2
Basic Operation

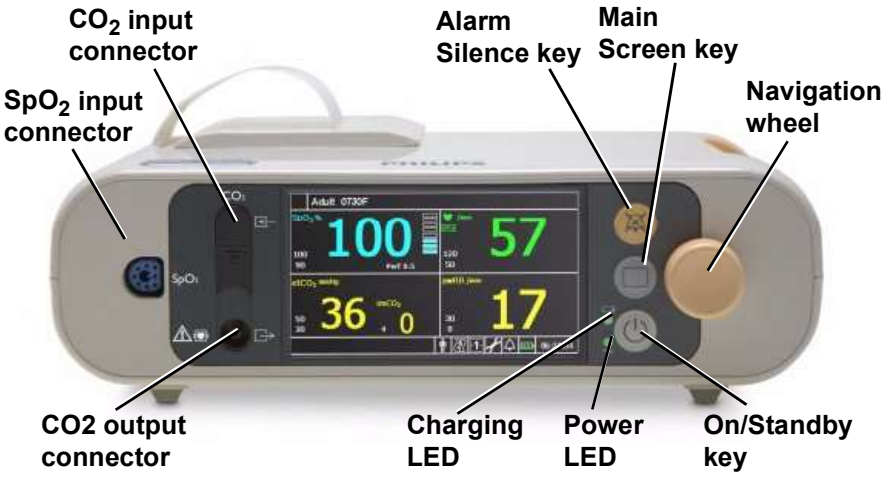
This chapter describes how to begin using your SureSigns VM1 monitor.

For information about setting up and configuring the monitor, see the *SureSigns VM1 Patient Monitor Setup Guide*.

Note — The illustrations in this chapter show a fully configured monitor.

The Front Panel

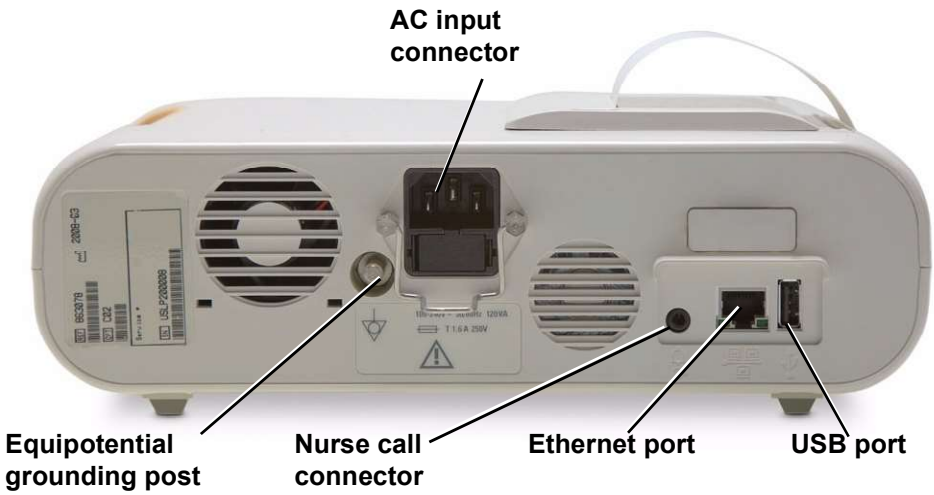
Function keys, connectors, and LEDs are on the monitor's front panel. The following illustration and table describe these controls.



Control	Icon	Description
Alarm Silence key		Press once to pause alarms for 60 seconds; press two times quickly to pause alarms for a specified period of time; press and hold for 2 seconds to initiate Audio Off mode. To turn audio alarms back on, press the Alarm Silence key.
Navigation wheel		Use the navigation wheel to select and change various settings.
Main Screen key		Press to exit from a screen and return to the main monitoring screen.
On/Standby key		Press once to turn the monitor on. Press again to enter Standby mode. In Standby mode, the display blanks and all monitoring ceases, but the monitor does not actually turn off.
Power LED		When lit, indicates that the monitor is connected to an AC power source.
Battery Charging LED		Changes color based on the charging status of the battery. For more information, see “Charging the Battery” on page 2-6.
SpO_2 connector		Use to connect an SpO_2 sensor to obtain SpO_2 measurements.
CO_2 input connector		Use to connect a line to obtain CO_2 measurements.
CO_2 output connector		Use to connect exhaust tubing.

The Rear Panel

The following illustration and table describe the connectors on the back of the monitor.



Connector	Description
Equipotential grounding post	For facilities that require a potential equalization connection.
AC input connector 100-240V ~ 50/60Hz 120\ T 1.6 A 250V	Plug the AC power cord into the AC input connector.
Nurse call connector	3.5 mm phone jack for connection to a nurse call system.

Connector	Description
Ethernet port 	10/100 Base-T Ethernet port for connecting the monitor to the SureSigns VSV Local Area Network (LAN). For more information, see the *SureSigns VSV Installation and Setup Guide*. Also used to export data in HL7 format. For more information, see the *SureSigns VM1 Data Export Guide*.
USB port 	Standard USB 1.1, 4-pin connector for the optional bar code scanner. Also used for software upgrades. For more information, see the *SureSigns VM1 Patient Monitor Service Guide*.

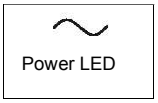
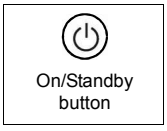
Setting up the Monitor

This section describes how to power up the monitor, charge the battery, and change the system date and time.

Powering Up

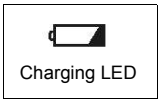
The monitor will operate on AC power or the internal battery.

To power up the monitor:

Step	
1	Connect the power cord to the receptacle on the monitor's rear panel and to an AC power source.
2	Ensure that the AC outlet is properly grounded and supplies the specified voltage and frequency (100 – 240 VAC, 50 – 60 Hz). **Note —** *Within the U.S., a hospital-grade outlet is recommended.*  The green power LED on the front panel lights when the AC power source is connected. Also, the battery indicator on the front panel indicates the current status of the battery (if the battery is installed). For more information about the battery indicator, see "Charging the Battery" on page 2-6.
3	 Press the **On/Standby** button. The monitor powers up and performs a self-test. You may also be prompted to set the language and change the system date and time the first time you power up the system. For more information, see "Changing the System Date and Time" on page 2-6.

If your facility requires a separate potential equalization connection, use the grounding post on the rear of the monitor. Connect a grounding cable from the equipotential grounding post to the grounding system in your facility.

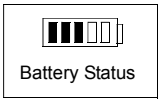
Charging the Battery



Any time the monitor is connected to AC power, the battery is being charged. When you first receive the monitor, the battery charge may be low. You should connect the monitor to an AC power source before using it on battery power alone.

The Charging LED on the front panel provides the charging status of the battery. The color of the LED tells you how much charge remains on the battery:

- **Green**: The battery is at least 90% charged.
- **Flashing Green:** More than 30% charge, but less than 90%.
- **Yellow:** More than 21% charge, but less than 30%.
- **Flashing Yellow:** Less than 21% charge.



The battery status pane on the bottom of the main screen also indicates battery status.

If the monitor is connected to AC power, and the power cord is then disconnected, the monitor automatically resorts to battery power, if the battery is sufficiently charged. All alarm settings are preserved.

Warning **Dispose of used batteries in an environmentally responsible manner. Do not dispose of the battery in normal waste containers. Consult your system administrator to find out about local arrangements.**

Changing the System Date and Time

Use the following procedure to change the system date and time. If the **Date/Time Menu** is already open, skip to step 3.

Caution **When you change the date or time, all patient data is deleted.**

To change the date and time:

Step	
1	Rotate the navigation wheel until the date and time pane is highlighted. The date and time pane is in the lower right corner of the main screen. **Note —** *Only the time is displayed in the Date/Time pane.*
2	Press the wheel. The **Date/Time Menu** appears.
3	Rotate the wheel until the value you want to change is highlighted.
4	Press the wheel and rotate it until the desired value appears.
5	Press the wheel again to save the new value.
6	Repeat step 3 through step 5 to change other values in the menu.
7	Rotate the wheel until the **Apply** button is selected and press the wheel to save your changes and close the menu.

Note — The system clock does not adjust for daylight savings time. You must manually change the time.

You can change the date format (mm/dd/yyyy or dd/mm/yyyy) and you can hide the time display using options in the **System Menu**. For details, see “Changing System-Wide Settings” on page 2-19.

If your monitor is networked, see Chapter 10, “Networked Monitoring,” for information about synchronizing the monitor’s date and time with the VSV.

On/Standby Mode

If you press the **On/Standby** button while the monitor is On, the monitor goes into Standby mode and the following occurs:

- The display goes blank.
- Battery charging continues if the monitor is connected to an AC power source.
- Trend data remains in memory.
- Monitoring stops.
- If your monitor is networked to the VSV, patient data is not sent to the VSV. The message, **No Data From Bed**, is displayed at the VSV.

To resume monitoring, press the **On/Standby** key.

Deep Sleep Mode

The monitor enters Deep Sleep mode when:

- The monitor is not connected to an AC power source and it remains in Standby mode for more than 30 minutes or the battery level drops below 30%.
- The monitor is on, but not connected to an AC power source, and the battery level drops below 12%.

In Deep Sleep mode, the display is blank and the system uses minimal power to maintain the system clock.

To resume normal monitoring, connect the monitor to an AC power source and press the **On/Standby** key to turn the monitor back on.

If you start a new patient, all trend data is cleared and the alarm settings are restored to default values; if you choose not to start a new patient, the alarm settings remain as they were before the monitor went into Deep Sleep mode and the trend data remains in memory.

Mounting the Monitor

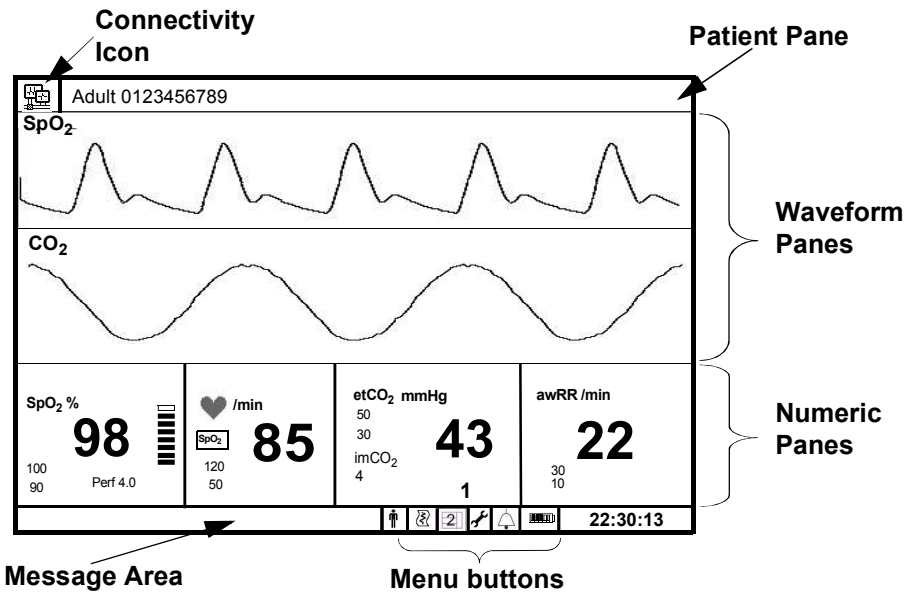
You can mount the monitor using a variety of mounting accessories, including:

- Roll stand
- Wall mount

For information about mounting the monitor on the roll stand or wall mount, see the *Instructions for Use* that comes with the mounting hardware.

Main Screen Display

Note — The illustration in this section shows the main screen on a fully configured monitor.



The main screen contains the following basic elements:

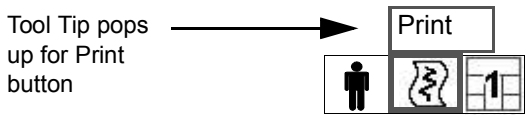
- The **connectivity icon** appears if the monitor is connected to a SureSigns VSV network, as described in Chapter 10, “Networked Monitoring.”
- The **patient pane** at the top of the screen displays the current patient ID and patient type. If you do not enter a patient ID, the text “ID Unknown” is displayed.

  If the monitor is networked, the patient pane also displays the monitor name.
- **Numeric panes** display measurements as numeric values. Some of the measurements in the numeric panes also have corresponding waveforms. For example, the SpO_2 measurement can be displayed as both a numeric value and a waveform.
- **Waveform panes** display real-time waveforms for SpO_2 and CO_2.
- The **message area** displays short text descriptions of all active alarms. High-priority alarms pre-empt low-priority alarms. Once the high-priority alarm has been resolved, the low priority alarm message appears. If multiple alarms of the same priority occur at the same time, the alarm messages rotate every 1.5 seconds.
- **Menu buttons** are used to open menus to change various system settings.

The placement of these screen elements is determined by the screen layout you choose. For more information, see “Changing the Main Screen Layout” on page 2-11.

Tool Tips

When you rotate the navigation wheel to highlight a button on the main screen, a description appears, as shown in the following illustration.



Changing the Main Screen Layout

Big number
2 Waveform
Graphical Trend
Tabular Trend

You can change the appearance of the main screen by selecting a layout from the **Display Mode** menu. Available layout choices depend on your monitor's configuration. The following layouts are available:

- **Big number** (All models) — Only the numeric panes are displayed. This layout is a good choice if you must read the screen from a distance.
- **2 Waveform**
  - SpO_2 and CO_2 — Two waveforms appear on the top of the screen and four numeric panes appear on the bottom.
  - SpO_2 only — SpO_2 waveform appears on the top of the screen and SpO_2 and heart rate numeric panes appear on the bottom.
- **Graphical Trend Display —** Parameter values are displayed vertically on the y-axis and the time is displayed horizontally along the x-axis.
- **Tabular Trend Display —** Numeric values are displayed in a tabular format. The most recent measurement is displayed in the top row of the Tabular trend display.

To change the screen layout:

Step	
1	Rotate the wheel until the **Display Mode** button is highlighted.
2	Press the wheel. The **Display Mode** menu opens and the currently active layout is highlighted.
3	Turn the wheel to select a layout and press the wheel again. The new layout is active.

Changing the Waveform Speed

The **Sweep Speed** setting — which appears in each waveform's pop-up menu — determines the speed at which the wave is drawn across the screen. Decreasing the wave speed compresses the wave, allowing you to view a longer time period. Increasing the wave speed expands the waveform, giving you a more detailed view.

To change the speed of a waveform:

Step	
1	Rotate the wheel until the waveform whose speed you want to change is highlighted.
2	Press the wheel. The configuration menu for the selected waveform appears.
3	Rotate the wheel until the **Sweep Speed** option is selected, then press the wheel to display a list of options. The **Sweep Speed** options are different for each waveform.
4	Rotate the wheel to select a sweep speed, and then press the wheel again.
5	Press the **Main Screen** key on the front panel.

Changing the Brightness of the Display

System button

If the display is too bright or too dark, you can adjust the brightness in the **System Menu**.

To adjust the brightness:

Step	
1	Rotate the wheel until the **System** button is highlighted and press the wheel. The **System Menu** appears.
2	Rotate the wheel until the **Brightness** option is highlighted.
3	Press the wheel and rotate it to select a brightness level. **1** is the darkest setting and **5** is the brightest.
4	Press the wheel to save the new brightness value.
5	Press the **Main Screen** key on the front panel to close the menu.

Starting a New Patient

New Patient button

When you admit a patient, you can use the **New Patient Menu** to enter information about the patient.

The current patient ID and patient type are displayed in the top left corner of the main screen and in the header on all printouts you generate with the optional recorder.

You do not have to enter a patient ID to take a set of measurements. If you choose not to enter an ID, the text **ID Unknown** appears in the patient record.

Note — You can use the **New Patient Menu** to change the **Patient Type** whether or not you are starting a new patient.

Caution **When you start a new patient, all trend data is cleared and the alarm limits are set to their default values.**

Note — If your monitor is networked to the VSV, see Chapter 10, "Networked Monitoring," for more information about entering patient IDs.

Patient ID Overview

Your system administrator configures your monitor to display any or all of the following patient ID input fields in the **New Patient Menu**:

- Medical Record Number (**MRN**): A unique number used to track and identify a patient. The maximum length is 20 characters.
- **Transaction ID**: Also known as a visit ID, the transaction ID is a unique number used to track a single patient visit. The maximum length is 20 characters.
- **First Name**, **Middle Name**, **Last Name**: The patient's name. The maximum length is 15 characters for each name field.
- **Location ID**: Typically, a description of the physical location of the monitor, for example a room number. The maximum length is 10 characters.

  Note — If the monitor remains in one location, your system administrator can configure a default Location ID so that you do not have to manually enter a Location ID each time you start a new patient.

- **Operator ID**: The ID of the person using the monitor to measure a patient's vital signs. The maximum length is 10 characters.

The available patient ID input fields can only be changed by your system administrator in the password-protected **System Admin Menu**.

In this manual, the term Patient ID is used to refer to any of the patient ID types listed above.

Primary Patient ID

Your system administrator also configures a primary ID. The primary ID must be either the **MRN**, **Transaction ID**, or **Location ID**.

An asterisk appears next to the selected primary ID in the **New Patient Menu**. To save a record with an ID, you must enter information in the selected primary ID field. If you do not enter information in the primary ID field, the record will be saved as **ID Unknown**.

Enabling/Disabling the New Patient Menu

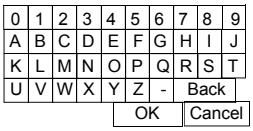
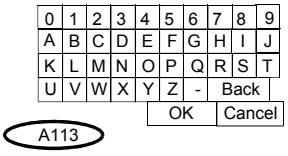
By default, the **New Patient Menu** appears only when you explicitly choose to open it.

To specify that the **New Patient Menu** automatically opens when the monitor is taken out of Standby Mode or Deep Sleep Mode:

Step	
1	Turn the wheel until the **System** button is highlighted and press the wheel. The **System Menu** appears.
2	Rotate the wheel until the **Enable New Patient Menu** option is highlighted and press the wheel.
3	Rotate the wheel until **Yes** is highlighted and press the wheel.
4	Press the **Main Screen** key on the front panel to close the menu.

Entering a Patient ID

To enter a patient ID:

Step	
1	Rotate the wheel until the **New Patient** button is highlighted. **Note —** *The* **New Patient** *button is available in* ***Big Number*** *and* ***2 Waveform*** *display modes*.
2	Press the wheel. The **New Patient Menu** appears.
3	If necessary, change the patient type by rotating the wheel to highlight the **Patient Type** field, pressing the wheel, and rotating the wheel to select a new patient type. Press the wheel again to save the selected patient type.
4	Rotate the wheel until the primary ID field (**MRN**, **Transaction ID**, or **Location ID**) is selected and then press the wheel. A keyboard appears. 
5	Rotate the wheel to select each character and press the wheel after each selection.As characters are entered, they appear below the keyboard. Example: A113.  If you enter an incorrect character, use the **Back** button to erase the character or use the **Cancel** button to start over.

6	Continue entering information in all fields as needed.
7	When you are done entering the patient information, rotate the wheel to select the **OK** button and press the wheel.
8	Rotate the wheel until the **OK** button is selected and press the wheel to close the **New Patient Menu**.

Changing the Patient Type

To change the patient type:

Step	
1	Rotate the wheel until the **New Patient** button is highlighted.
2	Press the wheel. The **New Patient Menu** appears.
3	Rotate the wheel to highlight the **Patient Type** field and press the wheel. Rotate the wheel to select a patient type. The choices are: • **Adult** • **Pediatric** • **Neonatal**
4	Press the wheel to save the selected patient type.
5	Optionally, enter a patient ID, as described in "Entering a Patient ID" on page 2-16. If you do not enter an ID, the text "ID Unknown" appears in the display.
6	Rotate the wheel until the **OK** button is selected and press the wheel to close the **New Patient Menu**.

Adding a Patient with the Bar Code Scanner

If you are using the optional bar code scanner, you can admit a new patient as described in the following procedure.

Note — The bar code scanner inputs a patient ID in the selected primary ID field only, unless your bar code scanner has been programmed to read multiple patient ID fields.

Step	
1	Hold the scanner over the bar code, pull the trigger, and center the beam on the bar code. **Note —** *To get a proper read, hold the scanner closer to small bar codes and farther away from large bar codes.* The **New Patient Menu** opens and the scanned ID appears in the **Enter Patient ID** field.
2	Verify that the correct patient type (Adult, Pediatric, or Neonatal) is selected. If necessary, change the patient type by rotating the wheel to highlight the **Patient Type** field and press the wheel. Select the appropriate patient type and press the wheel again to save your selection.
3	Rotate the wheel until the **OK** button is selected and press the wheel to close the **New Patient Menu**.

Changing System-Wide Settings

System button

The **System Menu** contains the following options:

- System settings buttons, which allow you to configure system-wide settings.
- The **System Info** button, which displays information about the monitor.
- The **System Admin** button, which provides access to the password-protected **System Admin Menu**.
- The **Waveform Settings** button, which allows you to access the **Waveform Settings Menu**.

To change settings in the **System Menu**:

Step	
1	Rotate the wheel until the **System** button is highlighted.
2	Press the wheel. The **System Menu** appears. Current settings are displayed.

3	Turn the wheel to change any of the following system-wide settings: • **Brightness —** This setting adjusts the brightness of the display, with 1 being darkest and 5 being brightest. For detailed information, see "Changing the Brightness of the Display" on page 2-13. • **Recorder Speed —** If your monitor has a recorder, use this option to change the speed at which it prints. For detailed information, see "Changing the Recorder Speed" on page 9-6. **Note —** The **Recorder Speed** setting is independent of the Sweep Speed settings for the various waveforms. In other words, the Sweep Speed setting does not affect the recorder output and vice versa. • **Date Format —** You can change the monitor's date format. Options are **mm/dd/yyyy** and **dd/mm/yyyy**. • **Display Time —** Select **Yes** or **No** to show or hide the time in the lower right corner of the main screen. • **Default Patient Type —** Select a patient type. Each time you start a new patient, the default patient type is selected and the alarm settings are restored to the default values for the specified patient type. • **Monitor Name —** The default name is the monitor serial number. Use this field to change the default name to something more meaningful, for example, a room number or some other identifying information, especially if the monitor is connected to a VSV network. The **Monitor Name** can be up to 10 characters long. For more information, see Chapter 10, "Networked Monitoring." • **Enable New Patient Menu —** Select **Yes** or **No** to indicate whether or not the New Patient Menu opens automatically when the monitor is taken out of Standby or Deep Sleep mode.

	• **System Info** button — Select this to display a summary of monitor-specific information, including the software and hardware versions. For more information, see “Viewing System Information” on page 2-22. • **System Admin** button— For qualified service personnel only. Accesses the **System Admin Menu**, which is password-protected. • **Waveform Settings** button— Use to access the **Waveform Setting Menu** and the following settings: – **Waveform Print —** Use this setting to select the length of printed waveforms. Options are **7 seconds** and **20 seconds**. For more information, see “Printing” on page 9-2. – **VSV Waveform Display —** This setting is available if the monitor is connected to a VSV network. For more information, see Chapter 10, “Networked Monitoring.”
4	Press the **Main Screen** key on the front panel to close the menu.

Viewing System Information

The **System Information** window displays the following information about the monitor:

- Serial number
- Hardware version
- Software version
- LAN MAC Address
- LAN IP Address
- Language
- VSV name
- Configuration

To view the **System Information**:

Step	
1	Rotate the wheel until the **System** button is highlighted.
2	Press the wheel. The **System Menu** appears.
3	Rotate the wheel until the **System Info** button is highlighted and press the wheel. The **System Information** window appears.
4	Rotate the wheel until the **Return** button is highlighted and press the wheel to close the window.

Networked Monitors

If your monitor is networked, the records in the Tabular Trend display change from white to green after they have been exported; if the records do not change from white to green, see your system administrator for assistance.

Caution **If you are using the optional serial interface adapter to export data and you disconnect the adapter to move the monitor to a different location, make sure the black sheath completely covers the RS-232 connector after you reconnect the cable.**

Using the Monitor Safely

All of the patient applied parts on the SureSigns VM1 patient monitor are classified as type CF, which specifies their degree of protection against electrical shock. All are rated as defibrillator proof, as indicated by the heart symbol on the side panel.

This monitor is suitable for use in the presence of electrosurgery.

The SureSigns VM1 patient monitor is suitable for use in all establishments, as defined by CISPR 11, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

Ensure that the monitor is in working condition before clinical use. If the accuracy of any measurement does not seem reasonable, first check the patient's vital signs by alternative means and then with the monitor to make sure it is working properly. Always verify that the monitor's settings match your intended selections.

If you connect the monitor to any instrument, verify proper operation before clinical use. Refer to the instrument's Instructions for Use for full instructions.

Accessory equipment connected to the monitor's data interface must be certified according to EN 60950 for data-processing equipment or EN 60601-1 for electromedical

equipment. All combinations of equipment must be in compliance with EN 60601-1-1 systems requirements.

Anyone who connects additional equipment to the signal input port or signal output port configures a medical system and is therefore responsible to ensure that the system complies with the requirements of system standard EN 60601-1-1. If in doubt, contact the Philips Customer Care Center or your local Philips representative.

The monitor and its accessories must be tested by qualified service personnel at regular intervals to ensure that performance has not been degraded by aging or environmental conditions. Periodic performance verification tests can be performed, as described in the *SureSigns VM1 Patient Monitor Service Guide.*

Warning **Explosion Hazard. Equipment not suitable for use in the presence of a flammable anaesthetic mixture with air or oxygen or nitrous oxide. Oxygen concentrations must be <25% and partial pressure <27.5 kPa when no other oxidants are present.**

Electric shock hazard. Covers should be removed only by qualified service personnel. There are no user-serviceable parts inside.

Do not touch the patient, or table, or instruments during defibrillation.

Measurement accuracy may decrease temporarily while performing electro-surgery or defibrillation. This does not affect patient or equipment safety.

Do not open the monitor or attempt to change the battery. If you suspect a problem with parts within the monitor, contact your biomed or local Philips Representative.

Route patient cabling to reduce the possibility of patient entanglement or strangulation.

Do not place the monitor in any position that might cause it to fall on the patient. Do not lift the monitor by the power supply cord or patient connections.

The roll stand basket has a maximum capacity of 8 pounds (3.6 kg). If you place more than 8 pounds (3.6 kg) in the basket, the roll stand may tip.

Do not use the monitor on more than one patient at a time.

To ensure patient electrical isolation, connect only to other equipment that provides patient electrical isolation. Use only unshielded network cables.

Use only grounded power cords (three-wire power cords with grounded plugs) and grounded electrical outlets. Never adapt a grounded plug to fit an ungrounded outlet by removing the equipotential grounding post or ground clip.

Do not use extension cords to connect the monitor to electrical outlets.

LAN cables must meet all local electrical requirements.

Do not use the monitor or SpO_2 sensors during magnetic resonance imaging (MRI) scanning. Induced current could potentially cause burns. The monitor may affect the MRI image, and the MRI unit may affect the accuracy of the monitor's measurements.

If multiple instruments are interconnected or if multiple instruments are connected to a patient, the sum of the leakage currents may exceed the limits given in EN 60601-1. Consult your service personnel.

Do not connect this monitor to any equipment or device, other than those specified in this manual.

Sterilization is not recommended for this monitor, accessories or supplies, unless otherwise indicated in the Instructions for Use that accompany the accessories and supplies.

Use only approved accessories with the SureSigns VM1 monitor. The use of unapproved accessories can diminish monitor performance or safety. Consult the Instructions for Use that accompany the accessories.

Electromagnetic interference may cause disruption of performance. Protect the monitor from sources of intense electromagnetic radiation. This device is designed to provide resistance to electromagnetic interference; however, because of the proliferation of radio-frequency transmitting equipment and other sources of electrical noise (such as cellular phones, mobile two-way radios, and electrical appliances) in the healthcare and home environments, it is possible that high levels of such interference due to close proximity or strength of a source, may result in disruption of performance of this device. Disruption may be evidenced by erratic readings, cessation of operation or other incorrect functioning. If this occurs, the site of use should be surveyed to determine the source of this disruption, and actions taken to eliminate the source. If you need assistance, contact the Philips Customer Care Center or your local Philips Representative.

Consult the Instructions for Use that accompany the accessories

Disposing of the monitor: To avoid contaminating or infecting personnel, the environment or other equipment, make sure you disinfect and decontaminate the monitor appropriately before disposing of it in accordance with your country's laws for equipment containing electrical and electronic parts. For disposal of parts and accessories such as thermometers, where not otherwise specified, follow local regulations regarding disposal of hospital waste.

Before disposing of a SureSigns VM1 patient monitor, delete all patient information. For instructions on deleting patient data, see *The SureSigns VM1 Patient Monitor Service Guide.*

Access to the System Admin Menu is restricted. It is password-protected to ensure that only system administrators, biomeds, or other qualified service personnel can change the system-wide settings on the monitor.