Passport® 12

Performance Specifications

Display

Display Type:	Color TFT LCD
Size:	12.1"
Resolution:	800 ×600 pixels
Waveforms:	Up to 8

ECG

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:	1mV (peak-to-peak value)

Frequency Response to Screen

Surgical Mode:	1 to 20 Hz
Monitor Mode:	0.5 to 40 Hz
ST Mode:	0.05 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.

ST Segment Analysis

Adult and Pediatric Patients Only

Default ST Measurement Point:	80 ms after J point for HR <120 bpm, 60 ms after J point for HR >120 bpm
ISO Point:	Can be manually adjusted: from 4 to 200 ms before R waves (default: 80 ms)
Adjustmented Interval:	4 ms
J Point:	Can be manually adjusted: from 4 to 200 ms after R waves (default: 48 ms)

Arrhythmia Analysis

Adult and Pediatric Patients Only

Arrhythmia Type	Asystole, VFib/VTac, Vtac, Vent. Brady, Extreme Tachy, Extreme Brady, PVC, Couplet, Bigeminy, Trigeminy, R on T, VT>2, PVCs, Tachy, Brady, Missed Beats, Vent. Rhythm, PNP, PNC, Multif. PVC, Nonsus. Vtac, Pause, Irr. Rhythm



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:	20-230mmHg
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

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Invasive Blood Pressure

Channel:	Up to 4 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

SpO_2

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)

SpO_2 (continued)

Pulse Oximetry with Masimo SET® SpO_2

Measurement Range:	1–100%
Resolution:	1%

SpO_2 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® SpO_2

Measurement Range:	0–100%
Resolution: 1%	

SpO_2 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 SpO_2 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 SpO_2 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

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

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

CO_2 Measurement with Microstream®

Range:	0-99 mmHg

Accuracy

0 to 38 mmHg:	±2 mmHg
39 to 99 mmHg:	±5% of the reading+0.08% of (the reading-38)
Resolution:	1 mmHg
Sample Flow Rate:	50 ml/min
Initialization Time:	30 sec (typical)

Response Time

Measured with a FilterLine of standard length:	2.9 s (typical), 4.5 s (Maximum)
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

awRR measurement accuracy

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

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CO_2 Measurement with Sidestream

Range:	0-99 mmHg
Accuracy	
0 to 40 mmHg:	±2 mmHg
41 to 76 mmHg:	±5% of the reading
77 to 99 mmHg:	±10% of the reading
Resolution:	1 mmHg
Sample Flow Rate	
Adult:	70 ml/min, 100 ml/min, 120 ml/min, 150 ml/min
Pediatric, Neonate:	70 ml/min, 100 ml/min
Sample Flow Rate Tolerance:	15% or 15 ml/min, whichever is greater.
Warm Up Time:	Iso accuracy mode: ≤45s
Full Accuracy Mode:	≤10 min
Rise Time:	Measured with a neonatal watertrap and a 2.5-meter neonatal sampling line, or an

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
awRR Measurement Precision:	±2 rpm
Apnea Time:	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

AG

Technique:	Infrared absorption
Warm-up Time	
Iso accuracy mode:	≤ 45 s
Full Accuracy Mode:	≤ 10 min
Sample Flow Rate	
Adult, pediatric:	120, 150, 200 ml/min
Neonate:	70, 90, 120 ml/min
Accuracy:	±10 ml/min or ±10%, whichever is greater

Measurement range

CO_2:	0 to 30%
O_2:	0 to 100%
N_2O:	0 to 100%
Des:	0 to 30%
Sev:	0 to 30%
Enf:	0 to 30%
Iso:	0 to 30%
Hal:	0 to 30%
awRR:	2 to 100 rpm

Resolution

CO_2:	1 mmHg
awRR:	1 rpm

Full Accuracy

Gases:	Range (%REL)	Accuracy (%ABS)
CO_2	0 to 1	±0.1
	1 to 5	±0.2
	5 to 7	±0.3
	7 to 10	±0.5
	>10	Not specified
N_2O	0 to 20	±2
	20 to 100	±3
O_2	0 to 25	±1
	20 to 80	±2
	80 to 100	±3
Des	0 to 1	±0.15
	1 to 5	±0.2
	5 to 10	±0.4
	10 to 15	±0.6
	15 to 18	±1
	>18	Not specified
Sev	0 to 1	±0.15
	1 to 5	±0.2
	5 to 8	±0.4
	>8	Not specified
Enf, Iso, Hal	0 to 1	±0.15
	1 to 5	±0.2
	>5	Not specified
awRR	2 to 60 rpm	±1 rpm
	>60 rpm	Not specified

Accuracy Drift:	Meet the requirement for measurement accuracy within 6 hours
Apnea Alarm Time:	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s
Refreshing Rate:	1 s
Anesthetic Agent Limit	
Primary anesthetic agent in full accuracy mode:	0.15%
Second anesthetic agent:	
in full accuracy mode:	0.3% or 5% REL (10% in ISO accuracy mode) of primary agent if primary agent is greater than 10%

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:	2 pcs
Battery Voltage:	11.1DVC
Rated Battery Capacity:	4.5 Ah (one battery)
Battery Run Time:	≥ 4 hours when powered by one new fully-charged battery (25°C, SpO_2, ECG, disconnected from Temp cable, Auto NIBP measurements at intervals of 15 minutes)
	≥ 8 hours when powered by two new fully-charged batteries (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)

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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
Surgical Mode:	1 to 20 Hz
ST Mode:	0.05 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

IBP Analog Output

Bandwidth (-3dB; reference frequency:1Hz)	DC to 40 Hz
Max Transmission Delay:	30 ms
Sensitivity:	1 V/100 mmHg ±5%

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 CO_2 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 CO_2 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

AG module

Temperature Range Operating:	10°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):	70 to 107.4
Storage Conditions:	70 to 107.4

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:	27.6 cm (H) x 13.7 cm (D) x 32.2 cm (W) 10.9" (H) x 5.4" (D) x 12.7" (W)
Weight:	4.5 kg (10 lbs), Standard parameters, including touchscreen and recorder, and 2 batteries

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