

V Series

Performance Specifications

Displays

Type:	V 12: 12.1" color TFT touchscreen display V 21: 21.3" color TFT touchscreen display
Resolution:	V 12: 1024 x 768 V 21: 1600 x 1200
Aspect Ratio:	V 12: 3:4 in portrait mode V 21: 3:4 in portrait mode
Waveforms:	V 12: 8 selectable V 21: 12 selectable

VPS Module

ECG (3, 5 and 6-lead)

ECG Type	Acquired Leads	Displayable Leads
3-Lead ECG	I, II, III	I, II, III (one vector at a time)
5-Lead ECG	I, II, and V (n)	I, II, III, aVR, aVL, aVF, V (n)
6-Lead ECG	I, II, V(n1), and V(n2)	I, II, III, aVR, aVL, aVF, Vx, Vy

Gain Selection:	0.125, 0.25, 0.5, 1, 2, 4 cm/mv
Sweep Speed:	6.25, 12.5, 25, 50 mm/sec
Bandwidth	Diagnostic Mode: 0.05 – 150 Hz Monitor Mode: 0.5 – 40 Hz ST Mode: 0.05 – 40 Hz
Defibrillator Overload Protection:	The ECG function is in accordance with the applicable requirements of EN 60601-2-27 and EN 60601-2-25
Recovery Time:	ECG system <8 sec Monitor <5 sec

12-Lead ECG

Adult/Pediatric Only	
Acquired Leads:	I, II, V1, V2, V3, V4, V5, V6
Displayable Leads:	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6

Heart Rate Meter

Measurement Range:	Adult/Pediatric: 30 – 300 bpm Neonate: 30 – 350 bpm
Resolution:	1 bpm
Accuracy:	30 – 250 bpm: ± 3 bpm or $\pm 3\%$, whichever is greater 251 – 350 bpm: $\pm 5\%$
Pacer Rejection:	When tested in accordance with ANSI/AAMI EC13-2002 Section 4.1.4: the heart rate meter rejects all pacer pulses ± 2.0 mV to ± 700 mV and duration 0.1 ms to 2 ms with no tail and with tails of less than 2 mV and with time constants from 4 ms to 100 ms.
Tall T-Wave Rejection:	When tested in accordance with ANSI/AAMI EC13-2002 Section 4.1.2.1 (c): the heart rate meter rejects all T-waves with amplitudes less than 120% of a 1 mV, 100 ms QRS, and a T-wave duration of 180 ms and a Q-T interval of 350 ms.

Arrhythmia Analysis

Adult/Pediatric Only	Asystole, Ventricular Fibrillation, Ventricular Tachycardia, Bigeminy, Bradycardia, Couplet, Irregular Heart Rate, Multifocal PVC, Pause, Pause Per Minute, R-on-T PVCs, PVCs Per Minute, Run, Trigeminy, Ventricular Rhythm
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ST Segment Analysis

Adult/Pediatric Only	
Measurement Range:	-10.0 mm to +10.0 mm (-1000 μ V to +1000 μ V RTI)
Resolution:	0.1 mm (10 μ V)
User Selectable ST Measurement Points:	40, 60 or 80 ms after the J point (HR independent); 60/80 HR dependent



Default ST

Measurement Point:	80 ms after the J point for HR ≤ 120 bpm 60 ms after the J point for HR > 120 bpm
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User Selectable ISO

Measurement Point:	User adjustable from Rpeak -10 ms to Rpeak -200 ms in 2 ms increments
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Default ISO

Measurement Point:	Located between the P and Q waves
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User Selectable J

J Measurement Point:	User adjustable from Rpeak +10 ms to Rpeak +200 ms in 2 ms increments
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Default J

Measurement Point:	End of QRS complex
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Respiration (ECG)

Measurement Range:	4 – 199 rpm
Resolution:	1 rpm
Accuracy:	4 – 150 rpm: ± 2 rpm or $\pm 2\%$, whichever is greater 155 – 199 rpm: $\pm 4\%$
Sensing Lead:	II or I (default: lead II)
Sweep Speed:	3.125, 6.25, 12.5, 25 mm/sec

Respiration (CO₂)

Measurement Range:	0 – 150 rpm
Resolution:	1 rpm
Accuracy:	0 – 70 rpm: ± 1 rpm 71 – 120 rpm: ± 2 bpm 121 – 150 rpm: ± 3 bpm

Non-Invasive Blood Pressure

Measurement Method:	Oscillometric
Measurement Modes:	Manual, Interval, Stat
Static Pressure Range:	0 – 300 mmHg
Accuracy:	± 3 mmHg
Systolic Measurement Range:	Adult: 55 – 235 mmHg Pediatric: 55 – 160 mmHg Neonate: 45 – 120 mmHg
Diastolic Measurement Range:	Adult: 30 – 200 mmHg Pediatric: 30 – 150 mmHg Neonate: 20 – 100 mmHg
Resolution:	1 mmHg
Accuracy:	Mean error ± 5 mmHg

Performance Specifications

Non-Invasive Blood Pressure (cont'd)

Standard Deviation:	<8 mmHg
Initial Cuff Inflation:	Adult: 180 mmHg Pediatric: 140 mmHg Neonate: 100 mmHg
Measurement Cycle Duration:	Adult/Pediatric: 180 sec maximum Neonate: 90 sec maximum
Over Pressure Protection:	Double safety protection (primary and secondary channels)

Pulse Rate from Non-Invasive Blood Pressure

Measurement Range:	Adult/Pediatric: 35 – 245 bpm Neonate: 70 – 245 bpm
Resolution:	1 bpm
Accuracy:	±3 bpm or ±3%, whichever is greater

Invasive Blood Pressure

Resolution:	1 mmHg
Accuracy:	±2 mmHg or 2% of the signal value, whichever is greater (excluding transducer)
Zero Offset Range:	±120 mmHg
Zero Accuracy:	±1 mmHg
Excitation:	5 Volts DC, ±2%
Frequency Response:	8 Hz ±1 Hz, 12 Hz ±1 Hz, 16 Hz ±1 Hz, (-3 db Point)

Pulse Rate from Invasive Blood Pressure

Measurement Range:	Adult/Pediatric: 30 – 300 bpm Neonate: 30 – 350 bpm
Resolution:	1 bpm
Accuracy:	30 – 250 bpm: ±3 bpm or ± 3% 251 – 350 bpm: ±5 bpm or ± 5%

Pulse Oximetry

With Masimo SET® SpO₂

Resolution:	1%
Accuracy:	Adult: ±2% with no motion ±3% during motion conditions, with motion resistant sensors Pediatric: ±2% with no motion ±3% during motion conditions, with motion resistant sensors Neonate: ±3% with no motion ±3% during motion conditions, with motion resistant sensors

Pulse Rate with Masimo SET® SpO₂

Measurement Range:	Adult/Pediatric/Neonate: 25 – 239 bpm
Resolution:	1 bpm
Accuracy:	±3 bpm

With Nellcor® OxiMax® SpO₂

Resolution:	1%
Accuracy:	70–100% ±2% for sensors: MAX-A, MAX-AL, MAX-P, MAX-I, MAX-N (Adult), MAX-N (Neonate) 70–100% ±2.5% for sensors: OxiCliq A, OxiCliq P, OxiCliq I, OxiCliq N (Adult), OxiCliq N (Neonate) 70–100% ±3% for sensors: DS-100A, D-YS (Infant to Adult), OXI-A/N (Adult), OXI-P/I 70–100% ±3.5% for sensors: D-YS with D-YSE Ear Clip, D-YS with D-YSPD Spot Clip 70–100% ±4% for sensors: D-YS (Neonate), OXI-A/N (Neonate)

Pulse Rate with Nellcor OxiMax SpO₂

Measurement Range:	Adult/Pediatric/Neonate: 20 – 249 bpm
Resolution:	1 bpm
Accuracy:	±3 bpm

Temperature

Unit of Measure:	Selectable °C or °F
Measurement Range:	15 – 45°C, inclusive 59 – 113°F, inclusive
Resolution:	0.1°C, 0.1°F
Accuracy:	±0.1°C (15 – 45°C), exclusive of probe errors ±0.2°F (59 – 113°F), exclusive of probe errors

Delta Temperature

Measurement Range:	0 – 10.0°C 0 – 10.0°F
Resolution:	0.1°C, 0.1°F

Analog Output

ECG Interface

Bandwidth:	0.5 Hz to 100 Hz (-3 dB referenced to 10 Hz)
Delay (Delay of QRS Complex):	<25 ms
Sensitivity:	1 V/mV ±10% (referenced to 10 Hz)
Pacer Enhancement:	Pacer is summed at the output when Pacer enhancement mode is on.
Pacer Amplitude Signal:	2.5 V minimum
Pacer Width:	10 ms ±5%
Pacer Rise/Fall Times:	100 µs maximum

IBP1/IBP2 Interface

Bandwidth:	DC to 15 Hz (-3 dB referenced to 1 Hz)
Delay:	<25 ms
Sensitivity:	1 V/100 mmHg ±2%

Defibrillator Sync Interface

Delay:	35 ms maximum between QRS peak and rising edge of defibrillator sync pulse
Amplitude:	2 V minimum into a 5 Kohm load
Pulse Width:	2 – 7 ms

Historical Data

Trend Modes:	Quick, List, Graphic, Events, Full Disclosure
Data Storage:	12 hours full disclosure at VPS Module 48 hours full disclosure at V 12/V 21 Monitors
Total Events:	1,000
Archivable Events:	100

CO₂ Microstream® Module

Measurement Range:	0 – 99 mmHg, inclusive (at sea level)
Resolution:	
Accuracy:	0 – 38 mmHg: ±2 mmHg 39 – 99 mmHg: ±(5% of reading + 0.08% for every 1 mmHg above 38 mmHg) *Accuracy applies for breath rates up to 80 bpm. For breath rates above 80 bpm, accuracy is 4 mmHg or ±12% of reading, whichever is greater, for EtCO ₂ values exceeding 18 mmHg.
Flow Rate:	50 ml/min -7.5 +15 ml/min

Cardiac Output Module

Measurement Range:	0.2 – 20.0 l/min
Resolution:	0.1 l/min
Accuracy:	+5% or 0.2 l/min, whichever is greater
Repeatability:	+2% or 0.2 l/min whichever is greater
Blood Temp Range:	17.5 – 43°C (63.5 – 109.4°F)
Blood Temp Accuracy:	±0.2°C (±0.4°F) exclusive of probe errors
Injectate Temp Range:	-1.0 – 30.0°C (30.2-86°F)
Injectate Temp Accuracy:	±0.2°C (±0.4°F) exclusive of probe errors

Performance Specifications

Continuous Cardiac Output Interface

Vigilance® Interface: Supports the Vigilance IFM out communication protocol in accordance with Edwards Lifesciences specification ELS 1291 Rev H

Recorder Module

Type: Thermal with auto feed
 Number of traces: 3
 Paper Width: 50 mm
 Print Speeds: 3.125, 6.25, 12.5, 25 and 50 mm/sec (±5%)

Environmental Conditions

Storage/Transport Temperature: -20 – 60°C (-4 – 140°F)
 Storage/Transport Humidity: 10 – 95%, non-condensing
 Storage/Transport Altitude: 1060 – 570 hPa
 Operating Temperature: 5 – 40°C (41 – 104°F)
 Operating Humidity: 15 – 95%, non-condensing
 Operating Altitude: 1060 – 700 hPa

Physical Dimensions

V 12 Size: 34.8 cm (H) x 23.9 cm (W) x 19.1 cm (D)
 13.7" (H) x 9.4" (W) x 7.5" (D)
 V 12 Weight: 4 kg (8.9 lbs)
 5.9 kg (13 lbs) with VPS Module and 3 batteries
 V 21 Size: 56.2 cm (H) x 39.2 cm (W) x 19.1 cm (D)
 22.1" (H) x 15.4" (W) x 7.5" (D)
 V 21 Weight: 9.5 kg (21 lbs)
 VPS Module Size: 7.3cm H x 15.7cm W x 13.9cm D
 2.9" H x 6.2" W x 5.5" D
 VPS Module Weight: .875kg (1.93 lbs)

V12 Electrical Ratings

Battery Type: Lithium Ion
 Number of Batteries: 3
 Battery Voltage: 11.1 V
 Battery Capacity: 4800 mAh
 Battery Runtime: 4 hours with three fully charged batteries while monitoring 6-lead ECG, Respiration, Masimo SpO₂, 2 IBPs, CO₂, Temperature and 1 NIBP and print strip every 15 minutes
 Battery Recharge Time: 4 hrs maximum

V Dock

Electrical Ratings

AC Mains Power Source:
 Input Voltage: 100 – 240 VAC (±10%)
 Line Frequency: 50 – 60 Hz (±3 Hz)

Physical Dimensions

Size: 15.7 cm (H) x 19.3 cm (W) x 25.1 cm (D)
 6.2" (H) x 7.6" (W) x 9.9" (D)
 Weight: 1.6 kg (3.5 lbs)

Indicators

Power Indicator: 1 LED indicates AC presence
 1 LED indicates when the battery charge is active



Input/Output Connections

Nurse Call: NC1
 Connects a nurse call relay
 Standard USB: SB1/SB2/SB3
 Connects external USB devices
 Powered USB: MR2/MR3/MR4
 Connects V Hub via PUSB cable
 Ethernet: CS1
 Connects to Panorama® Central Monitoring Network
 DVI: DV1
 Connects secondary display via DVI cable
 Output resolution of 1600 x 1200
 Aspect Ratio of 3:4 in portrait mode
 Equipotential Lug: Connects equipotential lug to earth ground
 AC Receptacle: Connects AC power source (100 – 240 VAC, 50/60 Hz)

Environmental Conditions

Storage/Transport Temperature: -20 – 60°C (-4 – 140°F)
 Storage/Transport Humidity: 10 – 95%, non-condensing
 Storage/Transport Altitude: 1060 – 570 hPa
 Operating Temperature: 5 – 40°C (41 – 104°F)
 Operating Humidity: 15 – 95%, non-condensing
 Operating Altitude: 1060 – 700 hPa

V Hub

Physical Characteristics

Mounting: Features a quick release mechanism for mounting to a wall-mounted arm or rolling stand.
 Lock Mechanism: Coin type

Physical Dimensions

Size: 25 cm (H) x 20 cm (W) x 13 cm (D)
 10" (H) x 8" (W) x 5" (D)
 Weight: 1.4 kg (3 lbs)

Indicators

Status Indicator: Indicates power, operational and communication statuses of V Hub
 Lock Indicator: Indicates a locked or unlocked position of modules installed in V Hub

Input/Output Connections

Powered USB: MRX
 Connects V Hub via PUSB cable to V 12 or V Dock
 6 Module Bays: Interfaces any combination of modules up to 6 bays in height
 Provides data and communication to modules

Environmental Conditions

Storage/Transport Temperature: -20 – 60°C (-4 – 140°F)
 Storage/Transport Humidity: 10 – 95%, non-condensing
 Storage/Transport Altitude: 1060 – 570 hPa
 Operating Temperature: 5 – 40°C (41 – 104°F)
 Operating Humidity: 15 – 95%, non-condensing
 Operating Altitude: 1060 – 700 hPa

