

pulse oximetry

VM-2160 SMARTsat

High Performance Pulse Oximeter

Designed with the most difficult conditions in mind

- For spot checking or constant monitoring of SpO₂ and pulse rate
- Now incorporating SMARTsat SpO₂ technology
- Clear and bright, colour TFT display
- Robust, ergonomic design with durable silicone protective cover
- Includes a SMARTsat soft silicone sensor
- Stores > 560 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 SpO₂, 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 SpO₂ and pulse rate with audible pulse tones, and is able to store > 560 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 SpO₂ and Pulse rate

- For spot checking or constant monitoring of SpO₂ 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
- Hard shell carry case



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



Long term monitoring and trending



VM-2160 SMARTsat Display



VM-2160 SMARTsat in Protective Cover

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

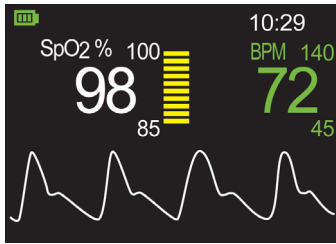
VM-2160 SMARTsat® SpO₂ accuracy validation results

Sensor Type	A _{RMS} in the SaO ₂ ranges ²⁾					
	60 - 100%	70 - 100%	90 - 100%	80 - 90%	70 - 80%	60 - 70%
SF7500VM Finger Clip Sensor	1.6	1.5	1.4	1.4	1.7	2.0
SC7500VM ¹⁾ Silicone Soft Sensor	1.7	1.6	1.5	1.8	1.7	2.4
W7500VM Wrap Sensor	1.7	1.6	1.3	1.5	1.9	2.4
EP7500VM Ear Clip Sensor	2.4	2.3	1.4	1.6	3.2	3.3
10-AP-VM Disposable Sensor - Adult	2.5	2.4	2.1	2.3	2.6	3.4

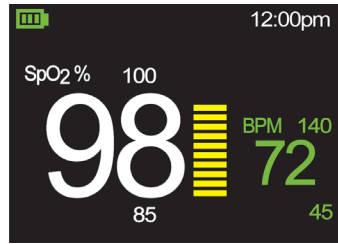
¹⁾ Accuracy statement applies to SC7500VM, SCM7500VM and SCP7500VM

²⁾ As inherent to their functional principle, pulse oximetry measurements underlie statistical spread; therefore only two thirds of the measurement data are within the specific range of +/- ARMS

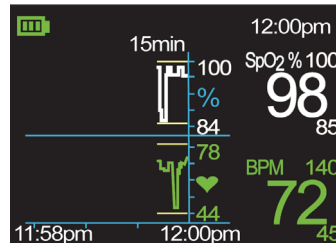
Display Formats



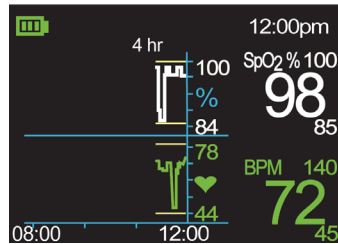
Default Display



Large Digit Display



Short Term Trending Display



Long Term Trending Display



Actual Size

Sensors and Cables



0014651

SMARTsat
Reusable Adult Finger Sensor
1.2m cable length



0014752

SMARTsat
Reusable Adult
Silicone Soft Sensor
1.2m cable length



0014851

SMARTsat
Reusable Silicone
Wrap Sensor
1.2m cable length



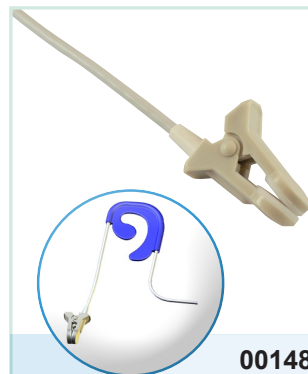
0014895

Pulse Oximetry
Extension Cable
1.2m cable length



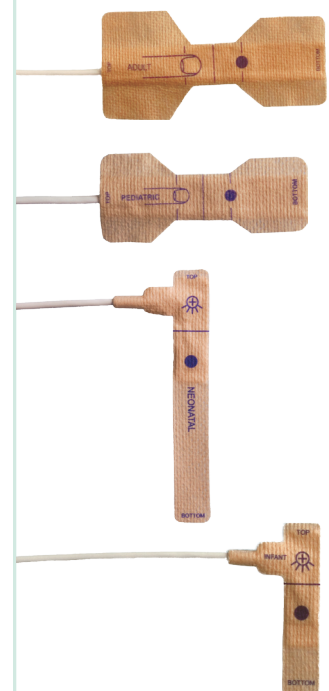
0014753

SMARTsat
Reusable Paediatric
Silicone Soft Sensor
1.2m cable length



0014850

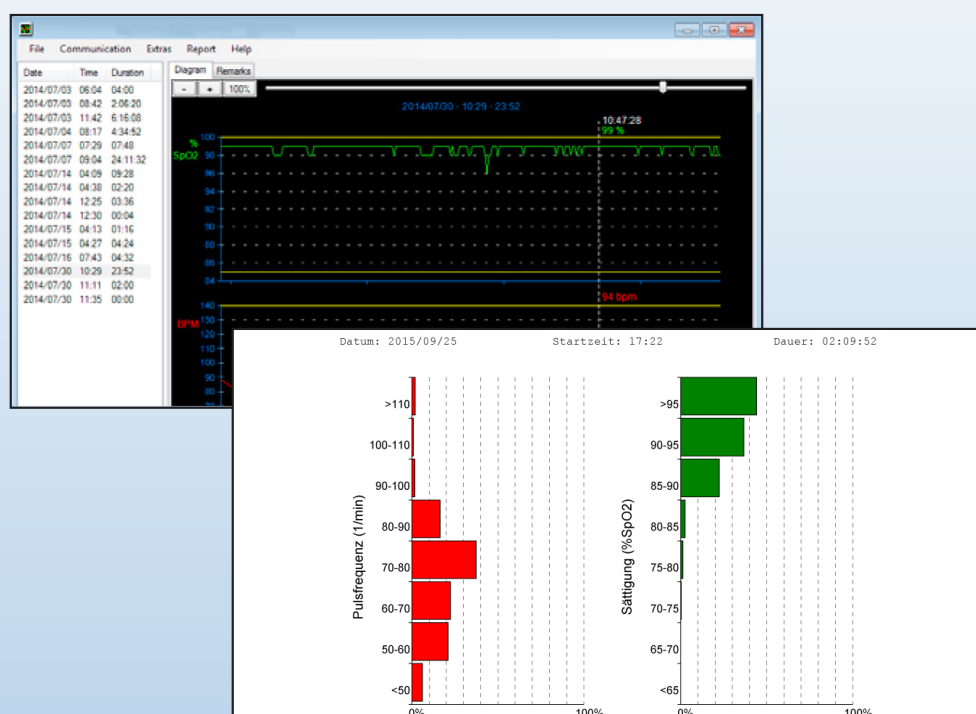
SMARTsat
Reusable Ear Sensor
1.2m cable length



SMARTsat
Disposable
Plaster Tape Sensors
Box of 24 sensors

Adult 0.45m cable	0015010
Paediatric 0.45m cable	0015011
Infant 0.90m cable	0015012
Neonatal 0.90m cable	0015013

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
- micAgard silver-lining inners
- Abrasion and tear resistance
- High visibility and reflective properties

0022178



0022160



0022171



0121180



0121181



0121182



0121184



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

0121200



0014890



0021013



0021018



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



Measuring Range

SpO ₂	0 - 100%
Pulse Rate	20 - 300 bpm
Perfusion Index	0.1 - 20% (no motion)

Accuracy

SpO ₂	60 - 100% ± 2 A _{RMS} (no motion) ^{1, 4} 70 - 100% ± 3 A _{RMS} (motion condition) ²
Pulse Rate	60 - 100% ± 2 A _{RMS} (low perfusion, no motion) ³ 20 - 300 bpm ± 2 A _{RMS} (no motion)

Optical Specifications

Red emitter	660nm, typ 3.5mW
Infra-red emitter	905nm, typ 3.5mW

Display

Features	1.77" TFT Colour, 65,000 colours, 128 x 160 pixels
Data displayed	Oxygen saturation, pulse rate, plethysmogram, bar graph, short and long term trends
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 data storage	> 560 hours, maximum 50 data sets

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 IEC 60601-1:2005 (3rd Edition), IEC 60601-1 (2nd Edition), IEC 60601-1-2:2007 (3rd Edition), EN ISO 80601-2-61:2011, EN ISO 9919:2009, ISO 14971:2007, IEC 60601-1-6:2010; IEC 60601-1-8:2006, ISO 10993-1:2009, ISO 10993-5:2009, ISO 10993-10:2010 Class II, Type BF
Safety	

Assembly

Construction	IP32
Dimensions	118 mm (L) x 60 mm (W) x 25 mm (H)
Weight	Approximately 160g (including batteries, without sensor)
Power Supply	3 x 1.5V AA alkaline batteries
Battery Life	> 2 days continuous operation or approximately 5 days in economy power mode
PC interface	USB 2.0

Part Numbers

VM-2160 SMARTsat	0012165
Central European language pack includes: English, Afrikaans, Dutch, French, German, Hungarian, Italian, Polish, Portuguese & Spanish	
VM-2160 - Scandinavian languages (English, Danish, Finnish, Swedish, Dutch)	0012166
VM-2160 - Special EU characters languages (English, Greek, Russian, Turkish)	0012167

Sensors and Cables

Reusable Adult Finger Clip Sensor - 1.2m PVC cable, (SF7500VM)	0014651
Reusable Adult Silicone Soft Sensor - 1.2m silicone cable, (SC7500VM)	0014752
Reusable Medium (Small Adult) Silicone Soft Sensor - 1.2m silicone cable, (SCM7500VM)	0014754
Reusable Paediatric Silicone Soft Sensor - 1.2m silicone cable, (SCP7500VM)	0014753
Reusable Silicone Wrap Sensor - 1.2m silicone cable, (W7500VM)	0014851
Reusable Ear Sensor - 1.2m PVC cable, (E7500VM)	0014850
Disposable Plaster Tape - Adult - 0.45m PVC cable - Box of 24, (10-AP-VM)	0015010
Disposable Plaster Tape - Paediatric - 0.45m PVC cable - Box of 24, (10-PP-VM)	0015011
Disposable Plaster Tape - Infant - 0.90m PVC cable - Box of 24, (10-IP-VM)	0015012
Disposable Plaster Tape - Neonatal - 0.90m PVC cable - Box of 24, (10-NP-VM)	0015013
Pulse Oximetry Extension Cable, 1.2m PVC cable, (XT6500)	0014895
Pulse Oximetry Extension Cable, 2.4m PVC cable, (XT6501)	0014896

Additional Accessories Available

Sensor Wraps - for use with 0014851 Silicone Wrap Sensors - Box of 12	0014890
Posey Sensor Wraps - 6554 - Box of 12	0021013
Posey Sensor Wraps - Paediatric - 6554P - Box of 12	0021018
Silicone Protective Cover	0022160
Carrying Case	0022178
Universal Mounting Plate, V-adapter with female pole-mount thread (1/4 - 20)	0022171
'V' mount wall plate	0121180
'V' mount pole clamp (Small: 14 - 25mm clamping width)	0121181
'V' mount pole clamp (Large: 16 - 40mm clamping width)	0121182
'V' mount rail clamp	0121184
'V' mount pole clamp, horizontal	0121197
Universal Mounting Clamp, with vertical and horizontal adjustments	0121200

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

¹ A_{RMS}: +/- 1 A_{RMS} represents approx 68 % of measurements

² Tested with all motion patterns index II

³ Tested with Prosim 8 simulator

⁴ Refers to SC7500VM, SCM7500VM and SCP7500VM

Specifications subject to change



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Part Number: 0092630
Date: 10/18

