VM-2160 SMARTsat
High Performance Pulse Oximeter

Designed with the most difficult conditions in mind

- For spot checking or constant monitoring of SpO$_2$ and pulse rate
- Now incorporating SMARTsat SpO$_2$ technology
- Clear and bright, colour TFT display
- Robust, ergonomic design with durable silicone protective cover
- Includes a SMARTsat soft silicone sensor
- Stores and restores up to 480 hours of trend data
- Adjustable high and low alarms
- Antibacterial keypad

The ergonomic VM-2160 hand held pulse oximeter has the durability of a compact and lightweight hand held unit for spot checking of SpO$_2$, but also has the power and functionality of a stand alone pulse oximeter. The very latest and innovative signal processing technologies and algorithms enable precise measurements, even under very difficult physiological conditions.

The VM-2160 incorporates adjustable high and low alarms for both the SpO$_2$ and pulse rate with audible pulse tones, and is able to store and restore up to 480 hours of patient trend data, enabling the unit to also be used at the bedside for continual patient monitoring.

Utilising the latest display technology, the clear and bright colour screen offers superb visibility in all lighting conditions, including direct sunlight.

The VM-2160 can be used in a variety of applications; in hospitals, paramedic ambulances, clinics and dental surgeries - making this an extremely flexible and durable piece of equipment.
The VM-2160 SMARTsat offers an efficient and cost effective solution for spot monitoring or constant monitoring of $\text{SpO}_2$ and Pulse rate

- For spot checking or constant monitoring of $\text{SpO}_2$ and Pulse Rate
- Includes a SMARTsat soft silicone sensor - *other sensors can be specified
- Stores and restores up to 480 hours of trend data
- Adjustable high and low alarms

**VM-2160 Standard Package**

- VM-2160 SMARTsat Pulse Oximeter
- Reusable SMARTsat adult silicone finger sensor*
- Silicone protective cover
- PC review software
- USB data cable
- 3 x AA batteries

* Please select from Soft Sensor (Adult, Small Adult or Paediatric), Finger Sensor, Silicone Wrap Sensor, Ear Sensor and indicate at the time of ordering.

**Key features of the VM-2160 SMARTsat Hand Held Pulse Oximeter**

- Self-explanatory and ergonomic functions enable intuitive operation
- The colour information display, as well as the simple information structure, support quick decisions and a rapid user reaction in critical situations
- Intelligent linking of visual and acoustic information and signals
- The pulse tone rate provides information about the level of oxygen saturation
- Automatic suppression of ambient light influences
- Signal quality indications
- Simple handling and clear error messages effectively prevent incorrect operation of the VM-2160
- 20 language options available - for operational control
- The most modern technologies and energy-saving elements enable continued use of the device over several days
- Rapid data transfer using a standard USB interface
- Silicone protective cover included in the package
- Powered by standard AA alkaline batteries

SMARTsat has been calibrated within the range of 60 - 100 % $\text{SpO}_2$.

**SMARTsat $\text{A}_{\text{rms}}$ in the $\text{SaO}_2$ ranges**

<table>
<thead>
<tr>
<th></th>
<th>100 - 60%</th>
<th>100 - 90%</th>
<th>90 - 80%</th>
<th>80 - 70%</th>
<th>70 - 60%</th>
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<td>1.68</td>
<td>3.52</td>
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</tbody>
</table>

* OEM III
**Display Formats**

- **Default Display**
- **Large Digit Display**
- **Short Term Trending Display**
- **Long Term Trending Display**

**Sensors and Cables**

- **SMARTsat Reusable Adult Finger Sensor**
  - 0014651
  - 1.2m cable length

- **SMARTsat Reusable Adult Silicone Soft Sensor**
  - 0014752
  - 1.2m cable length

- **SMARTsat Reusable Adult Medium Silicone Soft Sensor**
  - 0014751
  - 1.2m cable length

- **Pulse Oximetry Extension Cable**
  - 0014895
  - 1.2m cable length

- **Pulse Oximetry Extension Cable**
  - 0014896
  - 2.4m cable length

- **SMARTsat Reusable Paediatric Silicone Soft Sensor**
  - 0014753
  - 1.2m cable length

- **SMARTsat Reusable Ear Sensor**
  - 0014850
  - 1.2m cable length

- **SMARTsat Reusable Silicone Wrap Sensor**
  - 0014851
  - 1.2m cable length

- **SMARTsat Disposable Plaster Tape Sensors**
  - Box of 24 sensors
  - 0015010
  - Adult
  - 0015011
  - Paediatric
  - 0015012
  - Infant
  - 0015013
  - Neonatal
Powerful Pulse Oximetry PC Software

With the convenient Pulse Oximetry PC Software all measured values, selected alarm limits and alarm messages can be transferred to a computer via the USB interface.

The data can be viewed on a computer and patient information added. The PC software enables basic statistical evaluation of the stored data, to be printed or exported as CSV file for processing with additional software.

Mounting Options and Accessories

For use with VM-2160

- Fluid repellent
- Non rot
- U.V. stable
- Washable at 60°C
- Self healing and waterproof zips
- micrAgard silver-lining inners
- Abrasion and tear resistance
- High visibility and reflective properties

N.B.: The universal mounting plate is required when using any of the mounting options shown.

Applications

The VM-2160 SMARTsat with Silicone Finger Sensor is suitable for the following applications:

- Clinical Environments
- Rescue and emergency services
- Sleep studies
- Home care
- Long-term monitoring
- Stress testing
N.B. The universal mounting plate is required when using any of the above mounting options.

Specifications subject to change.

* in accordance with ISO 9919:2005 Standards.

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**Measuring Range**
- \(\text{SpO}_2\): 0 - 100%
- Pulse Rate: 0 - 300 bpm
- Perfusion Index: 0.1 - 20% (no motion)

**Accuracy**
- \(\text{SpO}_2\): 60 - 100% ± 2 \(\text{A}_{\text{max}}\) (no motion)\(^1\)
- 70 - 100% ± 3 \(\text{A}_{\text{max}}\) (motion condition)\(^2\)
- 60 - 100% ± 2 \(\text{A}_{\text{max}}\) (low perfusion, no motion)\(^3\)
- 20 - 300 bpm ± 2 bpm (no motion)

**Optical Specifications**
- Red emitter: 660nm, typ 3.5mW
- Infra-red emitter: 905nm, typ 3.5mW

**Display**
- Features: TFT Colour, 65,000 colours, 128 x 160 pixels
- Data displayed: Oxygen saturation, pulse rate, plethysmogram, bar graph, short and long term trend
- Indicators: Signal strength & quality, pulse amplitude, battery status, alarm silenced, sensor detection, sensor disconnection

**Trend Information**
- Short term trend: 15 / 30 / 240 minutes
- Long term trend: > 48 hours

**Environmental Conditions**
- Operating temperature: -20 - 50°C , 15 - 95% RH, 600 - 1300 hPa
- Storage temperature: -30 - 70°C, 10 - 95% RH, 600 - 1500 hPa

**Regulatory Approvals**
- Standards: CE Class IIb in accordance with MDD 93/42/EEC
- Safety: Class II, Type BF

**Assembly**
- IP32
- Dimensions: 118 mm (L) x 60 mm (W) x 25 mm (H)
- Weight: Approximately 160g (including batteries, without sensor)
- Power Supply: 3 x AA alkaline batteries.
- Battery Life: > 2 days continuous operation or approximately 5 days in economy power mode
- PC interface: USB 2.0

**VM-2160 SMARTsat**
- 0012165
  * Language package: Central European, includes: English, Afrikaans, Dutch, French, German, Hungarian, Italian, Polish, Portuguese and Spanish.

**Additional Accessories Available**
- Sensor Wraps - for use with 0014851 Silicone Wrap Sensors
- Posey Sensor Wraps - 6554
- Posey Sensor Wraps - Paediatric - 6554P
- Silicone Protective Cover
- Carrying Case
- Universal Mounting Plate, V-adapter with female pole-mount thread (’V’ - 20)
- ‘V’ mount wall plate
- ‘V’ mount pole clamp (Small: 14 - 25mm clamping width)
- ‘V’ mount pole clamp (Large: 16 - 40mm clamping width)
- ‘V’ mount rail clamp
- ‘V’ mount pole clamp, horizontal
- Universal Mounting Clamp, with vertical and horizontal adjustments

**Sensors and Cables**
- Reusable Adult Finger Sensor - 1.2m cable length
- Reusable Silicone Wrap Sensor - 1.2 cable length
- Reusable Adult Silicone Soft Sensor - 1.2m cable length
- Reusable Medium (Small Adult) Silicone Soft Sensor - 1.2m cable length
- Reusable Paediatric Silicone Soft Sensor - 1.2m cable length
- Reusable Ear Sensor - 1.2m cable length
- Pulse Oximetry Extension Cable, 1.2m cable length (XT6500)
- Pulse Oximetry Extension Cable, 2.4m cable length (XT6501)
- Disposable Plaster Tape - Box of 24 - Adult
- Disposable Plaster Tape - Box of 24 - Paediatric
- Disposable Plaster Tape - Box of 24 - Infant
- Disposable Plaster Tape - Box of 24 - Neonatal

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\(^1\) \(\text{A}_{\text{max}}\): +/- 1 \(\text{A}_{\text{max}}\) represents approx 68 % of measurements

\(^2\) Tested with all motion patterns index II

\(^3\) Tested with Prosim 8 simulator

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* in accordance with ISO 9919:2005 Standards.