



SureSigns VM1

Patient Monitor Technical Data Sheet

The SureSigns[®] VM1 monitor is a portable, standalone bedside monitor that measures oxygen saturation (SpO₂), heart rate, and optionally, respiration and CO₂. The VM1 is for monitoring, recording, and alarming multiple physiological parameters of adults, pediatrics, and neonates in healthcare environments. Additionally, the monitor can be used in transport situations within a healthcare facility.

Features and Benefits

- Easy-to-read display with large color-coded numerics
- Flexible display formats
- Compact and lightweight for portability
- Lithium ion battery

- Alarm output
- Compatible with a wide range of Philips accessories
- Easy software upgrades via USB port
- 96 hours of trend data
- Real-time SpO₂ and CO₂ waveform display
- Connectivity to SureSigns Vital Signs Viewer (VSV)
- Data export via HL7 Ethernet or serial connection
- Optional roll stand or wall mount
- Optional integrated recorder
- Optional patient ID entry with bar code scanner

PHILIPS

Main Components

Display

The SureSigns VM1 monitor features a color LCD display, with a 4.3-inch monitoring screen.

Front Panel

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

- Alarm Silence
- Main Screen
- On/Standby

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

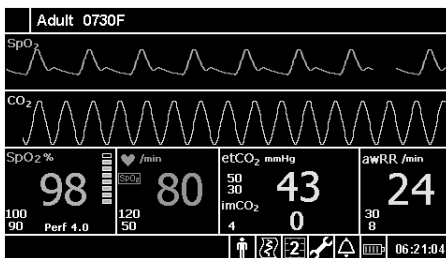
- Power
- Battery Charging

User Interface

The graphical user interface is intuitive. The main monitoring screen displays parameter values, real-time waveforms, alarm messages, and screen selection buttons.

You can change the appearance of the main screen by selecting a layout from the **Display Mode** menu.

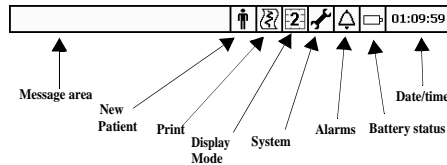
Numeric panes display measurements as numeric values. Waveform panes display real-time waveforms for SpO₂ and CO₂.



You can also view parameter values in a graphical trend or tabular trend display mode.

The bottom bar is divided into several panes. It 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



The navigation wheel is used to cycle through the screens. Rotate the wheel until the desired area is highlighted, then press it to display a new menu.

Mounting

The SureSigns VM1 has two mounting options:

- Roll stand
- Wall mount

Application Features

Trends

- Collect and store (maximum 96 hours) graphical and tabular trend data
- Display interval: User configurable
- Printout contains user-specified time range (tabular trends only)
- Export trend data to USB flash drive (tabular trends only)

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.
- Auto-set alarm limits allow alarm limits to be quickly set based on the patient's current vital sign values.

Device Connections

- USB port for software upgrade, tabular trend data export, bar code scanner connection, or serial interface adapter connection. The port complies with USB 1.1 standard as a full-speed host.
- Ethernet port for exporting HL7 data or connecting the VM1 monitor to the SureSigns VSV.
- Nurse call connector for alarm output to a nurse call system.

Specifications

Safety Standards

- EN/IEC 60601-1, EN/IEC 60601-1-2, EN/IEC 60601-1-1 (as applicable), EN/IEC 60601-2-49, ISO 9919, ISO 21647
- Protection class: Class I, internally powered equipment, per EN 60601-1
- Degree of protection: Type CF defibrillator-proof, per EN 60601-1
- Mode of Operation: Continuous

Physical Specifications

Size

- Width: 26 cm (10.2 in)
- Height: 9 cm (3.5 in)
- Depth: 23 cm (9.1 in)
- Weight (including optional CO₂ module and recorder): 1.82 Kg (4.0 lbs)

Display

- Screen type: 10.9 cm (4.3 in) WQVGA TFT-LCD display
- Resolution: 480 active pixels/line, 272 active lines per frame
- Refresh frequency: 60 Hz
- Screen active area: 95 x 53.9 mm (3.7 x 2.1 in)
- Pixel size: 0.213 mm
- Overall viewing angle: $\pm 80^\circ$
- Visual alarm viewing angle: $\pm 30^\circ$

Alarm Audio Range

52 – 79 dB

Recorder

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

Environmental Specifications

Mechanical Shock

In accordance with IEC 60068-2-27

- Peak acceleration: 150 m/s² (15.3g)
- Duration: 11 ms
- Pulse shape: Half sine
- Number of shocks: 3 shocks per direction per axis (18 total)

Mechanical Vibration

Broad-band random vibration in accordance with IEC 60068-2-64

- Frequency range: 10 Hz – 2000 Hz
- Resolution: 10 Hz
- Acceleration amplitude:
 - 10 Hz – 100 Hz 1.0 (m/s²)²/Hz
 - 100 Hz – 200 Hz -3 dB/octave
 - 200 Hz – 2000 Hz 0.5 (m/s²)²/Hz
- Duration: 10 minutes per each perpendicular axis (3 total)

Thermal

- Operating temperature: 10 – 40°C (50 – 104°F)
- Storage temperature:
 - -20 – 50°C (-4 – 122°F) for the monitor
 - -20 – 40°C (-4 – 104°F) for the monitor plus accessories

Humidity

- Operating:
 - Up to 90% RH, non-condensing for the monitor
 - Up to 80% RH, non-condensing for the monitor with optional recorder
- Storage: Up to 90% RH, non-condensing

Altitude

Up to 10,000 ft. above sea level (708 mbar)

Electromagnetic Compatibility

Complies with EN 60601-1-2:2001 standard

Electrical Specifications

- Internal battery: Lithium ion, Smart battery
 - 10.8 – 11.1 V
 - 2150 – 2300 mAh
- Battery operating time (new, fully-charged battery): 6 hours
- Battery charge time: < 4 hours

- Internal power supply: 100 – 240 VAC
 - Power consumption: < 75 Watts
 - Frequency: 50/60 Hz
 - VA: 120 VA

Interface Specifications

- Nurse call alarm output
 - Connector: 3.5 mm insulated phone jack
 - Contact wiring: Normally open contact (tip), common contact (barrel), normally closed contact (ring)
 - Contact rating: $\leq 1A @ < 25 VAC$, $\leq 1A @ < 60 VDC$
 - Isolation: 1.5 kv
 - Delay time: < 0.5 sec
- LAN port: 10/100 Base-T Ethernet interface with RJ-45 connector
- USB port: Series A standard USB connector

Measurement Specifications

SpO₂

- Measurement range
 - SpO₂: 0 – 100%
 - Heart rate: 30 – 300 bpm
- Heart rate accuracy: $\pm 2\%$ or ± 1 bpm, whichever is greater
- Wavelength range: 500 – 1000 nm for all specified sensors
- Maximum optical output power: ≤ 15 mW for all specified sensors
- Complies with EN ISO 9919 standard

etCO₂

- Measurement range: 0 – 150 mmHg
- Flow rate: 50 ml/min, +15 ml/min, -7.5 ml/min
- Initialization time: 30 seconds (typical), 3 minutes maximum
- System response time:
 - Total (includes delay and rise times): 2.9 seconds for 10 – 90% changes in CO₂ concentration

- Delay time: 2.7 seconds (typical)
- Rise time (adult and neonatal): 190 mSec maximum
- Calibration interval: Initial calibration after 1,200 hours, then once per year or every 4000 hours, whichever comes first.
- Auto zero interval: Once per hour (typical)
- Leak tightness: <40 mBar/min
- Accuracy:
 - 0 – 38 mmHg: ± 2 mmHg
 - 39 – 99 mmHg: $\pm(5\%$ of reading + 0.08% for every 1 mmHg above 38 mmHg)
 - 100 – 150 $\pm(5\%$ of reading + 0.08% for every 1 mmHg above 38 mmHg)
- Drift of measurement accuracy: No significant drift between calibration cycles that would affect accuracy.
- Respiration rate: 0 – 150 breaths/min
- Respiration accuracy:
 - ± 1 rpm in the range of 0 – 70 rpm
 - ± 2 rpm in the range of 71 – 120 rpm
 - ± 3 rpm in the range of 121 – 150 rpm
- Automatic barometric pressure: Monitor is equipped with automatic barometric pressure compensation.
- Effects of cyclical pressure: Will operate within specifications with over- and underpressure from a ventilation system.
 - Overpressure: +100 cmH₂O
 - Underpressure: -20 cmH₂O

Ordering Information

SureSigns VM1 Patient Monitors

863266

SpO₂, CO₂, and Recorder

A01

Accessories included:

- SpO₂ Sensor Starter Pack, single patient use
 - 2 adult/pediatric single patient clip sensors
 - 2 infant single patient wrap sensors
 - 2 neonate/infant/adult single patient wrap sensors
 - 1 adapter cable
- 5 rolls of recorder paper

A02

Accessories included:

- 5 rolls of recorder paper

863265

SpO₂ and Recorder

A01

Accessories included:

- SpO₂ Sensor Starter Pack, single patient use
 - 2 adult/pediatric single patient clip sensors
 - 2 infant single patient wrap sensors
 - 2 neonate/infant/adult single patient wrap sensors
 - 1 adapter cable
- 5 rolls of recorder paper

A02

Accessories included:

- 5 rolls of recorder paper

863264

SpO₂

A01

Accessories included:

- SpO₂ Sensor Starter Pack, single patient use
 - 2 adult/pediatric single patient clip sensors
 - 2 infant single patient wrap sensors
 - 2 neonate/infant/adult single patient wrap sensors
 - 1 adapter cable

A02

Accessories included:

- None

SureSigns VM1 Accessories

SpO₂ Accessories

Philips Reusable Sensors

M1191B

Adult finger

M1192A

Pediatric/small adult finger

M1193A

Neonatal foot/hand

M1194A

Adult ear clip

M1195A

Infant finger

M1191BL

Adult finger (long cable)

M1196A

Pediatric/adult finger

M1191T

Adult finger

M1192T

Pediatric finger

M1193T

Neonatal foot/hand

M1196T

Pediatric/adult finger

Philips Disposable Sensors**M1131A**

Adult/pediatric finger

M1132A

Infant digit

M1133A

Neonatal/infant/adult: Foot/hand sensor for neonate; big toe/thumb for infant; finger for adult.

M1131-64001

Sensor Starter Pack, single patient use

989803159781SpO₂ Starter Pack, single patient use**Nellcor Disposable Sensors¹****M1901B**

Neonate foot, adult digit

M1902B

Infant digit

M1903B

Pediatric digit

M1904B

Adult digit

Masimo Reusable Sensors**989803140321**

Adult finger

989803140331

Pediatric finger

989803140341

Adult ear clip

Masimo Disposable Sensors**989803140231**

Adult finger

989803140261

Pediatric finger

989803140311

Infant toe

989803140291

Neonate foot

989803140301

SoftTouch sensor, neonate foot

SpO₂ Extension and Adapter Cables**M1941A**

2 m extension cable for Philips reusable sensors

M1943A

1.1 m adapter cable for Philips sensors and Nellcor disposable sensors

M1943AL

3 m adapter cable for Philips sensors and Nellcor disposable sensors

M1020-61100

Adapter cable for Masimo sensors

989803148221

Adapter cable for Masimo sensors

CO₂ Accessories**Intubated Circuits****M1920A**

FilterLine set – adult/pediatric (25 sets per case)

M1921A

FilterLine H set – adult/pediatric (25 sets per case)

M1923A

FilterLine H set – infant/neonatal (yellow coded, 25 per case)

M1925A²

FilterLine set with Luer connector – adult/pediatric

M1926A²

FilterLine H set with Luer connector – adult/pediatric

989803159571

Vitaline H set – adult/pediatric

989803159581

Vitaline H set, long – infant/neonatal

989803160241

FilterLine set, long – adult/pediatric

989803160251

FilterLine H set, long – adult/pediatric

989803160261

FilterLine H set, long – infant/neonatal

Non-Intubated Dual-Purpose Circuits**M2520A**Smart CapnoLine O₂ – pediatric**M2522A**Smart CapnoLine Plus O₂ – adult/intermediate**M4680A**CapnoLine H O₂ – adult**M4681A**CapnoLine H O₂ – pediatric**989803160271**Smart CapnoLine O₂, long – pediatric**989803160281**Smart CapnoLine Plus O₂, long – adult

1. Available from Philips in Europe and Japan. In other countries, contact Nellcor directly.

2. Not available in the United States.

Non-Intubated Single-Purpose Circuits

M2524A

Smart CapnoLine – pediatric

M2526A

Smart CapnoLine Plus –
adult/intermediate

M4689A

CapnoLine H – adult

M4690A

CapnoLine H – pediatric

M4691A

CapnoLine H – infant/neonatal

989803160301

Smart CapnoLine – adult

Non-Invasive Ventilation, Single-Purpose Circuits

M4686A

NIV line – adult

M4687A

NIV line – pediatric

Miscellaneous Accessories

989803136891

Recorder paper (5 rolls)

989803144001

Roll stand with basket

989803144011

Wall mount

989803147821

Bar code scanner (includes mounting
arm for use with roll stand)

989803148841

Cable management kit

989803159601

Serial interface adapter

989803166291

Lithium ion battery

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