

MEDHealth Apollo N2 Multi-Parameter Specification Chart

Specifications

This appendix describes the specifications of the Apollo N2 Patient Monitor.

ECG/ST/Arrhythmia Specifications

The following table describes the ECG/ST/arrhythmia specifications.

ECG Specifications

Parameter	Specifications
CMRR (Common mode rejection ratio)	> 90 dB
HR measurement and alarm range	Adult/Pedi: 15bpm - 300bpm Neonate: 15bpm - 350bpm
HR accuracy	1bpm or 1%, whichever is greater
ECG channel	Up to 7channels
ST range	-2.0 mV - +2.0 mV
ST accuracy	0.02 mV or 10%, whichever is greater
Pacemaker pulse rejection capability	Meets AAMI EC 13
ECG leads	5-lead
Alarm indication	Visual and audible indicators
QRS indicator	Audible tone and heart symbol flashes
ECG speed	12.5 mm/s, 25.0mm/s, 50.0 mm/s
ECG gain	$\times 0.25 \times 0.5 \times 1 \times 2 \times 4$ Auto
Bandwidth	Monitor mode : 0.5 Hz - 40 Hz $\begin{pmatrix} +0.4dB \\ -3.0dB \end{pmatrix}$ Operations mode : 1.0 Hz - 25 Hz $\begin{pmatrix} +0.4dB \\ -3.0dB \end{pmatrix}$ Diagnostic mode: 0.05 Hz - 100 Hz $\begin{pmatrix} +0.4dB \\ -3.0dB \end{pmatrix}$
Tall T-wave rejection capability	Exceeds ANSI/AAMI EC 13 minimum recommended

	1.2 mV T-wave amplitude
Heart rate alarm response time	<12s
Defibrillator protected	Tested with 5kV
Recovery time following defibrillation	< 5s
Signal delay	0.5s
Auxiliary current (leads off detection)	Active electrode: < 100nA Reference electrode: < 900 nA

ECG Specifications (continue)

Parameter	Specifications
Heart ratemeter accuracy and response to irregular rhythm	Ventricular bigeminy: 80 bpm±2bpm Slow alternating ventricular bigeminy: 60 bpm ±2bpm Rapid alternating ventricular bigeminy: 120 bpm ±2bpm Bidirectional systoles: 90 bpm±2bpm
Response time of heart rate meter to change in heart rate	HR change from 80 bpm to 120 bpm: ≤ 8 s maximum HR change from 80 bpm to 40 bpm: ≤ 10 s maximum
Time to alarm for tachycardia	Vent tachycardia (1 mVpp, 206 bpm): Gain 0.5, range 6.5 to 8.4s, average 7.2s Gain 1.0, range 6.1 to 6.9s, average 6.5s Gain 2.0, range 5.9 to 6.7s, average 6.3s Vent tachycardia (2 mVpp, 195 bpm): Gain 0.5, range 5.4 to 6.2s, average 5.8s Gain 1.0, range 5.7 to 6.5s, average 6.1s Gain 2.0, range 5.3 to 6.1s, average 5.7s
ECG analog output	0.67 Hz - 40 Hz
Time to alarm for high heart rate	≤10s
Time to alarm for low heart rate	≤10s

Respiration Specifications

The following table describes the respiration specifications.

Respiration Specifications

Parameter	Specification
Work mode	Thoracic impedance
Respiration rate measurement and alarm range	Adult: 0 rpm - 120 rpm Paediatric: 0 rpm - 150 rpm Neonate: 0 rpm - 150 rpm
Apnea alarm duration	10 s - 40 s
Respiration accuracy	2 rpm or $\pm 2\%$, whichever is greater
Respiration speed	6.25 mm/s, 12.5 mm/s, 25.0 mm/s
Respiration gain	$\times 0.5$, $\times 1$, $\times 2$
Alarm delay	<10s

SpO₂ Specifications

The update rate for the SpO₂ value and pulse rate is typically 1 second. Data averaging and other signal processing on the displayed and transmitted data values of SpO₂ and pulse rate is not more than 20 seconds. Depending on the magnitude of difference between the alarm limit and the displayed value, the alarm signal generation delay may be from 1 second to 20 seconds.

Because pulse oximeter measurements are statistically distributed, only approximately two-thirds of pulse oximeter equipment measurements can be expected to fall within the

Arms value measured by a CO-oximeter.

Note — It is not necessary to have a SpO₂ calibration when the monitor is in use.

The following table describes the SpO₂ specifications.

SpO₂ Specifications

Parameter	Specification
SpO ₂ measurement range	0% - 100%
SpO ₂ pulse rate range	20 bpm - 254 bpm
SpO ₂ pulse rate accuracy	2 bpm in the range of 70%-100%, Other scope is not defined

SpO ₂ speed	12.5 mm/s, 25.0 mm/s
SpO ₂ pulse rate sound	PR tone
Wavelength range ¹	500 nm - 1000 nm for all specified sensors
Maximum optical output power	150 mW for all specified sensors
Pulse rate display	Numeric

1. Information about wavelength ranges can be useful for clinicians performing photodynamic therapy.
2. Sensor accuracy was obtained by performing controlled hypoxia studies on healthy, non-smoking adult volunteers (according to EN ISO 9919). The SpO₂ readings have been compared to CO-oximeter measurements on arterial blood samples. To represent the general population, data from at least 10 subjects (male and female) with a wide range of skin colour was taken to validate SpO₂ accuracy. Accuracy data for Masimo sensors is included in the sensor package insert.

Temperature Specifications

The following table describes the temperature specifications.

Temperature Specifications

Parameter	Specification
Temperature range	0°C - 50°C (32°F - 122°F)
Unit	°C or °F
Temperature accuracy	±0.1°C
Resolution	0.1°C
Updating time	Approximately 1 second

Blood Pressure Specifications

The following table describes the NIBP specifications.

NIBP Specifications

Parameter	Specification
Measuring method	Oscillometric method
Measuring parameter	SYS, DIA, MAP,
Unit	mmHg or kPa

Work mode	Manual, Auto, Stat
Cycle time	1-5,10, 15, 30, 60, 90, 120, 180, 240, 480 minutes
SYS range	Adult: 40 mmHg -270mmHg (5.3 kPa - 36.0kPa) Paediatric: 40 mmHg - 200mmHg (5.3kPa - 26.7kPa) Neonate: 40 mmHg - 135mmHg (5.3kPa - 18.0kPa)
DIA range	Adult: 10mmHg - 210mmHg (1.3kPa - 28.0kPa) Paediatric: 10 mmHg - 150mmHg (1.3 kPa - 20.0kPa) Neonate: 10mmHg -100mmHg (1.3kPa -13.3kPa)
MAP range	Adult: 20 mmHg -230mmHg (2.7 kPa -30.7kPa) Paediatric: 20 mmHg -165mmHg (2.7 kPa -22.0kPa) Neonate: 20mmHg -110mmHg (2.7kPa -14.7kPa)
NIBP accuracy	$\pm 0.80\text{kPa}$ ($\pm 6\text{mmHg}$)
Cuff pressure range	Adult/Paediatric: 0 mmHg - 300 mmHg (0 kPa - 40.0 kPa) Neonate: 0 mmHg - 150 mmHg (0 kPa - 20.0 kPa)
Initial inflation pressure	Adult: 160 mmHg (21.3kPa) Paediatric: 140 mmHg (18.6 kPa) Neonate: 100 mmHg (13.3 kPa)
Deflation pressure	30 mmHg above the last measured systolic value
Alarm delay	<10s

Carbon Dioxide Specifications

The following table describes the CO₂ specifications.

CO₂ Specifications

Parameter	Specification
Work mode	Work, Standby
CO ₂ range	0 mmHg - 99 mmHg (0 kPa - 13.2 kPa)
Unit	mmHg or kPa
CO ₂ accuracy	0 mmHg- 40 mmHg (0 kPa- 5.33 kPa): ± 2 mmHg (± 0.3 kPa) 41 mmHg- 76 mmHg (5.47 kPa- 10.1 kPa): ± 5 mmHg (± 0.7 kPa) 77 mmHg- 99 mmHg (10.3 kPa- 13.2 kPa): ± 10 mmHg (± 1.3 kPa)
Sample flow rate	Maximum: 50 ml/m + 15 ml/m

	Minimum: 50 ml/m - 7.5 ml/m
Waveform speed	6.25 mm/s, 12.5 mm/s
Alarm delay	<10s

Invasive Blood Pressure Specifications

The following table describes the IBP specifications.

Specifications

Parameter	Specification
IBP range	ART 0 - 300 mmHg PA -6 - 120 mmHg CVP -10 - 40 mmHg RAP -10 - 40 mmHg LAP -10 - 40 mmHg ICP -10 - 40 mmHg
IBP accuracy	1 mmHg or 2%, whichever is greater
Unit	mmHg or kPa
Sampling rate	62.5 times per second
Waveform speed	6.25 mm/s, 12.5 mm/s, 25.0 mm/s
Transducer sensitivity (Intellivue: Input sensitivity)	5 uV/V/mmHg
Resolution	1 mmHg (0.13 kPa)
Transducer type	Disposable
Updating time	Approximately 1 second
Alarm delay	<10s

Power Specifications

The following table describes the power specifications.

Power Specifications

AC Power Parameter	Specification
Mains power input	100V-240V~, 50 Hz/60 Hz, 1.4A-0.59A
Power input	140VA
Fuse	F3.15AL 250V
Battery Power Parameter	Specification
Capacity	Lithium ion 11.1 V/4800 mAh
Charging time	4 hours (to 90% battery capacity)
Typical operating time	3.5 hours (with ECG, SpO ₂ measurement and NIBP measured every 15 minutes)
Charge mode	Automatic (with charge protection feature) when the monitor is connected to an AC power source.
Discharge protection	When the monitor is powered by battery, the monitor powers off if the battery power is almost depleted.

Display Specifications

The following table describes the display specifications.

Display Specifications

Parameter	Description
Type	Color TFT LCD
N2 display Size	31 cm

Recorder Specifications

The following table describes the recorder specifications.

Recorder Specifications

Parameter	Specification
Type	Thermal array recorder
Mode	Real time recording
Channel	1, 2, 3 channel(s)
Speed	25.0 mm/s

Physical Specifications

The following table describes the physical specifications.

Physical Specifications

Parameter	Description
Net weight	4.7 kg
Gross weight	6.4kg
Size of N2	304x279x137mm

Environmental Specifications

The following table describes the environmental specifications.

Environmental Specifications

Parameter	Specification
Temperature	Operating: 0°C - 40 °C Storage: -20 °C+55 °Cfor the device
Relative humidity	Operating: 15% - 80% (noncondensing) Storage: 10% - 93% (noncondensing)
Barometric pressure	Operating: 59 kPa ~ 107.4 kPa Storage: 22 kPa ~ 107.4 kPa

Interface Specifications

The following table describes the interface specifications.

Interface Specification

Parameter	Specification
Isolation	1.5 kV
Delay time	<0.5 s
Data output	Via Ethernet port
Defib sync	0 to 5V pulse
Software upgrade	USB port