  - Volume displacement in mm^3/100 mm Hg may be provided in the transducer Instructions For Use.
  - supplied with the EQUIPMENT.
- Pressure Calibration: Supported
- Pressure Measurement specifications:
  - Measurement range: From -50 to +300 mmHg
  - ART, UA: From 0 to 300 (mmHg)
  - PA: From-6 to 120 (mmHg)
  - CVP: From -10 to 40 (mmHg)
  - RA, LA, ICP: From -10 to 40 (mmHg)
  - LV: From 0 to 60 (mmHg)
  - P1~P2: From -50 to 300 (mmHg) (Accuracy: 2% or 1mmHg, whichever is greater (excluding errors caused by a transducer); Resolution:1 mmHg)

- Refresh Rate: 1s
- Filter: Optional three bandwidths:
  - -3 dB point at 8 +/- 1 Hz,
  - -3 dB point at 12 +/- 1 Hz,
  - -3 dB point at 20 +/- 1 Hz,
- Alarm: Systolic pressure, diastolic pressure, mean pressure.

Automatic Scaling: Supported

- Data Storage: Physiological parameter: Systolic pressure, Diastolic pressure, Mean pressure

19.8.4 NIBP Performance and Functional Characteristics

The NIBP function is capable of providing systolic, diastolic, and mean blood pressure measurements in Neonate, Pediatric, and Adult modes non-invasively, using a blood pressure cuff.

The NIBP function is in accordance with the requirements of EN 60601-2-30, EN 1060-1, EN 1060-3, and SP 10.

Systolic Pressure Measurement

Accuracy:	Mean error is less than ± 5 mmHg, Standard Deviation is less than ± 8 mmHg.
Range:	
Adult Mode	55 to 235 mmHg
Pediatric Mode	55 to 160 mmHg
Neonatal Mode	45 to 120 mmHg

Diastolic Pressure Measurement

Accuracy:	Mean error is less than ± 5 mmHg, Standard deviation is less than ± 8 mmHg.
Range:	
Adult Mode	30 to 200 mmHg
Pediatric Mode	30 to 150 mmHg
Neonatal Mode	20 to 100 mmHg

Static Pressure Measurement

Range:	0-300 mmHg
Static Accuracy:	± 3 mmHg

Maximum Cuff Pressure

Hardware Maximum Cuff pressure:

Adult Mode:	330 mmHg
Pediatric Mode:	220 mmHg
Neonatal Mode:	165 mmHg

Software Maximum Cuff pressure:

Adult Mode:	300 mmHg
Pediatric Mode:	200 mmHg
Neonatal Mode:	145 mmHg

Cuff Inflation

The **Passport V** is capable of supplying sufficient air to bring a volume of at least 200 cc (12 cubic inches) to a pressure of 300 mmHg in no more than 10 seconds, unless otherwise stated. (ANSI/AAMI SP10A-1996)

If the cuff is not inflated to the desired pressure within 60 seconds then the cuff is vented and a retry cycle is initiated, up to 3 times.

Maximum Leakage

The maximum allowed pressure drop with the bleed valves closed is 10 mmHg in 10 seconds as measured with a 500 cc volume at differential pressures of 250 mmHg, 150 mmHg and 50 mmHg (Reference ANSI/AAMI SP10-1992, EN1060-3, 1997).

Vent Rate

A volume of 500 cc, when vented, is reduced from a pressure of 260 mmHg to a pressure of 15 mmHg in a maximum of 10 seconds. For Neonate, from a pressure of 150 mmHg to a pressure of 5 mmHg in less then 5 seconds (Reference: EN1060-3, 1997).

Initial Conditions

An NIBP Zero is performed automatically before the NIBP can be initiated.

NIBP Start Pressure Settings and Ranges

The Start Pressure is adjustable throughout the following ranges and is set to the following defaults:

PATIENT SIZE	USER-SELECTABLE START PRESSURE RANGE	INCREMENT SIZE	DEFAULT SETTING
Adult Mode	100-280 mmHg	5 mmHg	180 mmHg
Pediatric Mode	60-180 mmHg	5 mmHg	140 mmHg
Neonatal Mode	40-120 mmHg	5 mmHg	100 mmHg

NIBP Measurement Cycle

The Maximum Measurement Cycle Duration is 180 sec for Adult and Pediatric patients (Reference: EN60601-2-30, 1995).

The Maximum Measurement Cycle Duration is 90 sec for Neonatal patients (Reference: EN60601-2-30, 1995).

Pulse Rate Range for NIBP Measurement

PATIENT SIZE	RANGE	ACCURACY
Adult Mode	35 - 245 bpm	The greater of ± 3 bpm or ± 3%
Pediatric Mode	35 - 245 bpm	The greater of ± 3 bpm or ± 3%
Neonatal Mode	70 - 245 bpm	The greater of ± 3 bpm or ± 3%

19.8.5 Masimo SET SpO_2 Performance Requirements

Sensor Compatibility

LNOP® and LNCS® Series

Measured Parameters

SpO_2 and PR

SpO_2 Measurement Range

From 1% to 100%

SpO_2 Accuracy

A functional tester or patient simulator not used to assess the accuracy of the pulse oximeter probe or a pulse oximeter monitor.

No motion conditions[1]:

	SATURATION RANGE		
PATIENT SIZE	**70% TO 100%**	**50% TO 69%**	**1-49%**
Adult Mode	± 2%	± 3%	unspecified
Pediatric Mode	± 2%	± 3%	unspecified
Neonatal Mode	± 3%	± 3%	unspecified

During motion conditions[2]:

	SATURATION RANGE	
PATIENT SIZE	**70% TO 100%**	**1-69%**
Adult Mode	± 3%	unspecified
Pediatric Mode	± 3%	unspecified
Neonatal Mode	± 3%	unspecified

1 Masimo SET technology with LNOP and LNCS sensors have been validated for no motion accuracy in human blood studies on healthy adult volunteers in induced hypoxia studies in the range of 70-100% SpO2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation, which encompasses 68% of the population.

2 Masimo SET technology with LNOP and LNCS sensors have been validated for motion accuracy in human blood studies on healthy adult volunteers in induced hypoxia studies while performing rubbing and tapping motions, at 2 to 4 Hz at an amplitude of 1 to 2 cm and a non-repetitive motion between 1 to 5 Hz at an amplitude of 2 to 3 cm in induced hypoxia studies in the range of 70-100% SpO2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation, which encompasses 68% of the population.

Resolution

1%

Average Time

Optional 2-4 seconds, 4-6 seconds, 8 seconds, 10 seconds, 12 seconds, 14 seconds, 16seconds

Refresh Rate

1s

SpO_2 Response Time

The response time is 18 seconds to 95% of final step change of % SpO_2 value from 60 to 95% at 75 bpm. Post averaging time is set at 8 seconds.

Sensitivity

Normal and high sensitivity modes are optional. The sensitivity mode affects the measurement of dim signals.

Low Perfusion Performance

LOW PERFUSION CONDITIONS			
PULSE AMPLITUDE	**% TRANSMISSION**	**SATURATION ACCURACY**	**PULSE RATE ACCURACY**
> 0.02%	> 5%	± 2 digits	± 3 digits

Pulse Rate Range and Accuracy

		ACCURACY	
PATIENT SIZE	**PULSE RATE RANGE**	**NO MOTION CONDITIONS**	**DURING MOTION CONDITIONS**
Adult / Pediatric / Neonate	25 to 240 bpm	± 3 digits	± 5 digits

Masimo SET® Reference notes

The Masimo SET MS-3 pulse oximeter with LNOP®•Adt sensors has been validated for no motion accuracy in human blood studies on healthy adult volunteers in induced hypoxia studies in the range of 70% to 100% SpO_2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

The Masimo SET MS-3 pulse oximeter with LNOP®•Adt sensors has been validated for motion accuracy in human blood studies on healthy adult volunteers in induced hypoxia studies while performing rubbing and tapping motions at 2 to 4 Hz. At an amplitude of 1 to 2 cm and non-repetitive motion between 1 to 5 Hz. At an amplitude of 2 to 3 cm in induced hypoxia studies in the range of 70% to 100% SpO_2 against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

The Masimo SET MS-3 pulse oximeter with LNOP®•Neo and Neo•Pt sensors has been validated for neonatal motion accuracy in human blood studies on neonates while moving the neonate's foot at 2 to 4 Hz at an amplitude of 1 to 2 cm against a laboratory co-oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.

The Masimo SET MS-3 pulse oximeter has been validated for low perfusion accuracy in bench top testing against a Biotek Index 2 simulator and Masimo's simulator with signal strengths of greater then 0.02% and a % transmission of greater than 5% for saturation's ranging from 70 to 100%. This variation equals plus or minus one standard deviation. Plus or minus on standard deviation encompasses 68% of the population.

The LNOP ear sensors have an SPO_2 accuracy of 70% to 100% ±3.5% for adults during no motion conditions, however, since the monitor cannot display ½ digits, the accuracy rounded to ±4 digits. The SPO_2 accuracy during motion conditions is not specified for the LNOP ear sensors.

LNOP & LNCS Sensors with MMS/MS-13/MS-11: Summary of Accuracy Validation (TR-14864, DRO-22379, Revision C): With the exception of the LNOP Blue sensor and unless otherwise noted in CSD-1109 or CSD-1110, the above sensors [LNOP & LNCS Sensors] were clinically validated for motion and no motion conditions on healthy male and femaile adults with light to dark skin pigmentation.

Sensor Measurement Wavelengths

The sensor measurement wavelengths are nominally 660 nm for the red LED and 940 nm for the infrared LED. Maximum optical power output for the LEDs is 4 mW. This information may be useful to clinicians, such as those performing photodynamic therapy.

19.8.6 DPM SpO_2 Performance Requirements

Measured Parameters

SpO_2, PR

SpO_2 Measurement Range

From 0 to 100%

Accuracy

	SATURATION RANGE	
PATIENT SIZE	**70% TO 100%**	**0-69%**
Adult Mode	± 2% ABS	unspecified
Pediatric Mode	± 2% ABS	unspecified
Neonatal Mode	± 3% ABS	unspecified

Pulse Rate Range and Accuracy

PATIENT SIZE	PULSE RATE RANGE	ACCURACY (NO MOTION CONDITIONS)
Adult / Pediatric / Neonate	20 to 254 bpm	± 3 digits

Resolution

1%

Sensitivity

High, medium and low sensitivity are provided.

Refresh Rate
1s

Response Time
The maximum update period of saturation and pulse rate are 13s (% SpO2 value from 60 to 95% at 75 bpm) and 12s (bpm value from 60bpm to 100bpm).

SpO_2 Pitch Tone Adjustment
The systole beep is generated for each heart beat detection. The source for the trigger may be from the ECG, IBP (Art, UAP, LV, PAP), or SpO_2. The frequency of the tone is determined by the SpO_2 value if it is present.

Low SpO_2 Alarm Limit
Exclusive alarm. Alarm limit range is between 76 and 99 and is correlated with SpO_2 alarm low limit.

Alarm Suppression of Monitoring NIBP and SpO_2 Simultaneously
When NIBP and SpO_2 are monitored on the same limb simultaneously, users can choose this function to suppress the false alarm during the period of venous block.

Alarm
SpO2 and PR alarms are optional.

DPM SpO_2 Module Accuracy
The DPM SpO_2 module accuracy has been validated in human studies against arterial blood sample reference measured with a co-oximeter. Pulse oximeter measurements are statistically distributed, and about two-thirds of the measurements can be expected to fall within the specified accuaracy compared to the co-oximeter measurements.

Sensor Measurement Wavelengths
The sensor measurement wavelengths are nominally 660 nm for the red LED and 905 nm for the infrared LED. Maximum optical power output for the LEDs is 18 mW. The maximum photic output consumption of the sensor is less than 18 mW. This information may be useful to clinicians, such as those performing photodynamic therapy.

19.8.7 Nellcor SpO_2

Measurement Range
From 0 to 100%

Accuracy

	SATURATION RANGE	
PATIENT SIZE	**70% TO 100%**	**0-69%**
Adult Mode	± 2%	unspecified
Pediatric Mode	± 2%	unspecified
Neonatal Mode	± 3%	unspecified

Pulse Rate Range and Accuracy

PATIENT SIZE	PULSE RATE RANGE	ACCURACY (NO MOTION CONDITIONS)
Adult / Pediatric / Neonate	20 to 250 bpm	± 3 digits

Response Time

During normal measurement conditions, the averaging time is six to seven seconds.

Refresh Rate

1s

Sat-Seconds

Alarms are triggered only when set Sat-Seconds is violated. Sat-seconds is set by multiplying the number of percentage points that the SpO_2 saturation falls outside the alarm limit with the number of seconds that it remains outside the limit. Optional threshold value: 0, 10, 25, 50, or 100

Alarm

Optional SpO_2 and PR alarm

Sensor Measurement Wavelengths

SpO_2 sensors contain light emitting diodes (LEDs) that emit red light at a wavelength of approximately 660nm, and infrared light at a wavelength of approximately 900nm. The total optical output power of the sensor LEDs is less than 15mW. This information may be useful to clinicians, such as those performing photodynamic therapy.

19.8.8 CO_2 Performance Characteristics

The CO_2 function is in accordance with the requirements of ISO 21647.

The **Passport V** is capable of providing CO_2 measurements from either a DPM Sidestream capnography module, or an Oridion miniMediCO$_2$ capnography module.

The **Passport V** is equipped with automatic barometric pressure compensation.

The CO_2 function is in accordance with the requirements of ISO 21647.

miniMediCO$_2$ Microstream®

Range: 0 - 99 mmHg

Accuracy specification of the measured CO_2 partial pressure is according to the following table (This testing is done according to ISO 21647 clauses 51.101.1 and 51.101.2.).

CO_2 PARTIAL PRESSURE *	**ACCURACY****
0 - 38 mmHg	± 2 mmHg
39 - 99 mmHg	± (5% of reading + 0.08% for every 1 mmHg above 38 mmHg)

* *At sea level.*

** *Accuracy applies for respiration rates of up to 80 RPM. For respiration rates above 80 RPM, accuracy is 4 mmHg or ± 12% of the reading, whichever is greater, for $EtCO_2$ values exceeding 18 mmHg. This is tested according to and is compliant with ISO 21647. To achieve the specified accuracies for respiration rates above 60 respirations/minute, the Microstream FilterLine H Set for Infant/Neonatal (p/n 006324) must be used. Above 55 degrees C module temperature, ± 1 mmHg or ± 2.5% (whichever is greater) has to be added to the tolerance of the accuracy specs.*

Accuracy in the presence of interfering gases:

The accuracy specification is maintained to within 4% of the values indicated in the table above in the presence of interfering gases according to ISO 21647 clauses 51.101.3 and 101.1. The accuracy specification is maintained to within 4% of the values indicated in the table above in the presence of up to 80% Helium with up to 15% oxygen when tested according to the procedures defined by ISO 21647.

Flow Rate: 50 ml/min -7.5 + 15 ml/min, flow measured by volume.

Respiration Rate Range: 0 - 150 RPM

Respiration Rate Accuracy:

Respiration Rate	0 to 70 RPM	71 to 120 RPM	121 to 150 RPM
Accuracy	± 1 RPM	± 2 RPM	± 3 RPM

Self Maintenance (SFM) Interval:

Self-Maintenance (SFM) is performed only during measurement mode. The module performs one or more of the following:

- Ambient pressure measurement
- Auto zero (AZ)
- Flow test

SFM is triggered under the following conditions:

- During the first hour after entering measurement mode, periodically for durations of typically 10 seconds at a rate which limits the total time consumed by SFMs to less than 2% of the time in which active measurements are taken. Following the first hour

after entering measurement mode, periodically for durations of typically 10 seconds at a rate of at most once per hour.

- If a change of 8 °C from the last AZ is detected.
- If a pressure change of 20 mmHg relative to the last ambient pressure measurement (less than the purge threshold) for a period of 30 seconds is detected. The module will be able to detect a real change in the ambient pressure and a pressure change due to partial blockage of the FilterLine.

The module prevents the triggering of an SFM in the following situations:

- In case of purging until the end of this state.
- During a breath absence period which follows a valid breath.
- While waiting a minimum of 20 seconds for host SFM enable command. (After the 20-second opportunity given to the host to schedule the SFM passes, the module schedules the SFM according to a priority determined by current conditions).

System Response Time:	The system response time (with a standard-length FilterLine) which includes the delay time and rise time (10% to 90%) in response to a step change in the CO_2 concentration is 2.9 seconds typical.
Rise Time (Adult and Neonatal):	190 msec maximum
Delay Time:	2.7 seconds typical
Pump Calibration Interval:	No routine calibration is required. The module should initially be calibrated after 1200 operating hours, then once a year or after 4,000 operating hours, whichever comes first.
Initialization Time:	Time to full accuracy (power on to first reading): Typically 30 seconds for both reading and waveform (max 180 seconds). At full accuracy when value appears.

DPM CO_2

CO_2	CO_2 measurement range:	0-99 mmHg
	Measurement accuracy:	±2mmHg (0-40mmHg) ±5% of reading (41-76mmHg) ±10% of reading (77-99mmHg)
	Resolution:	1mmHg
	Sampling rate:	50Hz

Respiration Rate	Measurement range:	0-120 RPM
	Measurement accuracy:	±2 RPM
	Resolution:	1 RPM

Rise Time

<240ms @150ml/min
<300ms@120ml/min
<330ms@100ml/min
<400ms@70ml/min

Delay Time

<2.5s@150ml/min
<3s@120ml/min
<3s@100ml/min
<3.5s@70ml/min

Measurement conditions: use a neonatal watertrap and 2.5m neonatal sampling line.

<4s@150ml/min
<5s@120ml/min
<5s@100ml/min
<6.5s@70ml/min

Measurement conditions: use an adult watertrap and 2.5m adult sampling line.

Response Time

<3s@150ml/min
<3s@120ml/min
<3.5s@100ml/min
<4s@70ml/min

Measurement conditions: use a neonatal watertrap and 2.5m neonatal sampling line.

<4.5s@150ml/min
<5.5s@120ml/min
<5.5s@100ml/min
<7s@70ml/min

Measurement conditions: use an adult watertrap and 2.5m adult sampling line.

Quantitative Influence of Interference Gas	Interference gas	Concentration Level (%)	Quantitative Influence
			When measuring under 0~40mmHg, additional error introduced due to gas interference
	N_2O	60	±1mmHg
	HAL	4	±1mmHg
	SEV	5	±1mmHg
	ISO	5	±1mmHg
	ENF	5	±1mmHg
	DES	15	±2mmHg
	Helium	Unspecified	
	Xenon	Unspecified	

Start Time:	30 s (typical) 60s (maximum)
Warm-up Time:	1 min
Flowrate:	Options are 70ml/min, 100ml/min, 120ml/min and 150ml/min.
Flowrate Accuracy:	±15% or ±15ml/min, whichever is greater

19.8.9 Temperature Performance Characteristics

The **Passport V** is capable of providing temperature measurements from one channel for 400 series probe.

Measuring range: 0 - 50°C (32 -122°F)
Resolution: 0.1°C (0.1°F)
Scale: °C, °F
Tabular Trend: Yes
Graphic Trend: Yes
Clinical Common Range Default of Graphic Trend: 32 - 43°C (90 - 110°F)

400 Series Probes:
Scale: Celsius or Fahrenheit
Range: 59° F to 113° F
Resolution: 0.1° C (0.1° F)
Accuracy: ± 0.1° C (15° C - 45° C), exclusive of probe errors, ± 0.2° F (59° F - 113° F), exclusive of probe errors
Accuracy inclusive of 400 Series probes:
± 0.1° C (25° C - 42° C), ± 0.2° C (otherwise),
± 0.2° F (77° F - 108° F), ± 0.4° F (otherwise)
Probe Excitation: < 200 µA, tip to sleeve.

The minimum measuring time required to obtain an accurate reading at the specified body site is probe-dependent and should be indicated on the probe Instructions For Use.

For each temperature probe, information about the proper environmental conditions of use, storage, and transport including temperature and humidity should be contained in the probe Instructions For Use.

19.8.10 Gas Module Performance Characteristics

Technology	NDIR type gas analyzer measuring at 3.9 – 12.8 µm with paramagnetic oxygen sensor. Pressure, temperature and full spectral interference correction.	
Operating modes	Startup ISO accuracy Full accuracy	
Measured gases	CO_2, N_2O, O_2, HAL, ENF, ISO, SEV, DES	
Measured parameters	Momentary gas concentration Inspired and expired concentrations of all gases Breath rate	
Resolution	CO_2 and agents: 0.01%; O_2 and N_2O: 0.1%	
Warm-up time	ISO accuracy within 45 s, full accuracy within 10 min	
ISO Accuracy Specifications[1]	As Full Accuracy Specifications, but de-rated as follows: • Add ± 0.3% ABS to inaccuracy for CO_2 • Add ± 8% REL to inaccuracy for all Agents • N_2O inaccuracy is ± (8% REL + 2% ABS) • O_2 no addition	
Rise times (t10–90%)[2] @200 ml/min	• CO_2	250 ms (fall time 200 ms)
	• N_2O	250 ms
	• O_2	500 ms
	• HAL, ISO, SEV, DES	300 ms
	• ENF	350 ms

Rise times (t10–90%)[3] @120 ml/min	• CO_2	250 ms (fall time 200 ms)
	• N_2O	250 ms
	• O_2	600 ms
	• HAL, ISO, SEV, DES	300 ms
	• ENF	350 ms
Delay time[4] (t0—10%)	< 4 s	
Identification	Dual agent	
Primary agent ID threshold[5]	0.15% (0.4% during ISO accuracy mode)	
Secondary agent ID threshold[5]	0.3% (0.5% during ISO accuracy mode) or 5% REL (10% REL for Isoflurane) of primary agent if primary agent >10%	
Agent ID time	Three breaths - Typically less than 10 s	
Display Update Rate	Breath-by-Breath	
Compensation	The Gas Module 3 is equipped with automatic barometric pressure compensation.	
Main Fuse	2x T0.8A 250V	

1 Includes interference from other gases.

2 The step rise time specification at 200 ml/min sample flow includes DRYLINE• Water Trap, Adult/Pediatric and DRYLINE• Sampling Line, Adult/Pediatric 2.5 m.

3 The step rise time specification at 120 ml/min sample flow includes DRYLINE• Water Trap, Neonate and DRYLINE• Sampling Line, Neonate 2.5 m.

4 The delay time specification is valid both for 120 ml/min sample flow (using DRYLINE• Water Trap, Neonate and DRYLINE• Sampling Line, Neonate 2.5 m) and for 200 ml/min sample flow (using DRYLINE• Water Trap, Adult/Pediatric and DRYLINE• Sampling Line, Adult/Pediatric 2.5 m).

5 For HAL, add 0.1% ABS to threshold values.

19.9 Input/Output Communications

ECG Analog Output Specification

Bandwidth (-3 dB referenced to 10 Hz):	0.5 to100Hz
Maximum Transmission Delay:	≤25 ms (with notch on)
Sensitivity (referenced to 10 Hz):	1 V/mV of input, ± 10%
Pacer Enhancement:	Amplitude: +5 V±5 %. Width: 2 ±10 % ms.

Arterial Blood Pressure Analog Output Specification

Bandwidth (-3 dB referenced to 1 Hz):	0~12.5Hz
Maximum Transmission Delay:	<25 ms
Sensitivity:	1 V/100 mmHg, ±4% (reference frequency 1Hz)

Defib Sync Pulse

Connector:	BNC AUX connector (Meets the requirements of EC60601-1 for short-circuit protection and leakage current.)
Max time delay:	35 ms (R-wave peak to leading edge of pulse)
Amplitude:	High level: 3.5~5V, providing a maximum of 1 mA output current; Low level: <0.5V, receiving a maximum of 5 mA input current.
Pulse Width:	100 ms ±10 %
Output Impedance:	50Ω
Limited Current:	15mA rating
Rising and Falling Time:	<2ms

19.10 Communication Protocols

DIAP Communication Protocol

The **Passport V** supports the proprietary DIAP (0070-00-0307).

Gas Module

The **Passport V** supports the Gas Module Communication Protocol (0084-00-0025).

Alarm Delay Time to Remote Equipment

The alarm delay time from the **Passport V** to remote equipment is ≤ 2 seconds, measured at the **Passport V** signal output connector.

19.11 Data Storage

Monitor Configuration Data Storage and Transfer

Storage

The monitor has the ability to store, in non-volatile memory, the user-selectable configuration. There is one (1) configuration available for each patient size and the following information is saved:

- Alarm Values
- Display Configurations
- NIBP Interval
- Parameter Settings, Scaling
- Trace Speed
- Printer Settings
- Trend Configurations

Patient Data Storage and Transfer

Storage

The current patient information and demographics is stored in non-volatile memory.

19.12 Printing

Integrated Thermal Printer

The integrated printer is a maximum 3-trace thermal strip chart printer with integral paper spool.

The printer uses plain white thermal paper 5 cm wide.

The printer supports 5 paper speeds: 6.25, 12.5, 25, and 50 mm/sec., each within ± 5%.

The printer sensitivity is ± 5% on a single trace, and 50% if scale for dual trace, ±5%.

19.13 Agency Compliance

Passport V

The **Passport V** is designed to comply with the following industry standards:

- ANSI/AAMI SP10:1992/A1:1996
- ANSI/AAMI EC11:2001
- ANSI/AAMI EC13:2002
- ASTM E1112-00
- CEI/IEC60601-1-6:2006
- CEI/IEC60601-1-8:2006
- CSA Standard C22.2 No. 601.1M90
- EN 60601-1/IEC 60601-1
- EN 60601-1-1/IEC 60601-1-1
- EN 60601-1-4/IEC 60601-1-4
- EN 60601-2-27/IEC 60601-2-27
- EN 60601-2-30/IEC 60601-2-30
- EN 60601-2-34/IEC 60601-2-34
- EN 60601-2-25/IEC 60601-2-25
- EN 60601-2-49/IEC 60601-2-49
- EN 1060-1:1995 + A1:2002
- EN 1060-3:1997+A1 2005
- EN 12470-4:2000
- IEC 60601-1-2:2001+A1:2004
- IEC 60601-1-4:2000
- ISO 9919:2005
- ISO 14971:2007
- ISO 21647:2004+COR.1-2005
- UL 2601-1
- UL 60601-1
- The **Passport V** has been tested for functionality following ESU (Electrosurgery Unit Interference) energy exposure as described in the draft Amendment A1 to IEC 60601-2-25.

19.14 Safety Designations

19.14.1 Safety Classification

Transportable equipment intended for mobility

Type of Protection Against Electric Shock

Class I equipment

Where the integrity of the external protective earth conductor arrangement is in doubt, equipment shall be operated from its internal electrical electric power source (battery).

Degree of Protection Against Electric Shock

- ECG/RESP/IBP/TEMP: CF, defibrillation-proof
- SpO_2/NIBP/CO_2: BF, defibrillation-proof

Mode of Operation

Continuous

Protection Against Hazards of Explosion

- Not protected (ordinary equipment)
- Not for use in the presence of flammable anesthetic mixture, O_2 or N_2O.

Protection Against Ingress of Liquids

- Complies with the requirements of IEC60529: 2001, IPX1.
- Complies with the requirements of IEC60601-1:1988+A1:1991+A2:1995.

Electrical Connection Between Equipment and Patient

Direct electrical or non-electrical connection with the patient

19.14.2 Safety Performance Index

Shock

Complies with the requirements specified in ISO 9919: 2005, clause 21.101.

Vibration

- Complies with the requirements of ISO9919: 2005, clause 21.101 b).
- Complies with the requirements of IEC60068-2-6:1995, sinusoidal vibration.

Drop

- Main Unit Drop
  - Complies with the requirements of ECRI PB-296 892:1979, section AIII 3.3.
- Packaging Drop
  - Complies with the requirements specified in ISTA 2A:2006.

Impact

Complies with the requirements of ECRI PB-296 892, AIII 3.2.3 for Class 3 equipment.

Static Compression

Complies with the requirements specified in ISTA 2A.

Surface Temperature

Complies with the requirements CSA C22.2 No.601.1 M90:2003

Mechanical Stability

Complies with the requirements of IEC 60601-1: 1997, clause 24.1.

Surface, Corner, Edge

Complies with the requirements of IEC60601-1: 1997

Grip Strength

Complies with the requirements of IEC 60601-1: 1997, clause 21.c.

Incompatibility with External Connectors

- Complies with the requirements of IEC 60601-1: 1997, clauses 56.3
- Complies with the requirements of FDA Reviewer Guidance for Premarket Notification Submission November1993, N2

Rigidity and Strength of Enclosure

- Complies with the requirements of IEC 60601-1: 1997, clauses 21a, 16a and 21b.
- Complies with the requirements of UL 60601-1:2003.

Ball Pressure Test

Complies with the requirements of IEC60601-1: 1997, clause 59.2b.

Impairment of Cooling

Complies with the requirements of IEC 60601-1: 1997, clause 52.5.5

Durability of Markings

Complies with the requirements of IEC60601-1: 1997, clause 6.1.

Leakage Current

Complies with the requirements of CSA C22.2 No.601.1 M90:2003

Dielectric Strength

- Complies with the requirements of IEC 60601-1: 1997, clause 20.
- AC power to earth(A-a1): 1500VRMS, 1min/5mA
- AC power to applied part (B-a): 4000VRMS, 1min/5mA
- Applied part to earth(B-d): 1500VRMS, 1min/5mA
- Between applied parts(B-b): 1500VRMS, 1min/5mA

Earthing Impedance

- Complies with the requirements of IEC 60601-1: 1997, clause 18.
- The impedance between the protective earth terminal of the power input connector and any tangible metal part (such as screw and equipotential stud) that is protectively earthed shall not exceed 0.1 ohms.

Protective Earthing and Potential Equalization

Complies with the requirements of IEC 60601-1: 1997, clause 58.

The protective earth terminal cannot be used for mechanical connections between different parts of the equipment or for fixing any component irrelevant to protective or functional earthing.

Anti-power Interference

After interference from ESU/defibrillation/electrostatic discharge

The equipment returns to normal operation mode within 10 seconds. The display is able to show physiological parameters and waveforms normally. For example, the ECG waveform data stored are not lost.

Protection Against Power Failure

Requirements of ISO21647: 2005: provides the device to prevent AC power from disconnection and tension of 10 Kg.

If the power supply is restored after interrupted, saved presets, user settings, and patient data previous to power failure are retained or can be restored with a DPM storage device.

The monitor stores up to 96 hours of trend information (approximately 6000 trend items) when powered off. The interval for trend data is 1 minute.

Power Input

Complies with the requirements of IEC60601-1: 1997, clause 7.1.

Limitation of Voltage and (or) Energy

Complies with the requirements of IEC60601-1: 1997, clause 1.5.

Defibrillation-proof Applied Part

Complies with the requirements of IEC60601-1: 1997, clause 17.h.

19.15 Electromagnetic Capability

19.15.1 EMC Safety

The **Passport V** monitor needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information in this Instructions For Use. Portable and mobile RF communications equipment can affect the **Passport V** monitor.The **Passport V** is suitable for use in all establishments other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

Regulation Requirements

Complies with the requirements of IEC 60601-1-2: 2001+A1:2004.

Radiated Emission

Complies with the requirements of CISPR 11 (EN 55011:2007) Group 1, Class A.

Conducted Emission

Complies with the requirements of CISPR 11 (EN 55011:2007) Group 1, Class A.

Immunity Against Conducted Disturbance

Complies with the requirements of IEC 61000-4-6: 2006 for 3Vrms: Level 2, 150 KHz to 80 MHz, 3Vrms, 80% AM @ modulation frequency significant for the equipment under test.

Immunity Against Radiated Electromagnetic Fields

Complies with the requirements of IEC 61000-4-3:2001: 80 MHz to 2.5 GHz, 3V/m, 80% AM @ 2 Hz or modulation frequency significant for the equipment under test.

Electrostatic Discharge

Complies with the requirements of IEC 61000-4-2:2001 for ESD, namely, minimum of 6 kV contact discharge or 8 kV air discharge.

Electrical Fast Transient Burst

Complies with the requirements of IEC 61000-4-4:2004 for electrical fast transient burst, namely, minimum of 2 kV for power cord and 1 kV for I/O cable (more than 3 meters long).

Surge

Complies with the requirements of IEC 61000-4-5:2005 for surge interference, namely, 1 kV differential mode and 2 kV common mode of AC power.

Power Frequency Magnetic Field

Complies with the requirements of IEC 61000-4-8:2001 for power frequency magnetic field. 3A/m shall be reached based on the requirements of IEC60601-1-2.

Voltage Dips and Short Interruptions

Complies with the requirements of IEC 61000-4-11: 2001 for voltage dips and short interruptions, namely, 0 V for 0.5 cycle, 40% of V for 5 cycles, 70% of V for 25 cycles 0V for 0.5 cycles.

Harmonic Current

Complies with the requirements of EN 61000-3-2:2005 Class A.

Voltage Fluctuations and Flicker

Complies with the requirements of EN 61000-3-3:2005.

19.15.2 Passport V

The **Passport V** meets the requirements of IEC 60601-1-2/EN 60601-1-2.

NOTE: The Passport V needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided below.

NOTE: Portable and mobile RF communications equipment can affect the Passport V. See tables 19-1 through 19-4 that follow.

TABLE 19-1

GUIDANCE AND DECLARATION - ELECTROMAGNETIC EMISSIONS

The **Passport V** is intended for use in the electromagnetic environment specified below. The customer or the user of the **Passport V** should assure that it is used in such an environment.

EMISSIONS TEST	COMPLIANCE	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
RF emissions CISPR 11	Group 1	The **Passport V** uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The **Passport V** is suitable for use in all establishments other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Complies	

TABLE 19-2

GUIDANCE AND DECLARATION - ELECTROMAGNETIC IMMUNITY

The **Passport V** is intended for use in the electromagnetic environment specified below. The customer or the user of the **Passport V** should assure that it is used in such an environment.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/ output lines	±2 kV for power supply lines ±1 kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the **Passport V** requires continued operation during power mains interruptions, it is recommended that the **Passport V** be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

U_T is the A.C. mains voltage prior to application of the test level.

TABLE 19-3

GUIDANCE AND DECLARATION - ELECTROMAGNETIC IMMUNITY

The **Passport V** is intended for use in the electromagnetic environment specified below. The customer or the user of the **Passport V** should assure that it is used in such an environment.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
			Portable and mobile RF communications equipment should be used no closer to any part of the **Passport V**, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	$d = 1.2 \times \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2 \times \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \times \sqrt{P}$ 800 MHz to 2.5 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

NOTE: The device that intentionally receives RF electromagnetic energy at the exclusion band (2409.5MHz-2464.5MHz) is exempt from the wireless performance requirements, but remains safe.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Passport V is used exceeds the applicable RF compliance level above, the Passport V should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Passport V.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

TABLE 19-4

RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE AND MOBILE RF COMMUNICATIONS EQUIPMENT AND THE PASSPORT V

The **Passport V** is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the **Passport V** can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the **Passport V** as recommended below, according to the maximum output power of the communications equipment.

RATED MAXIMUM OUTPUT POWER (*P*) OF TRANSMITTER IN WATTS (W)	**SEPARATION DISTANCE (*d*) IN METERS (m) ACCORDING TO FREQUENCY OF TRANSMITTER**		
	150 kHz to 80 MHz	**80 MHz to 800 MHz**	**800 MHz to 2.5 GHz**
	$d = 1.2 \times \sqrt{P}$	$d = 1.2 \times \sqrt{P}$	$d = 2.3 \times \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

19.15.3 Radio Regulatory Compliance

RF parameter

TABLE 19-5

ITEM	DESCRIPTION		
	IEEE 802.11B	**IEEE 802.11G**	**IEEE 802.11N (20M)**
Operating Frequency B and (MHz)	2412-2462	2412-2462	2412-2462
Modulation	DSSS	OFDM-CCK	OFDM
Operating channel	1-11	1-11	1-11
Transmitter Output Power (dBm)	<30	<30	<30
FCC ID: N6C-SDMAN IC: 4908B-SDMAN			

NOTICE

Federal Communication Interference Statement (United States only)

The wireless module of this equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

Canadian Depertment of Communications Industry Canada Notice (Canada only)

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

FCC Rules, Part 15./Industry Canadian

This device complies with Part 15 of FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference, including interference that may cause undesired operation of this device.

Le présent appareil est conforme aux la partie 15 des règles de la FCC et CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- l'appareil ne doit pas produire de brouillage, et
- l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65 and RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body (excluding extremities: hands, wrists, feet and ankles).

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles les radioélectriques (RF) de la FCC lignes directrices d'exposition dans le Supplément C à OET65 et d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le dispositif rayonnant et le corps (à l'exception des extrémités : mains, poignets, pieds et chevilles).

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

19.15.4 Gas Module 3

The **Gas Module 3** meets the requirements of IEC 60601-1-2/EN 60601-1-2.

NOTE: The Gas Module 3 needs special precautions regarding EMC and need to be installed and put into service according to the EMC information provided below.

NOTE: Portable and mobile RF communications equipment can affect the Gas Module 3. See tables 19-6 through 19-9 that follow.

TABLE 19-6

GUIDANCE AND DECLARATION - ELECTROMAGNETIC EMISSIONS

The **Gas Module 3** is intended for use in the electromagnetic environment specified below. The customer or the user of the **Gas Module 3** should assure that they are used in such an environment.

EMISSIONS TEST	COMPLIANCE	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
RF emissions CISPR 11	Group 1	The **Gas Module 3** uses RF energy only for their internal function. Therefore, their RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The **Gas Module 3** is suitable for use in all establishments other than domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	Complies	

TABLE 19-7

GUIDANCE AND DECLARATION - ELECTROMAGNETIC IMMUNITY

The **Gas Module 3** is intended for use in the electromagnetic environment specified below. The customer or the user of the **Gas Module 3** should assure that it is used in such an environment.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/ output lines	±2 kV for power supply lines ±1 kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the **Gas Module 3** requires continued operation during power mains interruptions, it is recommended that the **Gas Module 3** be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

U_T is the A.C. mains voltage prior to application of the test level.

TABLE 19-8

GUIDANCE AND DECLARATION - ELECTROMAGNETIC IMMUNITY

The **Gas Module 3** is intended for use in the electromagnetic environment specified below. The customer or the user of the **Gas Module 3** should assure that it is used in such an environment.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT - GUIDANCE
			Portable and mobile RF communications equipment should be used no closer to any part of the **Gas Module 3**, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	$d = 1.2 \times \sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2 \times \sqrt{P}$ 80 MHz to 800 MHz $d = 2.3 \times \sqrt{P}$ 800 MHz to 2.5 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[a] should be less than the compliance level in each frequency range.[b] Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Gas Module 3 is used exceeds the applicable RF compliance level above, the Gas Module 3 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the or Gas Module 3.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

TABLE 19-9

RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE AND MOBILE RF COMMUNICATIONS EQUIPMENT AND THE GAS MODULE 3

The **Gas Module 3** is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the **Gas Module 3** can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the **Gas Module 3** as recommended below, according to the maximum output power of the communications equipment.

RATED MAXIMUM OUTPUT POWER (P) OF TRANSMITTER IN WATTS (W)	**SEPARATION DISTANCE (*d*) IN METERS (m) ACCORDING TO FREQUENCY OF TRANSMITTER**		
	150 kHz to 80 MHz	**80 MHz to 800 MHz**	**800 MHz to 2.5 GHz**
	$d = 1.2 \times \sqrt{P}$	$d = 1.2 \times \sqrt{P}$	$d = 2.3 \times \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

19.16 Warranty Statements

Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. warrants that components within the monitor unit will be free from defects in workmanship and materials for the number of years shown on the invoice. Under this extended warranty, Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. will repair or replace any defective component at no charge for labor and/or materials. This extended warranty does not cover consumable items such as, but not limited to batteries, displays, external cables and sensors.

Recommended preventative maintenance, as prescribed in the Service Manual, is the responsibility of the user, and is not covered by this warranty.

Except as otherwise provided herein, the terms, conditions and limitations of Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd.'s standard warranty will remain in effect.

USA, Canada, Mexico, and Puerto Rico

Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. warrants that its products will be free from defects in workmanship and materials for a period of one (1) year from the date of purchase except that disposable or one-time use products are warranted to be free from defects in workmanship and materials up to a date one year from the date of purchase or the date of first use, whichever is sooner. This warranty does not cover consumable items such as, but not limited to, batteries, external cables, sensors, cuffs, hoses, or mounts.

Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. will not be liable for any incidental, special, or consequential loss, damage, or expense directly or indirectly arising from the use of its products, liability under this warranty and the buyer's exclusive remedy under this warranty is limited to servicing or replacing at Mindray DS USA, Inc./ Shenzhen Mindray Bio-Medical Electronics Co., Ltd.'s option at the factory or at an authorized Distributor, any product which shall under normal use and service appear to the Company to have been defective in material or workmanship.

No agent, employee, or representative of Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. has any authority to bind Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. to any affirmation, representation, or warranty concerning its products, and any affirmation, representation or warranty made by any agent, employee, or representative shall not be enforceable by buyer.

This warranty is expressly in lieu of any other express or implied warranties, including any implied warranty or merchantability or fitness, and of any other obligation on the part of the seller.

Damage to any product or parts through misuse, neglect, accident, or by affixing any non-standard accessory attachments or by any customer modification voids this warranty. Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. makes no warranty whatever in regard to trade accessories, such being subject to the warranty of their respective manufacturers.

A condition of this warranty is that this equipment or any accessories which are claimed to be defective be returned when authorized by Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd., freight prepaid to Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. shall not have any responsibility in the event of loss or damage in transit.

Calibration may be performed without the need to disassemble the instrument. It is the responsibility of the purchaser to perform calibration as necessary, in accordance with the instructions provided in this manual.

International (excluding North America)

Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. warrants that its products will be free from defects in workmanship and materials for a period of two (2) years from the date of purchase except that disposable or one-time use products are warranted to be free from defects in workmanship and materials up to a date one year from the date of purchase or the date of first use, whichever is sooner. This warranty does not cover consumable items such as, but not limited to, batteries, external cables, sensors, cuffs, hoses, or mounts.

Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. shall not be liable for any incidental, special, or consequential loss, damage, or expense directly or indirectly arising from the use of its products, liability under this warranty and the buyer's exclusive remedy under this warranty is limited to servicing or replacing at Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd.'s option at the factory or at an authorized Distributor, any product which shall under normal use and service appear to the Company to have been defective in material or workmanship.

No agent, employee, or representative of Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. has any authority to bind Mindray DS USA, Inc. /Shenzhen Mindray Bio-Medical Electronics Co., Ltd. to any affirmation, representation, or warranty concerning its products, and any affirmation, representation or warranty made by any agent, employee, or representative shall not be enforceable by buyer.

This warranty is expressly in lieu of any other express or implied warranties, including any implied warranty or merchantability or fitness, and of any other obligation on the part of the seller.

Damage to any product or parts through misuse, neglect, accident, or by affixing any non-standard accessory attachments or by any customer modification voids this warranty. Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. makes no warranty whatever in regard to trade accessories, such being subject to the warranty of their respective manufacturers.

A condition of this warranty is that this equipment or any accessories which are claimed to be defective be returned when authorized by Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd., freight prepaid to Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. Mindray DS USA, Inc./Shenzhen Mindray Bio-Medical Electronics Co., Ltd. shall not have any responsibility in the event of loss or damage in transit.

Calibration may be performed without the need to disassemble the instrument. It is the responsibility of the purchaser to perform calibration as necessary, in accordance with the instructions provided in this manual.

19.17 Customer Service

Mindray DS USA, Inc. maintains a network of service representatives and factory-trained distributors. Prior to requesting service, perform a complete operational check of the instrument to verify proper control settings. If operational problems continue to exist, contact the Service Department at (800) 288-2121 or (201) 995-8116 for assistance in determining the nearest field service location.

Please include the instrument model number, the serial number, and a description of the problem with all requests for service.

Any questions regarding the warranty should be directed to the nearest Mindray DS USA, Inc. location. A list of international offices, along with their phone numbers, is provided at the end of this manual.

NOTE: **Upon request, Mindray DS USA, Inc. will provide circuit diagrams, component part lists, descriptions, calibration instructions, or other information which will 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.**

19.18 Manufacturer's Responsibility

Shenzhen Mindray Bio-Medical Electronics Co., Ltd. (hereinafter called Mindray) is responsible for the effects on safety, reliability and performance of the equipment only if:

- **a.** assembly operations, extensions, readjustments, modifications or repairs are carried out by persons authorized by Mindray; and
- **b.** the electrical installation of the relevant room complies with the appropriate requirements; and
- **c.** the equipment is used in accordance with the instructions for use.

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20.0 *Glossary*

20.1 Glossary of Terms

AG	Anesthetic Gas
Agent	Anesthetic agent
Art	Arterial - label for invasive blood pressure
awRR	airway Respiration Rate
CO_2	Carbon Dioxide
Compl	Dynamic Compliance
CVA	Cardiovascular Artifact - this is any artifact in the respiratory waveform due to heartbeats, also message will occur if heart rate and respiration rate are the same
CVP	Central Venous Pressure - label for invasive blood pressure
Des	Desflurane
ECG	Electrocardiogram
Enf	Enflurane
ET	End - tidal
etCO_2	End - tidal CO_2 . A patient's carbon dioxide level measured at end-expiration
Hal	Halothane
HR	Heart rate. Number of heartbeats per minute
ICP	Intracranial pressure - label for invasive blood pressure
IBP	Invasive Blood pressure
Insp	Inspiratory
ISO	Isoelectric point - reference point on ECG waveform for ST analysis International Organization for Standardization
Iso	Isoflurane

LA	Left atrium - label for invasive blood pressure
LV	Left ventricle - label for invasive blood pressure
MAC	Minimum Alveolar Concentration
N_2O	Nitrous oxide
NIBP	Non-invasive Blood Pressure
O_2	Oxygen
PA	Pulmonary artery - label for invasive blood pressure
PVC	Premature Ventricular Contractions
RA	Right Atrium - label for invasive blood pressure
Sev	Sevoflurane
SpO_2	Oxygen Saturation
ST	ST segment value, indicating the condition of myocardial ischemia
UA	Umbilical Artery - label for invasive blood pressure

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