

BeneVision N1

Transport Monitor



Physical Specifications

Weight	0.95 kg (2.1 lbs)
	(Standard parameters with battery)
	1.17 kg (2.6 lbs)
	(Standard parameters with internal CO2 module and battery)
Size	150×103×81 mm (5.9" x 4" x 3.2")
Display screen	Medical-grade color TFT LCD, capacitive touch screen, with Corning® Gorilla® Glass, support multi-touch operation. 5.5-inch, 1280 x 720 pixels (WXGA)
Waveforms	5 traces, up to 13 waveforms
External display	Medical-grade color TFT LCD, capacitive touch screen, 19-inch, 1280 x 720 pixels Up to 8 traces

ECG

Meet standards of IEC 60601-2-27 and IEC 60601-2-25.

Lead set	3-lead: I, II, III
	5-lead: I, II, III, aVR, aVL, aVF, V
	6-lead: I, II, III, aVR, aVL, aVF, Va, Vb
	12-lead: I, II, III, aVR, aVL, aVF, V1 to V6 Automatic 3/5/6/12 - lead recognition.
Input signal range ± 8 mV (p-p)	
Electrode offset potential tolerance	± 500 mV
Gain	x 0.125, x 0.25, x 0.5, x 1, x 2, x 4, auto
Sweep speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Waveform format	Standard, Cabrera
Bandwidth	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
	High Freq Cut-off (for 12-lead ECG analysis): 350 Hz (0.05 to 350 Hz), 150 Hz (0.05 to 150Hz), 35 Hz (0.05 to 35 Hz), 20 Hz (0.05 to 20Hz) selectable.
CMRR	Diagnostic: > 90 dB Monitor, Surgical, ST mode: > 105 dB (with notch filter on)
Pace detection	Amplitude: ± 2 mV to ± 700 mV
	Width: 0.1 to 2 ms

Rise time: 10 to 100 μ s (without overshoot)

Defib. protection	Withstand 5000V (360J) defibrillation
Defib. recovery time	≤ 5 s
ESU recovery time	≤ 10 s
Provides Glasgow resting 12-lead ECG algorithm.	

Heart Rate

HR range	Adult: 15 to 300 bpm
	Pediatric/Neonate: 15 to 350 bpm
HR accuracy	± 1 bpm or $\pm 1\%$, whichever is greater.
HR resolution	1 bpm

Arrhythmia Analysis

Intended use for adult, pediatric and neonate.

Multi-lead, 25 classifications. Asystole, VFib/VTac, Vtac, Vent. Brady, Extreme Tachy, Extreme Brady, Vrrhythm, PVCs/min, Pause/min, Couplet, Bigeminy, Trigeminy, R on T, Run PVCs, PVC, Tachy, Brady, Missed Beats, PNP, PNC, Multif. PVC, Nonsus. Vtac, Pause, Irr. Rhythm., Afib.

ST Segment Analysis

Intended use for adult, pediatric and neonate.

ST range	- 2.0 to + 2.0 mV RTI
ST accuracy	± 0.02 mV or $\pm 10\%$, whichever is greater (- 0.8 to + 0.8 mV)
ST resolution	0.01 mV

QT Analysis

Intended use for adult, pediatric, and neonate.

Parameters	QT, QTc, Δ QTc
QTc formula	Bazett, Fridericia, Framingham, or Hodges
QT/QTc range	200 to 800 ms
QT accuracy	± 30 ms
QT resolution	4 ms
QTc resolution	1 ms
QT-HR range	Adult: 15 to 150 bpm
	Pediatric/Neonate: 15 to 180 bpm

Respiration

Lead	I or II, auto
RR range	0 to 200 rpm
RR Accuracy	± 1 rpm (0 to 120 rpm),
	± 2 rpm (121 to 200 rpm)

RR Resolution	1 rpm		Max standard deviation: 8 mmHg
Apnea time	10, 15, 20, 25, 30, 35, 40 s	NIBP resolution	1 mmHg
Sweep speed	3, 6.25, 12.5, 25, 50mm/s	Assisting Venous Puncture	Yes

SpO₂

Meet standards of ISO 80601-2-61.

SpO ₂ module	Mindray SpO ₂ , Nellcor SpO ₂
SpO ₂ range	0 to 100 %
SpO ₂ accuracy	Adult/Pediatric: $\pm 2\%$ (70 to 100%) Neonate: $\pm 3\%$ (70 to 100%)
Perfusion indicator (PI)	Yes, for Mindray SpO ₂
Pitch Tone	Yes

PR

PR range	20 to 300 bpm (SpO ₂) 25 to 350 bpm (IBP) 30 to 300 bpm (NIBP)
PR accuracy	± 3 bpm (20 to 300 bpm, Mindray SpO ₂) ± 3 bpm (20 to 250 bpm, Nellcor SpO ₂) ± 1 bpm or $\pm 1\%$, whichever is greater (IBP) ± 3 bpm or $\pm 3\%$, whichever is greater (NIBP)
Refreshing rate	1s

Temperature

Meet standard of ISO 80601-2-56.

Technique	Thermal resistance
Channels	Up to 2 channels
Temp range	0 to 50 °C (32 to 122 °F)
Temp accuracy	$\pm 0.1\text{ °C}$ or $\pm 0.2\text{ °F}$ (without probe)
Temp resolution	0.1 °C
Refreshing rate	1s

NIBP

Meet standards of IEC 80601-2-30.

Technique	Oscillometry
Operation mode	Manual, Auto, STAT, Sequence
Parameters	Systolic, Diastolic, Mean
Max Measurement time	Adult/Pediatric: 180 s, Neonate: 90 s
Systolic range	Adult: 25 to 290 mmHg Pediatric: 25 to 240 mmHg Neonate: 25 to 140 mmHg
Diastolic range	Adult: 10 to 250 mmHg Pediatric: 10 to 200 mmHg Neonate: 10 to 115 mmHg
Mean range	Adult: 15 to 260 mmHg Pediatric: 15 to 215 mmHg Neonate: 15 to 125 mmHg
NIBP accuracy	Max mean error: ± 5 mmHg

IBP

Meet standard of IEC 60601-2-34.

Channels	Up to 4 channels (with PiCCO module)
Sensitivity	5 $\mu\text{V/V/mmHg}$
Impedance range	300 to 3000 Ω
IBP range	-50 to 360 mmHg
IBP accuracy	± 1 mmHg or $\pm 2\%$, whichever is greater
IBP resolution	1 mmHg
PPV range	0 to 50 %
PAWP ¹	Yes
ICP measurement	Support
Support waveforms overlapping.	

PiCCO

Parameters	Measurement range	Coefficient of variation
CCO	0.25 to 25.0 L/min	$\leq 2\%$
C.O.	0.25 to 25.0 L/min	$\leq 2\%$
GEDV	40 to 4800 ml	$\leq 3\%$
SV	1 to 250 ml	$\leq 2\%$
EVLW	10 to 5000 ml	$\leq 6\%$
ITBV	50 to 6000 ml	$\leq 3\%$

(Coefficient of variation is measured using synthetic and/or database wave forms (laboratory testing.) Coefficient of variation= SD/mean error.)

TB range	25 to 45 °C
TI range	0 to 30 °C
TI/TB accuracy	$\pm 0.1\text{ °C}$ (without sensor)
pArt/pCVP range	-50 to 300 mmHg
pArt/pCVP accuracy	± 1 mmHg or $\pm 2\%$, whichever is greater (without sensor)

Internal Sidestream CO₂

Meet standard of ISO 80601-2-55.

Intended use for adult, pediatric and neonate.

CO ₂ sample flow rate	50 ml/min
CO ₂ sample flow rate accuracy	± 15 ml/min or $\pm 15\%$, whichever is greater.
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO ₂ range	0 to 150 mmHg
CO ₂ accuracy	± 2 mmHg (0 to 40 mmHg) $\pm 5\%$ of the reading (41 to 76 mmHg) $\pm 10\%$ of the reading (77 to 99 mmHg) $\pm (3\text{mmHg}+8\%$ of the reading) (100 to 150 mmHg)

awRR range	0 to 150 rpm
awRR accuracy	± 1 rpm (0 to 59 rpm) ± 2 rpm (60 to 150 rpm)
Apnea time	10, 15, 20, 25, 30, 35, 40 s

Artema Sidestream CO₂

Meet standard of ISO 80601-2-55.

**Options: Paramagnetic O₂ sensor.

CO ₂ sample flow rate	120 ml/min (DRYLINE II™ watertrap for adult/pediatric) 90 ml/min (DRYLINE II™ watertrap for neonate)
CO ₂ sample flow rate accuracy	± 15 ml/min or ±15 %, whichever is greater.
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO ₂ range	0 to 150 mmHg
CO ₂ accuracy	± 2 mmHg (0 to 40 mmHg) ± 5% of the reading (41 to 76 mmHg) ± 10% of the reading (77 to 99 mmHg) ± (3mmHg + 8% of the reading) (100 to 150 mmHg)
CO ₂ resolution	1 mmHg
O ₂ range	0 to 100 %
O ₂ accuracy	± 1 % (0 to 25 %) ± 2 % (above 25 to 80 %) ± 3 % (above 80 to 100 %)
O ₂ resolution	1 %
awRR range	0 to 150 rpm
awRR accuracy	± 1 rpm (0 to 59 rpm) ± 2 rpm (60 to 150 rpm)
Apnea time	10, 15, 20, 25, 30, 35, 40 s

Oridion Microstream CO₂

Meet standard of ISO 80601-2-55.

Sample flow rate	50 ^{-7.5} ₊₁₅ ml/min
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO ₂ range	0 to 99 mmHg
CO ₂ accuracy	±2 mmHg (0 to 38 mmHg) ±5 % of the reading (0.08 % increased in error for every 1 mmHg if the reading is more than 38) (39 to 99 mmHg)
awRR range	0 to 150 rpm
awRR accuracy	±1 rpm (0 to 70 rpm) ±2 rpm (71 to 120 rpm) ±3 rpm (121 to 150 rpm)
Apnea time	10, 15, 20, 25, 30, 35, 40 s

Capnostat Mainstream CO₂

Meet standard of ISO 80601-2-55.

Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO ₂ range	0 to 150 mmHg
CO ₂ accuracy	±2 mmHg (0 to 40 mmHg) ±5 % of the reading (41 to 70 mmHg) ±8 % of the reading (71 to 100 mmHg) ±10 % of the reading (101 to 150 mmHg)
awRR range	0 to 150 rpm
awRR accuracy	±1 rpm
Apnea time	10, 15, 20, 25, 30, 35, 40 s

Data Review

Trends data	>120hours with resolution no less than 1min
Events	1000 events, including parameter alarms, arrhythmia events, technical alarms, and etc.
NIBP	1000 sets
Interpretation of resting	12-lead ECG results 20 sets
Full disclosure	48 hours at maximum. The specific storage time depends on the waveforms stored and the number of stored waveforms.
OxyCRG ¹	48 hours

Alarms

Audible indicator	Yes, 3 different alarm tones, and prompt tone
Visible indicator	Red/yellow/cyan LED, and alarm message

Special Functions¹

Clinical Assistive Application (CAA): EWS, GCS, ST Graphic™, BoA Calculations (drug, hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.
Support minitrends view, OxyCRG view, and other-bed view

Wi-Fi Communications

Protocol	IEEE 802.11a/b/g/n
Modulation mode	DSSS and OFDM
Operating frequency	IEEE 802.11b/g/n (2.4G): ETSI/FCC/KC: 2.4 to 2.483 GHz MIC: 2.4 to 2.495 GHz IEEE 802.11a/n (5G): ETSI: 5.15 to 5.35 GHz, 5.47 to 5.725 GHz FCC: 5.15 to 5.35 GHz, 5.725 to 5.82 GHz MIC: 5.15 to 5.35 GHz KC: 5.15 to 5.35 GHz, 5.47 to 5.725 GHz, 5.725 to 5.82 GHz
Channel spacing	IEEE 802.11b/g: 5 MHz IEEE 802.11n (@2.4 GHz): 5MHz

Wireless baud rate	IEEE 802.11a: 20 MHz	Charge time	>8h run time without internal CO2 (typical)
	IEEE 802.11n (@5 GHz): 20MHz		>3h run time with internal CO2 (typical)
	IEEE 802.11a: 6 to 54 Mbps		6 hours to 90% when the monitor without internal CO2 module is off.
	IEEE 802.11b: 1 to 11 Mbps		3 hours to 90% when the monitor with internal CO2 module is off.
	IEEE 802.11g: 6 to 54 Mbps		
Output power	IEEE 802.11n: 6.5 to 72.2 Mbps		
	< 20dBm (CE requirement: detection mode- RMS)		
	< 30dBm (FCC requirement: detection mode- peak power)		

Operating mode	Infrastructure
Data security	WPA-PSK, WPA2-PSK, WPA-Enterprise, WPA2-Enterprise (EAP-FAST, EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, PEAP-TLS, LEAP) Encryption: TKIP and AES

Interfacing and I/O devices

Main unit	DC power input (1) Multifunctional connector (1): analog output and defibrillator synchronization signals Multi-pin connector (1)
Dock	AC power connector (1) Network connector (1), 100 Base-TX, IEEE 802.3 VGA connector (1) USB 2.0 connector (2) Host monitor connector (1)
Barcode scanner	Support 1D and 2D barcode via dock
Keyboard & Mouse	Support wire and wireless type via dock
Network printer	Support

Power

Main unit	12VDC ($\pm 10\%$), 2A
AC adapter/Transport dock	Input: 100 to 240VAC (-15% , $+10\%$), 50/60 Hz Output: 12VDC, minimum 2.5A
Dock	100 to 240 VAC ($\pm 10\%$), 50/60 Hz
Battery	Build-in rechargeable lithium-ion battery, 2500mAh, 7.56 VDC

Environmental requirements

For Main unit/Transport dock/AC adapter

Temperature	Operating: 0 to 40 °C (32 to 104 °F) Storage: -30 to 70 °C (-22 to 158 °F)
Humidity	Operating: 5 to 95 % (non condensing) Storage: 5 to 95 % (non condensing)
Barometric	Operating: 427.5 to 805.5 mmHg (57.0 to 107.4 kPa) Storage: 120 to 805.5 mmHg (16.0 to 107.4 kPa) (without CO2), 375 to 805.5 mmHg (50.0 to 107.4 kPa) (with CO2)

For Module rack/Dock/Other extended modules

Temperature	Operating: 0 to 40 °C (32 to 104 °F) Storage: -20 to 60 °C (-4 to 140 °F)
Humidity	Operating: 15 to 95 % (non condensing) Storage: 10 to 95 % (non condensing)
Barometric	Operating: 427.5 to 805.5 mmHg (57.0 to 107.4 kPa) Storage: 120 to 805.5 mmHg (16.0 to 107.4 kPa)

Reliability

The monitor can also be used during patient transport with road, rotary and fixed-wing ambulance. Comply with standards of EN 1789, EN13718-1, IEC 60601-1-12, RTCA DO-160G, MIL-STD-810G, and MIL STD 461F.

Ingress protection	Main unit: IP44 Dock/Module rack/AC adapter: IPX1 Transport Dock: IP22
Drop protection	1.2m for all 6 faces

1. The functions are available for independent external display only.

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