SPACELABS HEALTHCARE

Operations Manual

DM4

91331

Software version 4.1.x

MD Medical Device

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- *the equipment is used in accordance with the operations manual.*

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- **Rx Only** U.S. Federal law restricts the devices documented herein to sale by or on the order of a physician.
- **Before use, carefully read the instructions, including all warnings and cautions.**

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Introduction

Overview

The DM4 is a lightweight and compact dual-mode monitor with a 17.78-cm (7-inch) touchscreen display. Designed for bedside and portable usage, the DM4 monitors SpO_2, pulse rate, NIBP, and temperature. You can use the DM4 to take spot check measurements of these parameters or to provide continuous monitoring.

Indications for Use

The DM4 series of monitors is indicated for use as a portable, multi-parameter, variable acuity device for use by health care professionals, clinicians and medically qualified personnel, in a variety of clinical environments and hospital departments, for non-invasive spot checking, and/or continuous monitoring and recording of:

- Blood pressure and pulse rate of adult, pediatric and neonatal patients;
- Functional oxygen saturation of arterial hemoglobin (SpO_2) and pulse rate of adult, pediatric and neonatal patients;
- Intermittent predictive body temperature (oral and axillary) of adult, pediatric, and neonatal patients; and
- Infrared (over the temporal artery) measurement of body temperature of people of all ages.
- Carbon Dioxide concentration of the expired and inspired breath and respiration rate including, with the Covidien Microstream MicroPod option, an Integrated Pulmonary Index (IPI);
- Electronic predictive and temporal artery temperature;
- ECG and heart rate derived from ECG;
- Impedance respiration to detect the rate or absence of respiratory effort with the ECG option for adult, adolescent, child and infant;

Contraindications

- Do not use on an arm ipsilateral to a mastectomy.
- Do not use on an arm with a vascular shunt (e.g., hemodialysis shunt).
- Do not use in a hyperbaric chamber.
- Do not use near an MRI machine.
- Do not use near flammable anesthetics.
- Do not place SpO2 sensors or Temp Probe or scanner near electro-cauterization.
- Do not use on patients connected to a cardiopulmonary bypass device.
- Do not use on patients connected to intra-aortic balloon pump device.
- Do not use on patients with peripheral convulsions, tremors or seizures.
- Not intended for use with severe arrhythmia.
- For contraindications of SpO2 sensors or Temp Probes or scanner, consult the manufacturer's directions for use.
- Oral Temperature measurements are not intended for neonatal use.
- No other contraindications are known at this time.

Conventions used in this manual

Spacelabs uses specific types of indications to draw your attention to how to use the monitor.

- Reference links are in blue. Place the mouse over the blue text and click the text, and the topic will be shown. The links are located throughout the manual and in the **Table of contents.**

- **Bold** lettering indicates words, buttons, keys, tabs, and titles that can be found on the touchscreen. For example: a **Home** key is located on the taskbar on the right of the touchscreen.
- Italicized words are references or links to other information. If it is a link to additional information in the manual, place your cursor over the reference and click once to bring up that information. It may also be a reference to other documents available on the CD-ROM.
- There are specific steps to accomplish a task that are presented in numbered steps, possibly followed by the results of the step.
- This Operations Manual is divided into multiple sections. The first section titled Basic Operations on page 2-1 is a quick reference for basic tasks. The other sections describe features in more detail.
- Quick Start sections are the steps that explain how to use the various features and parameters.
- Warnings, Cautions and Notes are listed in the priority of the information and formatted specifically as shown below. Warnings are of the highest priority and notes are not as serious as the warnings and cautions.

Warnings indicate potentially harmful conditions that may lead to injury or death.

Cautions indicate conditions that may lead to damage to or malfunction of the device.

Note:

Notes alert the user to relevant facts and conditions.

Safety Measures

- *The monitor needs special precautions regarding EMC and needs to be installed and put to service according to the EMC information provide in Electromagnetic Emissions on page B-1. Be aware that strong electromagnetic fields may interfere with the operation of the monitor. Interference prevents the clear reception of signals by the monitor. If the hospital is close to a strong transmitter—such as a TV, AM or FM radio, police or fire station, HAM radio, airport, or cellular phone—their signals could be detected as signals by the monitor.*
- *Portable and mobile RF communications equipment may affect the monitor and should be used no closer to any part of the monitor, including cables, than the recommended separation distance calculated in Electromagnetic Emissions on page B-1.*
- *The monitor is intended only as an adjunct in patient assessment. It must be used in conjunction with clinical signs and symptoms.*
- *The monitor alarm volume should be verified as suitable for the area in which they are used.*
- *Do not use this instrument for any purpose other than specified in this Manual. Doing so will invalidate the monitor's warranty.*
- *Do not connect more than one patient to the monitor at the same time.*
- *To remove all power from the monitor, you must disconnect the AC plug from the wall outlet, or disconnect the power cord from the rear of the monitor and remove the battery pack.*
- *Do not plug the monitor into an outlet controlled by a wall switch.*
- *Before each use in Continuous (CONT) mode, verify that the alarm limits are appropriate for the patient being monitored.*
- *The position of patient, physiological condition, and other factors affect the readings.*
- *Occasionally, electrical signals at the heart do not produce a peripheral pulse. If a patient's beat-to-beat pulse amplitude varies significantly (for example, pulsus alternans, atrial fibrillation, rapid-cycling artificial ventilator), blood pressure and pulse rate readings can be erratic and an alternate measuring method should be used for confirmation.*
- *When the integrity of the external protective conductor in the installation or its arrangement is in doubt, you must operate the equipment from its internal electrical power source.*
- *Do not use any other power supply other than the one supplied by Spacelabs. Refer to https://spacelabshealthcare.com/products/supplies, for accessories.*
- *Electric shock hazard - Do not open the monitor cover except to replace the batteries. Only qualified personnel may perform maintenance procedures specifically described in this Manual. Contact Spacelabs for assistance.*
- *Explosion hazard - Do not use the monitor in the presence of flammable anesthetics or other flammable substance in combination with air, oxygen-enriched environments, or nitrous oxide.*
- *For more battery warnings and safety tips, refer to Battery Management on page 1-14.*

- *The monitor is NOT intended for use as an apnea monitor.*
- *Do not place the monitor or accessories in any position that might cause it to fall on the patient. Do not lift the monitor by the patient cable.*
- *Do not use a frayed or damaged power cord, or any accessory if you notice any sign of damage. Contact Spacelabs Healthcare for assistance.*
- *This equipment is NOT suitable for use in the presence of flammable anesthetics.*
- *This equipment is NOT intended for use in oxygen enriched atmospheres.*
- *Do not gas sterilize or autoclave the monitor.*
- *The use of Accessory equipment not complying with the equivalent safety requirements of this equipment may lead to a reduced level of safety of the resulting system. Consideration relating to the choice shall include:*
  - *use of the accessory in the Patient Environment; and*
  - *evidence that the safety certification of the accessory has been performed in accordance with the appropriate IEC 60601-1 collateral and particular harmonized national standard.*
- *Do not use the monitor in the presence of Magnetic Resonance Imaging (MRI) equipment.*
- *Do not place liquids on top of the monitor. Do not immerse the monitor, power supply or power cords in water or any liquid. If unit is accidentally wetted it should be thoroughly dried.*
- *ELECTRICAL SHOCK – To reduce the risk of electrical shock, do not remove the back cover. Refer all servicing to qualified personnel.*
- *ACCURACY – If the accuracy of any measurement does not seem reasonable, first check the patient's vital signs by alternate means and then check the monitor for proper functioning.*
- *CABLES – Route all cables away from patient's throat to avoid possible strangulation.*
- *ACCESSORIES – The use of accessories and cables other than those specified, with the exception of the accessories and cables sold by Spacelabs Healthcare as replacement parts, may result in increased emissions or decreased immunity of the monitor. It is the responsibility of the organization and/or user to verify the compatibility of the monitor, probes, and cables before use, otherwise patient injury can result.*
- *Do not place the monitor where the controls can be changed by the patient.*
- *Do not place the monitor on electrical equipment that may affect the monitor, preventing it from working properly.*
- *Do not expose the monitor to excessive moisture such as direct exposure to rain. Excessive moisture can cause the monitor to perform inaccurately or fail.*

- *DEFIBRILLATION – Do not come in contact with patients during defibrillation. Serious injury or death could result.*
- *SITE REQUIREMENTS – For safety reasons, all connectors for patient cables and sensor leads are designed to prevent inadvertent disconnection, should someone pull on them. Do not route cables in a way that they may present a stumbling hazard. For devices installed above the patient, adequate precautions must be taken to prevent them from dropping on the patient.*
- *STACKING – Where a monitor is used adjacent to or stacked with other equipment, the monitor should be observed to verify normal operation in the configuration in which it will be used.*
- *An NIBP monitor does not operate effectively if a patient is having seizure activity, convulsions or tremors, or is connected to a heart/lung machine.*
- *When a patient is experiencing arrhythmias during an NIBP measurement, the accuracy of the pulse determination may be affected or the time needed to complete a measurement may be extended. The monitor will not make a determination beyond 120 seconds.*
- *Significant levels of dysfunctional hemoglobins such as carboxyhemoglobin or methemoglobin may affect the accuracy of the measurement.*
- *Cardiogreen and other intravascular dyes, depending on the concentration, may affect the accuracy of the oximeter measurement.*
- *Setting the Upper Alarm limit to the extreme high value can render the Upper Alarm Limit detection ineffective.*
- *Setting the Lower Alarm limit to the extreme low value can render the Lower Alarm Limit detection ineffective.*
- *This equipment has been tested and found to comply with the limits for medical devices to the EN 60601-1-2, Medical Device Directive 93/42/EEC. These limits are designed to provide reasonable protection against harmful interference in a typical medical 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 other devices in the vicinity. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other devices, 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:*
  - *Reorient or relocate the receiving device*
  - *Increase the separation between the equipment*
  - *Consult the manufacturer for help*
- *Elevated levels of Carboxyhemoglobin (COHb) may lead to inaccurate SpO2 measurements.*
- *Elevated levels of Methemoglobin (MetHb) will lead to inaccurate SpO2 measurements.*

- *The connection to the Nurse Call Interface should only be installed by qualified service personnel.*
- *Do not, under any circumstances, perform any testing or maintenance on the monitor, power supply or power cords while the unit is being used to monitor a patient. Unplug the power cords before cleaning or servicing the monitor. The user should not perform any servicing except as specifically stated in this manual.*
- *Do not touch part of non-medical electrical equipment in the patient environment after removal of covers, connectors, etc. without the use of a tool which operates at voltages not exceeding 25 VAC or 60 VDC and the patient at the same time.*
- *To ensure patient electrical isolation, connect only to other equipment with electrically isolated circuits.*
- *Loss of pulse signal can occur when:*
  - *The sensor is too tight*
  - *The patient has hypotension, severe vasoconstriction, severe anemia, or hypothermia*
  - *There is arterial occlusion proximal to the sensor*
  - *The patient is in cardiac arrest or is in shock*
- *Failure to apply the sensor properly may cause incorrect measurements.*
- *The monitor may not meet performance specifications if stored or used outside temperature and humidity ranges. When moving the monitor from a storage location, wait at least one-hour or more prior to use to allow the monitor to adjust to room temperature.*

- Pressing the touchscreen with a sharp or pointed instrument may permanently damage the touchscreen. Press the touchscreen using only your finger.
- Inspect the monitor, air hose, and sensors for any damage prior to operation. If any damage is noted, the monitor should not be used until it has been serviced. The monitor should be repaired only by authorized personnel.

- The oximeter is factory calibrated to determine the percentage of arterial oxygen saturation of functional hemoglobin.
- Some sensors may not be appropriate for a particular patient. If at least 10 seconds of adequate height pulse on the Plethysmograph waveform cannot be observed for a given sensor, change sensor location or sensor type until this condition is achieved.
- Do not operate the monitor unless it has been properly calibrated. Inaccurate blood pressure readings may result. A calibration check is recommended once every year. A pneumatic check is recommended once every year.

- If the monitor fails to respond (including the display and touchscreen), do not use it until the situation has been corrected by qualified personnel.
- Biting the FILAC Temp Probe tip while taking a temperature may result in damage to the Temp Probe.
- ACCIDENTAL SPILLS – In the event that fluids are accidentally spilled on the monitor, take the monitor out of operation and inspect for damage.
- ELECTROSURGERY – Measurements may be affected in the presence of strong electromagnetic sources such as electrosurgery equipment.
- GROUNDING – Do not defeat the three-wire grounding feature of the AC power cord by means of adaptors, plug modifications, or other methods. Do not use extension cords of any type.

- INTERFACING OTHER EQUIPMENT – Monitoring equipment must be interfaced with other types of medical equipment by qualified biomedical engineering personnel. Be certain to consult manufacturers' specifications to maintain safe operation.
- The monitor may not meet performance specifications if stored or used outside temperature and humidity ranges. When moving a monitor from a storage location, wait at least one hour prior to use to allow it to adjust to room temperature.
- Remove the battery if the monitor is not likely to be used for some time.
- Under certain conditions, the monitor provides "DRIP-PROOF" level of protection from ingress to moisture. Do not expose the monitor to extreme moisture levels such as direct exposure to rain. Exposure to extreme moisture levels may cause incorrect or inaccurate performance or monitor failure during or after exposure.

Note:

- *There are no known risks with common disposal of equipment or accessories; however, the disposing of accessories should follow in accordance with local hospital policies. The Li-Ion battery should not be incinerated. The user should ensure these policies do not conflict with any local, state or federal guidelines.*
- *The monitor is suitable to be connected to public AC mains power.*
- *The monitor is not Category AP or APG Equipment.*
- *The monitor is rated for Continuous Operation.*
- *The applied parts of the monitor are Type BF Defibrillation Proof.*

Monitor Components

Figure 1-1: Front panel view

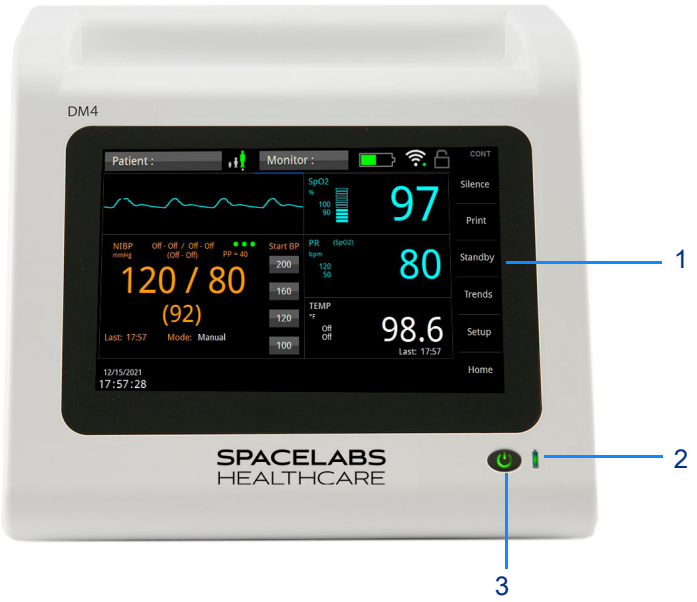


Table 1-1: Front Panel Components

	Description	Symbol on panel
1	Touchscreen – Provides graphical user Interface (GUI) for controlling and configuring the monitor.	
2	Battery charging indicator – Indicates external power is connected and internal battery is charging.	
3	Power On/Off button – Press once to turn the monitor ON. Press and hold for two seconds to turn the monitor Off.	

Figure 1-2: Rear panel view

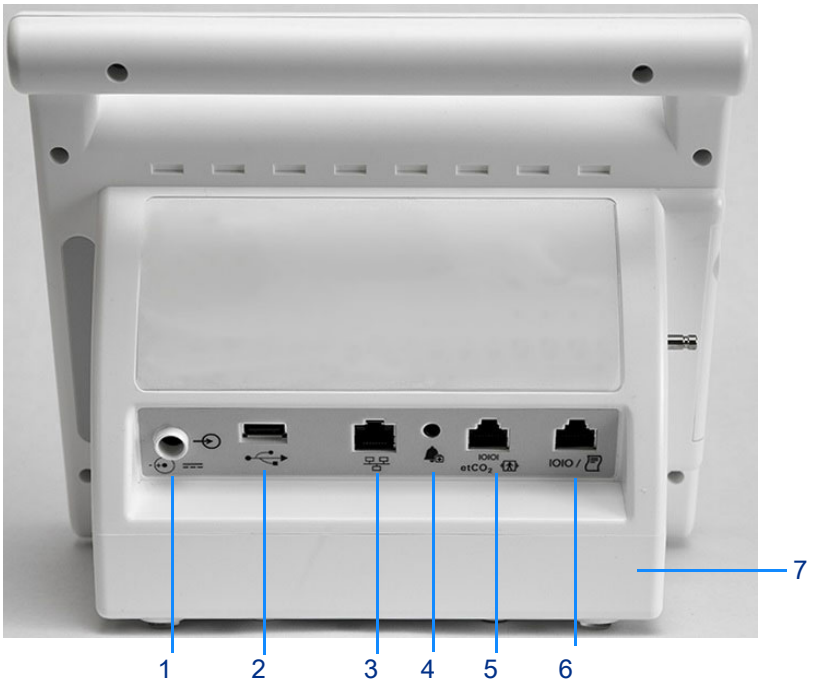


Table 1-2: Back Panel Components

	Description	Symbol on panel
1	DC power input – connection for external power supply (P/N 010-2177-xx)	
2	USB port – connection for optional bar code scanner (P/N 010-2179-xx), Exergen Temporal Artery Thermometer (P/N 010-2157-xx), or USB flash drive (P/N 010-1950-xx)	
3	Ethernet port – connection for wired networking for transmission of patient data to Intesys Clinical Suite (ICS), or hospital EMR through ICS HL7	
4	Nurse call jack – connection to existing health care facility Nurse Call systems. **Alarm Out Relay** must be enabled in the **Setup Service** menu.	
5	$EtCO_2$ device interface (for future use)	IOIO $etCO_2$
6	External printer interface – RJ45 serial communications output for optional external printer (P/N 010-1852-xx)	IOIOI /
7	Battery compartment – contains Li-ion (10.8 Volt, 7800 mAhr) battery pack that, when new and fully charged, is capable of taking 150 NIBP readings when the monitor is set in the 5 minute Automatic Mode (continuous SpO_2 and 15 minute Temp measurements)	

Figure 1-3: Left panel view (with Masimo SpO_2)

Do not place the left panel speaker grill of the monitor against a solid surface. This will cause the alarm tones to be muffled.

Table 1-3: Left Panel Components

	Description	Symbol on panel
1	NIBP hose connector – MAXNIPB single tube, bayonet fitting	MAXNIBP
2	Speaker – internal speaker for alarm tones	
3	Masimo or Nellcor SpO_2 connector – SpO_2 adapter cable connection for Masimo or Nellcor technology (depending on pulse oximetry option)	MASIMO SET -or- COVIDIEN Nellcor SpO_2

Figure 1-4: Right panel view

Without FILAC temperature option

With FILAC temperature option

Table 1-4: Right Panel Components

	Description
1	Transport handle
2	FILAC temperature probe
3	FILAC isolation chamber – provides holding wells for the temperature probe and box of probe covers
4	FILAC temperature module – provides quick connection and disconnection between the isolation chamber/temperature probe assembly and the monitor

Monitor Configurations

Table 1-5 shows the monitor configurations available for the DM4.

Table 1-5: Monitor Configurations

Configuration	Installed Options
91331-M	NIBP, Masimo SpO_2, and Exergen or no temperature
91331-N	NIBP, Nellcor SpO_2, and Exergen or no temperature
91331-MF	NIBP, Masimo SpO_2, and FILAC predictive temperature
91331-NF	NIBP, Nellcor SpO_2, and FILAC predictive temperature
91331-MW	NIBP, Masimo SpO_2, Exergen or no temperature, and Wi-Fi
91331-NW	NIBP, Nellcor SpO_2, Exergen or no temperature, and Wi-Fi
91331-MFW	NIBP, Masimo SpO_2, FILAC predictive temperature, and Wi-Fi
91331-NFW	NIBP, Nellcor SpO_2, FILAC predictive temperature, and Wi-Fi

FILAC Isolation Chamber

If the FILAC 3000 thermometry option (91331-F) is installed, a temperature module and isolation chamber is connected to the side of the monitor. Store the FILAC temperature probe and probe covers in the designated isolation chamber locations when it is not in use.

Figure 1-5: Placing FILAC temperature probe into isolation chamber

Note:

Ensure that the FILAC temperature probe is secured in the isolation chamber well. FILAC temperature probes slide in and out of the isolation chamber well without any restrictions.

Network Indicators

Icons at the top of the display indicate the network connectivity of the DM4 monitor. For information on network setup, refer to the *DM4 Service Manual*.

The icon shown on the right indicates wireless network connectivity with Intesys® Clinical Suite (ICS). The number of white bars is proportional to the signal strength.

The icon shown on the right indicates that Wi-Fi is enabled, but there is no wireless connectivity.

Environmental factors can contribute to waveform gaps over the wireless network. If this issue continues, consult with a biomed technician or a Spacelabs Healthcare field service representative.

The icon shown on the right indicates wired (Ethernet) connectivity with ICS.

The icon shown on the right indicates there is no wired network connectivity (and Wi-Fi is not enabled).

Battery Management

- *Rechargeable lithium-ion batteries are widely used in technology today due to their high energy density and efficiency, but they do come with certain risks that require caution.*
  - *Risk of overheating and fire: Lithium-ion batteries can overheat and catch fire if they are damaged, improperly charged, or used beyond their use life.*
  - *Toxic and flammable gases: When lithium-ion batteries overheat, they can release toxic and flammable gases, which pose a risk of inhalation and combustion.*
  - *Expired batteries have a fire hazard associated with them when they are used. Check battery age, replace battery pack every two (2) years.*
  - *Replace batteries that no longer hold a charge.*
  - *Do not short circuit, crush, or expose the battery to high temperature, incinerate or disassemble the battery.*
  - *Do not use any damaged battery.*
- *Batteries, 2 years or older, are not to be used and are considered expired.*

This product contains a rechargeable Li-ion battery that is recyclable. Under various state and local laws, it may be illegal to dispose of this battery into the municipal waste stream. Check with your local authorities for instructions on recycling options in your area.

Note:

- *Fully charge the battery before first use of the monitor.*
- *Dispose of the battery according to the manufacturer instructions and never dispose of them in the trash.*

Safety Tips:

- *Purchase: Only buy batteries listed by a nationally recognized testing laboratory and the manufacturer.*
- *Charging: Use the correct charging equipment and avoid charging at extreme temperatures.*
- *Storage: Store batteries at room temperature, away from direct sunlight and anything that can burn.*
- *Handling: Be careful with batteries to prevent physical damage.*

The monitor has an internal rechargeable battery. The battery charges whenever the monitor is connected to an external power source. A green battery-charging indicator (located to the right of the **On/Off** button) on the front panel is lit when the battery is charging.

Batteries will self-discharge when they are not used. It is recommended that the battery be maintained at full charge by leaving the monitor connected to an external power source whenever possible.

The standard 10.8 Volt, 7800 mAhr battery pack, when new and fully charged, is capable of taking 150 NIBP readings when the monitor is set in the 5-minute automatic mode.

The battery icon  appears when the monitor is disconnected from the mains power. The icon provides an indication of relative battery charge level remaining.

When the **Low Battery** message and 

icon show on the main screen, approximately 30 minutes of battery operation remain. An audio beep occurs every 25 seconds.

Upon the detection of a Low Battery condition and if the battery is not charged by the user, the monitor may no longer function as intended. You should connect the monitor to a power source as soon as possible and allow the battery to charge for eight hours.

When the **Battery Nearly Depleted** message shows, the battery is no longer able to power a measurement. The **Battery Nearly Depleted** message shows on the main screen and a continuous audio tone occurs until the power is turned off.

Upon the detection of a Battery Nearly Depleted condition and if the monitor is not turned off by the user, the monitor shuts down and turns off within sixty seconds.

When either of these messages appears, it is necessary to recharge the battery. A depleted battery may be fully recharged in eight hours. The monitor can obtain measurements while the battery is charging.

Note:

- *Use of the monitor while charging may lengthen the time to restore the battery power.*
- *While charging the battery, the monitor case may feel warm.*

Maintenance

- Check battery age, replace battery pack every two (2) years.
- Perform a NIBP pneumatic check once per year.
- Perform a NIBP transducer check once per year or when there is doubt about the validity of the blood pressure readings.

Basic Operations

Basic Operation Overview

This chapter provides information about the basic operations and features of the DM4 monitor. For detailed information on patient monitoring, refer to the parameter chapters.

For monitor setup information, refer to the *DM4 Service Manual*.

Adult/Pediatric/Neonate Patient Mode

NIBP and temperature functions are affected by changing between Adult, Pediatric and Neonate patient modes. Once power has been applied, a visual indicator on the display shall indicate the current patient mode. The monitor will operate in the mode selected until it is changed. For information on configuring the patient mode, refer to Patient Mode (Type) on page 2-8.

- ***Prior to patient monitoring, ensure the monitor is configured to the appropriate patient mode – Adult, Pediatric, or Neonate. The current patient mode is displayed on the main screen.***

Powering the Monitor On and Off

Each time the monitor is turned ON, a Configuration Setup Test and electronic Power On Self-Test (POST) is conducted to ensure that its internal circuits are functioning properly. Completion of the Setup Test and POST is confirmed by a two-beep audio alert. Once the Power On Self-Test is complete, the monitor is ready for use.

Note:

The user should use the Power On Self-Test as a verification tool that all front panel visual indicators and the audio are functioning properly.

To power ON the monitor

1 Press the On/Off button on the lower front panel.

The boot-up sequence follows (approximately 25 to 30 seconds):

- On/Off button illuminates green;
- Spacelabs Healthcare splash screen shows;
- Touchscreen turns blank for approximately 20 seconds;
- light on power **On/Off** button flashes to show power up is in progress.
- two audio tones sound (lower pitch, then higher pitch) to confirm that main speaker functions; and
- two higher-pitch audio tones sound to confirm that second speaker functions.

To power OFF the monitor

1 Press and hold the power **On/Off** button for two seconds.

Before Connecting Monitor to Patient

This section provides general information to follow before you connect the DM4 to a patient. Connections from the monitor to the patient vary by parameter. Refer to the appropriate parameter chapter for instructions.

Inspect the monitor and connectors each time the unit is used. Check all patient cables and sensors for worn or damaged plastic covering, frayed or broken wires, cracked connections, or any other signs of damage. Do not use any equipment that shows obvious damage.

Before you connect the monitor to a patient

1. Power **ON** the unit and make sure that you hear startup tones (refer to Powering the Monitor On and Off on page 2-1).
2. Confirm that the main screen shows on the monitor display (refer to Main Screen on page 2-2).

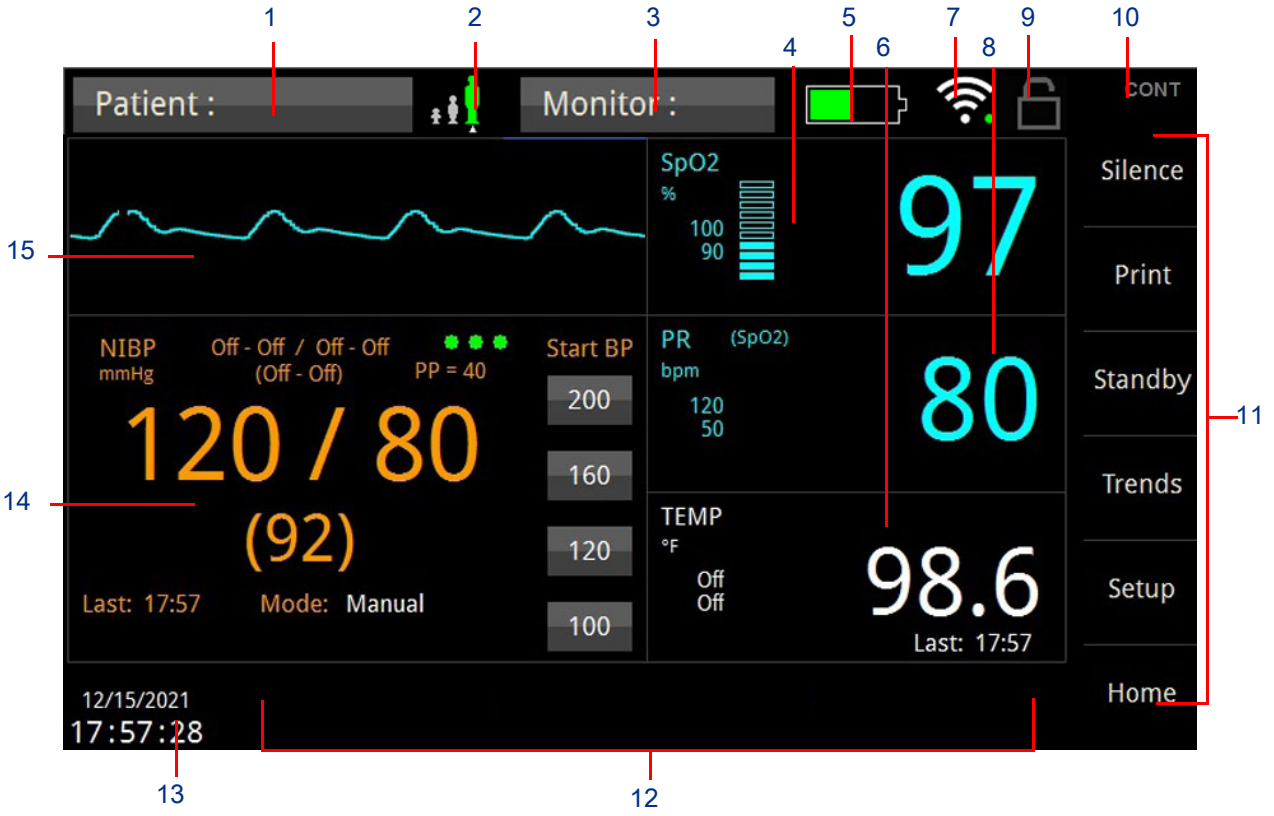
If you see any problems while you perform these steps, take the monitor out of service and contact Spacelabs Healthcare Technical Support.

Before you leave the patient, make sure that the monitor, the power supply, and all the cables are secure and do not hang in a way that could be hazardous to the patient or to someone caring for the patient.

Main Screen

The main screen (refer to Figure 2-1) shows the patient data and provides one-touch access to dedicated parameter zones and alarms, settings, and the **Setup** menu. The display is configurable with or without an SpO_2 waveform (plethysmograph).

Figure 2-1: Main Screen (with Exergen TEMP and SpO_2 Plethysmograph)



1 Patient button – Shows patient identification information, and provides one-touch access to the **Patient Information** screen. For information on entering patient demographic information, refer to Patient Information on page 2-4.

2 Patient Type icon – Shows the current patient mode selection (Adult, Pediatric, or Neonatal), and provides one-touch access to the screen for changing the patient type. For more information, refer to Patient Mode (Type) on page 2-8.

3 Monitor button – Shows the clinician or monitor ID, depending on the button label setting. For information on setting the clinician ID, refer to Clinician ID on page 2-8.

4 SpO_2 numeric zone – Shows numerical pulse oximetry data. For more information, refer to SpO_2 Numeric and PR (Pulse Rate) Zones on page 5-4.

5 Battery icon – Shows the battery power level. For more information, refer to Battery Management on page 1-14.

6 Temperature (TEMP) zone – Shows temperature data. For more information, refer to FILAC Temperature Display Details on page 6-2 and Exergen Temperature Display Details on page 7-2.

7 Network icon – Shows status of network connectivity with ICS. For more information, refer to Network Indicators on page 1-12.

8 Pulse Rate (PR) zone – Shows pulse rate data derived from SpO_2 or NIBP (if there is no SpO_2 data). For more information, refer to SpO_2 Numeric and PR (Pulse Rate) Zones on page 5-4.

9 Screen Lock icon – Shows whether or not the Screen Lock is enabled. Screen Lock prevents access to the monitor by unauthorized users. For more information, refer to Screen Lock on page 2-9.

10 Workflow – Shows the clinical Workflow mode of the monitor: **CONT** (Continuous) or **SPOT** (Spot Check). For more information, refer to Workflow Modes on page 2-10.

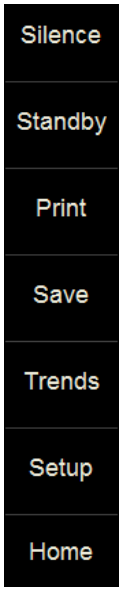
11 Touchscreen keys – Fixed navigation buttons. For more information, refer to Touchscreen Keys on page 2-4.

12 Message area – Dedicated area for patient alarm and system messages. For more information, refer to Alarm Messages on page 3-2.
13 Date and time – Dedicated area for current date and time.
14 NIBP zone – Shows NIBP data. For more information, refer to Maintenance on page 4-2.
15 Waveform zone – Shows the SpO_2 waveform (plethysmograph). For more information, refer to SpO_2 Waveform (Plethysmograph) on page 5-5.

Touchscreen Keys

The monitor uses touchscreen keys to facilitate monitoring functions. The Touchscreen keys are located in a column on the right side of the display screen. The keys are fixed and cannot be changed or reconfigured.

- **Silence** – Pauses audio for 1, 1.5, or 2 minutes.
- **Standby** (Continuous mode only) – Puts the monitor into Standby mode; touch the screen to return the monitor to full operation.
- **Print** – Prints physiological data to the optional external printer. For more information, refer to External Printer (Optional) on page 8-1.
- **Save** – (Spot Check mode only) Saves a snapshot (measurement record) of patient values to trends.
- **Trends** – Shows a record of trends, including saved snapshots, in tabular form. For more information, refer to Trends Screen on page 9-1.
- **Setup** – Accesses the **Setup** menu to configure the monitor settings. For detailed information, refer to the *DM4 Service Manual*.
- **Home** – Returns the monitor to the main screen.



The monitor does not generate alarms when in Standby mode.

Note:

Standby enhances clinical workflow by:

- *allowing attachment of the patient interface cables to the monitor in advance of the patient;*
- *the monitor automatically reverting to active monitoring when patient data is detected; and*
- *providing the user with the option to suspend all patient monitoring.*

Patient Information

You can enter patient demographic information through the Patient button or **Setup** key before or after you take measurements. For information on configuring the Patient button label, refer to the *DM4 Service Manual*.

Note:

If you attach a patient to both a DM4 device and telemetry transmitter, admit the patient to the telemetry transmitter and bed first. This prevents the hospital database from detecting the patient as a duplicate.

To enter patient demographic information

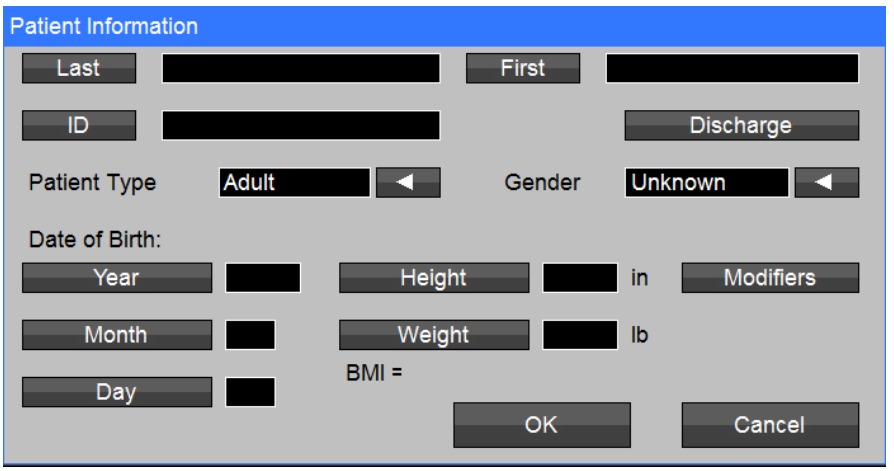
1 Touch the Patient button (on the top left corner of the screen).

-Or-

Touch the **Setup** key, and then touch the **Patient Information** button in the **Setup** menu.

The **Patient Information** screen shows (refer to Figure 2-2).

Figure 2-2: Patient Information screen (Continuous mode)



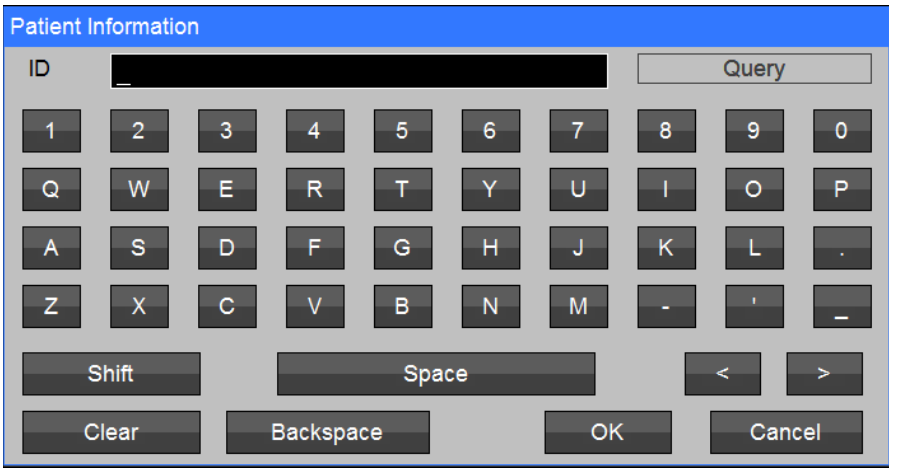
2 For **First**, **Last**, and **ID**, touch the corresponding button and use the on-screen keyboard to enter the information (refer to Figure 2-3).

If the monitor is connected to ICS, you can touch the **Query** button to automatically enter patient information associated with the **ID**.

Note:

- *The **ID** field supports up to 16 characters.*
- *You can enter the **ID** with the optional bar code reader.*
- *For Spot Check (**SPOT**) mode: If you do not enter a patient ID, the monitor can automatically create a patient ID when you send a spot-check record to ICS.*
- *The **Discharge** button only shows for Continuous (**CONT**) mode.*

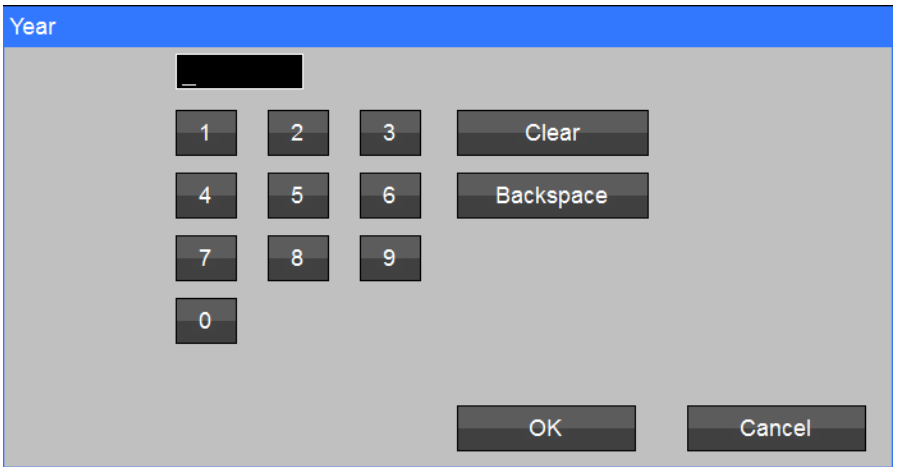
Figure 2-3: On-screen keyboard (for entering and querying patient ID)



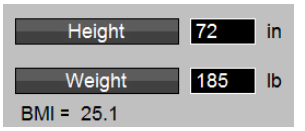
3 Touch the drop-down arrows to select the **Patient Type** and **Gender**. Touch **OK** when done.

4 For **Date of Birth** entries and **Height** and **Weight**, touch the corresponding buttons and use the on-screen numeric keypad (refer to Figure 2-4) to enter the information. Touch **OK** when done.

Figure 2-4: Numeric keypad



A **BMI** (Body Mass Index) value automatically shows when you enter a valid **Height** and **Weight**. The BMI calculation automatically compensates for height (**in** or **m**) and weight units (**lb** or **kg**).



5 Touch the **Modifiers** button to enter patient modifiers.

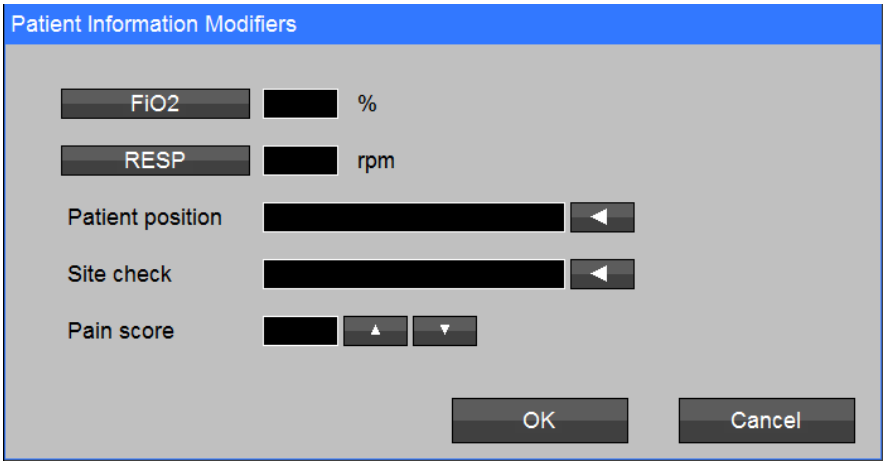
In the **Patient Information Modifiers** screen (refer to Figure 2-5), you can touch the buttons and drop-down menu arrows to enter modifiers for:

- **FiCO2** (fractional concentration of inspired CO_2) – 21 to 100%
- **RESP** (respiration rate) – 1 to 150 rpm

- **Patient position** – **N/A**, **Sitting**, **Supine**, or **Standing**
- **Site check** – **N/A**, **Within Normal Limits**, **Warm, Dry and Intact**, or **Other**
- **Pain score** – 0 to 10

6 Touch **OK** when done.

Figure 2-5: Patient Information Modifiers screen



Discharge Patient

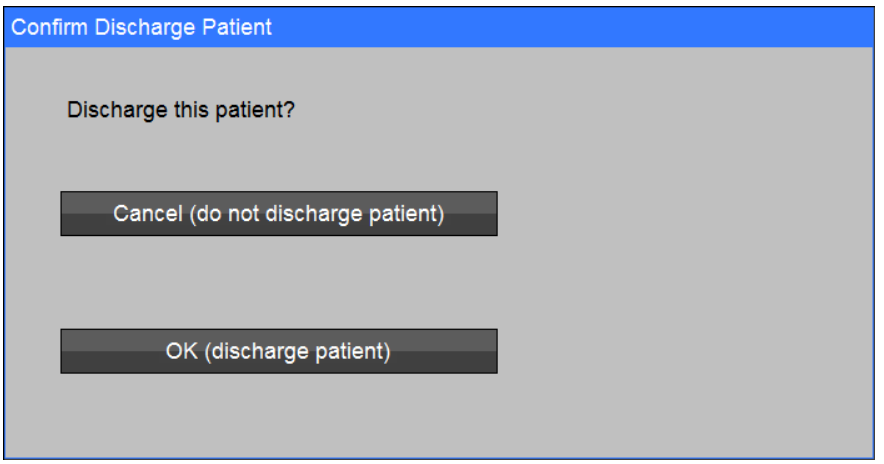
When the monitor is in Continuous (**CONT**) mode, the **Patient Information** screen also lets you discharge the patient.

To discharge a patient (Continuous mode only)

1 Touch the Patient button (on the top left corner of the screen).
-Or-
Touch the **Setup** key, and then touch the **Patient Information** button in the **Setup** menu.
The **Patient Information** screen shows (refer to Figure 2-2).

2 Touch the **Discharge** button.
The **Confirm Discharge Patient** screen shows (refer to Figure 2-6).

Figure 2-6: Confirm Discharge Patient screen



3 Touch **OK** to discharge the patient.
The monitor goes to Standby mode and automatically creates a patient ID (which you can edit through the **Patient Information** screen).

Clinician ID

If the Monitor button is configured to show the clinician ID, you can use the button to enter and show the clinician ID.

To enter the clinician ID

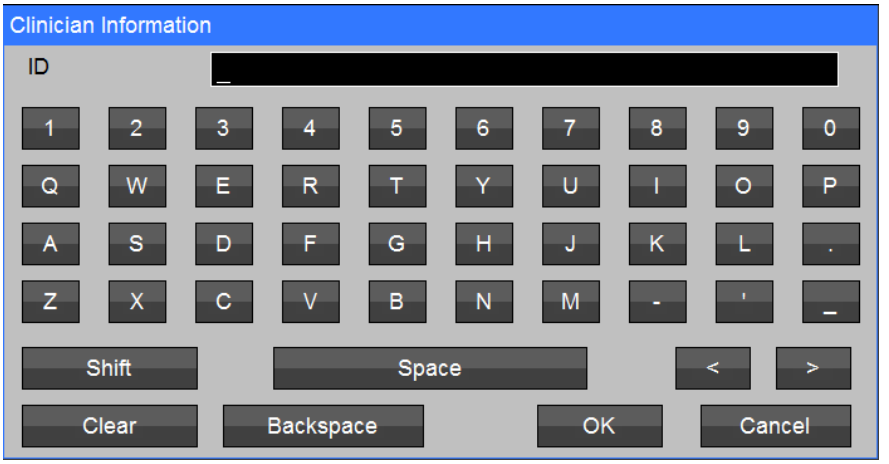
1 Touch the Monitor button (on the top center of the screen).

-Or-

Touch the **Setup** key, and then touch the **Clinician Information** button in the **Setup** menu.

The **Clinician Information** screen shows (refer to Figure 2-7).

Figure 2-7: Confirm Discharge Patient screen



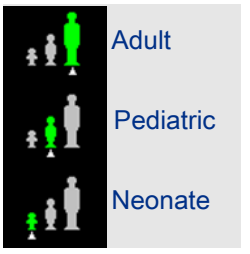
2 Use the on-screen keyboard to the enter the **ID**.

3 Touch **OK** to apply or **Cancel** to cancel the change.

Patient Mode (Type)

Default alarm limits are automatically set based on the Patient mode selection. Changing the Patient mode changes the current alarm limits to the last saved user defaults for that Patient mode.

You can use the DM4 to monitor Adult, Pediatric, and Neonatal patients. The Patient Type icon indicates the current Patient mode selection.



To change the Patient mode

1 Touch the Patient Type icon.

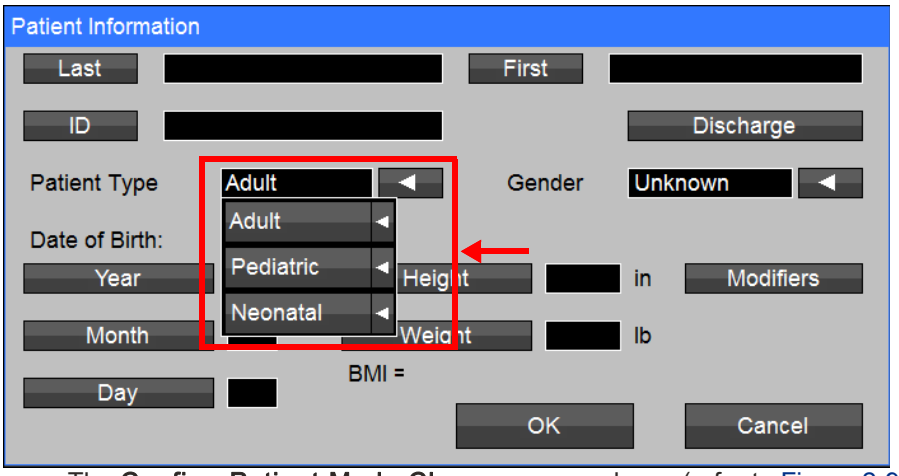
-Or-

Touch the **Setup** key, and then touch the **Patient Information** button in the **Setup** menu.

The **Patient Information** screen shows (refer to Figure 2-2).

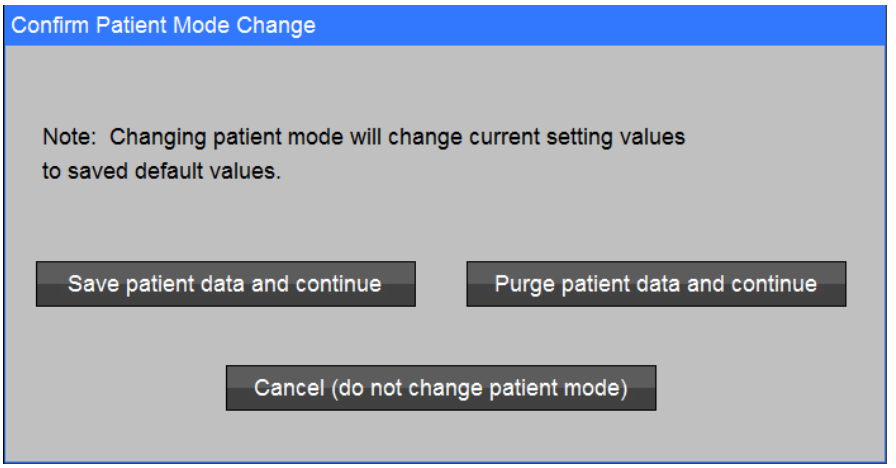
2 Touch the **Patient Type** drop-down arrow to select **Adult**, **Pediatric**, or **Neonatal** (refer to Figure 2-8). Touch **OK** when done.

Figure 2-8: Patient Type selection



The **Confirm Patient Mode Change** screen shows (refer to Figure 2-9).

Figure 2-9: Confirm Patient Mode Change screen



3 Select the **Save patient data and continue** or **Purge patient data and continue** to change the patient mode. To cancel changing the patient mode, touch **Cancel (do not change patient mode)**.

Screen Lock

The Screen Lock feature lets you limit access to menus by unauthorized users. Use screen lock to avoid changes to settings. The Screen Lock icon (Enabled) indicates if the Screen Lock feature is on.


Disabled


Enabled

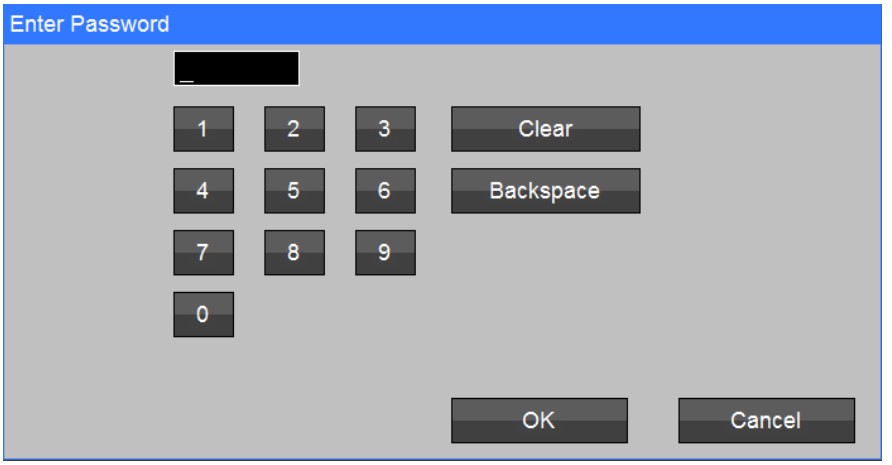
The Screen Lock feature lets you limit access to the configuration menus; it does not affect the usability of the monitor (i.e. users can still initiate NIBP measurements, acknowledge alarms, etc.). With the Screen Lock feature enabled, only authorized users can make changes to the configuration settings.

If the Screen Lock feature is enabled, you must enter a password as described here to access any of the configurations menus. The password is the current date shown on the monitor (MMDDYY). For example, if the date shown on the monitor is **01/05/2019**, then the Screen Lock password is **010519**.

To enable or disable Screen Lock

1 Touch the Screen Lock icon.
The **Enter Password** screen shows (refer to Figure 2-10).

Figure 2-10: Enter Password screen



2 Use the numeric on-screen keypad to enter the password (six-digit current date—MMDDYY).

Workflow Modes

The DM4 monitor has two Workflow modes: Spot Check (**SPOT**) and Continuous (**CONT**). The current Workflow mode appears in the upper right corner of the screen.

Spot Check (SPOT) Mode Features

When the monitor is in Spot Check (**SPOT**) mode, you can:

- print measurements from the optional external recorder;
- enter supplemental patient data (modifiers), such as **Pain Level** and **Patient Position**, as part of measurement records;
- save spot-check records of vital signs to the local trends database;
- show and print up to 1,000 measurements on the **Trends** screen; and
- send spot-check trend data to ICS Clinical Access Trends, or to the hospital EMR (through the ICS HL7 interface)

Continuous (CONT) Mode Features

When the monitor is in Continuous (**CONT**) mode, you can:

- print measurements with the optional external strip chart recorder;
- enter supplemental patient data (modifiers), such as **Pain Level** and **Patient Position**, as part of measurement records;
- put the monitor in Standby (to temporarily suspend patient monitoring);
- set and use limit alarms.

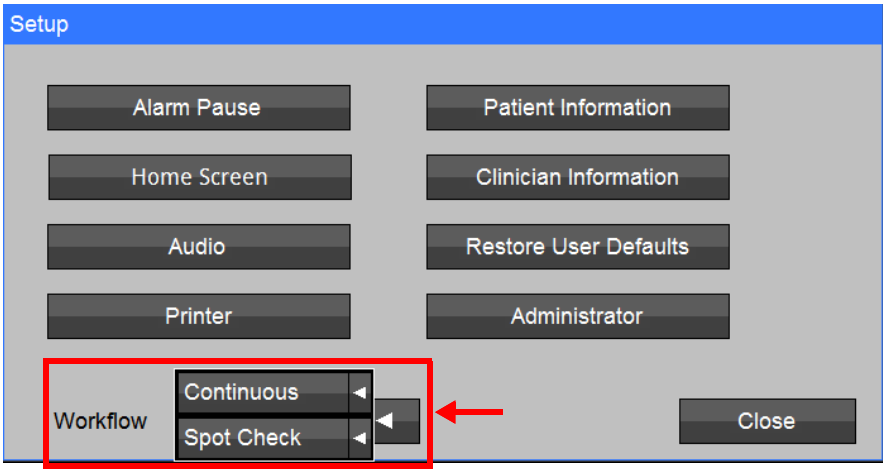
Continuous measurements are automatically saved to the trends database once every minute.

When connected to a network or an ICS database (version 4.02.02 or newer), continuous physiologic measurements are automatically transmitted over the network for showing in ICS Clinical Access Trends, or to the hospital EMR (through the ICS HL7 interface).

Workflow Setup

The **Workflow** setting (refer to Figure 2-11) in the **Setup** menu lets you configure the monitor for Continuous (**CONT**) or Spot Check (**SPOT**) mode.

Figure 2-11: Workflow setting



To set the Workflow mode

1. Touch the **Setup** key (on the right side of the screen).
2. Touch the **Workflow** drop-down arrow and select **Continuous** or **Spot Check**.
3. Touch **Close** to apply the new setting.

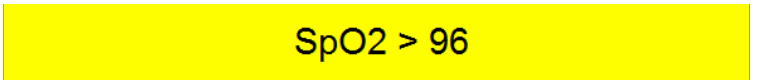
   The display goes momentarily goes blank, and then shows the new Workflow mode in the upper right corner of the screen.

Message Area (Alarms)

Patient alarm and system messages show in the dedicated message area (12) at the bottom of the screen. For a list and description of all patient alarm and system messages, refer to Alarm Messages on page 3-2.

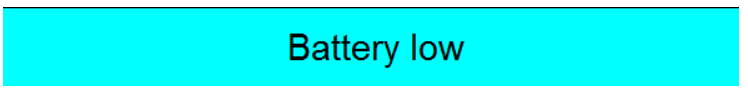
For medium priority alarms, the message area flashes yellow (refer to Figure 2-12).

Figure 2-12: Medium priority alarm message



For low priority alarms, the message area changes to cyan (refer to Figure 2-13).

Figure 2-13: Low priority alarm message

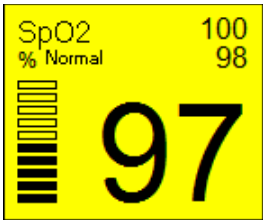


Parameter Zones (Alarms)

Like the message area, the parameter zones change color to alert the user of patient alarms for that parameter.

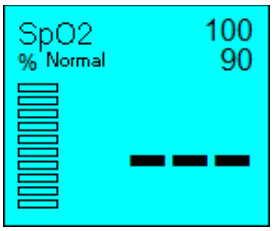
For medium priority patient alarms, the parameter zone flashes yellow (refer to Figure 2-14).

Figure 2-14: SpO_2 zone with medium priority alarm



For low priority patient alarms, the parameter zone changes to cyan (refer to Figure 2-15).

Figure 2-15: SpO_2 zone with low priority alarm



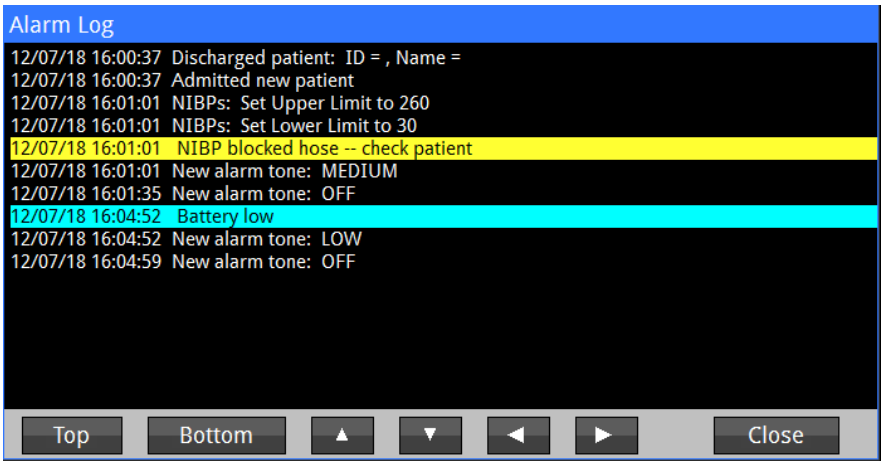
Alarm Log

The Alarm Log (refer to Figure 2-16) shows a record of physiological and system alarms, as well as changes to alarm limit settings. Medium priority alarm entries are highlighted in yellow, and low priority alarm entries are highlighted in cyan. The Alarm Log entries are maintained even after the monitor powers OFF or the battery is depleted.

To show the Alarm Log

1 Touch the message area at the bottom of the main screen.

Figure 2-16: Alarm Log



Audio Setup

You can configure the audio for alarms, pulse tones, and touchscreen response.

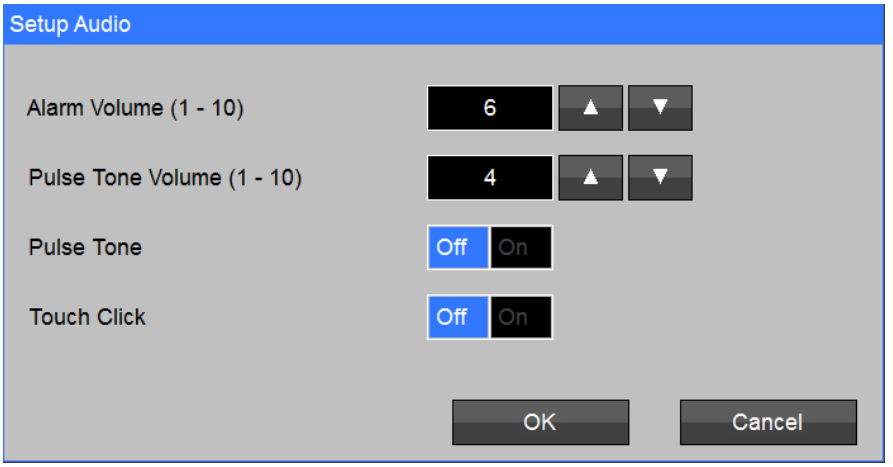
To set up the monitor audio

1 Touch the **Setup** key (on the right side of the screen).
2 In the **Setup** menu, touch the **Audio** button.
3 In the **Setup Audio** menu (refer to Figure 2-17):

- Touch the up and down arrows to adjust the **Alarm Volume (1 - 10)** (default is **6**).
- Touch the up and down arrows to adjust the **Pulse Tone Volume (1 - 10)** (default is **4**).
- Select **Off** to disable or **On** to enable the **Pulse Tone.**
- Select **Off** to disable or **On** to enable the **Touch Click**.

4 Touch **OK** to apply or **Cancel** to cancel changes to settings.

Figure 2-17: Setup Audio menu



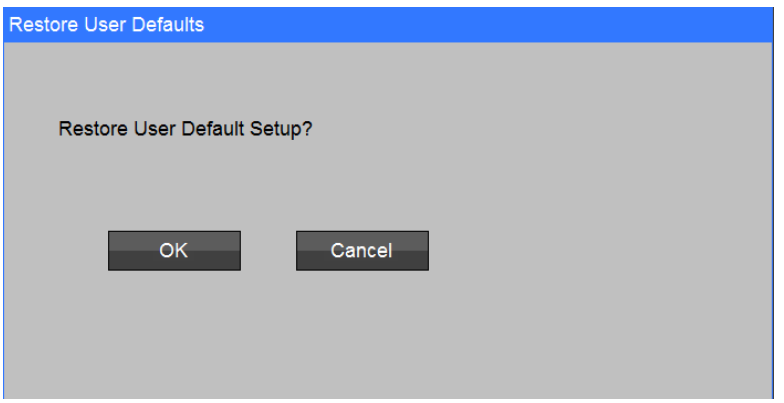
Restore User Defaults

You can restore the monitor to its user default settings.

To restore user defaults

1 Touch the **Setup** key (on the right side of the screen).
2 In the **Setup** menu, touch the **Restore User Defaults** button.
3 In the **Restore User Defaults** screen (refer to Figure 2-18), touch **OK** to restore user defaults or **Cancel** to retain current monitor settings.

Figure 2-18: Restore User Defaults screen



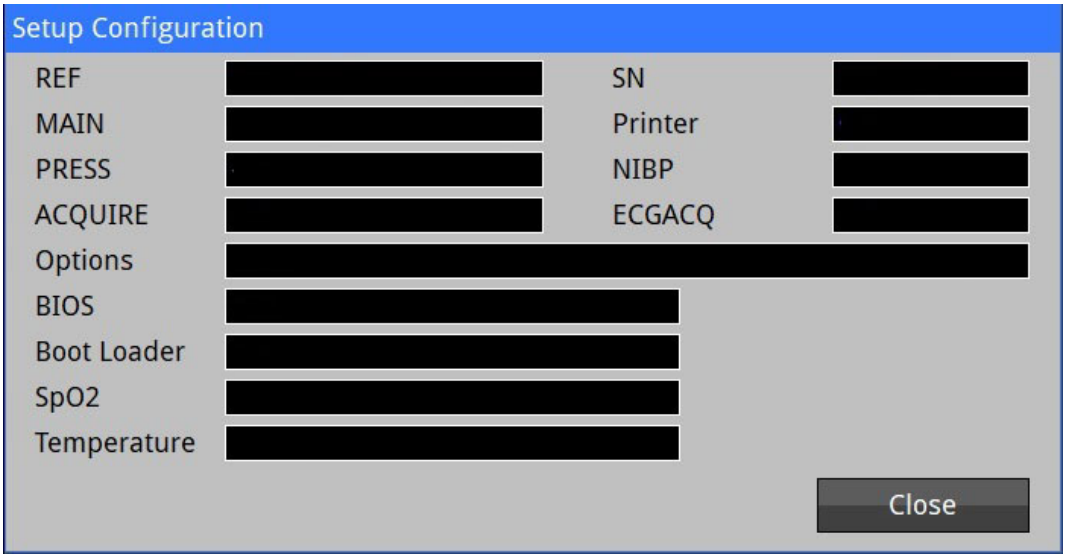
Configuration (System Information)

You can review monitor system information, such as the model, serial number, software version, and installed options.

To show monitor system information

1. Touch the **Setup** key (on the right side of the screen).
2. In the **Setup** menu, touch the **Administrator** button.
3. In the **Setup Administrator** menu, touch the **Configuration** button.
   The **Setup Configuration** screen shows (refer to Figure 2-19).
   Touch **Close** to close the screen.

Figure 2-19: Setup Configuration screen



Alarms and Messages

Alarms and Messages Overview

The DM4 monitor provides audible and visual indications to alert users of physiological conditions or technical issues.

In Spot Check (**SPOT**) mode, the monitor can provide error messages that alert the user of equipment issues that are preventing patient monitoring (for example, **NIBP cuff leak**).

In Continuous (**CONT**) mode, the monitor can provide equipment error messages, as well as alarms when one or more measured vital sign values have exceeded the high or low alarm limit settings. For example, you can configure the system to sound an alarm when the SpO_2 of a patient goes below 92%. Alarm monitoring can be individually configured for each physiological parameter.

You can access the alarm limit settings of a parameter by touching the parameter zone. For more information on setting alarm limits, refer to the setup sections in the parameter chapters.

- **Restoring User Defaults does not automatically restore the default Alarm Volume. The Alarm Volume should be checked and set Manually after selecting Restore User Defaults.**
- **Restoring Factory Defaults does not automatically restore the default Alarm Volume. The Alarm Volume should be checked and set Manually after selecting Restore Factory Defaults.**
- **Before making a change to the date and time, clearing patient trends is recommended to avoid patient data appearing out of sequence. [Setup/Administrator/Clear Trends]**
- **Always follow hospital protocols when setting alarms.**

Note:

Limit alarms are disabled in Spot Check mode.

Audible and Visual Alerts

Table 3-1 describes the audible and visual indications that the monitor generates to alert users of physiological conditions and technical issues.

Table 3-1: Audible and Visual Alerts

Audible Alert	Visual Alert	Alarm Priority	Condition
Three, high-pitch tones every 15 seconds	Yellow flashing background	Medium	Parameter alarm limit violation
Single, lower pitch tone every 20 seconds	Cyan background	Low	Technical error that prevents monitoring (for example, detached SpO_2 sensor)
Single tone every 25 seconds	Flashing battery icon	N/A	Low battery
Continuous tone	N/A	N/A	Battery almost depleted

Alarm Messages

When a parameter alarm is active, a corresponding message shows at the bottom of the screen. If more than one alarm condition is active at the same time, the message for each condition alternately shows every two to three seconds.

Table 3-2 lists the alarm messages that can show on the monitor display, as well as the possible causes for the indicated conditions and suggested actions for resolving them. The messages show in a dedicated area on the bottom of the main screen (refer to Figure 2-1 on page 2-3).

Table 3-2: Alarm Messages

Message	Possible Cause	Suggested Action
NIBP Messages		
NIBP weak signal	• Poor limb perfusion • Improper cuff placement • Cuff size too large for patient	• Check patient and provide any necessary clinical care • Check to make sure cuff is applied properly, with artery mark aligned with brachial artery • Check limb circumference against recommended range as printed on cuff to ensure cuff is not too big • Move cuff to another limb
NIBP artifact	• Persistent patient movement or coughing • Hemodynamic interference (varying pulse amplitudes due to breathing or valvular problem) • Hose is clogged or leaking	• Check patient and provide any necessary clinical care • Calm patient • Move cuff to another limb with less movement • If no obvious patient motion, switching to other limb may still help in the case of hemodynamic interference • Check cuff and hose for signs of damage
NIBP cuff leak	• Leaky cuff or hose • Cuff not applied to patient	• Check for leaks in the cuff or hose and replace if necessary • Check that cuff and hose are connected to the monitor • Check that cuff is applied to patient
NIBP blocked hose -- check patient	Pinched hose	• Check patient and insure that cuff is deflated • Check for kinks or obstructions in the hose • Replace hose if necessary
NIBP measurement time exceeded	Measurement time limit was exceeded, usually due to motion artifact – 120 seconds in Adult or Pediatric Mode, 90 seconds in Neonatal Mode	• Check patient and provide any necessary clinical care • Calm patient • Move cuff to another limb with less movement • If no obvious patient motion, switching to the other limb may still help in the case of hemodynamic interference • Check cuff and hose for signs of damage • Repeat measurement
NIBP problem detected	A hardware problem has been detected	• Check patient and insure that cuff is deflated • Turn monitor OFF, then ON • If message persists, contact Spacelabs Healthcare technical support

Table 3-2: Alarm Messages (continued)

Message	Possible Cause	Suggested Action
NIBP cannot measure	• Initial inflation pressure may not have been high enough (if patient's systolic pressure is above 200 mmHg) • Patient movement	Repeat the measurement (monitor will automatically adjust to using a higher initial inflation pressure if needed)
NIBPs < [lower limit]	Systolic pressure of patient is below lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
NIBPs > [upper limit]	Systolic pressure of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
NIBPd < [lower limit]	Diastolic pressure of patient is below lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
NIBPd > [upper limit]	Diastolic pressure of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
NIBPm < [lower limit]	Mean pressure of patient is below lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
NIBPm > [upper limit]	Mean pressure of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
PR < [lower limit]	Pulse rate of patient is below lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
PR > [upper limit]	Pulse rate of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
	SpO_2 Messages	
SpO_2 check sensor	• Faulty SpO_2 sensor • Incorrect setup	• Replace SpO_2 sensor • Contact Spacelabs Healthcare technical support
SpO_2 check sensor placement	• Sensor has become detached from patient • Sensor not fully inserted on patient's finger • Excessive ambient light • Faulty sensor (no red light on sensor)	• Check to make sure sensor is attached fully and securely to patient • Cover sensor with opaque material, such as a towel, to reduce ambient light • Reattach the sensor, possibly on a smaller or larger finger • Replace sensor if there is no red light on it

Table 3-2: Alarm Messages (continued)

Message	Possible Cause	Suggested Action
SpO_2 low perfusion	• Poor perfusion • Large tissue mass • Nail polish • Bad SpO_2 sensor	• Check patient and provide any necessary clinical care • Warm extremities of patient if needed • Reattach the sensor on a smaller finger • Remove any nail polish that may be interfering with red light • Replace the SpO_2 sensor
SpO_2 low signal IQ	• Poor perfusion • Large tissue mass • Nail polish • Bad SpO_2 sensor	• Check patient and provide any necessary clinical care • Warm patient's extremities if needed • Reattach the sensor on a smaller finger • Remove any nail polish that may be interfering with red light • Replace the SpO_2 sensor
SpO_2 unplugged	SpO_2 sensor not connected to SpO_2 adapter cable	Check to make sure SpO_2 sensor is securely connected to SpO_2 cable on monitor
SpO_2 artifact	• Patient movement or coughing • Hemodynamic interference • Small tissue mass	• Calm patient • Reattach sensor on another finger with less movement • Reattach sensor on a larger finger
SpO_2 problem detected	A hardware problem has been detected	• Turn monitor OFF, then ON. • If message persists, contact Spacelabs Healthcare technical support
SpO_2 < [lower limit]	Oxygen saturation of patient is below current lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
SpO_2 > [upper limit]	Oxygen saturation of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
PR < [lower limit]	Pulse rate of patient is below lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
PR > [upper limit]	Pulse rate of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
FILAC Temperature Messages		
Temp unplugged	Temperature probe disconnected	• Check to make sure that temperature probe is connected to temperature cable • Check to make sure that temperature cable is connected to monitor

Table 3-2: Alarm Messages (continued)

Message	Possible Cause	Suggested Action
Temp out of range (too high)	• Temperature of patient is above maximum value that monitor can accurately detect • Problem with connections or hardware	• Check patient and provide any necessary clinical care • Check temperature probe cable connections • Check that temperature probe placement is stable • If message persists, contact Spacelabs Healthcare technical support
Temp cannot measure	• Patient movement • Problem with connections or hardware	• Calm patient • Check temperature probe cable connections • Check that temperature probe placement is stable • If message persists, contact Spacelabs Healthcare technical support
Temp problem detected *Note:* *There is no audio alert for this message.*	Hardware problem has been detected	• Turn monitor OFF, then ON • If message persists, contact Spacelabs Healthcare technical support
Temp < [lower limit]	Temperature of patient is below lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
Temp > [upper limit]	Temperature of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
Exergen Temperature Messages		
Internal error	Temperature problem detected	If message persists, contact Spacelabs Healthcare technical support
Fatal battery error	Temperature problem detected	If message persists, contact Spacelabs Healthcare technical support
Patient temperature too high to measure	Temperature out of range (too high)	• Check patient and provide any necessary clinical care • Take measurement as described in <LinkTextChar>Exergen Temperature Measurement on page 7-4. • If message persists, contact Spacelabs Healthcare technical support
Patient temperature too low to measure	Temperature out of range (too low)	• Check patient and provide any necessary clinical care • Take measurement as described in <LinkTextChar>Exergen Temperature Measurement on page 7-4. • If message persists, contact Spacelabs Healthcare technical support

Table 3-2: Alarm Messages (continued)

Message	Possible Cause	Suggested Action
Ambient temperature too high to measure	Temporal scanner is too warm	• Make sure room temperature is within the operating temperature of temporal scanner • Wait for temporal scanner to go to room temperature (approximately 30 minutes) • If message persists, contact Spacelabs Healthcare technical support
Ambient temperature too low to measure	Temporal scanner is too cold	• Make sure the room temperature is within the operating temperature of the scanner • Wait for temporal scanner to go to room temperature (approximately 30 minutes) • If message persists, contact Spacelabs Healthcare technical support
Temp < [lower limit]	Temperature of patient is below lower alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate
Temp > [upper limit]	Temperature of patient is above upper alarm limit	• Check patient and provide any necessary clinical care • Change alarm limit if it is no longer clinically appropriate

Technical Messages

Table 3-3 lists the technical messages that can show on the monitor display, as well as the possible causes for the indicated conditions and suggested actions for resolving them. The messages show in a dedicated area on the bottom of the main screen (refer to Figure 2-1 on page 2-3).

Table 3-3: Technical Messages

Message	Possible Cause	Suggested Action
Printer door open	Printer door is open	Close printer door
Printer out of paper	Printer is out of paper	Refill printer paper
Serial port not setup for Printer	A print has been requested, but printer option is not enabled	Contact Spacelabs Healthcare technical support
Printer not connected	A print has been requested, but printer is not connected	• Check printer cable connections • If message persists, contact Spacelabs Healthcare technical support
Battery Low	Battery power is low (30 minutes left)	Connect monitor to mains power
Battery Nearly Depleted	Battery is nearly depleted and will shut down in 60 seconds if not connected to mains power	Connect monitor to mains power
Monitor problem detected	Internal problem with monitor has been detected	• Turn monitor OFF, then ON • If message persists, contact Spacelabs Healthcare technical support

Audio Silence

You can silence audio alerts for a preset duration.

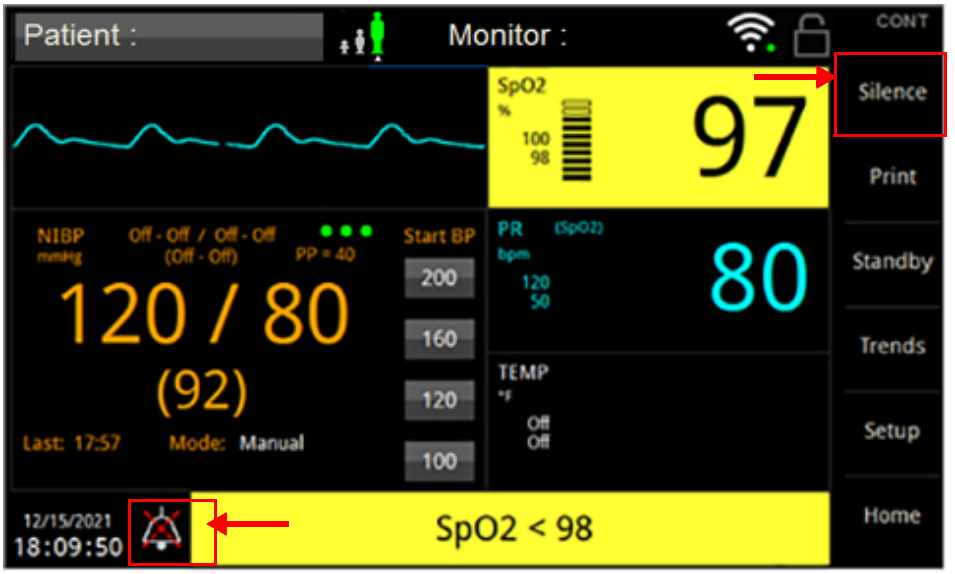
To silence audio alerts

1 Touch the **Silence** key.

The following occurs until the preset Audio Silence time expires:

- audio silences;
- for medium priority alarms, yellow background stops flashing; and
- Audio Silence icon shows on bottom of screen (refer to Figure 3-1).

Figure 3-1: Audio silenced alarm



Alarm Pause

You can pause all audio and visual alarm indications for a preset duration.

To pause alarms

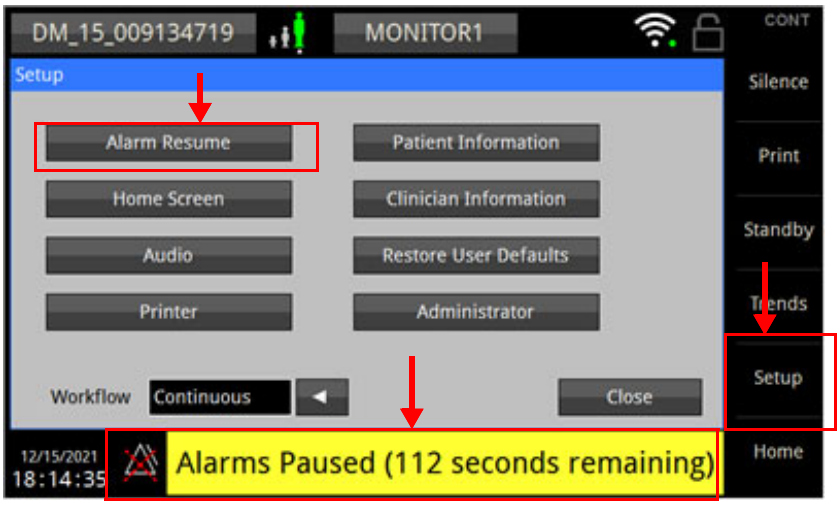
1 Touch the **Setup** key.

2 In the **Setup** menu, touch the **Alarm Pause** button.

- The **Alarm Pause** button label changes to **Alarm Resume**.
- The Alarms Paused icon shows on the bottom of the screen.
- The **Alarms Paused** message and countdown timer show on the bottom of the screen (refer to Figure 3-2).

To resume alarms before the countdown ends, touch the **Alarm Resume** button.

Figure 3-2: Alarms Paused



Alarm Limits

When the monitor is in Continuous (**CONT**) mode, you can configure alarm limits for all parameters. For more information on setting alarm limits, refer to the setup sections in the parameter chapters.

Default Alarm Limits

Table 3-4 shows the default alarm limits for SpO_2 and PR (Pulse Rate) for each Patient mode (type). The default setting for all NIBP and Temperature alarm limits is **OFF**.

Table 3-4: Default Alarm Limits: SpO_2 and PR

Parameter	Adult		Pediatric		Neonate	
	Upper	Lower	Upper	Lower	Upper	Lower
SpO_2	100	90	100	90	95	85
PR	120	50	120	50	180	100

Auto Set Alarm Limits

The Setup screen for each parameter includes an **Auto** button (to the right of the **Lower Limit** and **Upper Limit** settings). You can touch the **Auto** button to automatically set the alarm limits based on percentages of the current measured value. Table 3-5 shows the percentages that the Auto Set feature uses to adjust the upper and lower alarm limits for each parameter.

Table 3-5: Auto Set Alarm Limit Adjustments

Parameter	Alarm Limit Adjustment (x% of current measured value)	
	Lower	Upper
NIBP Systolic	80%	120%
NIBP Diastolic	80%	120%
NIBP Mean (MAP)	80%	120%
SpO_2	95%	105%
PR	80%	125%
Temperature	95%	105%

NIBP

NIBP Overview

The DM4 monitor uses the motion tolerant MAXNIBP algorithm and oscillometric measurement technique to determine systolic, diastolic and mean arterial pressure and pulse rate. When the monitor is in Continuous mode, you can take automatic NIBP measurements at preset intervals.

NIBP Safety Measures

- *Blood pressure and pulse can fluctuate greatly between measurements; the monitor cannot alert the user to changes in blood pressure occurring between measurement cycles.*
- *Do not apply the cuff on a limb being used for intravascular access or therapy, or an arterio-venous (A-V) shunt.*
- *Do not place the cuff on any extremity being used for SpO_2 monitoring.*
- *When monitoring over an extended period of time, or at frequent intervals, periodically observe the patient's limb to make sure that the circulation is not impaired for a prolonged period of time.*
- *Do not allow the inflation tube to be kinked; this may cause continuous cuff pressure and blood flow interference, resulting in injury.*
- *Too frequent measurements can cause injury due to blood flow interference.*
- *Do not apply a cuff over a wound, as this can cause further injury.*

- *There may be a marked difference between readings taken from the left and the right arms. Do not apply the cuff on an arm on the same side of a mastectomy.*
- *As with any non-invasive oscillometric blood pressure monitor, the accuracy of the measurements obtained may be adversely affected by the presence of agents that alter the patient's cardiovascular system.*
- *In some cases, rapid, prolonged cycling of an oscillometric, noninvasive blood pressure monitor cuff has been associated with any or all of the following: ischemia, purpura, or neuropathy. Apply the blood pressure cuff appropriately, according to instructions, and check the cuff site and cuffed extremity regularly when blood pressure is measured at frequent intervals or over extended periods of time.*
- *Do not place the cuff on an arm that is not suitable for NIBP measurement, e.g., an extremity with a deep vein thrombosis, grafts, ischemic changes, arteriovenous fistula or graft, vessel harvest or any trauma/incision. The cuff should not be applied over a peripherally inserted central catheter (PICC) or midline catheter site, but may be placed distally to the insertion site. NIBP measurements should not be taken in extremities with peripheral IV while an infusion is running.*
- *If the cuff should become contaminated with blood or other bodily fluids, it should be discarded.*
- *If the hose should become grossly contaminated with blood or other bodily fluids, it should be discarded.*

- **Consult a physician for interpretation of blood pressure measurements.**
- **Do not operate the monitor unless it has been properly calibrated. Inaccurate blood pressure readings may result. A Calibration check is recommended once every year. A pneumatic check is recommended once every year. For more information, refer to the *DM4 Service manual*.**
- **Do not alter the monitor's air hose. Spacelabs Healthcare cannot ensure proper monitor performance if the tubing is altered. Modification of the air hose will void the warranty. Avoid compression or restriction of pressure tubes.**
- **In shock conditions, the low amplitude of the blood pressure waveform may make it difficult for the monitor to accurately determine the systolic and diastolic pressures.**
- **If the cuff is applied on a limb being used for oxygen saturation monitoring %SpO_2 results will be altered during each blood pressure measurement due to the occlusion of blood flow.**

Note:

- *The NIBP parameter has not been investigated for use on pregnant (including pre-eclamptic) patients, and the effectiveness of the NIBP parameter has not been established in pregnant (including pre-eclamptic) patients.*
- *The monitor has been designed to promote patient safety. The maximum amount of time allowed to complete a blood pressure measurement is 120 seconds in Adult/Pediatric mode and 90 seconds in Neonatal mode. If the measurement has not been completed within that time, the cuff is deflated automatically and a message is shown indicating the problem.*
- *To prevent exposure of the extremity to an inordinately high pressure, the cuff is deflated automatically when the pressure in the system is greater than 290 mmHg in the Adult/Pediatric mode or 145 mmHg in the Neonatal mode.*
- *The cuffs used by the monitor are designed without transducers for patient safety. The transducers used for NIBP measurement are located inside the monitor on the NIBP board and are isolated from the patient.*
- *In the event of a microprocessor failure, the cuff will be deflated automatically within ten seconds.*
- *All equipment parts are protected against the effects of the discharge of a defibrillator. No separate actions are required when using this equipment with a defibrillator.*
- *The default initial inflation pressure is 160mmHg for Adult/Pediatric (80 for Neonatal). This may be adjusted if the patient's blood pressure range is known.*
- *Environmental or operational factors can affect the accuracy of the measurement (e.g., common arrhythmias such as atrial or ventricular premature beats or atrial fibrillation, patient motion, trembling, shivering).*

Maintenance

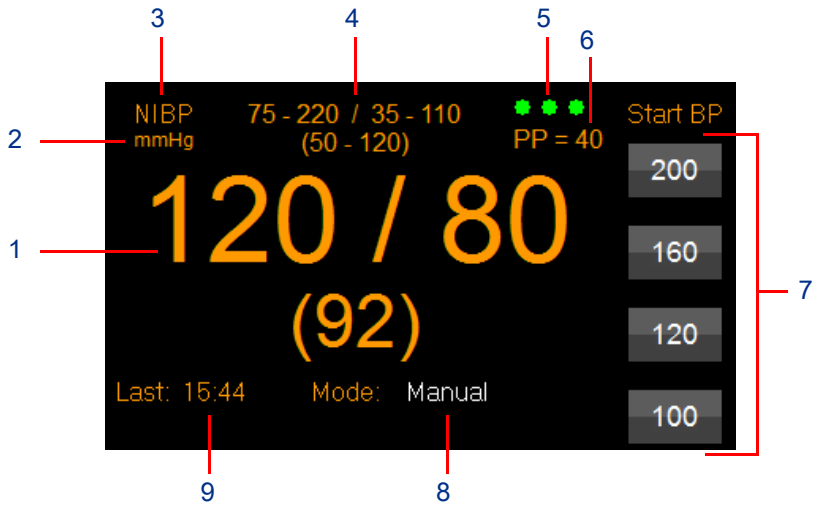
- Perform a NIBP pneumatic check once per year.
- Perform a NIBP transducer check once per year or when there is doubt about the validity of the blood pressure readings.

NIBP Display Details

Figure 4-1 shows the details of the NIBP zone. If there is no SpO_2 data, then the data shown in Pulse Rate (PR) zone is derived from NIBP. For more information, refer to SpO_2 Display Details on page 5-4.

Touching a button under **Start BP** initiates NIBP measurement at the indicated initial inflation pressure. Touching anywhere else in the NIBP zone accesses the settings for NIBP monitoring.

Figure 4-1: NIBP Zone



1 Measured value (Systolic / Diastolic (MAP))
2 Unit of measure
3 Parameter name
4 Upper and lower alarm limits (Systolic / Diastolic (MAP))
5 MAXIQ signal quality status (SQS) indicator – Shows the signal quality and degree of artifact for the NIBP measurement.
6 Pulse pressure (Systolic-Diastolic)
7 User-selectable Start BP Options – Each option starts a manual blood pressure measurement at the initial inflation pressure indicated on the button. When NIBP is setup for automatic measurements, a single **Start** button shows, and the initial inflation pressure shows above the button.
8 Current NIBP mode
9 Time of last measurement

NIBP Measurements

Excessive patient motion can contribute to inaccurate measurements. It is important that the patient be kept still during a measurement. Make every attempt to alleviate fear, anxiety and pain.

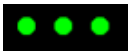
Touching the **Start** button or one of the Start BP Options (when **Start BP Options** is set to **Yes**) in the NIBP zone initiates NIBP measurements. For the first measurement, the monitor inflates the cuff to the pressure indicated above or on the button. For subsequent measurements (with Start BP Options disabled), the monitor will inflate approximately 30 mmHg higher than the previously determined Systolic pressure.

The measurement typically takes less than 30 seconds to complete. In no case does the cuff remain pressurized for more than 120 seconds for Adult and Pediatric patients and no more than 90 seconds for Neonates.

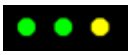
When the measurement is completed, the cuff automatically deflates and the monitor shows the Systolic, Diastolic, MAP and Pulse Pressure (Systolic-Diastolic) values, as well as Pulse Rate (if there is no SpO_2). The NIBP zone also shows a timestamp for the NIBP measurement in the format **HH:MM**, where **HH** is the hour and **MM** is the minute.

The MAXIQ Signal Quality Status Indicator shows the NIBP signal quality and degree of artifact present during a measurement (refer to Figure 4-2).

Figure 4-2: MAXIQ Signal Quality Status Indicator conditions



Excellent signal quality, low artifact present



Good signal quality, moderate artifact present

Poor signal quality, moderate artifact present

Touching the **Stop** button at any time stops a measurement and deflates the cuff. Quickly touching the **Start**/**Stop** button twice clears the current NIBP measurement from the NIBP zone.

Note:

If an NIBP measurement remains on the screen for 24 hours, the monitor automatically clears the measurement from the NIBP zone.

To start NIBP monitoring

1. Connect the NIBP hose to the NIBP port on the left side of the monitor.
2. Connect an appropriate NIBP cuff to the NIBP hose.

Note:

- *Clean reusable cuffs in accordance with hospital infection control policies. For recommended cleaning methods, refer to Cleaning, Disinfecting, and Sterilization on page 10-1.*
- *Actual connection steps may vary by facility. For instance, where disposable NIBP cuffs are used for infection control, you can connect the NIBP hose to the cuff after the cuff has been attached to the patient.*

3. Apply the appropriate sized cuff for the patient being monitored to the extremity.
4. Touch the **Start** button or one of the four buttons under **Start BP** (Start BP Options).

   The **Start** button label changes to **Stop**. To stop measurements and deflate the cuff, touch the **Stop** button once. To clear data from the NIBP zone, quickly touch the **Start**/**Stop** button twice.

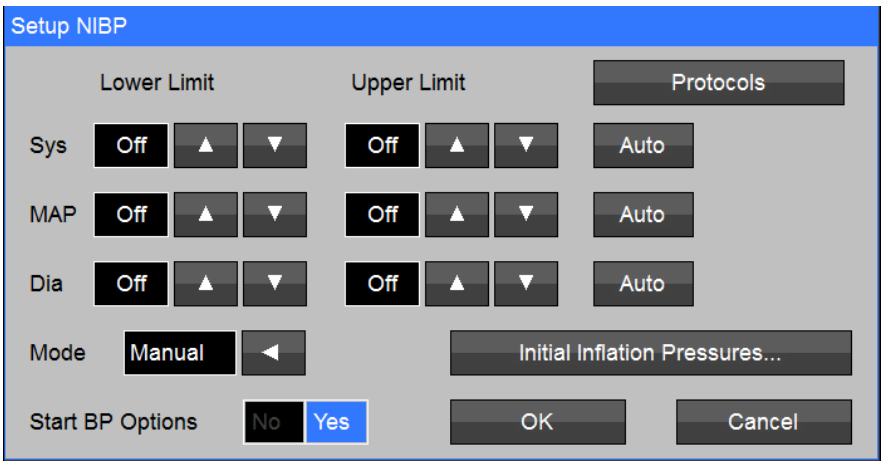
Note:

*To take an NIBP measurement between automatic cycles, touch the **Start** button. After the manual measurement, the monitor will resume the automatic measurement cycle.*

NIBP Settings

The **Setup NIBP** menu (refer to Figure 4-3) lets you change settings for NIBP monitoring. Settings available in this menu depend on the NIBP monitoring and Workflow modes.

Figure 4-3: Setup NIBP (in Manual and Continuous modes)



To access the NIBP settings

1 Touch the NIBP zone (on the main screen).

NIBP Modes

If the monitor is in Spot Check (**SPOT**) mode, the NIBP mode is set for manual measurements and cannot be changed. If the monitor is in Continuous (**CONT**) mode, you can select any of the NIBP modes that follow:

- **Manual** – Select to enable you to take manual measurements.
- **Auto** – If selected, the **Interval** setting replaces the **Start BP Options** setting. The **Interval** settings available for **Auto** mode are: **1**, **2**, **3**, **4**, **5**, **10**, **15**, **30**, **60**, and **90 min** (minutes). Select **Auto** to enable you take automatic measurements at the set **Interval**.
- **STAT** – If selected, the **Start BP Options** setting is removed. Select **STAT** to enable you to take an automatic series of blood pressure measurements for five minutes, with an approximately five-second pause between each measurement.

Readings obtained in STAT mode may not meet the stated accuracy of the monitor.

- **Proto 1**, **Proto 1**, and **Proto 3** – If selected, the **Start BP Options** setting is removed. Select a Protocol mode to enable you take a series of user-selected numbers of automatic NIBP measurements to take at specific time intervals (5, 10, 15, 30, 60, and 90 minutes). For information on setting the number measurements for each interval, refer to the *DM4 Service Manual*.

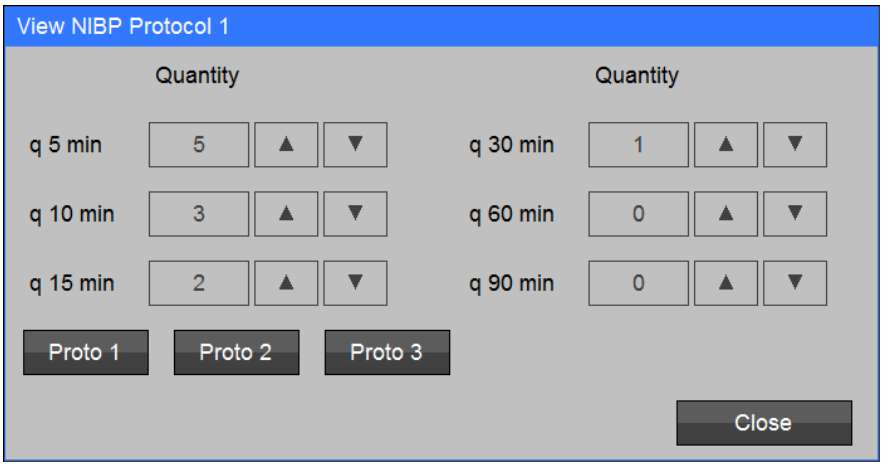
To change the NIBP mode

1 Touch the NIBP zone.
2 In the **Setup NIBP** menu, touch the **Mode** drop-drop arrow to select the NIBP mode.
3 Touch **OK** to apply or **Cancel** to cancel changes.

To show Protocol mode settings

1 Touch the NIBP zone.
2 In the **Setup NIBP** menu, touch the **Protocols** button.
The **View NIBP Protocol** menu shows (refer to Figure 4-4).

Figure 4-4: View NIBP Protocol menu



3 Touch the **Proto 1**, **Proto 2**, and **Proto 3** buttons to show the settings for each Protocol mode. For information on changing these settings, refer to Setup NIBP Protocols on page 4-9.

4 Touch **Close** when done.

Initial Inflation Pressures

If the NIBP **Mode** is set to **Manual**, the **Start BP Options** setting shows in the **Setup NIBP** menu. When **Start BP Options** is enabled (set to **Yes**), four **Start BP** buttons show in NIBP zone, each with a user-selectable initial inflation pressure.

If **Start BP Options** is set to **No** or the NIBP **Mode** is set to one of the automatic NIBP Modes (**Auto**, **STAT** or a Protocol), a single **Start** button shows in the NIBP zone, with a user-selectable initial inflation pressure shown above the button. Table 4-1 shows the initial inflation pressures available for each Patient mode when Start BP Options is disabled or not available.

When measuring blood pressure on a pediatric patient, it is recommended that the initial inflation pressure be set to a value of 120 mmHg or lower.

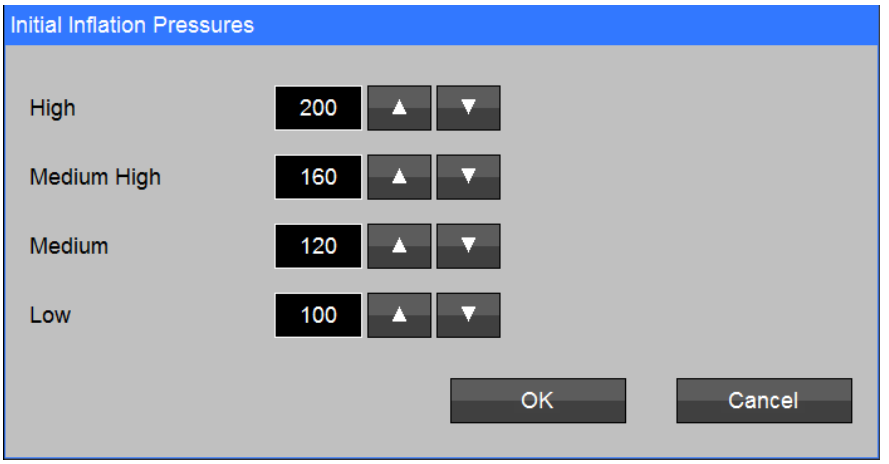
Table 4-1: Selectable Initial Inflation Pressures (No Start BP Options)

Adult Mode	Pediatric Mode	Neonate Mode
240 mmHg	240 mmHg	120 mmHg
220 mmHg	220 mmHg	100 mmHg
200 mmHg	200 mmHg	80 mmHg
180 mmHg	180 mmHg	60 mmHg
160 mmHg	160 mmHg	
140 mmHg	140 mmHg	
120 mmHg	120 mmHg	
100 mmHg	100 mmHg	
80 mmHg	80 mmHg	

To set up Start BP Options (Manual mode only)

1. Touch the NIBP zone.
2. In the **Setup NIBP** menu, touch the **Yes** for **Start BP Options**.
3. Touch the **Initial Inflation Pressures...** button.
   The **Initial Inflation Pressures** menu shows (refer to Figure 4-5).
4. Touch the up and down arrows to select the High, Medium High, Medium, and Low initial inflation pressures.
5. Touch **OK** to apply or **Cancel** to cancel changes.

Figure 4-5: Initial Inflation Pressures menu



To change the initial inflation pressure (no Start BP Options)

1. Touch the NIBP zone.
2. In the **Setup NIBP** menu, touch the **Initial Inflation Pressure** up and down arrows to select a new pressure.
3. Touch **OK** to apply or **Cancel** to cancel changes.

NIBP Alarm Limits

The NIBP alarm limits settings are available only when the monitor is in Continuous (**CONT**) mode.

If you set the upper or lower alarm limit to Off, there will be no visual or audible indication for that alarm condition.

To set NIBP alarm limits

1. Touch the NIBP zone to show the **Setup NIBP** menu.
2. For **Sys** (Systolic), **MAP**, and **Dia** (Diastolic):
   - Touch the up and down arrows to adjust the **Lower Limit** and **Upper Limit** values.

   -Or-
   - Touch the **Auto** button to automatically set the **Lower Limit** to 80% and the **Upper Limit** to 120% of the current measured value.
3. Touch **OK** to apply or **Cancel** to cancel changes.

SpO_2

SpO_2 Overview

Depending on the installed pulse oximetry option, the DM4 features Masimo SET or Nellcor OxiMax SpO_2 technology that you can use for Adult, Pediatric, and Neonatal patients.

SpO_2 Safety Measures

- *A pulse oximeter should be considered an early warning device. If a trend toward patient deoxygenation is indicated, blood samples should be analyzed by a laboratory oximeter to completely understand the patient's condition.*
- *Accurate oxygen saturation measurements cannot be obtained when the oximeter is not measuring the pulse properly. If the Plethysmograph waveform is erratic or the Pulse Rate display is erratic or inaccurate, first examine the patient for any sign of distress and only then re-examine sensor placement.*
- *Pulse rate measurement is based on the optical detection of a peripheral flow pulse and therefore may not detect certain arrhythmias. The monitor should not be used as a replacement or substitute for ECG based arrhythmia analysis.*
- *SpO_2 is empirically calibrated to functional arterial oxygen saturation in healthy adult volunteers with normal levels of carboxyhemoglobin (COHb) and methemoglobin (MetHb). A pulse oximeter cannot measure elevated levels of COHb or MetHb. Increases in either COHb or MetHb will affect the accuracy of the SpO_2 measurement.*
- *Inspect the pulse oximeter site every 2 to 4 hours or per hospital protocol. If there is any skin irritation caused by the sensor, remove the sensor and apply it to a different location.*

- *Interfering Substances: Carboxyhemoglobin may erroneously increase SpO_2 readings. The level of increase is approximately equal to the amount of carboxyhemoglobin present.*
- *Severe anemia may cause erroneous SpO_2 readings.*
- *Do not use the monitor or oximetry 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 oximetry measurements.*
- *If using pulse oximetry during full body irradiation, keep the sensor out of the irradiation field. If the sensor is exposed to the irradiation, the reading might be inaccurate or the unit might read zero for the duration of the active irradiation period.*
- *Carefully route patient cabling to reduce the possibility of patient entanglement or strangulation.*
- *Always remove the sensor from the patient and completely disconnect the patient from the monitor before bathing the patient.*
- *Patient Safety: If a sensor is damaged in any way, discontinue use immediately.*
- *The monitor may be used during defibrillation, but the readings may be inaccurate for up to 20 seconds.*
- *The site must be checked at least every four hours to ensure adequate adhesion, circulation, skin integrity and correct optical alignment.*
- *If the sensor is wrapped too tightly or supplemental tape is used, venous congestion/pulsations may occur, causing erroneous readings.*
- *Exercise caution when applying a SpO_2 sensor to a site with compromised skin integrity. Applying tape or pressure to such a site may reduce circulation and/or cause further skin deterioration.*
- *With very low perfusion at the monitored site, the readings may read lower than core arterial oxygen saturation.*
- *Misapplied sensors or sensors that become partially dislodged may cause either over or under reading of actual arterial oxygen saturation.*
- *To prevent damage, do not soak or immerse the sensor in any liquid solution. Do not attempt to sterilize.*
- *Intravascular dyes or externally applied coloring (such as nail polish) may lead to inaccurate SpO_2 measurements.*
- *Elevated levels of Total Bilirubin may lead to inaccurate SpO_2 measurements.*

- *Do not use damaged sensors or patient cables. Do not use a sensor or patient cable with exposed optical or electrical components.*
- *Do not immerse the sensor or patient cable in water, solvents, or cleaning solutions (the sensors and connectors are not waterproof).*
- *Unless otherwise specified, do not sterilize sensors or patient cables by irradiation, steam, autoclave, or ethylene oxide. Refer to cleaning information in the instruction for use for the Masimo re-useable sensors.*
- *Do not attempt to reprocess, recondition, or recycle any SpO_2 sensors or patient cables as these processes may damage the electrical components, potentially leading to harm.*
- *To avoid cross contamination, only use SpO_2 single use sensors on the same patient.*
- *High intensity extreme lights (including pulsating strobe lights) directed on the sensor may not allow the monitor to obtain readings.*
- *Avoid placing the sensor on any extremity with an arterial catheter or blood pressure cuff.*
- *The pulsations from intra-aortic balloon support can be additive to the pulse rate on the oximeter pulse rate display. Verify patient's pulse rate against the ECG heart rate.*
- *Do not modify or alter the sensor in any way. Alterations or modification may affect performance and/or accuracy.*
- *The sensor should not be below heart level (for example, a sensor on the hand of a patient in a bed with the arm lowered toward the floor).*
- *Venous pulsations may cause erroneous low readings (for example, tricuspid value regurgitation).*
- *Circulation distal to the sensor site should be checked routinely.*

Inaccurate measurements may be caused by:

- **anemia or low hemoglobin concentrations**
- **electrosurgical interference**
- **excessive ambient light**
- **excessive patient movement**
- **incorrect sensor application or use**
- **intravascular dyes such as indocyanine green or methylene blue**
- **moisture in the sensor**
- **placement of a sensor on an extremity with a blood pressure cuff, arterial catheter, or intravascular line**
- **venous pulsations**

The loss of a pulse signal can occur in any of the following situations:

- **a blood pressure cuff is inflated on the same extremity as the one with the SpO2 sensor attached**
- **excessive ambient light such as from a surgical lamp, a bilirubin lamp, or sunlight**
- **the patient has hypotension, severe vasoconstriction, severe anemia, or hypothermia**
- **the patient is in cardiac arrest or is in shock**
- **the sensor is too tight**
- **there is arterial occlusion proximal to the sensor**

Note:

- *High levels of COHb may occur with seemingly normal SpO_2. When elevated levels of COHb are suspected, laboratory analysis (oximetry) of a blood sample should be performed.*
- *The SpO_2 may be decreased by levels of MetHb of up to approximately 10% to 15%. At higher levels of MetHb, the SpO_2 may tend to read in the low to mid 80s. When elevated levels of MetHb are suspected, laboratory analysis (oximetry) of a blood sample should be performed.*
- *A functional tester cannot be used to assess the accuracy of the monitor or any sensors.*

SpO_2 Display Details

Physiologic data from the installed SpO_2 option shows in the SpO_2 numeric, PR (Pulse Rate), and (when enabled) SpO_2 waveform zones.

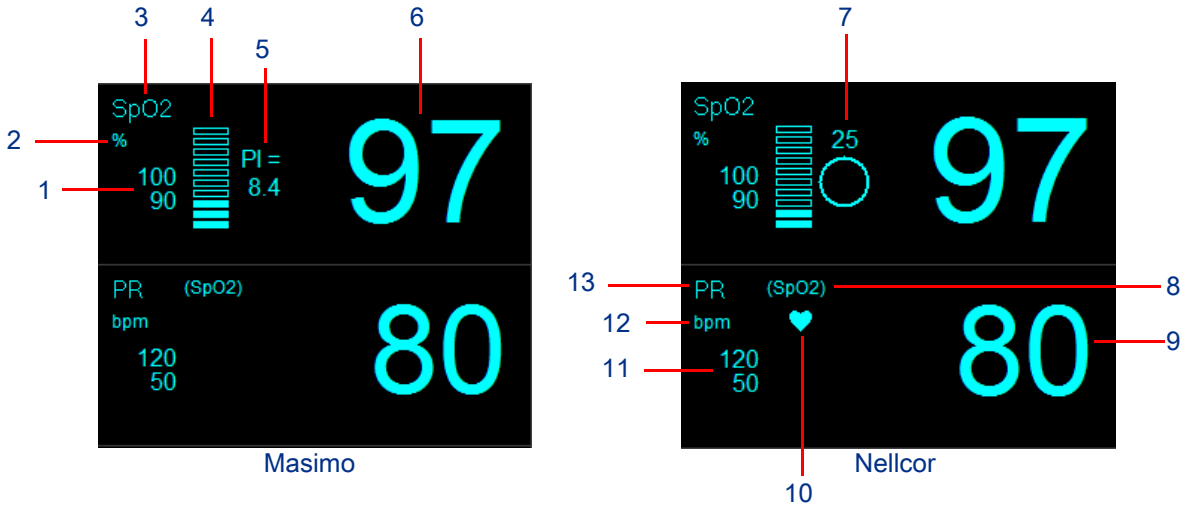
SpO_2 Numeric and PR (Pulse Rate) Zones

Figure 5-1 shows the display details of the Masimo and Nellcor SpO_2 numeric and Pulse Rate (PR) zones. Touching anywhere in each of these zones accesses its settings.

Note:

If there is no SpO_2 measurement, Pulse Rate is derived from NIBP.

Figure 5-1: SpO_2 numeric and PR zones

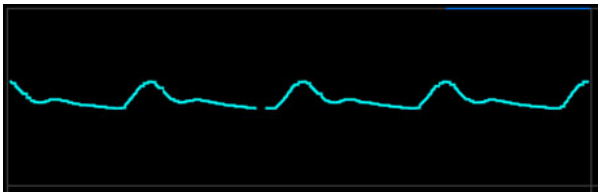


1 SpO_2 alarm limits
2 SpO_2 unit of measure
3 SpO_2 parameter name
4 Signal strength bar graph
5 Perfusion Index (PI) – Available only for Masimo SpO_2. For information on enabling display of the PI, refer to SpO_2 Settings on page 5-8.
6 SpO_2 value
7 SatSeconds – Available only for Nellcor SpO_2. For information on enabling display of SatSeconds, refer to SpO_2 Settings on page 5-8.
8 Pulse Rate (PR)-derived parameter (**SpO2** or **NIBP**) – SpO_2 takes precedence over NIBP.
9 PR value
10 Pulse Blip – For information on enabling and disabling display of the Pulse Blip, refer to Display of Pulse Blip and SpO_2 Waveform Zone on page 5-7.
11 PR alarm limits
12 PR unit of measure
13 PR parameter name

SpO_2 Waveform (Plethysmograph)

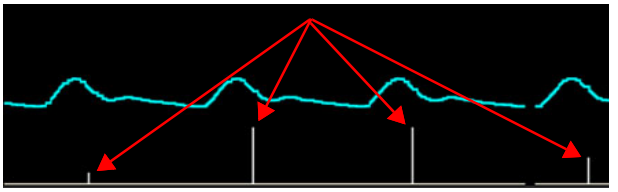
You can configure the monitor to show the SpO_2 waveform (plethysmograph) (refer to Figure 5-2). Touching anywhere under the blue line on the top right of the waveform zone freezes/unfreezes the waveform. Touching anywhere else in the waveform zone accesses its settings. For information on enabling or disabling display of the SpO_2 waveform zone, refer to Setup Home Screen on page 4-1.

Figure 5-2: SpO_2 waveform (plethysmograph)



For monitors with Masimo SpO_2, you can show a Signal IQ waveform (refer to Figure 5-3). For more information on setting up the SpO_2 parameter, refer to SpO_2 Settings on page 5-8.

Figure 5-3: Signal IQ waveform (Masimo SpO_2 only)



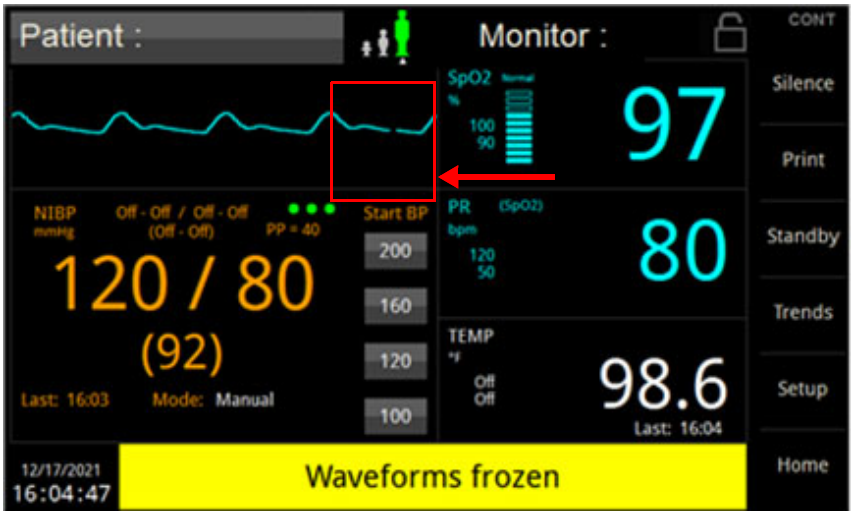
Freeze SpO_2 Waveform

In some clinical environments the user may want to freeze the SpO_2 waveform. When you freeze the waveform, numeric values continue to be updated, and alarm conditions continue to be generated as they occur.

To freeze the SpO_2 waveform

1 Touch the right side of the waveform zone, under the blue line (refer to Figure 5-4).
The waveform freezes, and the **Waveforms frozen** message shows.

Figure 5-4: Waveforms frozen – touch area is under blue line



To unfreeze the SpO_2 waveform

1 Touch the right side of the waveform zone, under the blue line.
-Or-
Touch anywhere on the screen that will open a menu (most buttons, numerics, or the left side of the waveform area). Touching **Silence** or **Home** does NOT unfreeze waveforms.

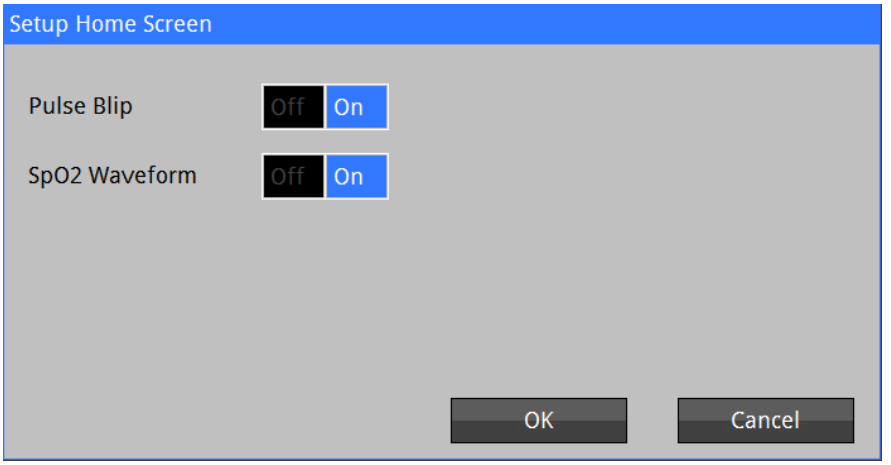
Display of Pulse Blip and SpO_2 Waveform Zone

You can enable or disable display of the Pulse Blip (heart icon in the Pulse Rate zone) and/or SpO_2 waveform zone.

To enable or disable the Pulse Blip and/or SpO_2 waveform zone

1. Touch the **Setup** key (on the right side of the screen).
2. In the **Setup** menu, touch the **Home Screen** Button.
3. In the **Setup Home Screen** menu (refer to Figure 5-5), select **Off** to disable or **On** to enable display of the **Pulse Blip** and/or **SpO2 Waveform**.
4. Touch **OK** to apply or **Cancel** to cancel changes to settings.

Figure 5-5: Setup Home Screen menu



SpO_2 Setup and Monitoring

If the accuracy of any measurement does not seem reasonable, first check the patient's vital signs by an alternate method.

Note:

- *The SpO_2 sensor must be kept as motionless as possible to make a proper determination. Use the waveform (plethysmograph) to determine if a strong rhythmic pulse signal is present.*
- *Use only the SpO_2 adapter cable supplied with the monitor:*
  P/N 010-2192-xx (Nellcor), P/N 010-2193-xx (Masimo RD SET), or P/N 010-2227-xx (Masimo LNCS).

To set up and monitor SpO_2

1. Apply the sensor to the patient. For a list of sensors approved for the monitor, refer to Appendix A—Product Specifications on page A-1.
2. Connect the sensor to the SpO_2 adapter cable.
3. Connect the adapter cable to the SpO_2 connector on the side of the monitor.

   The message **SpO2 searching** shows in the message area until a signal is acquired and SpO_2 data shows.

4 When SpO_2 monitoring is complete, remove the sensor from the patient.
   - For Spot Check mode: The SpO_2 and PR measurements remain on the screen with a timestamp.
   - For Continuous mode: The **SpO2 check sensor placement** alarm shows. To silence the audio for this alarm, touch the **Silence** touchscreen key or the **SpO2 Alarm Acknowledge** button (refer to SpO_2 Alarm Acknowledge on page 5-9).

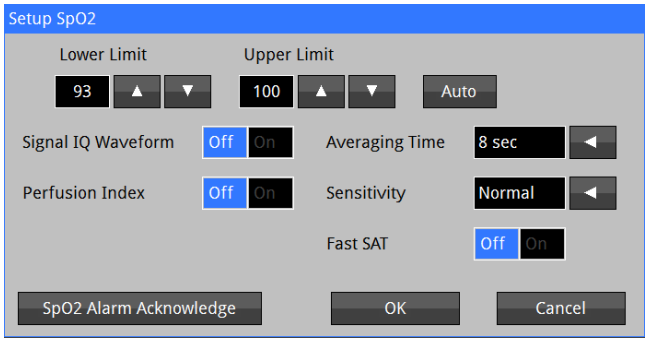
SpO_2 Settings

Touching the SpO_2 numeric, PR, and waveform zones access their settings.

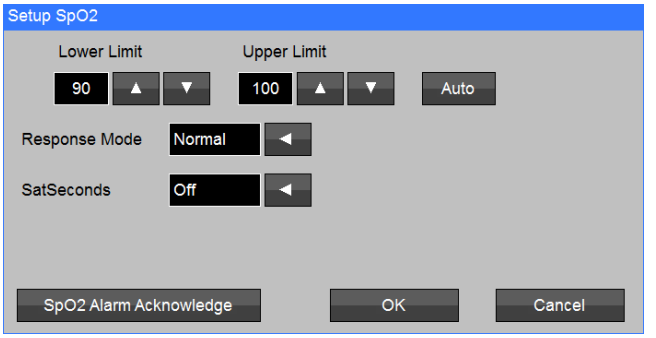
Setup SpO_2 Menu

The **Setup SpO2** menu (refer to Figure 5-6) lets you change settings for SpO_2 monitoring and acknowledge SpO_2 alarms. The settings available in this menu depend on the installed SpO_2 option (Masimo or Nellcor) and Workflow setting (Continuous or Spot Check).

Figure 5-6: Setup SpO_2 menu



Masimo



Nellcor

If you set the upper or lower alarm limit to Off, there will be no visual or audible indication for that alarm condition.

To change SpO_2 settings

1 Touch the SpO_2 numeric zone.
2 In the **Setup SpO_2** menu, change any of the settings that follow:
   - **Lower Limit** (Continuous mode only) – Touch the up and down arrows to adjust the lower alarm limit; or touch the **Auto** button to automatically set the lower alarm limit to 95% of the measured value.
   - **Upper Limit** (Continuous mode only) – Touch the up and down arrows to adjust the upper alarm limit; or touch the **Auto** button to automatically set the upper alarm limit to 105% of the measured value, up to **100**.
   - **Response Mode** (Nellcor only) – Touch the drop-down arrow to select **Normal** or **Fast**.
   - **SatSeconds** (Nellcor only) – Touch the drop-down arrow to select **Off**, **10**, **25**, **50**, or**100**.
   - **Signal IQ Waveform** (Masimo only) – Select **On** to enable or **Off** to disable display of the Signal IQ waveform.
   - **Perfusion Index** (Masimo only) – Select **On** to enable or **Off** to disable display of the Perfusion Index (PI).

- **Averaging Time** (Masimo only) – Touch the drop-down arrow to select **2-4 sec** (seconds), **4-6 sec**, **8 sec**, **10 sec**, **12 sec**, **14 sec**, or**16 sec**.
- **Sensitivity** (Masimo only) – Touch the drop-down arrow to select **Normal**, **APOD**, or **Max**.
- **Fast SAT** (Masimo only) – Select **On** to enable or **Off** to disable.

3 Touch **OK** to apply or **Cancel** to cancel changes.

SpO_2 Alarm Acknowledge

The SpO_2 Alarm Acknowledge feature lets you reduce nuisance alarms for removing the SpO_2 sensor when the monitor is in Continuous mode.

To acknowledge an SpO_2 technical alarm

1 Touch the SpO_2 numeric zone.

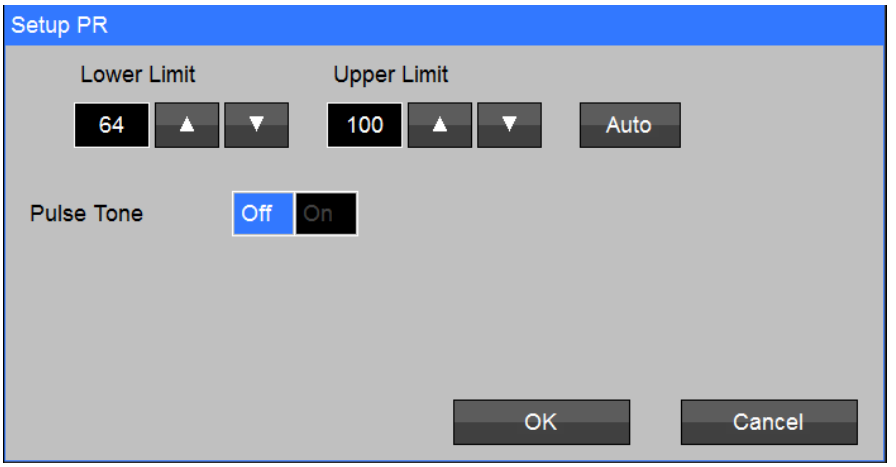
2 In the **Setup SpO_2** menu, touch the **SpO2 Alarm Acknowledge** button.

- Alarm audio is silenced.
- **SpO2 alarm acknowledged** message replaces alarm message.

Setup PR Menu

The **Setup PR** menu (refer to Figure 5-7) lets you change alarm limit and pulse tone settings for Pulse Rate (PR) monitoring. For information on enabling and disabling display of the Pulse Blip, refer to Display of Pulse Blip and SpO_2 Waveform Zone on page 5-7.

Figure 5-7: Setup PR menu



To change PR settings

1 Touch the PR zone.

2 In the **Setup PR** menu, change any of the settings that follow:

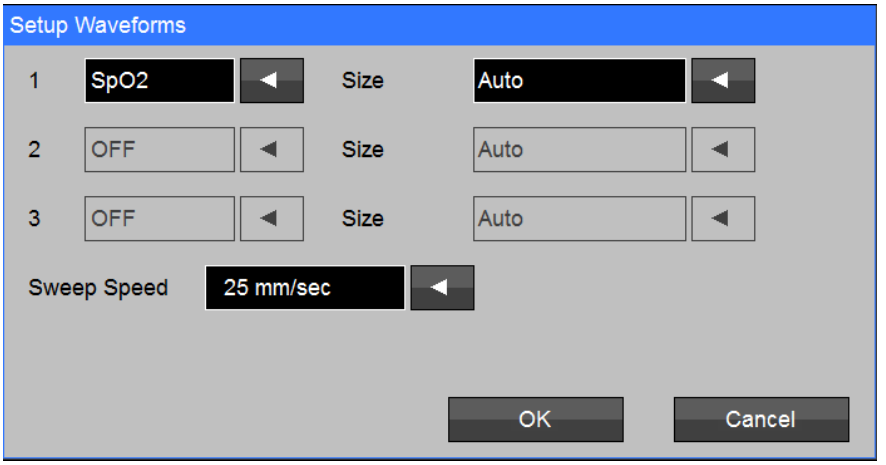
- **Lower Limit** (Continuous mode only) – Touch the up and down arrows to adjust the lower alarm limit; or touch the **Auto** button to automatically set the lower alarm limit to 80% of the measured value.
- **Upper Limit** (Continuous mode only) – Touch the up and down arrows to adjust the upper alarm limit; or touch the **Auto** button to automatically set the upper alarm limit to 125% of the measured value.
- **Pulse Tone** – Select **On** to enable or **Off** to disable the pulse tone.

3 Touch **OK** to apply or **Cancel** to cancel changes.

Setup Waveforms Menu

The **Setup Waveforms** menu (refer to Figure 5-7) lets you show and hide the SpO_2 waveform and change the sweep speed. For information on enabling and disabling display of the waveform zone, refer to Display of Pulse Blip and SpO_2 Waveform Zone on page 5-7.

Figure 5-8: Setup Waveforms menu



To change the SpO_2 waveform settings

1 Touch the waveform zone.
2 In the Setup Waveforms menu, you can change the settings that follow:
- **1** – Touch the drop-down arrow to select **SpO2** (to show the waveform) or **OFF** (to hide the waveform).
- **Sweep Speed** – Touch the drop-down arrow to select **6.25**, **12.5**, or **25 mm/sec** (millimeters/second).

FILAC Temperature

FILAC Temperature Overview

If the FILAC 3000 option (91331-F) is installed on the DM4, you can use predictive thermometry to measure temperature from an oral or axillary site. In the Oral-Quick (default) mode, the FILAC thermometer measures (non-febrile) body temperature in about 3 to 5 seconds. The measurement time for axillary temperatures is about 8 to 12 seconds.

FILAC Temperature Safety Measures

- *During use, single-use disposable FILAC temperature probe covers supplied by Spacelabs Healthcare or Covidien limit patient cross-contamination. The use of any other temperature probe cover or the failure to use a temperature probe cover may produce temperature errors and invalidates the monitor's warranty. Temperature probe covers are required to ensure the safety of the patient and user.*
- *When replacing a FILAC temperature probe, it is recommended to replace the isolation chamber received with the temperature probe. Failure to replace the isolation chamber could result in patient cross contamination.*
- *To limit cross contamination, use only FILAC blue probes and isolation chambers for taking oral and axillary temperatures.*

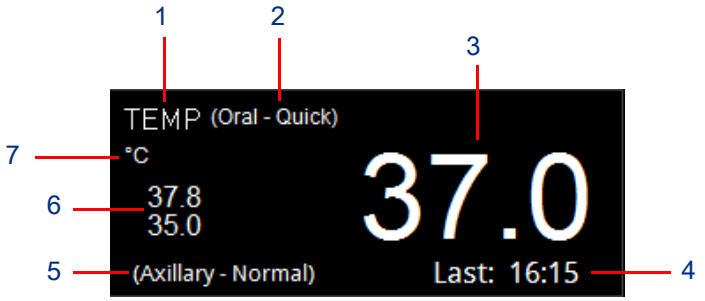
- *For proper operation, be sure to insert the FILAC temperature probe back into the isolation chamber when not in use. Be sure the temperature probe is inserted fully into the isolation chamber.*
- *The FILAC 3000 electronic temperature and temperature probe covers are non-sterile. Do not use on abraded tissue.*
- *For re-calibration, service or integrity checks, refer to a qualified biomedical technician or return the monitor to the manufacturer.*
- *Disposal of used FILAC temperature probe covers must be performed in accordance with current medical practices or local regulations regarding disposal of infectious, biological medical waste.*
- *If the FILAC temperature reading is < 30.0°C (86.0°F) or > 43.0°C (109.4°F), the temperature numeric will flash. If the FILAC temperature numerics flash for values between 30.0°C (86.0°F) and 43.0°C (109.4°F), this may indicate a questionable reading.*

- *Do not open the monitor to clean or repair it. Contact Spacelabs for service needs. Refer to the copyright page (second page) for address and phone number information.*
- *Disconnect all accessories from the monitor before cleaning. Do not immerse any part of the electrical connector of the cable or accessories in the cleaning or disinfection solution at any time. Do not use an abrasive cloth or cleaner on the accessories.*
- *Do not spray any water or cleaning solution directly onto the monitor.*
- *Caution: Use care when cleaning the display. Scratches may occur.*
- *Do not soak or immerse the sensor or its cable in any liquid solution. Do not attempt to sterilize.*
- *Do not soak or immerse the Temp Probe or its cable in any liquid solution. Do not attempt to sterilize.*
- *Do not use hard or sharp objects to clean the Temp Probe. This could damage the Temp Probe and cause the unit to not function properly. Do not use steam, heat or gas sterilization on the Temp Probe. Do not autoclave the Temp Probe.*
- *Do not soak or immerse the Isolation Chamber in any liquid solution. Do not attempt to sterilize.*
- *Do not use hard or sharp objects to clean the Isolation Chamber. This could damage the Isolation Chamber and cause the unit to not function properly. Do not use steam, heat or gas sterilization on the Isolation Chamber. Do not autoclave the Isolation Chamber.*

FILAC Temperature Display Details

Figure 6-1 shows the display details of the FILAC temperature (TEMP) zone. Touching anywhere in the TEMP zone accesses its settings.

Figure 6-1: FILAC TEMP zone



1 Parameter name
2 Temperature site and mode
3 Temperature value
4 Time of last temperature measurement
5 Temperature site and mode of last temperature measurement
6 Alarm limits
7 Unit of measure

FILAC Temperature Setup

To set up FILAC temperature monitoring

1 Make sure that the temperature probe is fully seated in the isolation chamber well.
2 Open a box of FILAC temperature probe covers by lifting the tab marked on the corner with an arrow. Do NOT remover entire top cover.
3 Insert the new box of probe covers into the isolation chamber with the opening in the top facing forward (refer to Figure 6-2).

Figure 6-2: Open and insert box of probe covers into isolation chamber

FILAC Temperature Settings

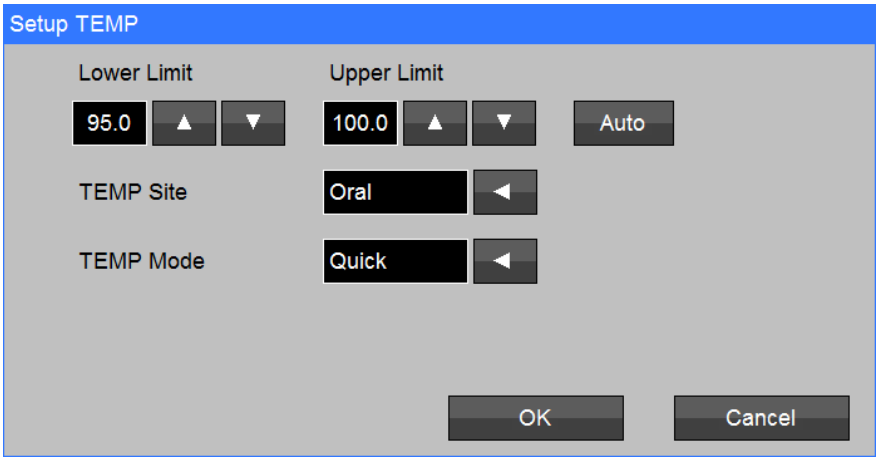
When the FILAC thermometry option is installed, the **Setup TEMP** menu (refer to Figure 6-3) lets you change settings for FILAC temperature monitoring.

If you set the upper or lower alarm limit to Off, there will be no visual or audible indication for that alarm condition.

Note:

Limit alarms are disabled in Spot Check mode.

Figure 6-3: Setup TEMP menu – FILAC thermometry option



To change FILAC temperature settings

1. Touch the TEMP zone.
2. In the **Setup TEMP** menu, you can change the settings that follow:
   - **Lower Limit** (Continuous mode only) – Touch the up and down arrows to adjust the lower alarm limit; or touch the **Auto** button to automatically set the lower alarm limit to 95% of the measured value.
   - **Upper Limit** (Continuous mode only) – Touch the up and down arrows to adjust the upper alarm limit; or touch the **Auto** button to automatically set the upper alarm limit to 105% of the measured value.
   - **TEMP Site** – Touch the drop-down arrow to select **Oral** or **Axillary**.
   - **TEMP Mode** – Touch the drop-down arrow to select **Normal**, **Quick** (Oral site only), **Direct**, **Cold**, or **Monitor**. For more information on temperature modes, refer to Temperature Modes.
3. Touch **OK** to apply or **Cancel** to cancel changes.

Temperature Modes

There are five available modes for FILAC temperature monitoring:

- **Normal** – Provides a standard (non-predictive) temperature measurement.
- **Quick** (Oral only) – Provides a rapid, predictive temperature measurement for use in applications where a quick estimate of body temperature is needed. In most cases, a predictive measurement is provided in approximately 8 to 10 seconds. If the predictive temperature is outside of normal range, the monitor automatically changes to Normal mode and measurement time will be longer.
- **Cold** – Provides a lower preheat for use in applications where the body temperature may be lower than normal (for example, patients recently out of surgery).
- **Direct** (thermometer) – Provides non-predictive temperature measurements until measured values stabilize. If no measurement site is detected or the temperature does not stabilize, the monitor automatically changes to Direct mode.

- **Monitor** – Provides continuous (non-predictive) temperature measurements for 10 ten minutes.

FILAC Temperature Measurements

With the FILAC thermometry option, you can use the monitor for predictive temperature monitoring at oral and axillary sites. The last temperature measurement remains on the screen for two hours before it is automatically cleared from the TEMP zone.

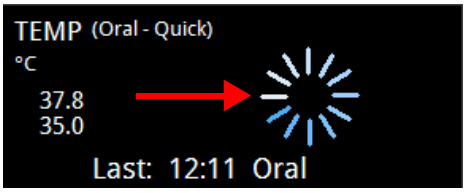
- **Never use the FILAC temperature probe without a probe cover.**
- **Failure to correctly place temperature probe back into the isolation chamber well may result in the failure of the next predictive temperature measurement. If the probe is not fully seated in the Isolation Chamber well within 60 seconds after a measurement, the message *Temp Probe out of well* shows.**

To take an oral temperature measurement

1. Make sure that **Oral** shows in the TEMP zone and that the temperature probe is fully seated in the isolation chamber well.
2. Remove the temperature probe from the isolation chamber well.

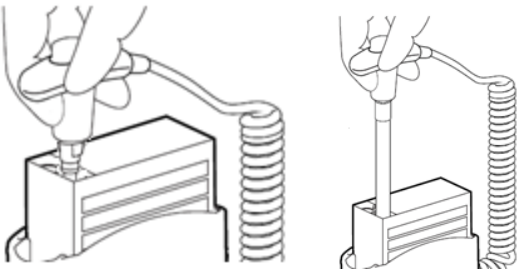
   The monitor generates a two-tone audio alert, and the TEMP zone shows the in-progress icon (refer to Figure 6-4).

Figure 6-4: Temperature in-progress icon



3. Apply a cover to the temperature probe by inserting the probe into a cover within the box until you feel the cover “snap” into place (refer to Figure 6-5).

Figure 6-5: Apply cover to temperature probe

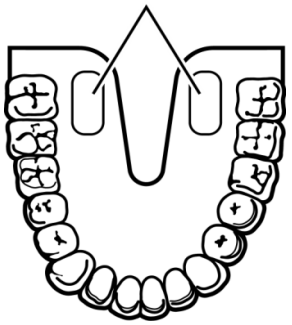


4. Insert the tip of the temperature probe into one of the sublingual pockets of the patient’s mouth (refer to Figure 6-6).

Note:

You can only obtain accurate body temperatures in this location. Temperatures in other mouth locations can vary by as much as 2°F (1°C).

Figure 6-6: Location of the sublingual pockets



5 Securely hold the temperature probe in place and make sure that the mouth of the patient remains closed during the measurement.

When the measurement completes:

- monitor generates an audible tone;
- temperature value and timestamp show in the TEMP zone; and
- measurement is saved to trends (Continuous mode only).

6 After the measurement, remove the probe from the measurement site and push the gray eject button on the probe handle to eject the cover. Properly dispose of the probe cover.

7 Reinsert the temperature probe into the isolation chamber well before you take another measurement.

The monitor generates a two-tone audio alert to indicate that the probe is fully seated in the well.

To take an axillary temperature measurement

1 Make sure that **Axillary** shows in the TEMP zone and that the temperature probe is fully seated in the isolation chamber well.

2 Remove the temperature probe from the isolation chamber well.

The monitor generates a two-tone audio alert, and the TEMP zone shows the in-progress icon (refer to Figure 6-4).

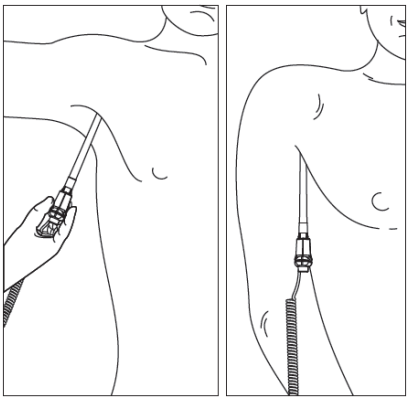
3 Apply a cover to the temperature probe by inserting the probe into a cover within the box until you feel the cover “snap” into place (refer to Figure 6-5).

4 Raise the arm of the patient and place the tip of the temperature probe as high as possible in the axilla (refer to Figure 6-7).

Note:

- *Press gently to ensure good contact.*
- *For the most accurate measurement, place the tip of the probe directly against the skin of the patient.*
- *Do not allow the tip of the probe to come into contact with the patient until it is deliberately placed in the measurement site.*
- *Be sure that the tip of the probe is completely surrounded by axillary tissue.*
- *Clothing or any other material touching the tip of the probe may cause inaccurate readings.*

Figure 6-7: Axillary temperature measurement



5 Lower the arm of the patient and hold the temperature probe parallel to the arm (refer to Figure 6-7). Make sure that the patient remains still during the measurement.

When the measurement completes:

- monitor generates an audible tone;
- temperature value and timestamp show in the TEMP zone; and
- measurement is saved to trends (Continuous mode only).

Note:

If the tip of the probe did not maintain tissue contact during the entire predictive measurement, the final temperature value shown in the TEMP zone will flash. If this occurs, it is recommended that you take a new measurement. Touch the ***Silence*** *key (on the right side of the screen) or wait two minutes for the monitor to automatically clear the TEMP zone.*

6 After the measurement, remove the probe from the measurement site and push the gray eject button on the probe handle to eject the cover. Properly dispose of the probe cover.

7 Reinsert the temperature probe into the isolation chamber well before you take another measurement.

The monitor generates a double tone to indicate that the probe is fully seated in the well.

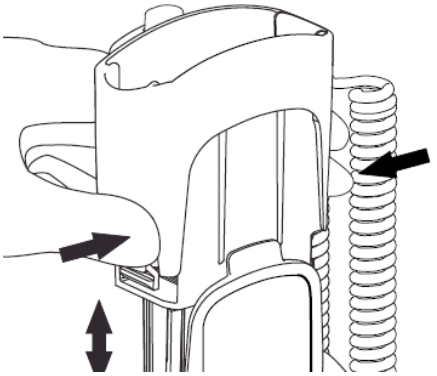
Replace Isolation Chamber and Temperature Probe

When you replace the FILAC temperature probe, you should also replace the isolation chamber. Failure to replace the isolation chamber with the temperature probe can result in patient cross-contamination.

To replace the isolation chamber

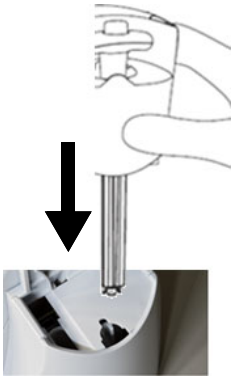
1 Squeeze the lock tabs on the sides of the isolation chamber and lift up the chamber from the temperature module (refer to Figure 6-8).

Figure 6-8: Remove isolation chamber



2 Align the well shaft of the new isolation chamber with the well hole on the top of the temperature module and slide the chamber down until the lock tabs “click” in place (refer to Figure 6-9).

Figure 6-9: Remove isolation chamber

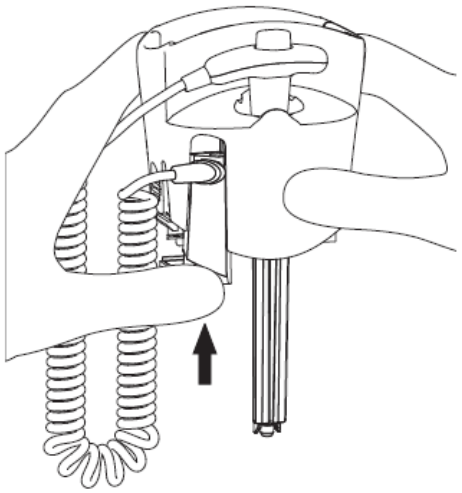


To replace the temperature probe

1 Remove the isolation chamber (refer to step 1 of To replace the isolation chamber).
2 Grab the sides of the L-shaped probe cable connector with hand, and pull open the connector latch with the other hand.
3 Slide out the L-shaped cable connector and remove the temperature probe from the isolation chamber.
4 Align the L-shaped cable connector of the new temperature probe with the connector slot on the isolation chamber.

5 Push up the L-shaped connector into the connector slot on the isolation chamber until it is fully seated (refer to Figure 6-10).

Figure 6-10: Install temperature probe



Exergen Temperature

Exergen Temperature Overview

If the monitor is not configured for FILAC thermometry, the DM4 monitor provides USB support for the optional Exergen Temporal Artery Thermometer (scanner), model TAT-5000S-USB-GN, for non-invasive (infrared) temperature measurements.

For detailed information on the Exergen temporal scanner, refer to the user manual for that product.

- *No modification of this equipment is allowed.*
- *Do not use this thermometer if it is not working properly, if it has been exposed to temperature extremes, damaged, been subject to electrical shocks or immersed in water.*
- *Not suitable for use in the presence of flammable anesthetic mixtures.*
- *Do not take temperature over scar tissue, open sores or abrasions.*
- *If readings are not correct, the instrument should be returned for repair.*
- *The monitor may not meet performance specifications if stored or used outside temperature and humidity ranges. When moving the monitor from a storage location, wait at least one-hour or more prior to use to allow the monitor to adjust to room temperature.*

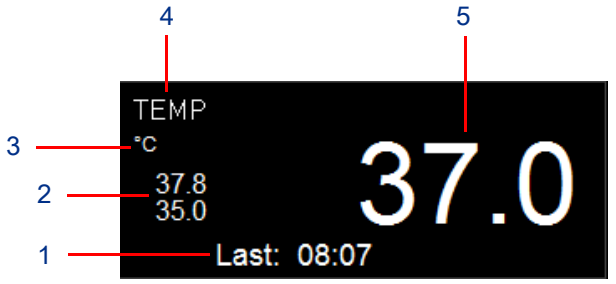
- **Use only Spacelabs approved accessories and sensors to preserve the integrity, accuracy and the electromagnetic compatibility of the monitor.**
- **Do not open the Monitor to repair it. Contact Spacelabs for service needs. Refer to the copyright page (second page) for address and phone number information.**
- **Use this product only for its intended use as described in this manual.**
- **The operating environmental temperature range for this product is 60 to 104°F (15.5 to 40°C).**
- **Always store this thermometer in a clean, dry place where it will not become excessively cold (-4°F/-20°C), or hot (122°F/50°C) or humid (max RH 93% non-condensing, at 50 to 106 kPa).**
- **The thermometer is not shockproof. Do not drop it or expose it to electrical shocks.**
- **Do not Autoclave. Please note cleaning and sterilizing procedures in this manual.**
- **There are no parts that you can service yourself except for the battery, which you should replace when low by following the instructions in this manual. For service, repair, or adjustments, return your thermometer to Exergen.**
- **Never drop or insert any object into any opening, unless stated in this manual.**

- If your thermometer is not used regularly, remove the battery to prevent possible damage due to chemical leakage.
- Disposal of used Exergen scanner must be performed in accordance with current medical practices or local regulations regarding disposal of infectious, biological medical waste.
- Follow the battery manufacturer's recommendations or your hospital policy for the disposal of used batteries.
- Switching modes from Adult, Pediatric or Neonate to any other patient mode, shall recall the last stored values for the patient alarm limits.
- Allow the temp scanner to acclimate for at least 30 minutes before using it if it is taken from a cold room into a hot room, or vice versa
- Do not open the Monitor to clean or repair it. Contact Spacelabs for service needs. Refer to the copyright page (second page) for address and phone number information.
- Disconnect all accessories from the Monitor before cleaning. Do not immerse any part of the electrical connector of the cable or accessories in the cleaning or disinfection solution at any time. Do not use an abrasive cloth or cleaner on the accessories.
- Do not submerse the Exergen Temp scanner in any cleaning solution.
- If the battery leaks, remove it carefully.
- Do not allow bare skin to touch leaking fluids.
- Properly dispose of used batteries.
- Do not wrap them in metal or aluminum foil. Wrap them in paper before disposing of them, batteries may explode if overheated.

Exergen Temperature Display Details

Figure 7-1 shows the display details of the Exergen temperature (TEMP) zone. Touching anywhere in the TEMP zone accesses the alarm limit settings.

Figure 7-1: Exergen TEMP zone



1 Time of last temperature measurement
2 Alarm limits
3 Unit of measure – If the monitor and temporal scanner are set to different units of measure, the monitor automatically changes to the temporal scanner unit of measure after acquiring a valid temperature value.
4 Parameter name
5 Temperature value

Exergen Temperature Setup

To set up Exergen temperature monitoring

1 Connect the Exergen temporal scanner to the USB port on back of the monitor (refer to Figure 1-2 on page 1-9).

Exergen Temperature Settings

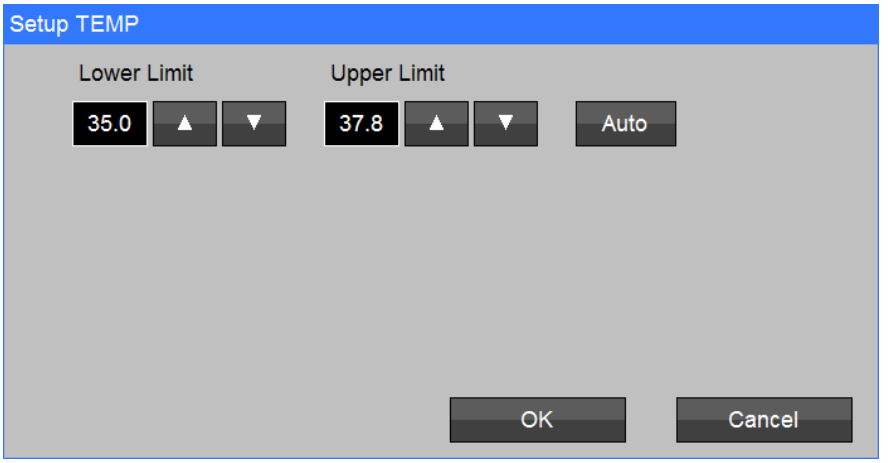
When the monitor is configured for the Exergen thermometry option, the **Setup TEMP** menu (refer to Figure 7-2) lets you change the alarm limit settings for episodic temperature monitoring.

If you set the upper or lower alarm limit to Off, there will be no visual or audible indication for that alarm condition.

Note:

Limit alarms are disabled in Spot Check mode.

Figure 7-2: Setup TEMP menu – Exergen thermometry option



To change Exergen temperature alarm limits

1 Touch the TEMP zone.

2 In the **Setup TEMP** menu, you can change the settings that follow:

- **Lower Limit** (Continuous mode only) – Touch the up and down arrows to adjust the lower alarm limit; or touch the **Auto** button to automatically set the lower alarm limit to 95% of the measured value.
- **Upper Limit** (Continuous mode only) – Touch the up and down arrows to adjust the upper alarm limit; or touch the **Auto** button to automatically set the upper alarm limit to 105% of the measured value.

3 Touch **OK** to apply or **Cancel** to cancel changes.

Exergen Temperature Measurement

To take an Exergen temperature measurement

1. Make sure that the temporal scanner is connected to the USB port.
2. Take a measurement with temporal scanner (refer to the Exergen Temporal Artery Thermometer user manual).

   When the measurement completes, the temperature value and timestamp show in the TEMP zone, and the measurement is saved to trends (Continuous mode only).

External Printer (Optional)

External Printer Overview

An optional external printer is available for the DM4 (refer to Figure 8-1).

Figure 8-1: External printer

Features of the printer are as follows:

- Powered directly from the serial port (does not require a separate battery or AC power cord)
- 50 mm strip chart recorder
- Prints physiologic measurements, trend data, and SpO_2 waveforms (auto scaled, 25 mm/sec)
- Configurable to print on alarm and on save snapshot

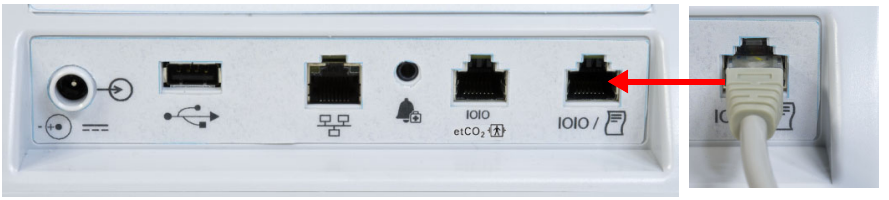
External Printer Setup

The external printer connects to the serial port on the back on the monitor. For information on configuring the serial port for communication with the printer, refer to the *DM4 Service Manual*.

To set up the printer

1 Connect the printer cable connector (RJ45) to the serial port on the far right of the rear monitor connections (refer to Figure 8-2).

Figure 8-2: Serial port for external printer connection



2 Load the printer with a roll of paper.

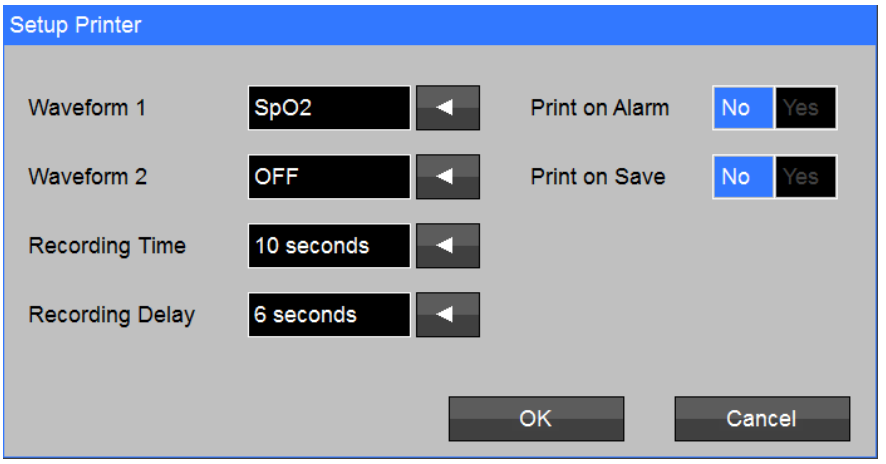
Note:

Replace the paper when the roll shows a red line.

3 Touch the **Setup** key (on the right side of the screen).

4 In the **Setup** menu, touch the **Printer** button.
The Setup Printer menu shows (refer to Figure 8-3).

Figure 8-3: Setup Printer menu



5 In the **Setup Printer** menu, touch the drop-down arrows to select:
- **Waveform 1** – first parameter waveform to print: **SpO2**
- **Waveform 2** (future use) – second parameter waveform to print: **SpO2** or **OFF**
- **Recording Time** – total amount of time shown on strip chart: **5**, **10**, or **16 seconds** (default is **10 seconds**)
- **Recording Delay** – amount of time shown on strip chart before detection of alarm: **0**, **6**, and **10** seconds (default is **6 seconds**)

For the **Print on Alarm** setting, select **No** to disable or **Yes** to enable automatic strip recordings when monitor alarms (default is **No**).

For the **Print on Save** setting, select **No** to disable or **Yes** to enable strip recordings when you touch the **Save** key (default is **No**).

6 Touch **OK** to apply or **Cancel** to cancel changes to settings.

Trends

Trends Overview

Trends let you recall continuous trended physiological measurement records and saved snapshots. The DM4 can store up to 1,000 snapshots and up to 72 hours of continuous trend data. When these limits are exceeded, the monitor automatically deletes the oldest records first.

When the monitor is in Continuous (**CONT**) mode, parameter measurements are automatically saved to trends. When the monitor is in Spot Check (**SPOT**) mode, parameter measurements can only be saved (as snapshots) to trends manually (by touching the **Save** key).

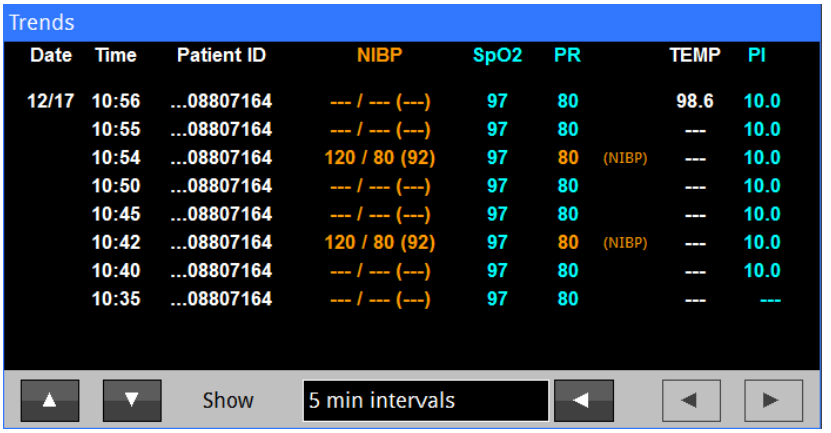
Trends Screen

The **Trends** screen (refer to Figure 9-1) shows a chronological list of color-coded measurement records.

To show trends

1 Touch the **Trends** key (on the right side of the screen).

Figure 9-1: Trends screen: 5-minute intervals



Trends are arranged under the column headings that follow:

- **Date**
- **Time**
- **Patient ID** or **Patient ID / Clinician ID**
- **NIBP**
- **SpO2**
- **PR**
- **TEMP**
- **PI** – Shows only if the Masimo SpO_2 option is installed and display of the Perfusion Index is enabled. For more information, refer to SpO_2 Setup and Monitoring on page 5-7.

Touch the up and down and left and right arrows on the bottom of the screen to navigate the list of trends. Touch the drop-down arrow on the bottom center of the screen to select the time interval setting:

- **1 min intervals**
- **5 min intervals**
- **15 min intervals**

- **1 hour intervals**
- **4 hour intervals**

Note:

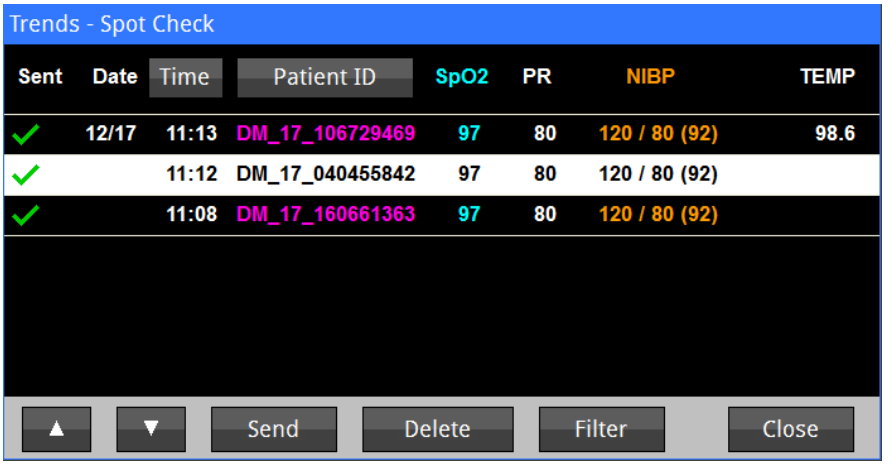
The Trends screen shows NIBP and TEMP measurements at the time they were taken regardless of the time interval setting.

Trends – Spot Check Screen

If the monitor is in Spot Check (**SPOT**) mode, touching the **Trends** key opens the **Trends – Spot Check** screen (refer to Figure 9-2). This screen includes the additional features that follow:

- **Send** button – (Shows only if networked to ICS) sends Spot Check trends to ICS
- **Delete** button – deletes selected measurement records
- **Filter** button – lets you show only trends for a selected patient ID
- **Close** button – closes the **Trends – Spot Check** screen
- **Sent** column – (Shows only if networked to ICS) indicates that a measurement record has been sent to ICS with a green check mark
- **Time** column button – sorts trends by time
- **Patient ID** column button – sorts trends by patient ID

Figure 9-2: Trends – Spot Check screen



Send Spot Check Measurements to ICS

In order to send spot-check measurements to ICS, you must first save the measurements as snapshots to the local trends database in the monitor, and then manually send these trends to ICS.

To save a snapshot of measurements to trends

1 Touch the **Save** key (on the right side of the screen).

To send Spot Check trends to ICS

1 With the monitor in Spot Check (**SPOT**) mode, touch the **Trends** key (on the right side of the screen).

The **Trends – Spot Check** screen shows (refer to Figure 9-2).

2 If necessary, use the **Delete** and **Filter** buttons to show only the trends you want to send to ICS.

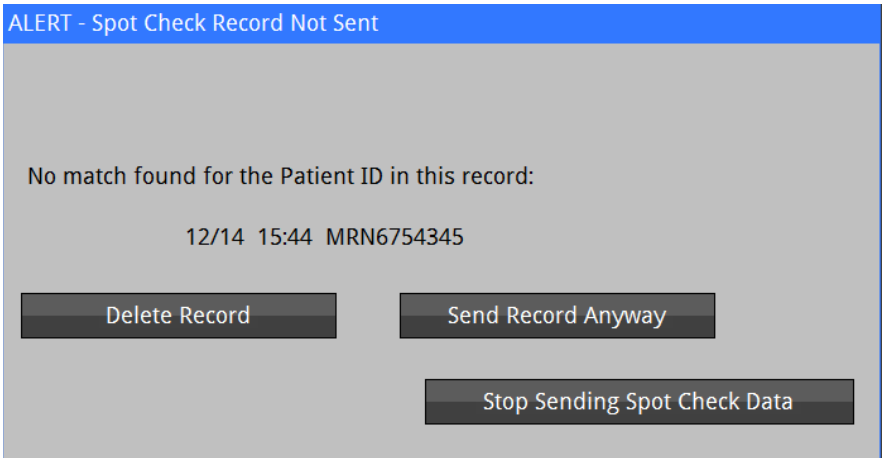
3 IF there is network connectivity, touch the **Send** button.

The monitor begins to send all unsent records shown in the **Trends – Spot Check** screen.

When sending the Spot Check trends to ICS, the monitor queries the **Patient ID** of each measurement record. If the ID is not found, the **Alert – Spot Check Record Not Sent** screen shows (refer to Figure 9-3). This screen provides the options that follow:

- **Delete Record** – Touch this button to delete the record specified on the screen.
- Send Record Anyway – Touch this button to send the record specified on the screen and continue sending trends.
- Stop Sending Spot Check Data – Touch this button to stop sending trends.

Figure 9-3: Alert – Spot Check Record Not Sent screen



Printing Trends

If the monitor is connected to the optional external recorder, you can print all measurement records shown on the **Trends** screen. For information on setting up the printer, refer to External Printer Setup on page 8-1.

To print trends

1 Touch the **Trends** key (on the right side of the screen) to show the **Trends** screen.

2 Touch the **Print** key (on the right side of the screen) to print all trends shown on the **Trends** screen.

Clear Trends

You can delete all trend data stored in the monitor.

To clear all trends stored in the monitor

1 Touch the **Setup** key (on the right side of the screen).

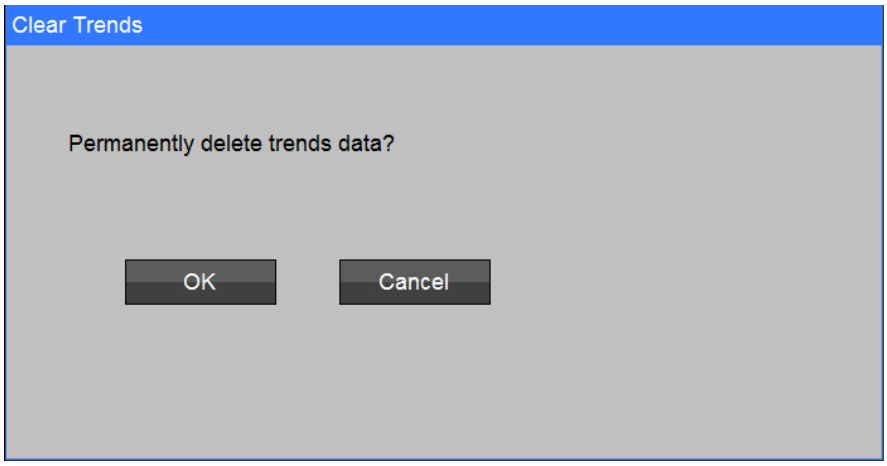
2 In the **Setup** menu, touch the **Administrator** button.

3 In the **Setup Administrator** menu, touch the **Clear Trends** button.

The **Clear Trends** screen shows the **Permanently delete trends data?** message (refer to Figure 9-4).

4 Touch **OK** to proceed or **Cancel** to cancel.

Figure 9-4: Clear Trends screen



Cleaning, Disinfecting, and Sterilization

Cleaning the Monitor, Cables, and Printer

- *Use only recommended cleaning solutions, or you may void the manufacturer's warranty.*
- *Harsh chemical agents degrade plastics and compromise the safety of the device. Some germicidal and other harsh cleaning compounds are known to damage some plastics by weakening the structural integrity and compromising the electrical insulating properties.*
- *Disconnect the equipment from the patient and the electrical supply before cleaning.*
- *Do not allow liquid to enter the interior of the module or monitoring equipment.*
- *Do not immerse the equipment or cables in water or cleaning solutions.*
- *Do not autoclave.*
- *Accelerated Hydrogen Peroxide (AHP) and quaternary ammonia-based products ARE NOT RECOMMENDED for cleaning monitors and cables. These chemicals degrade plastics used in patient monitors and cables, and can cause serious safety hazards as the electrical insulating properties and structural integrity of the equipment break down.*
- *Cavicide, Virex, Virex 256, PDI Sani-Cloth Bleach Plus, Super Sani-Cloth, and Sani-Cloth AF3 are common quaternary ammonia germicidal products. The manufacturers of these solutions advertise that these germicidal products are safe for use on hard, non-porous surfaces, such as linoleum floors, Formica countertops, and stainless steel. The manufacturers discourage the use of quaternary ammonia germicidal products on computer-grade plastics and on data, patient, and power cables, which are classified as porous materials.*

- **Use caution when cleaning cable connectors so that liquid does not collect around the electrical contacts or seep inside the connector. Trapped liquids and surface residues provide an unintentional electrical path, which may cause noisy signals and false alarms.**
- **Questions and concerns about cleaning issues should be directed to Spacelabs Healthcare Technical Support.**

Note:

For cleaning instructions for an Original Equipment Manufacturer (OEM) device, refer to the user manual for that product.

For the cables and printer, use only the following recommended cleaning solutions:

- Mild soap and water solution
- U.S. Pharmacopoeia (USP) green soap
- Sodium hypochlorite solution (1:10 dilution of household chlorine bleach in water)
- Phenolic germicidal detergent (1% aqueous solution)

- Glutaraldehyde (2.4%) (Cidex)
- Isopropyl alcohol (70% solution)
- PDI Sani-Cloth Bleach (sodium hypochlorite 0.63%)

For the monitor, use only the following recommended cleaning solutions:

- Mild soap and water solution
- U.S. Pharmacopoeia (USP) green soap
- Sodium hypochlorite solution (1:10 dilution of household chlorine bleach in water)
- Phenolic germicidal detergent (1% aqueous solution)
- Glutaraldehyde (2.4%) (Cidex)
- Isopropyl alcohol (70% solution)
- PDI Sani-Cloth Bleach (sodium hypochlorite 0.63%)
- Diversey Oxivir wipes (benzyl alcohol 1 to 5% and hydrogen peroxide 0.5 to 2%)
- Clorox Healthcare wipes (benzyl alcohol 1 to 5% and hydrogen peroxide 0.5 to 2%)

Note:

- *Accelerated Hydrogen Peroxide (AHP) contains hydrogen peroxide and low concentrations of phosphoric acid. AHP is different from cleaners containing hydrogen peroxide mixed with alcohols and specifically NOT recommended for cleaning Spacelabs Healthcare products.*
- *Over time, repeated use of a chlorine bleach solution may cause some colors to fade.*
- *Tape adhesive can be removed with Spacelabs Healthcare adhesive tape remover pads (P/N 392196-001).*

To clean the monitor, cables, and printer

1. Prepare the cleaning solution according to the manufacturer's instructions.
2. Wet a clean cloth with the selected cleaning solution.
3. Remove excess liquid from the cloth and squeeze dry.
4. Wipe exposed surfaces of the equipment and cables.
5. Remove any soap residue by gently wiping with a clean damp cloth.
6. Wipe dry with a clean dry cloth.

Note:

- *Follow your hospital protocol for the handling of blood and body fluids.*
- *Do not allow liquid to enter the display.*

Make sure to let the alcohol dry before re-assembly. If you do not let the alcohol dry, the monitor may not work correctly.

Accessories

- ***The use of accessories and cables other than those specified, with the exception of the accessories and cables sold by Spacelabs Healthcare as replacement parts, may result in increased emissions or decreased immunity of the monitor. It is the responsibility of the organization and/or user to verify the compatibility of the monitor, probes, and cables before use, otherwise patient injury can result.***
- ***Use only the manufacturer's approved accessories.***

- Where provided, follow the manufacturers' instructions concerning disposable and reusable supplies.
- As applicable, follow your hospital protocol concerning cleaning, disinfection, and/or sterilization of reusable supplies.
- Follow hospital protocols to dispose of used and contaminated single-use accessories.

Noninvasive Blood Pressure Cuffs

TruLink Reusable and Disposable Cuffs

The disposable cuff is packaged non-sterile and cannot be soaked, rinsed, or sterilized.

The reusable cuff is packaged non-sterile. It may be cleaned and disinfected with an enzymatic detergent and 10% solution of household bleach (5.25% sodium hypochlorite).

Cuff Cleaning and Disinfection Materials

- Enzymatic detergent such as ENZOL (US) or CEDEZYME (UK)
- 10% solution of household bleach (5.25% sodium hypochlorite) in distilled water
- Soft cloths or bristle brushes
- Spray bottles

To clean and disinfect reusable cuffs

1. Prepare the enzymatic detergent and bleach solutions in separate bottles according to the manufacturer's instructions.
2. Spray detergent liberally on cuff, allowing it to sit for one minute.
3. Remove detergent with a soft cloth. For persistent contamination, scrub with a soft bristled brush.
4. Rinse the cuff thoroughly with distilled water.
5. Spray bleach solution on the affected area until saturated. Allow the cuff to sit for five minutes.
6. Remove any excess solution with a soft cloth and rinse again with distilled water. Allow two hours for air drying at ambient temperature.

Note:

Make sure water does not enter the hose connector.

Appendix A—Product Specifications

Physical Specifications

Dimensions (H x W x D) (with FILAC temperature option)	19.4 x 27.9 x 14.6 cm (7.6 x 11.0 x 5.7 in)
Weight	1.9 kg (4.3 lbs)
Display	Touchscreen LCD
Size	17.8 cm (7.0 in) diagonal
Resolution	800 x 480 pixels
Controls	Power On/Off (front panel) Touchscreen user interface
Indicators	
Alarms	Audible tones, visual on display
Alarm levels	Medium, Low
Power	External power/battery charging indicator
Connections	
Measurement connections	MAXNIBP Masimo SET or Nellcor OxiMax SpO_2 RJ45 serial port for $EtCO_2$ device (for future use)
USB port	USB port for flash drive, optional bar code reader, and optional Exergen Temporal Artery Thermometer
Network	LAN: Ethernet WLAN: 802.11 a/b/g/n (optional)
Nurse Call interface	3.5 mm stereo jack for Nurse Call system (Alarm Out Relay)
Printer/communications device interface	RJ45 serial port for optional external printer or communications device
Mounting interface	VESA
Recorder (Optional)	
Type	RJ45 serial connection
Paper width	50 mm (2 in)

Parameter Specifications

Noninvasive Blood Pressure (NIBP)	
Measurement method	Oscillometric
Measurement operation	Automatic interval, STAT, manual, protocol
Interval times	User selectable: 1, 2, 3, 4, 5, 10, 15, 30, 60, 90 minutes
Measurement read time	<30 seconds, typical
Pulse measurement range	Adult: 30 to 240 bpm Pediatric: 30 to 240 bpm Neonate: 40 to 240 bpm
Measurement range	
Systolic	Adult: 35 to 260 mmHg; Pediatric: 35 to 260 mmHg; Neonate: 35 to 135 mmHg
Diastolic	Adult: 15 to 215 mmHg; Pediatric: 15 to 215 mmHg; Neonate: 15 to 105 mmHg
Mean	Adult: 20 to 235 mmHg; Pediatric: 20 to 235 mmHg; Neonate: 20 to 115 mmHg
Resolution	1 mmHg
Accuracy	±5 mmHg with a standard deviation no greater than 8 mmHg
Initial cuff inflation	Adult: 160 mmHg Pediatric: 120 mmHg Neonate: 80 mmHg
Maximum cuff inflation	Adult: 290 mmHg Pediatric: 290 mmHg Neonate: 145 mmHg
Connector	MAXNIBP quick connect fitting
Masimo SET Pulse Oximetry (SpO_2) Option	
Measurement method	Functional saturation (oxygen saturation of functional hemoglobins)
Display parameters	%SpO_2, pulse rate
Measurement range	SpO_2: 1% to 100% Pulse rate: 25 to 240 bpm
Resolution	SpO_2: 1% Pulse rate: 1 bpm
Numeric update rate	Every 1 second
Pulse accuracy	No motion: ±3% Motion: ±5% Low perfusion: ±3%

SpO_2 accuracy (70% to 100%) of Masimo sensors	
LNCS DC-I, LNCS DC-IP, LNCS TF-I, LNCS Adtx, LNCS Pdtx, LNCS Inf	No motion: ±2% Low perfusion: ±2%
LNCS TC-I	No motion: ±3.5% Low perfusion: ±3.5%
LNCS Neo	No motion: <3 kg ±3%, >40 kg ±2% Low perfusion: <3 kg ±3%, >40 kg ±2%
RD SET Adt, RD SET Pdt, RD SET Inf, RD SET DCI, RD SET DCI-P	No motion: ±2% Low perfusion: ±2%
RD SET TC-I	No motion: ±3.5% Low perfusion: ±3.5%
RD SET Neo	No motion: <3 kg ±3%, >40 kg ±2% Low perfusion: <3 kg ±3%, >40 kg ±2%
RD SET NeoPt	No motion: ±3% Low perfusion: ±3%
Nellcor OxiMax Pulse Oximetry (SpO_2) Option	
Measurement method	Functional saturation (oxygen saturation of functional hemoglobins)
Display parameters	%SpO_2, pulse rate
Measurement range	SpO_2: 1% to 100% Pulse rate: 20 to 240 bpm
Resolution	SpO_2: 1% Pulse rate: 1 bpm
Numeric update rate	Every 1 second
SpO_2 accuracy (70% to 100%) of Nellcor sensors	
DS-100A, OXI-P/I	±3%
D-YS (Neonate), OXI-A/N	±4%
Neonatal accuracy	When sensors are used on neonatal subjects as recommended, the specified accuracy range is increased by ±1 digit as compared to adult usage, to account for the theoretical effect on oximeter measurements of fetal hemoglobin in neonatal blood. For example, MAX-N accuracy on neonates is ±3 digits, rather than ±2 digits.
FILAC 3000 Temperature Option	
Measurement range	30° to 43° C
Accuracy	±0.1° C (35.5° to 42° C); ±0.2° C (<35.5° or >42° C)

Operating mode	Predictive monitoring
Measurement time	Standard mode: 6 to 10 seconds, oral; 10 to 15 seconds, axillary Quick mode: 3 to 4 seconds, oral; 10 to 15 seconds, axillary Cold mode: 12 to 15 seconds, oral; 15 to 20 seconds, axillary

Exergen Temperature Option

For product specifications of the Exergen Temporal Artery Thermometer, model TAT-5000S-USB-GN, refer to the documentation for that product.

Electrical Specifications

Power Supply

Power source	Internal battery or external AC power supply, P/N 010-2177-00
AC input	100 to 240 VAC, 50 to 60 HZ, 1.2 to 0.5 A
Safety classification	Class II

Battery

Type	Rechargeable lithium-ion, P/N 010-2178-00
Voltage	10.8 V
Battery operation	Approximately 12 hours
Charge time	Approximately 8 hours (fully depleted battery)

Environmental Specifications

Ambient temperature	Operating: 0° to 40° C (32° to 104° F) Storage and transport: -20° to 60° C (-4° to 140° F)
Relative humidity	Operating: 15 to 90% (non-condensing) Storage and transport: 15 to 95% (non-condensing)
Altitude	Operating: 0 to 4,572 meters (0 to 15,000 feet) Storage and transport: 0 to 12,192 meters (0 to 40,000 feet)
Water ingress	IPX1

Ordering Information

Configurations

91331-M	NIBP, Masimo pulse oximetry, Exergen Temporal Artery Thermometer or no temperature
91331-N	NIBP, Nellcor pulse oximetry, Exergen Temporal Artery Thermometer or no temperature
91331-MF	NIBP, Masimo pulse oximetry, FILAC 3000 predictive temperature
91331-NF	NIBP, Nellcor pulse oximetry, FILAC 3000 predictive temperature
91331-MW	NIBP, Masimo pulse oximetry, Exergen Temporal Artery Thermometer or no temperature, WiFi

91331-NW	NIBP, Nellcor pulse oximetry, Exergen Temporal Artery Thermometer or no temperature, WiFi
91331-MFW	NIBP, Masimo pulse oximetry, FILAC 3000 predictive temperature, WiFi
91331-NFW	NIBP, Nellcor pulse oximetry, FILAC 3000 predictive temperature, WiFi
Accessories	Exergen Temporal Artery Thermometer (P/N 010-2157-00) External printer (P/N 010-1852-00) Bar code scanner (P/N 010-2179-00) Roll stand (P/N 016-0823-00) Nurse call cable (P/N 010-2184-00, 010-2185-00, or 010-2186-00) For further ordering information and details on compatible accessories, please contact your Spacelabs Healthcare representative or refer to the product documentation. This product may not be approved for market release in all countries.

Documentation

This product ships with a complete set of comprehensive documentation.

For a full list of available supplies and accessories, refer to the *Spacelabs Healthcare Supplies and Accessories Catalog* at https://www.spacelabshealthcare.com/supplies.

Appendix B—Electromagnetic Compatibility

Electromagnetic Emissions

Note:

The monitor is intended for use in the electromagnetic environment specified below. The customer or user of the monitor should ensure that it is used in such an environment.

Emission Test	Compliance	Electromagnetic Environment
RF emissions CISPR 11	Group 1 Class B	The DM4 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. Suitable for use in all establishments, including domestic, and those directly connected to the public low-voltage supply.
Harmonic emissions IEC 61000-3-2	Class B	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Electromagnetic Immunity

Note:

The monitor is intended for use in the electromagnetic environment specified below. The customer or user of the monitor should ensure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment
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 data lines	±2 kV for power supply lines ±1 kV for input/output data 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 seconds)	<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 seconds)	Mains power quality should be that of a typical commercial or hospital environment. If user of the monitor requires continued operation during power mains interruptions, it is recommended that the monitor 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.

Note:

U_T is the AC mains voltage prior to application of the test level.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms, 150 kHz to 80 MHz 3 V/m, 80 MHz to 2.5 GHz	3 Vrms 20 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the monitor, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance:** $d = \left[\frac{3.5}{V_1}\right]\sqrt{P}$ 150 kHz to 80 MHz $d = \left[\frac{3.5}{E_1}\right]\sqrt{P}$ 80 MHz to 800 MHz $d = \left[\frac{7}{E_1}\right]\sqrt{P}$ 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,* should be less than the compliance level in each frequency range.**  Interference may occur in the vicinity of equipment marked with the following symbol.

** 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 monitors are used exceeds the applicable RF compliance level above, the monitors should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the monitors.*

*** Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V_1] V/m.*

Separation Distances

Note:

The monitor is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the monitor can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the monitor as recommended below, according to the maximum output power of the communications equipment.

Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the Monitor

Rated maximum output power of transmitter (watts)	Separation distance according to frequency of transmitter (meters)		
	150 kHz to 80 MHz $d = 3.5 / 3 \sqrt{P}$	80 MHz to 800 MHz $d = 3.5 / 20 \sqrt{P}$	800 MHz to 2.5 GHz $d = 7.0 / 20 \sqrt{P}$
0.01	0.12	0.02	0.04
0.1	0.38	0.06	0.11
1	1.17	0.18	0.35
10	3.69	0.55	1.11
100	11.87	1.75	3.50

For transmitters operating at a maximum output power not listed above, the recommended separation distance *d* in meters can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts according to the transmitter manufacturer.

Note:

- *At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.*
- *These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.*

Appendix C — Symbols

This appendix lists the symbols that apply to the Spacelabs Healthcare product or products described in this manual.

Table C-1: Symbols used on DM4 (91331), accessories, and packaging

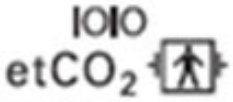
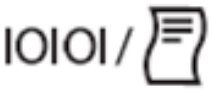
Symbol	Description
MD	Medical Device
	Follow Instructions For Use
	eIFU Indicator
 www.spacelabshealthcare.com	eIFU (electronic Instructions for Use) indicator
Rx Only	Rx Only - Federal law restricts this device to sale by or on the order of a physician.
	Caution—Potential damage to equipment (consult accompanying documents)
	Universal Serial Bus (USB)
	Serial data port
	$EtCO_2$ device interface (for future use)
	External printer interface
	Power ON/OFF button

Table C-1: Symbols used on DM4 (91331), accessories, and packaging

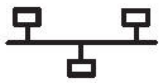
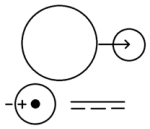
Symbol	Description
	Network connection
	DC power input – connection for external power supply (P/N 01-02-0806)
	Nurse Call Jack
	Battery charging indicator Replace only with the appropriate battery.
	NRTL certified for electrical safety for Canada and the US by Intertek Testing Services; DM4 Product Listing Number: 2003191
	Radio transmitting device; elevated levels of non-ionizing radiation
REF	Catalog Number or Order Number
SN	Serial Number
#	Model number
UDI	Unique device identifier
EC REP	EC Representative
LOT	LOT
QTY	Quantity

Table C-1: Symbols used on DM4 (91331), accessories, and packaging

Symbol	Description
	Date of manufacture
	Manufacturer
	This side up
	Keep dry
	Fragile, handle with care
	Humidity limitation
	Atmospheric pressure limitation
	Filac isolation chamber - provides holding well for the Filac temperature probe and box of probe covers.
	IEC 60601-1 Type BF equipment which is defibrillator-proof. The unit displaying this symbol is an F-type isolated (floating) patient-applied part which contains an adequate degree of protection against electric shock, and is defibrillator-proof.
IPX1	Ingress protection—Protected against vertical falling liquids
	Masimo SET compatible
	NIBP hose connector - MAXNIBP single tube, beyonet fitting
	Nellcor OxiMax compatible
	Temperature limitation

Table C-1: Symbols used on DM4 (91331), accessories, and packaging

Symbol	Description
	No LATEX, ISO 15223 with warning
	CE mark
	Power supply meets EISA 2007, CEC Efficiency Level V
	UL-recognized component
	Indoor, dry location use only
	This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.
	Symbol Set, Adult/Pediatric Cuff Sizes
	Symbol Set, Neonatal Cuff Sizes
	NIBP Cuff, Neonatal 1
	NIBP Cuff, Neonatal 2
	NIBP Cuff, Neonatal 3
	NIBP Cuff, Neonatal 4
	NIBP Cuff, Neonatal 5