







Nightingale PPM2 Technical Data

General	
Dimensions	11.3"W x 7.2"H x 2.4"D (288 mm x 182 mm x 60 mm)
Weight	4.5 lb (2.0 Kg)
Finish	PC/ABS
Power Requirements	100 – 240 VAC 0.7 A max
Mains Frequency Range	50 – 60 Hz
Power Consumption	12W nominal, 25W (when charging battery)
Standards Conformance	UL 60601-1, FCC Part 15 (Class A), CSA C22.2 No. 601.1-M90 IEC 60601-1, IEC 60601-1-2 (Class A), IEC 60601-1-4, IEC 60601-2-27, EN 865
Patient Risk Current (AAMI ES1-1993)	Electromedical Apparatus with Isolated Patient Connection. Meets the following limits: Enclosure Risk Current < 100 μ A Patient-applied Risk Current < 10 μ A Patient Isolation Risk Current < 50 μ A Earth Risk Current < 500 μ A
Type of Protection (Electrical)	Class II
Degree of Protection (Electrical)	Type CF, Defibrillation-proof
Degree of Protection (Water)	Ordinary Equipment (IPX0)
Disinfecting Method	Per the instructions in the Cleaning section
Degree of Safety (Flammable Anesthetic Mixture)	Not suitable for use in the presence of a Flammable Anesthetic Mixture
Mode of Operation	Continuous

PPM2 Device Markings	
	For indoor-use only
	Attention! Consult accompanying documents before using this device.
 05/2001	Manufacture date (month/year)
	Type CF Equipment (Defibrillation-proof)
12-32V  < 1A	Input power rating (15 Volts dc, less than 0.6 Amperes)
	Network connection to Nightingale MPC station
Battery	
Type	Lithium-Ion Rechargeable
Discharging Time	4 hours (minimum), 5 hours (typical)
Charging Time	5 hours
Charging Method	Battery is charged while monitor is connected to the mains supply
Environmental	
Cooling	Convection (no fan)
Operating Temperature	59 to 95 °F (15 to 35 °C)
Storage Temperature	-4 to 122 °F (-20 to 50 °C)
Operating Humidity	>30% to <80% non-condensing
Storage Humidity	>10% to <80% non-condensing
Operating Altitude	0 to 9842' (0 to 3000 m)
Storage Altitude	0 to 29520 (0 to 9000 m)
Display	
Type	Active Matrix LCD
Area	6.925 x 5.3 inches (8.4 inches diagonal). 176 x 134.6 mm (213.35 mm diagonal).
Matrix	640 x 480 pixels
Pixel Dimension	0.27 mm
Number of Channels	3
Sweep Speed	6.25, 12.5, 25 mm/s
Display Mode	Eraser Bar

ECG	
Accessories	3-lead cable, 5-lead cable
Input Connector	7-pin connector
Displayable Leads	3-lead cable: II 5-lead cable: I, II, III, V
HR Resolution	1 bpm (beats per minute)
Measurement Range	15 to 300 bpm
Measurement Accuracy	± 2 bpm or $\pm 1\%$, whichever is greater
Response Time	Step change from 80 to 120 bpm: < 7 seconds Step change from 80 to 40 bpm: < 11 seconds Per AAMI EC13-2002 4.1.2.1(f), response time is measured from the onset of the first QRS at the new rate to the time the measurement reads a value that is the original rate plus 63% of the change
Report Interval	1 second
HR Averaging Scheme	Average of the 10 most recent, valid R-R intervals, discarding the shortest and longest interval
Time To Alarm - Tachycardia	< 10 seconds (5 seconds typical) for 150 bpm ventricular tachycardia or 3.5 Hz sinusoidal ventricular fibrillation
Notch Filter Frequency	50Hz, 60Hz, Off
Monitor Bandwidth	0.4Hz to 50Hz (-3dB)
Dynamic Range AC	± 20 mV
Dynamic Range DC	± 300 mV
Electrode Impedance	>2.5 Mohm at 10 Hz
Defibrillation Protection	Complies with IEC 60601-2-27
Pacer Pulse Detection	Lead II
Pacer Pulse Rejection	Rejects all pulses of amplitude ± 2 mV to ± 700 mV and duration 0.1 to 2 ms with no tail, per AAMI EC13-2002 4.1.4.1. Rejects all pulses of amplitude ± 2 mv to ± 700 mV and duration 0.1 to 2 ms with 10 ms time constant tail of < 2mV, per AAMI EC13-2002 4.1.4.2 (Method A). AAMI EC13-2002 4.1.4.3: 1.54 v/s.
Tall T-Wave Rejection	Rejects all T-Waves less than or equal to 120% of a 1mV QRS and a Q-T interval of 350 ms, per AAMI EC13-2002 4.1.2.1(c)
HR Response to Irregular Rhythm	HR is 82 bpm for a bigeminy rhythm consisting of 0.51 and 0.96 second R-R intervals. HR is 76 to 82 for a trigeminy rhythm consisting of 0.51, 0.81 and 0.96 second R-R intervals. HR is 76 to 80 for a frequent multifocal rhythm consisting of 0.63, 0.65, 0.75, 0.95 and 1.03 second R-R intervals.
Active Noise Suppression	RL drive (< 500 nA)

Pulse Tone	Yes
Respiration	
Method	Impedance Pneumography
Input Connector	Same as ECG
Sensing Lead	II
RR Resolution	1 bpm (breaths per minute)
Measurement Range	2 to 120 bpm
Measurement Accuracy	±3 bpm
Measurement Sensitivity	0.25 ohms (minimum)
Report Interval	1 second
Bandwidth	0.17 to 3.3 Hz (-3dB)
Impedance Measuring Current	40 µA @ 28 kHz square wave across Lead II
Pulse Oximetry	
Method	Absorption – Spectrophotometric (dual wavelength) (Functional oxygen saturation of arterial hemoglobin)
Input Connector	9-pin connector
SpO ₂ / PR Resolution	SpO ₂ : 1 O ₂ % PR: 1 bpm (beat per minute)
Measurement Range	SpO ₂ : 20 to 100% PR: 30 to 240 bpm
Measurement Accuracy	SpO ₂ : from 70 to 100%: ±2% (O ₂ %), < 70%: unspecified PR: ±5%
Measurement Test Method	BioTek Instruments Index2 SpO ₂ Simulator
Report Interval	1 second. Numeric values held < 30 seconds, per EN 865
Pulse Tone	Yes (pulse tone pitch tied to SpO ₂ parameter value)
Temperature	
Compatibility	YSI 400-series probes
Input Connector	2-pin connector
Display Units	°F and °C (user-selectable)
Measurement Resolution	0.1 °F (0.1 °C)
Measurement Range	32.0 to 122.0 °F (0.0 to 50.0 °C)
Measurement Accuracy	±0.1 °F (±0.1 °C) plus probe tolerance

Non Invasive Blood Pressure	
Method	Oscillometric
Input Connector	Single Lumen Hose (Quick-Disconnect fitting)
Cuff	Infant, Child, Small Adult, Adult, Large Adult
Derived Parameters	Systolic, Mean, Diastolic
Resolution	1 mmHg
Measurement Range	Systolic: 30 to 250 mmHg Mean: 20 to 230 mmHg Diastolic: 10 to 210 mmHg
Measurement Accuracy	Sys: ± 5 mmHg ($s < 8$ mmHg) Mean: ± 5 mmHg ($s < 8$ mmHg) Dia: ± 5 mmHg ($s < 8$ mmHg)
Pulse Rate Range	30 to 240 bpm
Pulse Rate Accuracy	$\pm 5\%$ or ± 2 bpm, whichever is greater
Update Interval	Upon measurement completion
Measurement Time	30 seconds (typical) < 135 seconds (maximum)
Initial Cuff Pressure	160 mmHg (user-selectable)
Repeated Cuff Pressure	Previous systolic + 40 mmHg
Static Cuff Pressure Accuracy	± 3 mmHg
Overpressure Cutoff	290 \pm 3 mmHg (normal means), 300 \pm 30 mmHg (back-up)
Measurement Modes	Single Measurement or Auto (Interval) Measurement
Auto Measurement Settings	Off, 3, 5, 10, 15, 30, 60, 120 minutes