

Performance Specifications

Display

Display Type:	Color TFT LCD screen
Size:	8.4"
Resolution:	800 × 600 pixels
Waveforms:	Up to 7

ECG (3 and 5-Lead)

Leads

3-lead:	I, II, III
5-lead:	I, II, III, aVR, aVL, aVF, V
Cable Detection:	Automatic Detection of 3 or 5-lead Sets
Display Sensitivity:	1.25 mm/mV (X0.125), 2.5 mm/mV (X0.25), 5 mm/mV (X0.5), 10 mm/mV (X1), 20 mm/mV (X2), 40 mm/mV (X4)
Sweep Speed:	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
ECG Signal Range:	±8 mV (peak-to-peak value)
Calibration Signal:	1 mV (peak-to-peak value)

Frequency Response to Screen

Surgical Mode:	1 to 20 Hz
Monitor Mode:	0.5 to 40 Hz
Diagnostic Mode:	0.05 to 150 Hz
Defibrillation Protection:	Withstand 360 Joule discharged current as per IEC 60601-2-27, 51.101.1
Baseline Recovery Time:	≤ 10 seconds
Defib. Synchronous Pulse:	The time interval between the peaks of R-waves to the start of synchronous pulses is ≤35 ms

ECG Analog Output

Delay:	≤ 25 ms (in diagnostic mode, and non-paced)
Sensitivity:	1V/mV ±5%

Heart Rate

Range

Adult:	15–300 bpm
Pediatric:	15–350 bpm
Neonatal:	15–350 bpm
Accuracy:	±1 bpm or ±1%, whichever is greater.
Pacer Pulse Rejection:	Rejects all pulses meeting the following conditions:
Amplitude:	±2 to ±700 mV
Width:	0.1 to 2 ms
Rise time:	10 to 100 µs
Tall T Waves Rejection:	Rejects all 100 ms QRS complexes with less than 1.2 mV of amplitude, and T waves with T-wave interval of 180 ms and those with Q-T interval of 350 ms.

Respiration (ECG)

Measurement Method:	Trans-thoracic impedance
Measurement Parameters:	Respiration rate, waveform

Range

Adult:	0–120 rpm
Pediatric and Neonatal:	0–150 rpm
Resolution:	1 rpm
Lead:	Options are lead I and II. The default is lead II.

Accuracy

7 to 150 rpm:	±2 rpm or ±2%, whichever is greater
0 to 6 rpm:	Not specified

Non-invasive Blood Pressure

Adult, Pediatric and Neonatal Patients

Technique:	Oscillometry
Mode of Operation:	Manual, Auto, and STAT

Accuracy

Max mean error:	±5 mmHg
Max standard deviation:	8 mmHg



Systolic Range

Adult:	40-270 mmHg
Pediatric:	40-200 mmHg
Neonatal:	40-135 mmHg

Diastolic Range

Adult:	10-210 mmHg
Pediatric:	10-150 mmHg
Neonatal:	10-100 mmHg

Mean Range

Adult:	20-230 mmHg
Pediatric:	20-165 mmHg
Neonatal:	20-100 mmHg

Resolution:

1 mmHg

Temperature

Technique:	Thermal resistance
Measuring Range:	0–50°C (32–122°F)
Resolution:	0.1°C (0.1°F)
Parameters:	T1, T2, and TD
Accuracy:	±0.1 °C (without probe)
Scale:	Selectable °C or °F

Invasive Blood Pressure

Channel:	Up to 2 channels
Pressure Unit:	mmHg
Measurement Range:	-50 to +300 mmHg
Accuracy:	±2% or ±1 mmHg, whichever is greater (without sensor)
Resolution:	1 mmHg

Pressure Transducer

Excitement Voltage:	5 VDC, ±2%
Sensitivity:	5 µV/V/mmHg
Impedance Range:	300 to 3000Ω
Refresh Rate:	1 second

SpO₂

SpO ₂ High:	(low limit + 2) to 100%
SpO ₂ Low:	
Masimo:	Desat to (high limit – 2)
Nellcor:	Desat or 20 (whichever is greater) to (high limit – 2)
Desat:	0 to (high limit – 2)

Pulse Oximetry with Masimo SET® SpO₂

Measurement Range:	1–100%
Resolution:	1%

Performance Specifications

SpO₂ (continued)

SpO₂ Accuracy	
70 to 100%:	±2% (measured without motion in adult/pediatric mode)
70 to 100%:	±3% (measured without motion in neonate mode)
70 to 100%:	±3% (measured with motion)
1% to 69%:	Not specified.
Refreshing Rate:	1 sec
Average Time:	2-4 s, 4-6 s, 8 s, 10 s, 12 s, 14 s, 16 s

Low Perfusion Performance

Pulse Amplitude:	>0.02%
Light Penetration:	>5%
Saturation Accuracy:	±2 %

Pulse Oximetry with Nellcor® Oximax® SpO₂

Measurement Range:	0-100%
Resolution:	1%

SpO₂ Accuracy

Adult and Pediatric:	70 to 100%: ±2%
Neonate:	70 to 100%: ±3%
0% to 69%:	Not specified.
Refresh Rate:	1 second

PR

PR High:	(low limit +2) to 300 bpm
PR Low:	15 to (high limit-2)

PR from Masimo SpO₂ Module

Measurement Range:	25 to 240 bpm
Resolution:	1 bpm
Accuracy:	±3 bpm (measured without motion) ±5 bpm (measured with motion)

Refreshing Rate:	1 s
SpO ₂ Averaging Time:	2-4 s, 4-6 s, 8 s, 10 s, 12 s, 14 s, 16 s
Low Perfusion Conditions:	Pulse amplitude: >0.02%
Light Penetration:	>5%
Low Perfusion PR Accuracy	±3 bpm

PR from Nellcor SpO₂ Module

Measurement Range:	20 to 300 bpm
Resolution:	1 bpm
Accuracy:	20 to 250 bpm: ±3 bpm 251 to 300 bpm, not specified

Refreshing Rate:	1 sec
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PR from NIBP Module

Measurement Range:	40 to 240 bpm
Resolution:	1 bpm
Accuracy:	±3bpm or ±3%, whichever is greater

PR from IBP Module

Measurement Range:	25 to 350 bpm
Resolution:	1 bpm
Accuracy:	±1 bpm or ±1%, whichever is greater
Refreshing Rate:	1 sec

CO

Measurement Method:	Thermodilution method
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Measurement Range

C.O.:	0.1 to 20 L/min
TB:	23 to 43 °C
TI:	0 to 27 °C

Resolution

C.O.:	0.1 L/min
TB, TI:	0.1 °C

Accuracy

C.O.:	±5% or ±0.1 L /min, whichever is greater
TB, TI:	±0.1 °C (without sensor)

Repeatability

C.O.:	±2% or ±0.1 L/min, whichever is greater
Alarm Range:	TB: 23 to 43 °C

CO₂ Measurement with Microstream®

Range:	0-99 mmHg
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Accuracy

0 to 38 mmHg:	±2 mmHg
39 to 99 mmHg:	±5% of the reading+0.08% of (the reading-38)

Resolution:	1 mmHg
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Sample Flow Rate:	50 ml/min
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Initialization Time:	30 sec (typical)
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Response Time

Measured with a FilterLine of standard length:	2.9 s (typical), 4.5 s (Maximum)
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The response time is the sum of the rise time and the delay time:

Rise Time:	<190 ms (10% to 90%)
Delay Time:	2.7 s (typical)

awRR measurement range:	0-150 rpm
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awRR measurement accuracy

0 to 70 rpm:	±1 rpm
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71 to 120 rpm:	±2 rpm
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121 to 150 rpm:	±3 rpm
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Apnea Alarm Time:	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s
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CO₂ Measurement with Sidestream

Range:	0-99 mmHg
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Accuracy

0 to 40 mmHg:	±2 mmHg
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41 to 76 mmHg:	±5% of the reading
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77 to 99 mmHg:	±10% of the reading
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Resolution:	1 mmHg
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Sample Flow Rate

Adult:	70 ml/min, 100 ml/min, 120 ml/min, 150 ml/min
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Pediatric, Neonate:	70 ml/min, 100 ml/min
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Sample Flow Rate Tolerance:	15% or 15 ml/min, whichever is greater.
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Warm Up Time:	Iso accuracy mode: ≤45s
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Full Accuracy Mode:	≤10 min
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Rise Time:	Measured with a neonatal watertrap and a 2.5-meter neonatal sampling line, or an
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Gas Sampling Delay Time

Adult watertrap and a 2.5-meter adult sampling line:

<400 ms @ 70 ml/min

<330 ms @ 100 ml/min

<300 ms @ 120 ml/min

<240 ms @ 150 ml/min

awRR Measurement Range:	0 to 120 rpm
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awRR Measurement Precision:	±2 rpm
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Apnea Time:	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s
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Performance Specifications

Data Storage

Trends:	120 hours, at 1 min resolution
Mid-length trends:	4 hours, at 5 s resolution
Minitrends:	1 hour, at 1 s resolution
Parameter Alarms:	100 alarms and manual events and related parameter waveforms. The waveform recording length can be 8s, 16s, or 32s.
Arrh. Events:	100 arrhythmia events and relate waveforms and parameters. The waveform recording length can be 8s, 16s, or 32s.
NIBP Measurements:	1000 sets
Full Disclosure Waveforms:	48 hours at maximum. The specific storage time depends on the waveforms stored and the number of stored waveforms.

Electrical Ratings

Power Supply: AC power, battery

AC Main Power Source

AC Power:	100 - 240 VAC (±10%)
Current:	1.3 to 0.5 A
AC Input Power Frequency:	50/60 Hz (±3Hz)

Battery

Type:	Chargeable Lithium-Ion
Number:	1 pc
Battery Voltage:	11.1DVC
Rated Battery Capacity:	4.5 Ah (one battery)
Battery Run Time:	≥ 6 hours when powered by a new fully-charged battery (25°C, SpO ₂ sensor and ECG cable connected, Temp cable not connected, Auto NIBP measurements at an interval of 15 minutes)
Battery Charge Time:	Less than 3 hours to 90%, and less than 4 hours to 100% when the monitor is off. Less than 8 hours to 90%, and less than 12 hours to 100% when the monitor is on.
Shutdown Delay:	At least 20 min (after a low battery alarm first occurs)

Monitor Interface Specifications

Power:	1 AC power input connector
Wired Network:	1 RJ45 connector, 100 Base-TX, IEEE 802.3
USB	2 connectors, USB 2.0
Equipotential Grounding Terminal:	1
Multifunctional Connector:	1
VGA Connector:	1

Outputs

ECG Analog Output Specification

Bandwidth (-3dB; reference frequency: 10Hz)	
Diagnostic mode:	0.05 to 150 Hz
Monitor mode:	0.5 to 40 Hz

QRS Delay:	≤ 25 ms (in diagnostic mode, and non-paced)
Sensitivity:	1V/mV ±5%

PACE Rejection/enhancement

Pace Enhancement Signal Amplitude:	Voh≥2.5V
Pulse Width:	10ms±5%
Signal Rising and Falling Time:	≤100µs

Nurse Call Signal

Amplitude:	High level: 3.5 to 5 V, providing a maximum of 10 mA output current; Low level: < 0.5 V, receiving a maximum of 5 mA input current.
Rising and Falling Time:	≤1 ms
Defib Sync Pulse	
Output Impedance:	≤100 Ω
Max Time Delay:	35 ms (R-wave peak to leading edge of pulse)
Amplitude:	High level: 3.5 to 5 V, providing a maximum of 10 mA output current; Low Level: < 0.5 V, receiving a maximum of 5 mA input current.
Pulse Width:	100 ms ±10%
Rising and Falling Time	≤1 ms

Alarm output (Network connector)

Alarm delay time from the monitor to remote equipment: The alarm delay time from the monitor to remote equipment is ≤2 seconds, measured at the monitor's signal output connector.

Environmental Conditions

Main Unit

Temperature Range Operating:	0°C to 40°C
Non-operating (storage):	-20 to 60
Relative Humidity (noncondensing):	15% to 95%
Non-operating (storage):	10% to 95%
Barometric (kPa):	57.0 to 107.4
Storage Conditions:	16.0 to 107.4

Microstream CO₂ module

Temperature Range Operating:	0°C to 40°C
Non-operating (storage):	-20°C to 60°C
Relative Humidity (noncondensing):	15% to 95%
Non-operating (storage):	10% to 95%
Barometric (kPa):	57.3 to 105.3
Storage conditions:	57.3 to 105.3

Sidestream CO₂ module

Temperature Range Operating:	5°C to 40°C
Non-operating (storage):	-20°C to 60°C
Relative Humidity (noncondensing):	15% to 95%
Non-operating (storage):	10% to 95%
Barometric (kPa)	57.3 to 105.3
Storage Conditions:	57.3 to 105.3

Recorder

Method:	Thermal dot array
Paper Width:	50 mm±1 mm
Speed:	25 mm/s or 50 mm/s with accuracy within ±5%
Number of Waveform Channels:	Maximum 3

Physical Dimensions

Monitor Size:	22.4 cm (H) x 13.5 cm (D) x 24.2 cm (W) 8.8" (H) x 5.3" (D) x 9.5" (W)
Weight:	3.5 kg (7.8 lbs), Standard parameters, including touchscreen and recorder, and battery