SPACELABS Healthcare

Flexport® System Interface SenTec Digital Monitor

90442A-03

Operations Manual

071-0971-00 Rev. A

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- *assembly operations, re-adjustments, modifications or repairs are carried out by persons authorized by Spacelabs Medical, and*
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- *the equipment is used in accordance with the operations manual.*

Spacelabs Medical will make available, on request, such circuit diagrams, component part lists, descriptions, calibration instructions or other information which will assist appropriately qualified technical personnel to repair those parts of the equipment which are classified by Spacelabs Medical as field repairable.

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Caution:

Rx Only **US 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

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Overview

The Flexport® system interface provides access to monitoring data at the patient bedside. It enables data from compatible third-part peripheral devices such as ventilators, multigas analyzers, pulse oximeters, NIBP monitors, IV pumps, incubators, and capnographs to be displayed on Spacelabs Medical monitors.

The Flexport system interface provides current numeric data, alarm information, and selected waveforms to the Spacelabs Medical monitor, enables you to print the current display, and can support data transfer via the Data Shuttle® option (refer to *Supporting Data Transfer* on page 1-3).

Once device data is in the Spacelabs Medical monitor, it becomes an integral part of the monitoring system and can be communicated over the network to other locations providing alarms, centralized display, trending, and documentation capabilities at remote locations.

Flexport System Interface Basics

The interface uses RS-232 serial communications to collect data and then transmits the data, via synchronous data link control (SDLC) communications, to the Spacelabs Medical monitor.

The Flexport system interface has a male, 9-pin, SDLC connector at one end and either a female, 6-pin, modular jack or a female, 8-pin receptacle at the other end (refer to *Figure 1-1*). The interface contains no operator controls. Power to the interface is provided by the Spacelabs Medical monitor through the SDLC connection.

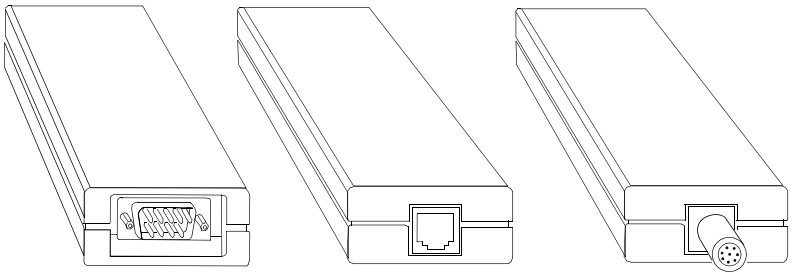


Figure 1-1: Flexport system interface

Setup

The Flexport system interface uses two cables:

- The “L-shaped” SDLC cable connects the Spacelabs Medical monitor to the Flexport system interface.
- The modular cable has modular connectors (similar to U.S. telephone connectors) at each end and connects the Flexport system interface to the peripheral device.

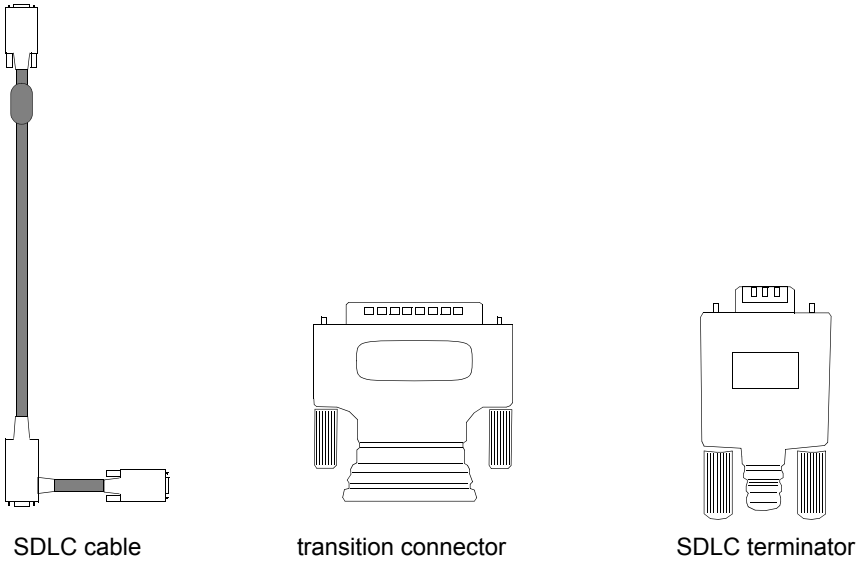


Figure 1-2: Flexport system interface connectors

The transition connector adapts the modular cable to the peripheral device.

The SDLC terminator is used at one end of the SDLC cable when the SDLC cable is not used to connect additional Spacelabs Medical products to the Spacelabs Medical monitor.

Note:

- *After receiving your Flexport installation kit, contact your Field Service Engineer or your Biomedical Department to install your SDLC cable and terminator on your monitor or module housing.*
- *Additional installation details are available in the 90485/86/91/99 Module Housings and Power Supplies Service Manual (P/N 070-0680-xx, located on CD-ROM 084-0700-xx).*

Connecting the Flexport System Interface

The Flexport system interface connects to a peripheral device such as a ventilator, IV pump, multigas analyzer, or capnograph as shown in *Figure 1-3*.

Note:

Your device setup may differ from the graphic shown here. Refer to the chapter corresponding to your peripheral device for specific setup information.

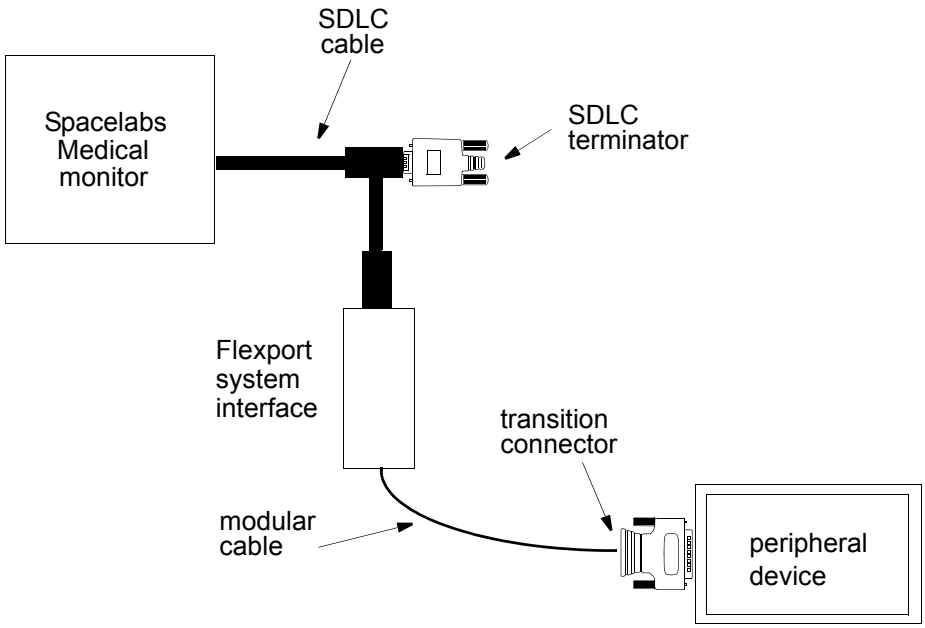


Figure 1-3: Flexport system interface connections

Caution:

Attach only Spacelabs Medical-approved accessories to RS-232 connectors.

Supporting Data Transfer

If you use the interface with a Spacelabs Medical monitor that includes a multi-parameter module with the Data Shuttle option, you can use that module's data transfer capability to pass data from one monitor to another. To ensure the integrity of your data, you must finish data collection before you begin the transfer process. To end data collection, disconnect the modular cable from the interface.

For further information on the Data Shuttle option, refer to the Bedside/Transport Monitors chapter in the Ultraview Care Network Operations Manual (P/N 070-1150-XX, located on CD-ROM 084-1101-xx)

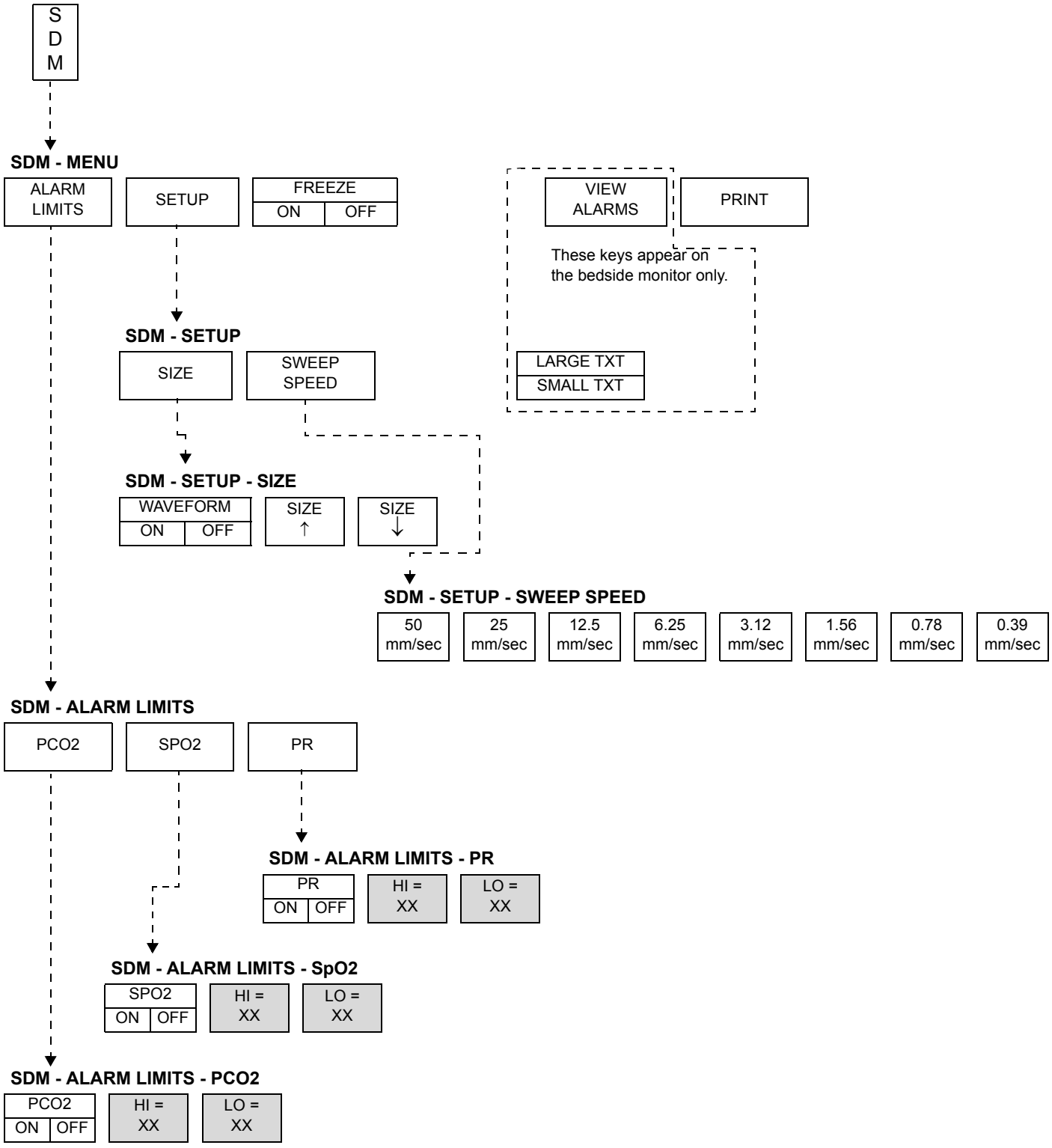
Help Messages

If you are in doubt about a key, touch the monitor HELP key, and then touch the key in question. The monitor will display a brief description of its function.

SenTec Digital Monitor

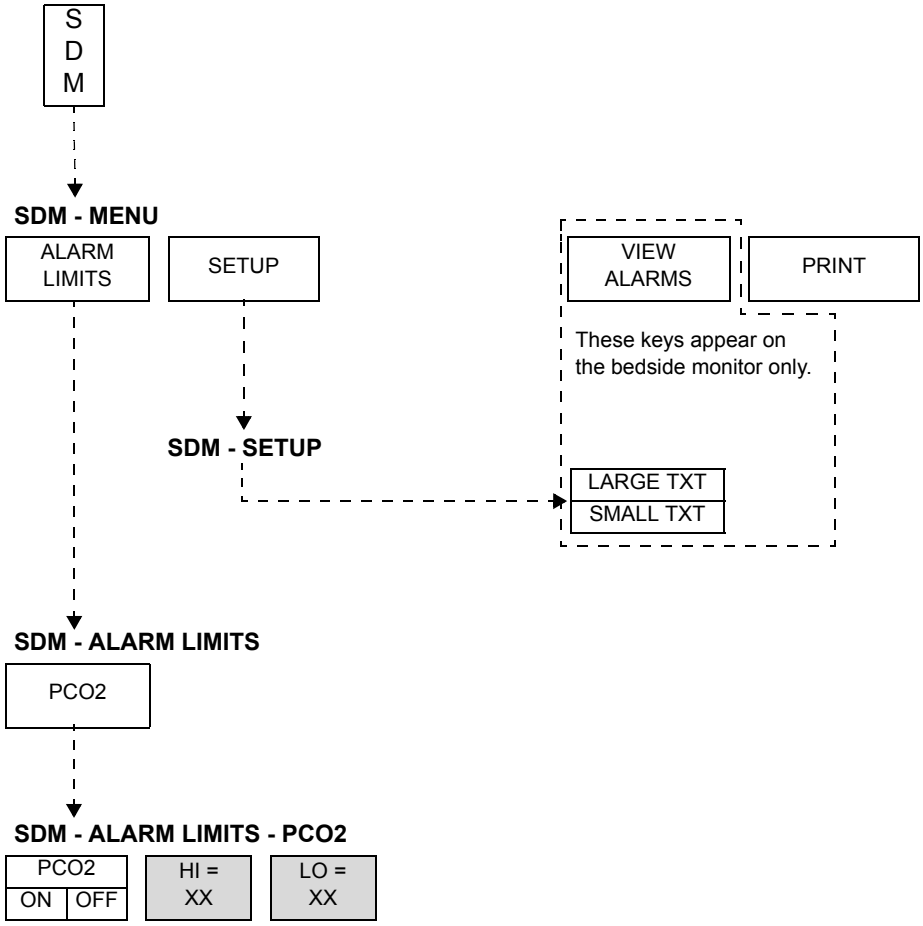
Directory of Keys

(with PCO_2/SpO_2/PR parameters enabled on SenTec device)



Directory of Keys

(with only PCO_2 parameter enabled on SenTec device)



SenTec Digital Monitor

Contents

Overview

The 90442A-03 Flexport system interface enables information from a SenTec Digital Monitor (SDM) to be displayed on Spacelabs Medical monitors.

Configure the SDM as shown in *Table 1*. Consult the SDM manual for additional configuration setup procedures.

Table 1: SenTec Digital Monitor Configuration

Baud Rate	Minimum Software Revision	Installation Kit Part Number	Transition Connector Part Number
9600	v06.10	045-0162-xx	131-1972-xx (9 pin)

Connecting the Flexport System Interface

To connect the Flexport system interface to the SDM, complete the steps listed in the following Quickstart.

To connect the Flexport system interface:

- Connect the SDLC cable to the 9-pin male connector on the Flexport system interface as shown in *Figure 1-3* on page 1-3.
- Plug one end of the modular cable into the modular jack on the Flexport system interface.
- Plug the other end of the modular cable into the transition connector.
- Plug the transition connector into the 9-pin connector on the back of the SDM serial port.

The Spacelabs Medical monitor is now ready to display information from the SDM. To control other interface functions, refer to the sections that follow.

Note:

During the warm-up phase, the PCO_2 values display in grey on the device and the monitor displays question marks (???). Once the device is sufficiently warmed up, PCO_2 values will display normally.

Display Detail

When you power ON a Spacelabs Medical monitor that is properly connected to a Flexport system interface, the monitor provides the following information from the SDM.

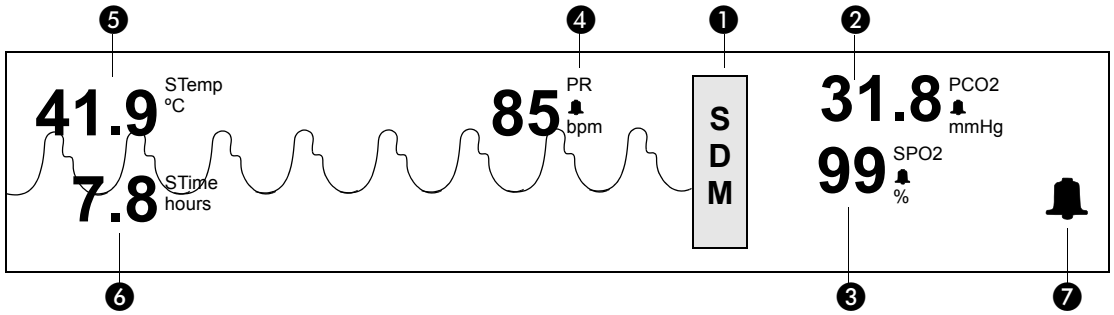


Figure 2-1: Bedside monitor, large text screen with PCO_2/SpO_2/PR enabled

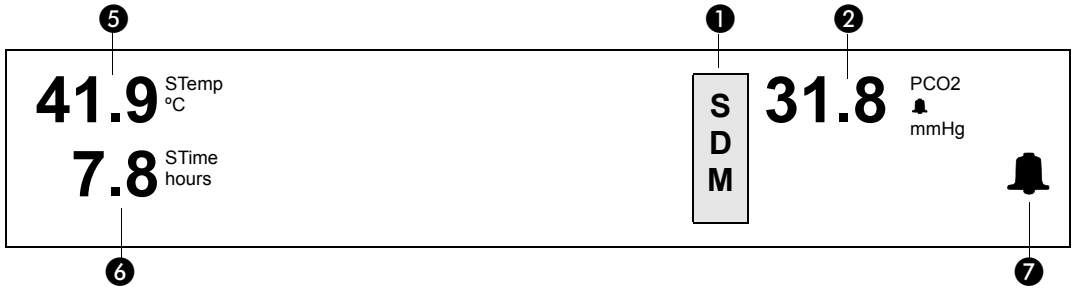


Figure 2-2: Bedside monitor, large text screen with only PCO_2 enabled

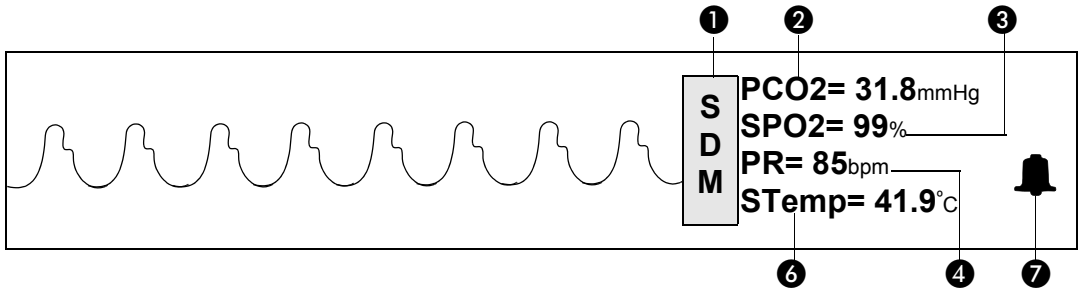


Figure 2-3: Bedside monitor, small text screen with PCO_2/SpO_2/PR enabled

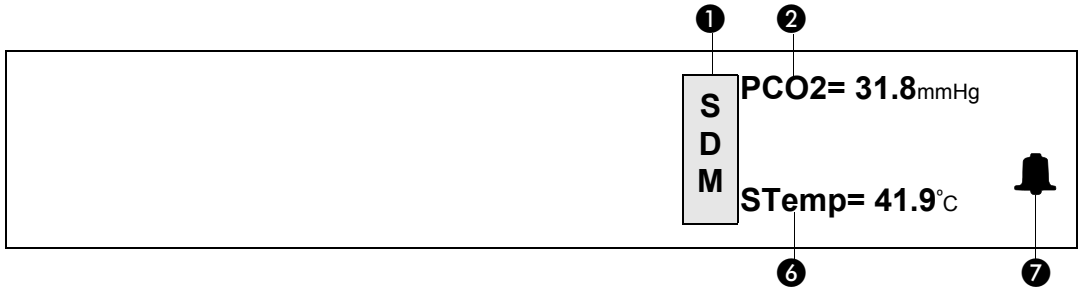


Figure 2-4: Bedside monitor, small text screen with only PCO_2 enabled

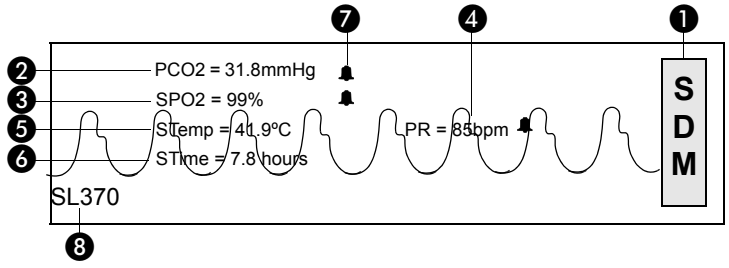


Figure 2-5: Central monitor, split screen with PCO_2/SpO_2/PR enabled

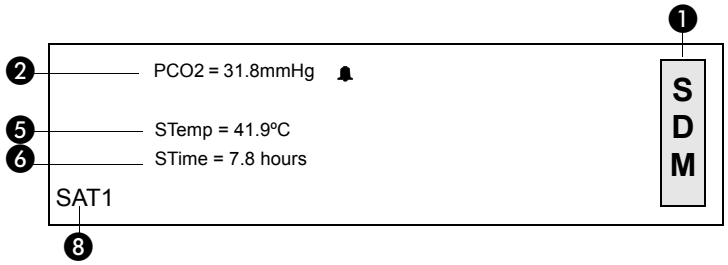


Figure 2-6: Central monitor, split screen with only PCO_2 enabled

1. SDM parameter key
2. Current PCO_2 (transcutaneous carbon dioxide tension) value
3. Current SpO_2 (oxygen saturation) value
4. Current PR (pulse rate) value
5. Current STemp (sensor temperature measured in ºC) value
6. Current STime (site timer countdown clock) value
7. Alarm status bell (appears when alarms are turned ON)
8. Patient/room ID

Enabling Alarms

The **Alarm Limits** menu allows you to enable alarm limits for each parameter. When an alarm is turned ON and that parameter value exceeds an alarm limit, all of the following occur:

- an alarm tone sounds,
- the SDM key flashes,
- the alarm limits key for that parameter flashes, and
- the alarm bell flashes.

When all parameter alarms are turned OFF, alarm status messages will still cause the SDM key to flash.

Alarm settings default to ON.

Note:

- *Turning Flexport system interface alarms ON or OFF does not affect alarm settings on the SDM.*
- *Alarm limits can only be adjusted at the SDM. Alarm violation is detected at the SDM, and the Flexport system interface reports the alarm if it is turned ON for that parameter.*
- *Alarm tones on the SDM can be selectively enabled or disabled. If alarm tones are also disabled at the Spacelabs Medical monitor(s), alarm violations will be reported visually only.*

To turn alarms ON or OFF from the Spacelabs Medical monitor:

- Touch SDM.
- Select ALARM LIMITS.
- Select an alarm parameter.
- Touch the parameter alarm ON/OFF key.

Viewing Alarm Settings

The VIEW ALARMS key enables you to display the current alarm settings for the SDM's parameters (refer to *Figure 2-7*, *Figure 2-8*, *Figure 2-9*, and *Figure 2-10*). If alarms for all parameters are turned OFF, the Spacelabs Medical monitor displays SDM ALM OFF to the right of the SDM key. If alarms are turned ON for any parameter, a bell is displayed. The alarm bell flashes when an alarm limit is violated.

To view alarm settings:

- Touch SDM.
- Touch VIEW ALARMS.

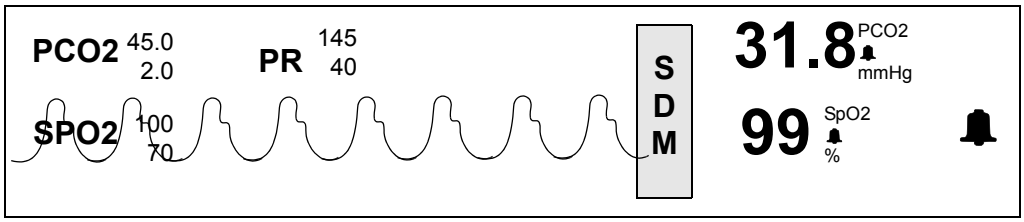


Figure 2-7: View Alarms screen, large text, PCO_2/SpO_2/PR enabled

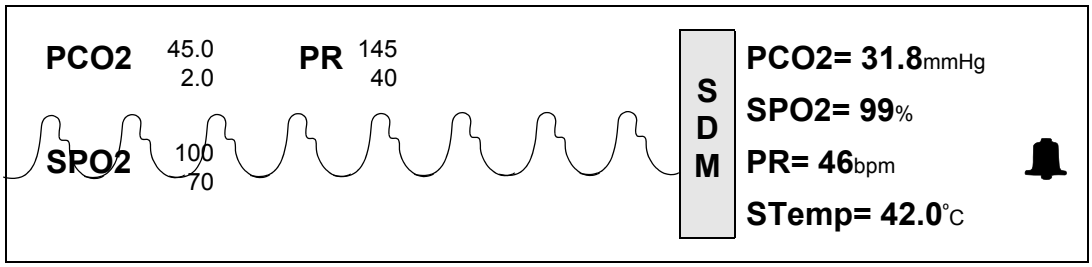


Figure 2-8: View Alarms screen, small text, PCO_2/SpO_2/PR enabled

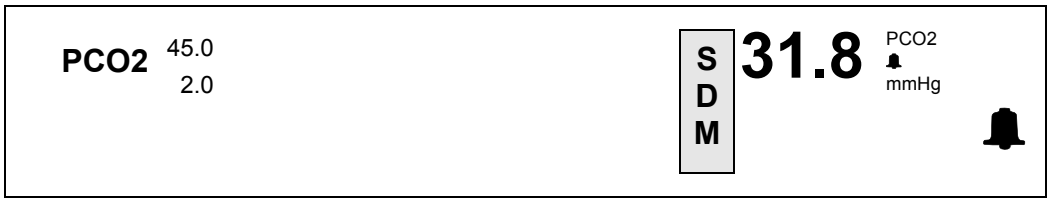


Figure 2-9: View Alarms screen, large text, only PCO_2 enabled

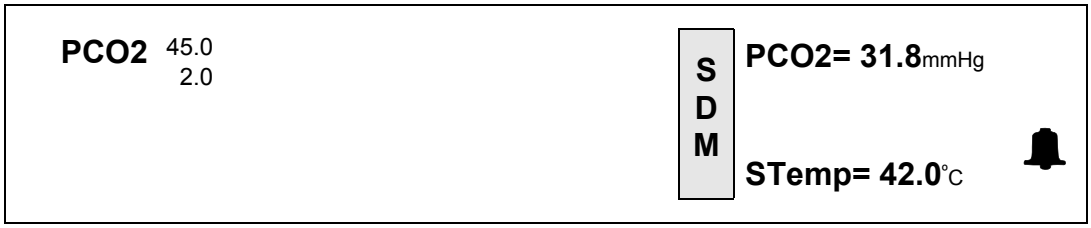


Figure 2-10: View Alarms screen, small text, only PCO_2 enabled

Entering Setup Information

Changing setup information is helpful in optimizing the monitor display. The SETUP key controls the functions described below and affects only the monitor at which these adjustments are made.

Turning Waveforms ON or OFF

You can turn waveforms OFF and display only the numeric values. When waveforms are OFF, the SIZE ↑ and SIZE ↓ keys, the SWEEP SPEED key, and the FREEZE ON/OFF keys are disabled.

The default setting is WAVEFORM ON.

When PCO2 is the only parameter enabled on the SDM device, the WAVEFORM ON/OFF key, the SWEEP SPEED key, and the FREEZE ON/OFF keys are not displayed on Spacelabs Medical monitors.

To turn the waveform display ON or OFF:

- Touch SDM.
- Touch SETUP.
- Touch SIZE.
- Select WAVEFORM ON/OFF.

Adjusting the Waveform Size

If the waveform is too large to fit within the display zone, use the waveform size keys to adjust the display size.

Note:

The WAVEFORM ON/OFF key must be set to ON for the size keys to appear and function.

To adjust waveform size:

- Touch SDM.
- Touch SETUP.
- Touch SIZE.
- Touch SIZE ↑ or SIZE ↓ to adjust the waveform size.

Selecting a Sweep Speed

The sweep speed determines the speed at which the waveform trace moves across the display. Available sweep speeds are: 50, 25, 12.5, 6.25, 3.12, 1.56, 0.78, and 0.39 mm/second.

The default setting is 12.5 mm/second.

To select a sweep speed:

- Touch SDM.
- Touch SETUP.
- Touch SWEEP SPEED.
- Select the desired speed.

Selecting a Display Format

Two display formats are available for the bedside monitor (refer to *Display Detail* on page 2-4).

The default setting is LARGE TXT.

To select a display format:

- Touch SDM.
- Touch SETUP.
- Select LARGE TXT or SMALL TXT.

Freezing the Waveform on the Display

The FREEZE ON key enables you to freeze the waveform on the display. When you freeze the waveform, the Flexport system interface continues to process, update, and display numeric information.

The default setting is FREEZE OFF.

To freeze the waveform on the display:

- Touch SDM.
- Select FREEZE ON.

Printing the Current Display

Touch the PRINT key to print the information shown on the current display. Each recording is identified by the bed name, patient name, time, and date.

Note:

- *The patient name you enter in the Spacelabs Medical monitor is the name that appears on the printout.*
- *The PRINT key does not print the waveform. A waveform recording is obtained by touching the monitor RECORD key.*

To print the SDM display:

- Touch SDM.
- Touch PRINT.

Status Messages

The message COMMUNICATION LINK LOST indicates a problem with the SDM or cabling. If the monitor displays this message, perform the following troubleshooting steps:

- Verify that the SDM is powered ON.
- Verify that all cables are secure.

Note:

- *When powering OFF the SDM with all cables attached, do NOT power the SDM back ON until after the Flexport channel has disappeared from the Spacelabs Medical monitor (approximately one minute).*

Table 2 lists the status messages that the Flexport system interface reports for the SenTec Digital Monitor during Flexport system interface operation.

Table 2: Status Messages

Message Text	Indication	Alarm Sounds
MONITOR FAULT	Monitor faulty, do not use — contact qualified service personnel.	Yes
CONNECT SENSOR	Sensor is not detected — if sensor is connected, replace, do not use.	Yes
SENSOR FAULT	The system detected a severe sensor fault. Sensor is shut down — do not use, replace sensor.	Yes
TEMP. LIMITER ACTIVE	Temperature surveillance detected a temperature problem.	Yes
GAS LEAK IN DOCKING STATION	Docking station (DS) surveillance detected a leak in the DS chamber (for example, polluted by sensor gel).	Yes
SENSOR OFF PATIENT	The sensor was dropped or is removed from the patient and calibration is needed.	Yes
CALIBRATE SENSOR	Sensor is removed from the docking station and calibration is needed.	Yes
DOCKING STATION FAULT	Docking station surveillance detected a severe DS fault (for example, the gas pressure too high).	Yes
GAS BOTTLE EMPTY	Gas bottle on the docking station is empty.	Yes
SPO2 STABILIZING	SpO_2 and pulse rate are not stable.	No
LOW SIGNAL	Low pulse signal.	No
MOTION ARTIFACT	Motion artifact detected.	No
SITE TIME ELAPSED	Check measurement site, and if necessary, relocate the sensor to prevent skin irritation.	Yes
REMEMBRANCE SENSOR	The sensor needs to be remembrance.	Yes
BATTERY LOW	Battery capacity is low (<10%) while the power supply cable is unplugged or the power supply is plugged in and charging.	Yes
PCO2 STABILIZING	PCO_2 measurement is not yet stable after sensor application. PCO_2 values do not yet reflect patient data.	No

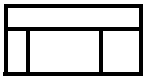
Table 2: Status Messages (continued)

Message Text	Indication	Alarm Sounds
READY FOR USE	Ths sensor is removed from the docking station and calibration is NOT needed	No

Appendix A — Symbols

The following list of international and safety symbols describes all symbols used on Spacelabs Medical products. No one product contains every symbol.

HELP Key



Keyboard Connection

SPECIAL FUNCTIONS Key

Mouse Connection

RECORD Key

START/STOP Key

NORMAL SCREEN Key

START/STOP

MONITOR SETUP Key

STOP or CANCEL Key

ALARMS Key

CONTINUE Key

PREVIOUS MENU Key

ENTER Key

ON — Power Connection to Mains

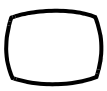
OFF — Power Disconnection from Mains

ON Position for Push Button Power Switch

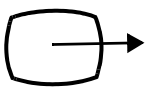
OFF Position for Push Button Power Switch

On Direction

ON/OFF



Television; Video Display



Video Output

ON — Part of the Instrument Only

OFF — Part of the Instrument Only

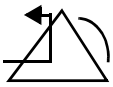
Appendix A — Symbols


Standby


STANDBY Key
Power ON/OFF Key

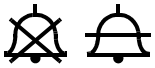

PAUSE or INTERRUPT


Slow Run


Alarm Reset

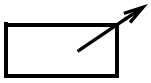

Power Indicator LED

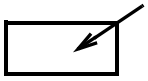

Alarm Audio ON


Alarm Audio OFF


Alarm Audio Paused


Activate Telemetry Recorder


Indicator — Remote Control


Indicator — Local Control


PRINT REPORT Key


Indicator — Out of Paper


Partial ON/OFF


Recorder Paper


Normal Screen


Return to Prior Menu


Clock/Time Setting Key


TREND/TIMER Key


HELP (Explain Prior Screen) Key

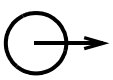

Keypad

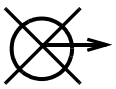

Activate Recorder for Graphics

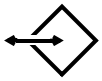

Indoor Use Only

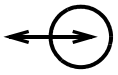

START (NIBP) Key


Auto Mode (NIBP)


Output (Non-terminated)


No Output (Terminated)

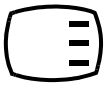

Data Input/Output


Input/Output


Input


Reset


Menu Keys

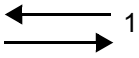

Waveform/Parameter Keys


Monitor Setup
Select Program Options

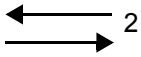
Set Initial Conditions Menu

Access Special Function Menu


Return Unit to Monitor Mode

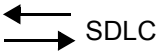


Serial Port 1



Serial Port 2


External Marker Push Button
Connection



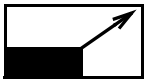
SDLC Port


Arterial Pulse

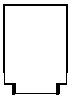

Electrocardiograph or
Defibrillator Synchronization


Gas Exhaust


Foot Switch


Enlarge, Zoom

Delete


PCMCIA Card

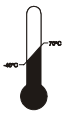

Event


Keep Dry


Fragile; Handle with Care

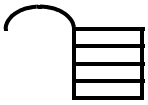
Environmental Shipping/Storage
Altitude Limitations


This Way Up

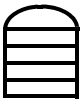

Environmental Shipping/Storage
Temperature Limitations

Environmental Shipping/Storage
Humidity Limitations

Appendix A — Symbols



Open Padlock



Closed Padlock

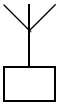
Down Arrow

Up Arrow

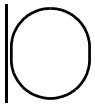
Hard Drive

Power Indicator LED

Antenna

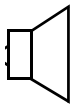


Mermaid Connector



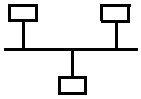
Microphone

Omnidirectional Microphone



Audio Output, Speaker

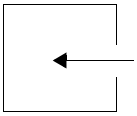
Universal Serial Bus



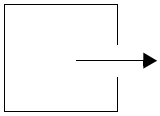
Network Connection

Ref.

Oxygen reference gas port



Gas Sampling Port



Gas Return Port

Low Priority Alarm

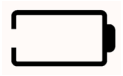
Nurse Call

High Priority Alarm

Medium Priority Alarm

Alarms Paused

Nurse Alert Interface



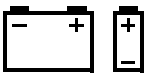
Battery Status

Alarm OFF

Battery
Replace only with the appropriate battery.

Low Battery

All batteries should be disposed of properly to protect the environment. Lithium batteries should be fully discharged before disposal. Batteries such as lead-acid (Pb) and nickel-cadmium (Ni-Cd) must be recycled. Please follow your internal procedures and or local (provincial) laws regarding disposal or recycling.



Replace only with the appropriate battery.
(+ / - signs may be reversed)

Caution - hazardous voltages. To reduce risk of electric shock, do not remove the cover or back. Refer servicing to a qualified field service engineer (U.S.A.).
DANGER - High Voltage (International)

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.

Protective Earth Ground

Functional Earth Ground

Replace Fuse Only as Marked

Fuse

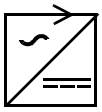
Power supply jack polarity.
(+ / - signs may be reversed)

Equipotentiality Terminal

Alternating Current

Direct Current

Both Direct and Alternating Current



AC/DC Input

A

Amperes

Hz

Hertz

V

Volts

W

Watts

IEC 60601-1 Type B equipment. The unit displaying this symbol contains an adequate degree of protection against electric shock.

IEC 60601-1 Class II equipment, double-isolated. The unit displaying this symbol does not require a grounded outlet.

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.

IEC 60601-1 Type BF equipment. The unit displaying this symbol is an F-type isolated (floating) patient-applied part providing an adequate degree of protection against electric shock.

IEC 60601-1 Type CF equipment. The unit displaying this symbol is an F-type isolated (floating) patient-applied part providing a high degree of protection against electric shock, and is defibrillator-proof.

IEC 60601-1 Type CF equipment. The unit displaying this symbol is an F-type isolated (floating) patient-applied part providing a high degree of protection against electric shock.

Loop Filter

Adult NIBP

ETL Laboratory Approved

Canadian Standards Association Approved

Risk of Explosion if Used in the Presence of Flammable Anesthetics

Operates on Non-Harmonized Radio Frequencies in Europe

Note

Note

Attention - Consult Operations or Service Manual for Description

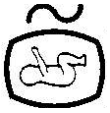
Warning

Warning About Potential Danger to Human Beings

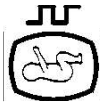
Caution

Caution About Potential Danger to a Device

Noninvasive Blood Pressure (NIBP), Neonate



Fetal Monitor Connection (Analog)

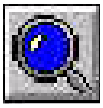


Fetal Monitor Connection RS-232 (Digital)

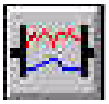
Physiological Monitor Connection RS-232 (Digital)

Happy Face

Sad Face



Magnifying Glass

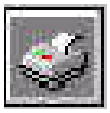
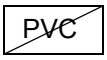


Compression

File Cabinet

List of Rooms

Appendix A — Symbols

	Arrows		Printer
	Recycle		Service Message
	Non Sterile		PVC-Free
	Latex-Free		Do Not Reuse; Single Use Only
	Radio transmitting device; elevated levels of non-ionizing radiation		Reusable
	Batch Code		Catalog Number
	Date of Manufacture		Nellcor Oxisensor II Compatible
	UL recognized component in Canada and United States		Novametrix Compatible
	Nellcor OxiMax Compatible		Spacelabs TruLink Compatible
	Masimo SET Compatible		Nellcor OxiMax Compatible
	Spacelabs Compatible		

Abbreviations used as symbols are shown below.

1 - 32	Access Codes 1 Through 32	**AIR**	Air
ANT 1	Diversity Antenna System 1	**Arr1**	Arrhythmia Net 1
ANT 2	Diversity Antenna System 2	**ArrNet2**	Arrhythmia Net 2

CH **ch**	EEG, EMG, or ECG Channel EEG Channels - CH1, CH2, CH3, CH4 EMG Channel - CH5	**cmH_2O**	Centimeters of Water
C.O. **CO** **co**	Cardiac Output	**DIA** **dia**	Diastolic
ECG **ecg**	Electrocardiogram	**EEG** **eeg**	Electroencephalogram
EMG **emg**	Electromyogram	**ESIS**	Electrosurgical Interference Suppression
EXT	External	**FECG**	Fetal Electrocardiogram
FHR1 **FHR2**	Fetal Heart Rate, Channel 1 Fetal Heart Rate, Channel 2	**GND** **gnd**	Ground
HLO **hlo**	High-Level Output	**Multiview**	Multi-Lead Electrocardiogram
NIBP **nibp**	Noninvasive Blood Pressure	**N_2O**	Nitrous Oxide
O_2	Oxygen	**PRESS** **press** **PRS**	Pressure
RESP **resp**	Respiration	**SDLC**	Synchronous Data Link Control
SPO2 **SpO2** **SpO_2** **SaO_2**	Arterial Oxygen Saturation as Measured by Pulse Oximetry	**SVO2** **S$\underline{v}$O2** **SvO_2**	Mixed Venous Oxygen Saturation
SYS **sys**	Systolic	**T1** **T2** **T3** **T4**	Temperature 1 Temperature 2 Temperature 3 Temperature 4
TEMP **temp**	Temperature	**UA**	Uterine Activity or Umbilical Artery

VAC	Vacuum Connection	**UV**	Umbilical Venous