



# SureSigns VS2<sup>+</sup>

## Vital Signs Monitor Technical Data Sheet

The SureSigns<sup>®</sup> VS2<sup>+</sup> is a vital signs monitor that can measure blood pressure, pulse rate, oxygen saturation (SpO<sub>2</sub>), and temperature. The SureSigns VS2<sup>+</sup> monitor is for monitoring, recording, and alarming of multiple physiological parameters of adults, pediatrics, and neonates in healthcare environments. Additionally, the monitor is intended for use in transport situations within a healthcare facility.

### Key Features

- Easy-to-read display with large color-coded numerics
- Lithium ion battery
- Stores up to 100 patient records
- SpO<sub>2</sub> waveform (if SpO<sub>2</sub> is installed)
- Flexible blood pressure modes, including auto intervals, user-defined interval program, and manual start/stop
- Optional integrated recorder
- Optional predictive temperature
- Alarm output
- Available with roll stand, wall mount, and tabletop base mounting options
- HL7 data export via wired LAN, wireless LAN<sup>1</sup>, or serial connection
- Easy software upgrades
- Patient ID entry using optional barcode scanner
- Synchronization of the monitor clock when connected to a designated network server

<sup>1</sup> The wireless option may not be available in all countries.

# PHILIPS

## Main Components

### Display

The SureSigns VS2<sup>+</sup> monitor features a color LCD display with a 10.9 cm (4.3 in.) screen.

### Front Panel

The following fixed keys and LED indicators are located on the monitor's front panel:

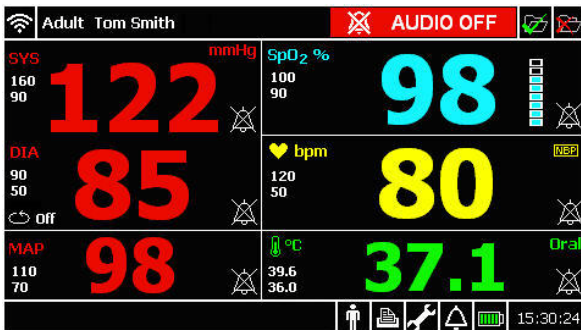
- Alarm Silence
- NBP start/stop
- Main Screen
- Print
- On/Standby
- AC Power LED
- Charging LED

### User Interface

The SureSigns VS2<sup>+</sup> monitor has three display modes: Vital Signs, Patient Records, and Display Waveform. Press the Main Screen key to switch between the display modes.

### Vital Signs Mode

In Vital Signs mode, the main screen displays vital signs measurements for the current patient as numeric values.



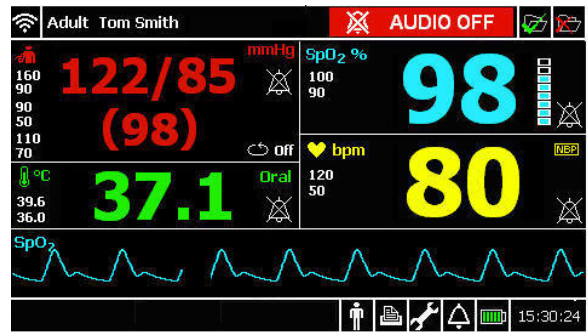
### Patient Records Mode

In Patient Records mode, the main screen displays the patient records table. You can display all patient records or all records for a specific patient. When highlighted, the patient ID information for the highlighted record appears in a separate pane at the bottom of the screen.

Patient/Type	Date	Time	Pulse	NBP	SpO <sub>2</sub>	Temp
123432...	A	09/06/11 11:15:00	80 SpO <sub>2</sub>	120 / 80 (93)	98	--
123432...	A	09/06/11 11:14:00	80 SpO <sub>2</sub>	120 / 80 (93)	98	--
123432...	A	09/06/11 11:13:43	80 SpO <sub>2</sub>	-- / -- (--)	98	37.1
123432...	A	09/06/11 11:13:00	80 SpO <sub>2</sub>	120 / 80 (93)	98	--
123432...	A	09/06/11 11:12:00	80 SpO <sub>2</sub>	120 / 80 (93)	98	--
123432...	A	09/06/11 11:11:13	80 SpO <sub>2</sub>	-- / -- (--)	98	37.8
123432...	A	09/06/11 11:10:45	80 SpO <sub>2</sub>	120 / 80 (93)	98	--

### Display Waveform Mode

In Display Waveform mode, vital signs measurements for the current patient appear in numeric panes on the top of the screen and an SpO<sub>2</sub> waveform appears on the bottom if an SpO<sub>2</sub> signal is being monitored.



### Bottom Bar

The bottom bar contains the following elements:



- Message area
- New Patient button
- Print button
- System button
- Alarms button
- Battery Status icon
- Date/Time pane

### Navigation

Use the navigation wheel to cycle through the screens and menus. Rotate the wheel until the desired area is highlighted, and then press the wheel to display a new menu, or to select an item.

### Mounting Options

The SureSigns VS2<sup>+</sup> monitor has the following mounting options:

- Roll stand
- Wall mount
- Tabletop base

## Safety Standards

- EN/IEC 60601-1, EN/IEC 60601-1-2, EN/IEC 60601-2-30, EN/IEC 60601-2-49, ISO 9919
- Protection class: Class I, internally powered equipment, per IEC 60601-1
- Degree of protection: Type CF defibrillator-proof, per IEC 60601-1
- Ingress of Liquids: IPX1
- Mode of Operation: Continuous
- Protection Against Hazards of Ignition of Flammable Anaesthetic Mixtures: Equipment is not suitable for use in the presence of a flammable anaesthetic mixture with air or oxygen or nitrous oxide, per IEC 60601-1

## Wireless Radio Compliance Standards

- ETSI: EN 300 328, EN 301 489, EN 301 893, EN 60950-1
- FCC Regulatory Domain: Part 15.247 Subpart C, Part 15.407 Subpart E
- Industry Canada: RSS-210/RSS-Gen Issue 2

## Physical Specifications

### Size

- Width: 18.4 cm (8.1 in.)
- Height: 20.5 cm (7.2 in.)
- Depth: 15.0 cm (5.9 in.)
- Weight: 2.0 kg (4.3 lb) including battery, recorder, temperature module, and wireless option

### Display

- Screen Type: 10.9 cm (4.3 in.) WQVGA TFT-AM LCD display
- Resolution: 480 active pixels/line, 272 active lines per frame
- Refresh frequency: 60 Hz
- Screen active area: 95.0 mm x 53.9 mm (3.7 in. x 2.1 in.)
- Pixel size: 0.213 mm
- Viewing angle:  $\pm 60^\circ$

### Alarm Audio Range

Meets IEC 60601-2-49 (45 dB to 85 dB)

## System Response Time

1 second

## Recorder

- Recorder type: Thermal
- Paper width: 58 mm
- User selectable speeds of 6.25, 12.5, 25, and 50 mm/sec

## Environmental Specifications

### Mechanical Shock

- Complies with mechanical shock requirement in ISO 9919 standards for use within the healthcare facility. Test conditions include:
- Peak Acceleration:  $150 \text{ m/s}^2$  (15.3 g)
  - Duration: 11 ms
  - Pulse shape: Half sine
  - Number of shocks: 3 shocks per direction per axis (18 total)

### Electromagnetic Compatibility

Meets the EN 60601-1-2:2001 standard

### Mechanical Vibration

- Complies with mechanical vibration requirement in ISO 9919 standards for use within the healthcare facility. Test conditions include:
- Frequency range: 10 Hz to 2000 Hz
  - Resolution: 10 Hz
  - Acceleration amplitude:
    - 10 Hz to 100 Hz:  $1.0 \text{ (m/s}^2\text{)}^2/\text{Hz}$
    - 100 Hz to 200 Hz: -3.0 dB/octave
    - 200 Hz to 2000 Hz:  $0.5 \text{ (m/s}^2\text{)}^2/\text{Hz}$
  - Duration: 10 minutes per each perpendicular axis (3 total)

### Thermal

- Operating temperature:  $10^\circ\text{C}$  to  $40^\circ\text{C}$  ( $50^\circ\text{F}$  to  $104^\circ\text{F}$ )
- Storage temperature:
  - $-20^\circ\text{C}$  to  $50^\circ\text{C}$  ( $-4^\circ\text{F}$  to  $122^\circ\text{F}$ ) for the device
  - $-20^\circ\text{C}$  to  $40^\circ\text{C}$  ( $-4^\circ\text{F}$  to  $104^\circ\text{F}$ ) for the device plus accessories

### Humidity

- Operating: Up to 80% RH, non-condensing
- Storage: Up to 90% RH, non-condensing

### Altitude

Up to 3000 m (9842 ft) above sea level (701 mbar)

## Electrical Specifications

- Internal battery: Lithium ion, smart battery 10.8 V to 11.1 V, 2150 mAh to 2300 mAh
- Battery operating time (new, fully-charged battery): >4.5 hours, with continuous SpO<sub>2</sub> and NBP interval measurement every 15 minutes
- Battery charge time:
  - Up to 5 hours to charge to 90% level when monitoring SpO<sub>2</sub> and making an NBP measurement every 15 minutes
  - Up to 4 hours to charge to 90% level when the device is in Standby mode
- Internal power supply: 100 VAC to 240 VAC
- Power consumption: < 75 Watts
- Frequency: 50/60 Hz

## Application Features

### Alarms

- Three alarm severity levels (high, medium, low) that determine the monitor's visual and audio response
- Visual alarm indicators, including flashing numeric panes, alarm messages, and alarm icons
- Audible alarms, configurable for volume, tone, and silence
- Configurable alarm limits
- Ability to latch all physiological alarms
- Auto-set alarm limits are based on the patient's current vital sign values

### Interface Connections

- Nurse Call Alarm Output
  - Connector: 3.5 mm insulated phone jack, N.O and N.C contacts
  - Contact rating: ≤1A @ < 25 VAC and ≤1A @ < 60 VDC
  - Isolation: 1.5 kV
  - Delay time: < 0.5 sec
- Data output
  - Ethernet port
  - USB port, with the optional Serial Interface Adapter
  - Wireless
- Software Upgrade: USB port
- Barcode scanner connection: USB port

## Measurement Specifications

### SpO<sub>2</sub>

- Measurement range
  - SpO<sub>2</sub>: 0% to 100%
  - Pulse rate: 30 bpm to 300 bpm
- SpO<sub>2</sub> accuracy: 70% to 100%

- Philips reusable sensors
  - ± 2% - M1191B, M1191BL, M1192A
  - ± 3% - M1193A, M1194A, M1195A, M1196A, M1196S, M1191T, M1192T, M1196T
  - ± 4% - M1193T (Neonatal)
- Philips disposable sensors
  - ± 3% - M1131A, M1133A, M1134A (Neonatal)
  - ± 2% - M1132A, M1133A, M1134A (Adult/infant)
- Nellcor disposable sensors<sup>1</sup>
  - ± 3% - M1901B, M1902B, M1903B, M1904B
- Pulse rate accuracy: 2% or 1 bpm, whichever is greater
- Wavelength range: 500 nm to 1000 nm for all specified sensors
- Maximum optical output power: ≤15 mW for all specified sensors

## Non-invasive Blood Pressure (NBP)

- Technique: Oscillometric using stepwise deflation pressure
- Adult measurement range
  - Systolic: 30 mmHg to 270 mmHg (4.0 kPa to 36.0 kPa)
  - Diastolic: 10 mmHg to 245 mmHg (1.3 kPa to 32.7 kPa)
  - MAP: 20 mmHg to 255 mmHg (2.7 kPa to 34.0 kPa)
  - Pulse rate range: 40 bpm to 300 bpm
- Pediatric measurement range
  - Systolic: 30 mmHg to 180 mmHg (4.0 kPa to 24.0 kPa)
  - Diastolic: 10 mmHg to 150 mmHg (1.3 kPa to 20.0 kPa)
  - MAP: 20 mmHg to 160 mmHg (2.7 kPa to 21.3 kPa)
  - Pulse rate range: 40 bpm to 300 bpm
- Neonatal measurement range
  - Systolic: 30 mmHg to 130 mmHg (4.0 kPa to 17.0 kPa)
  - Diastolic: 10 mmHg to 100 mmHg (1.3 kPa to 13.3 kPa)
  - MAP: 20 mmHg to 120 mmHg (2.7 kPa to 16.0 kPa)
  - Pulse rate range: 40 bpm to 300 bpm
- Blood pressure accuracy
  - Maximum Standard Deviation: 8 mmHg
  - Maximum Mean Error: ±5 mmHg
- Pulse rate accuracy<sup>2</sup>
  - 40 bpm to 100 bpm: ± 5 bpm
  - 101 bpm to 200 bpm: ± 5% of reading
  - 201 bpm to 300 bpm ± 10% of reading
- Initial cuff inflation
  - Adult: 160 mmHg (21.3 kPa)
  - Pediatric: 140 mmHg (18.7 kPa)
  - Neonatal: 100 mmHg (13.3 kPa)
- Subsequent cuff inflation (in NBP Interval Mode only) is determined automatically, depending on the previous measurement and patient type.

<sup>1</sup> The Nellcor disposable sensors are only available from Philips in Europe and Japan.

<sup>2</sup> The pulse rate value derived from NBP is an averaged value.

## Temperature

- Measurement Range
  - Monitored mode: 26.7°C to 43.3°C (80°F to 110°F)
  - Predictive mode: 34.4°C to 40.6°C (93.9°F to 105°F)
- Accuracy:  $\pm 0.1^\circ\text{C}$  ( $\pm 0.2^\circ\text{F}$ ) in Monitored mode
- Resolution:  $0.1^\circ\text{C}$  ( $0.2^\circ\text{F}$ )

## Wireless Interface

- Optional wireless interface
- Networking Standards: IEEE 802.11a, 802.11b, 802.11d, 802.11g, and 802.11h
- Wi-Fi Transmit Power Settings<sup>1</sup>:
  - 802.11a: 15 dBm (30 mW), 13 dBm (20 mW), 10 dBm (10 mW)
  - 802.11b: 18 dBm (63 mW), 17 dBm (50 mW), 15 dBm (30 mW), 13 dBm (20 mW), 10 dBm (10 mW), 7 dBm (5 mW), 0 dBm (1mW)
  - 802.11g: 18 dBm (63 mW), 17 dBm (50 mW), 15 dBm (30 mW), 13 dBm (20 mW), 10 dBm (10 mW), 7 dBm (5 mW), 0 dBm (1mW)
- Security Standards:
  - WEP, WPA, and WPA2
  - 802.1X Extensible Authentication Protocol Type: PEAP-MSCHAPv2, EAP-TLS
- Typical Receiver Sensitivity<sup>2</sup>:
  - 802.11a: (6 Mbps -85 dBm, 9 Mbps -83 dBm, 12 Mbps -83 dBm, 18 Mbps -81 dBm, 24 Mbps -75 dBm, 36 Mbps -73 dBm, 48 Mbps -68 dBm, 54 Mbps -67 dBm (PER  $\leq 10\%$ ))
  - 802.11b: (1 Mbps -95 dBm, 2 Mbps -94 dBm, 5.5 Mbps -93 dBm, 11 Mbps -89 dBm (PER  $\leq 10\%$ ))
  - 802.11g: (6 Mbps -93 dBm, 12 Mbps -88 dBm, 18 Mbps -85 dBm, 24 Mbps -83 dBm, 36 Mbps -77 dBm, 48 Mbps -74 dBm, 54 Mbps -72 dBm (PER  $\leq 10\%$ ))

<sup>1</sup> Maximum transmit power varies according to individual country regulations. All values nominal +/- 2 dBm.

<sup>2</sup> All values nominal to +/- 3 dBm.

- Antenna: The antenna in the monitor has the following specifications:
  - Form Factor: Whip
  - Type: Dipole
  - Maximum 2.4 GHz Gain: 2.15 dBi
  - Maximum 5.0 GHz Gain: 3.90 dBi

## Ordering Information

### 863278

**Standard:** NBP, SpO<sub>2</sub>

**Monitor options:** Recorder, Predictive temperature

Option	Accessories
A01	Standard accessories include: <ul style="list-style-type: none"><li>• Adult cuff</li><li>• NBP tubing, 3 m long</li><li>• Adult finger SpO<sub>2</sub> sensor, reusable</li></ul>
A02	No accessories included with monitor.
R01	Recorder accessories include: <ul style="list-style-type: none"><li>• 5 rolls of recorder paper</li></ul>
T01	Predictive temperature accessories include: <ul style="list-style-type: none"><li>• Oral temperature probe</li><li>• 1 box of temperature probe covers</li></ul>

### 863279

**Standard:** NBP, SpO<sub>2</sub>, Wireless

**Monitor options:** Recorder, Predictive temperature

Option	Accessories
A01	Standard accessories include: <ul style="list-style-type: none"><li>• Adult cuff</li><li>• NBP tubing, 3 m long</li><li>• Adult finger SpO<sub>2</sub> sensor, reusable</li></ul>
A02	No accessories included with monitor.
R01	Recorder accessories include: <ul style="list-style-type: none"><li>• 5 rolls of recorder paper</li></ul>
T01	Predictive temperature accessories include: <ul style="list-style-type: none"><li>• Oral temperature probe</li><li>• 1 box of temperature probe covers</li></ul>

## SureSigns Accessories

### SpO<sub>2</sub> Accessories

Philips Reusable Sensors	
M1191B	Adult finger
M1192A	Pediatric/small adult finger
M1193A	Neonatal foot/hand
M1194A	Adult ear clip
M1195A	Infant finger
M1196A	Adult finger clip (long cable)
M1196S	Adult/large pediatric finger clip
M1191BL	Adult finger (long cable)
M1191T	Adult finger clip
M1192T	Pediatric finger clip
M1193T	Neonatal foot/hand
M1196T	Pediatric/small adult finger clip

Philips Disposable Sensors	
M1131A	Adult finger
M1132A	Infant digit
M1133A	Neonatal/infant/adult: Foot/hand sensor for neonate, big toe/thumb for infant, finger for adult.
M1134A	Neonatal/infant/adult: Foot/hand sensor for neonate, big toe/thumb for infant, finger for adult.

Nellcor Disposable Sensors <sup>a</sup>	
M1904B	Adult digit
M1903B	Pediatric digit
M1902B	Infant digit
M1901B	Neonate foot, adult digit

<sup>a</sup> The Nellcor disposable sensors are only available from Philips in Europe and Japan.

SpO <sub>2</sub> Extension and Adapter Cables	
M1020-61100	3.6 m LNOP adapter cable for Masimo sensors
989803148221	3 m LNCS adapter cable for Masimo sensors
M1941A	2 m extension cable for Philips reusable sensors
M1943A	1.1 m adapter cable for Philips and Nellcor disposable sensors
M1943AL	3 m adapter cable for Philips and Nellcor disposable sensors

## NBP Accessories

Reusable Comfort Cuffs	
M1576A	Thigh
M1575A	Large adult
M1574A	Adult
M1573A	Small adult
M1572A	Pediatric
M1571A	Infant
M1598B	Interconnect tubing, 1.5 m
M1599B	Interconnect tubing, 3 m

Reusable Traditional Cuffs	
40401E	Thigh
40401D	Large adult
40401C	Adult
40401B	Pediatric
40401A	Infant
M1598B	Interconnect tubing, 1.5 m
M1599B	Interconnect tubing, 3 m

Reusable Easy Care Adult/Pediatric Cuffs	
M4559B	Thigh
M4558B	Large adult, X-long
M4557B	Large adult
M4556B	Adult, X-long
M4555B	Adult
M4554B	Small adult
M4553B	Pediatric
M4552B	Infant
M1598B	Interconnect tubing, 1.5 m
M1599B	Interconnect tubing, 3 m

Disposable Soft Adult/Pediatric Cuffs	
M4579B	Thigh
M4578B	Large adult, X-long
M4577B	Large adult
M4576B	Adult, X-long
M4575B	Adult
M4574B	Small adult
M4573B	Pediatric
M4572B	Infant
M1598B	Interconnect tubing, 1.5 m
M1599B	Interconnect tubing, 3 m

Disposable Adult/Pediatric Cuffs	
M1879A	Thigh
M1878A	Large adult
M1877A	Adult
M1876A	Small adult
M1875A	Pediatric
M1874A	Infant
M1598B	Interconnect tubing, 1.5 m
M1599B	Interconnect tubing, 3 m

Disposable Neonatal Cuffs (Luer Connector) <sup>a</sup>	
M1866A	Size 1
M1868A	Size 2
M1870A	Size 3
M1872A	Size 4
M1596B	Interconnect tubing, 1.5 m
M1597B	Interconnect tubing, 3 m

a The Luer connector cuffs and air hoses are not available in EEA (European Economic Area) countries.

Disposable Neonatal Cuffs (Safety Connector) <sup>a</sup>	
M1866B	Size 1
M1868B	Size 2
M1870B	Size 3
M1872B	Size 4
M1873B	Size 5 Infant
M1596C	Interconnect tubing, 1.5 m
M1597C	Interconnect tubing, 3 m

a The safety connector cuffs and air hoses may not be available in all countries. Check with your local sales organization.

Disposable Soft Neonatal Cuffs (Safety Connector)	
M1866S	Size 1
M1868S	Size 2
M1870S	Size 3
M1872S	Size 4
M1873S	Size 5 Infant
M1596C	Interconnect tubing, 1.5 m
M1597C	Interconnect tubing, 3 m

### Temperature Accessories

Part Number	Accessory
989803143391	Rectal probe well and kit (all patient types)
989803143381	Oral/Axillary probe and well kit (all patient types)
M4823A	Disposable probe covers, 1000 per case

### Miscellaneous Accessories

Part Number	Accessory
989803144001	Roll Stand with Basket
989803144011	Wall Mount
989803136891	Recorder Paper (5 rolls)
989803174881	Lithium Ion Battery
989803167691	1D Barcode Scanner (includes mounting arm for use with roll stand)
989803147821	2D Barcode Scanner (includes mounting arm for use with roll stand)
989803159601	Serial Interface Adapter
989803148841	Cable Management Kit
989803150281	SureSigns Mount Adapter
453564039661	USB Hub, 4-port
989803176261	SureSigns VSi and VS2 <sup>+</sup> Tabletop Base

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The SureSigns VS2<sup>+</sup> vital signs monitor is a Class IIb device and complies with the requirements of the Council Directive 93/42/EEC of 14 June 1993 (Medical Device Directive).



The radio device used in the SureSigns VS2<sup>+</sup> vital signs monitor is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC (Radio Equipment and Telecommunications Terminal Equipment Directive).

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