

# SureSigns VS4

## Vital Signs Monitor Technical Data Sheet

The SureSigns<sup>®</sup> VS4 is a vital signs monitor that measures blood pressure, pulse rate, oxygen saturation (SpO<sub>2</sub>), and temperature. The VS4 monitor is for monitoring, recording, and alarming 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

- Touch screen user interface
- Optional internal wireless network connection
- Easy-to-read display with large color-coded numerics
- Lithium ion battery
- Stores up to 800 patient records
- FAST SpO<sub>2</sub> algorithm
- SpO<sub>2</sub> waveform
- Continuous SpO<sub>2</sub> mode
- Alarm output
- Flexible blood pressure modes, including auto intervals, five user-defined interval programs, STAT, and manual start/stop
- Optional integrated recorder
- Optional Welch Allyn<sup>™</sup> predictive temperature module
- Optional Genius<sup>™</sup> 2 tympanic temperature module
- Available with roll stand or wall mount
- HL7 data export through wired LAN, wireless LAN<sup>1</sup>, or serial connection

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

# PHILIPS

- Easy software upgrades by USB port
- Automatic or prompted patient ID entry using optional barcode scanner
- QuickCapture feature, which allows entry of patient observations and assessments
- QuickAlerts feature, which allows user-defined alert messages for immediate clinician response
- QuickCheck feature, which allows for in-device patient record validation
- Synchronization of the monitor clock when connected to a designated network server

## Main Components

### Display

The SureSigns VS4 monitor features a touch screen color 8.4-in. (21.3 cm) LCD display.

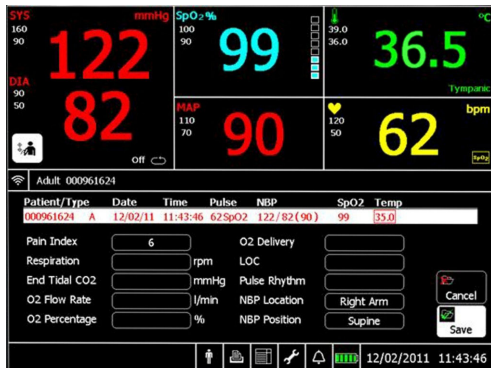
### Front Panel

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

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

### User Interface

The main screen displays vital signs measurements for the current patient, up to eight patient records, alarm messages, and screen selection buttons.



The bottom bar contains a message area and the following elements:

- New Patient button
- Print button
- Display Mode button
- System button
- Alarms button
- Battery Status icon
- Date/Time pane

Touch the screen to cycle through the patient monitoring screens and menus. Alternatively, use the wheel to navigate through the user interface.

### Mounting Options

The SureSigns VS4 monitor has two mounting options:

- Roll stand
- Wall mount

### Specifications

#### Safety Standards

- EN/IEC 60601-1, EN/IEC 60601-2, EN/IEC 60601-1-1 (as applicable), EN/IEC 60601-2-30, EN/IEC 60601-2-49, ISO 9919, EN12470-5:2003 (E), ASTM E1965-98
- 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 60950-01
- 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: 26 cm (10.2 in.)
- Height: 22 cm (8.6 in.)
- Depth: 14.5 cm (5.7 in.)
- Weight: 3.6 kg (8 lb), including battery, excluding temperature, optional recorder, optional connectivity package, and mounting hardware

### Display

- Screen Type: 8.4-inch LCD with 5-Wire resistive touch screen
- Resolution: 800 active pixels/line, 600 active lines per frame
- Screen active area: 170.4 mm x 127.8 mm (6.71 in. x 5.03 in.)
- Pixel size: 0.213 mm
- Viewing angle:  $\pm 60^\circ$

### Alarm Audio Range

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

### Recorder

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

### System Response Time

1 second

## 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)

### 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  $104^\circ\text{F}$ ) monitor
  - $16^\circ\text{C}$  to  $33^\circ\text{C}$  ( $60.8^\circ\text{F}$  to  $91.4^\circ\text{F}$ ) monitor with tympanic thermometer
- 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 90% RH, non-condensing
- Storage: Up to 95% RH, non-condensing

## Altitude

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

## Electromagnetic Compatibility

Meets the EN 60601-1-2:2001 standard

## Electrical Specifications

- Internal battery: Lithium ion, smart battery 10.8 V to 11.1 V, 7200 mAh
- Battery operating time (new, fully-charged battery): at least 3 hours of monitoring with  $\text{SpO}_2$  and NBP measured every 15 minutes
- Battery charge time: < 4 hours
- Internal power supply: 100 VAC to 240 VAC, 50/60 Hz
- Power consumption: 72W
- 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
- Automatically set alarm limits based on the patient's current vital sign values

### Device Connections

- USB port for software upgrades, barcode scanner connection, serial interface adapter connection, or 4-port hub connection
- Ethernet port for exporting HL7 data
- Nurse call connector for alarm output to a nurse call system
- Wireless data export

## Measurement Specifications

### 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 30 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:  $\pm 5$  mmHg
- Pulse rate accuracy
  - 40 bpm to 100 bpm:  $\pm 5$  bpm
  - 101 bpm to 200 bpm:  $\pm 5\%$  of reading
  - 201 bpm to 300 bpm  $\pm 10\%$  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.
- NBP intervals:
  - Automatic measurements at intervals of 1, 2, 3, 5, 10, 15, 30, 60, 90, 120 minutes, and STAT
  - Up to five interval programs can be defined

### Temperature

#### Predictive Temperature Module

- 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:  $\pm 0.1^\circ\text{C}$  ( $\pm 0.2^\circ\text{F}$ )
- Measurement time
  - Oral: 4 seconds
  - Axillary and rectal:  $<16$  seconds
- Resolution:  $0.1^\circ\text{C}$  ( $0.1^\circ\text{F}$ )

#### Tympanic Temperature Module<sup>1</sup>

- Measurement Range: 33.0°C to 42.0°C (91.4°F to 107.6°F)
- Accuracy:  $\pm 0.2^\circ\text{C}$  ( $\pm 0.4^\circ\text{F}$ )
- Measurement time: 2 seconds
- Resolution:  $0.1^\circ\text{C}$  ( $0.1^\circ\text{F}$ )

### 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
    - $\pm 2\%$  - M1191B, M1191BL, M1192A
    - $\pm 3\%$  - M1193A, M1194A, M1195A, M1196A, M1196S, M1191T, M1192T, M1196T
    - $\pm 4\%$  - M1193T (Neonatal)
  - Philips disposable sensors
    - $\pm 3\%$  - M1131A, M1133A, M1134A (Neonatal)
    - $\pm 2\%$  - M1132A, M1133A, M1134A (Adult/infant)
  - Nellcor disposable sensors
    - $\pm 3\%$  - M1901B, M1902B, M1903B, M1904B
- Pulse rate accuracy: greater of 2% or 1 bpm
- Wavelength range: 500 nm to 1000 nm for all specified sensors
- Maximum optical output power:  $\leq 15$  mW for all specified sensors
- Complies with EN ISO 9919 standard
- FAST SpO<sub>2</sub> algorithm

### 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>2</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 (1 mW)
  - 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 (1 mW)
- Security Standards:
  - WEP, WPA, and WPA2
  - 802.1X Extensible Authentication Protocol Type: PEAP-MSCHAPv2, EAP-TLS
  - WiFi certified
  - Cisco compatible

<sup>1</sup> The Genius™ 2 Thermometer meets EN12470-5:2003 (E), and ASTM E1965-98.

<sup>2</sup> Maximum transmit power varies according to individual country regulations. All values nominal  $\pm 2$  dBm.

- Typical Receiver Sensitivity<sup>1</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 ≤ 10%))
  - 802.11b: (1 Mbps -95 dBm, 2 Mbps -94 dBm, 5.5 Mbps -93 dBm, 11 Mbps -89 dBm (PER ≤ 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 ≤ 10%))
- 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

863283

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

**Monitor Options:** Predictive Temperature or Tympanic Temperature, Recorder, Wireless

Option	Accessories Included
A01	Standard accessories include: <ul style="list-style-type: none"> <li>• Adult cuff</li> <li>• NBP tubing, 3m long</li> <li>• SpO<sub>2</sub> sensor, adult finger, reusable</li> </ul>
A02	None
T01	Predictive temperature accessories include: <ul style="list-style-type: none"> <li>• Oral/Axillary temperature probe</li> <li>• 1 box of temperature probe covers</li> </ul>
T02	Tympanic temperature accessories include: <ul style="list-style-type: none"> <li>• Temperature probe</li> <li>• 1 box of temperature probe covers</li> </ul>
R01	Recorder accessories include: <ul style="list-style-type: none"> <li>• 5 rolls of recorder paper</li> </ul>
W01	None

<sup>1</sup> All values nominal to +/- 3 dBm.

## SureSigns VS4 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 (3 m)
M1196S	Adult finger clip (2 m)
M1191BL	Adult finger (long cable)
M1191T	Adult finger clip
M1192T	Pediatric finger clip
M1193T	Neonatal foot/hand
M1196T	Pediatric/adult finger clip

Philips Disposable Sensors	
M1131A	Adult finger
M1132A	Infant digit
M1133A	Neonatal/infant/adult: Adhesive-free 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> Available from Philips in Europe and Japan. In other countries, contact Nellcor directly.

SpO <sub>2</sub> Extension and Adapter Cables	
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 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
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

## Predictive Temperature Accessories

Part Number	Description
989803143381	Oral/axillary probe and well kit – All patient types
989803143391	Rectal probe and well kit – All patient types
M4823A	Disposable probe covers, 1000 per case

## Tympanic Temperature Accessories

Part Number	Description <sup>a</sup>
989803179611	Genius 2 tympanic temperature probe covers (CE mark)
989803179381	Genius 2 tympanic temperature probe covers (no CE mark) <sup>b</sup>
989803180831	Genius 2 tympanic thermometer

a Licensed by one or more of the following US patents: 7,237,949; 7,354,194; 7,556,424; 7,927,012; 7,686,506; and 7,478,946, which are held by a Covidien company, the registered owner of these patents.

b Not available in all countries.

## Miscellaneous Accessories

Part Number	Description
989803175861	SureSigns value roll stand
989803176601	SureSigns premium roll stand
989803144001	Roll stand with basket
989803144011	Wall mount
989803136891	Recorder paper (5 rolls)
989803144631	Lithium ion battery

Part Number	Description
989803176611	SureSigns HS-1 2D barcode scanner
989803147821	2D barcode scanner (includes mounting arm to use with roll stand)
989803159601	Serial interface adapter
989803148841	Cable management kit
453564039661	USB hub, 4-port

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The SureSigns VS4 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 VS4 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).

Please visit [www.philips.com/](http://www.philips.com/)



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