

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	
Type	Medical-grade color TFT LCD, capacitive touch screen, with Corning® Gorilla® Glass, support multi-touch operation.
Size & Resolution	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, 21.5-inch, 1920 x 1080 pixels Up to 8 traces

ECG

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

Lead Sets	Automatic 3/5/6/12 - lead recognition
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
Sweep Speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Gain Selection	x 0.125, x 0.25, x 0.5, x 1, x 2, x 4, auto
Waveform format	Standard, Cabrera
Input Signal Range	± 8 mV (p-p)
Electrode Offset Potential Tolerance	± 500 mV
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, 150 Hz, 35 Hz, 20 Hz 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 μs (without overshoot)
Defibrillator Protection	Withstand 5000VAC (360J) defibrillation
Defib. Recovery Time	≤ 5 seconds
ESU recovery time	≤ 10 s
Provides Glasgow resting 12-lead ECG algorithm.	
Provides Mindray Multi(4)-lead ECG monitoring analysis algorithm.	

Heart Rate

Measurement Range	
Adult:	15 to 300 bpm
Pediatric/Neonate:	15 to 350 bpm

Accuracy	± 1 bpm or ± 1%, whichever is greater.
Resolution	1 bpm

Arrhythmia Analysis

Patient	Adult/Pediatric/Neonate.
Monitored Arrhythmias	Asystole, VFib/VTac, VTac, Vent. Brady, Extreme Tachy, Extreme Brady, Vrrhythm, PVCs/min, Pauses/min, Couplet, Bigeminy, Trigeminy, R on T, Run PVCs, PVC, Tachy, Brady, Missed Beats, PNP, PNC, Multif. PVC, Nonsus. VTac, Pause, Irr. Rhythm, AFib., SVT, SVTs/min

ST Segment Analysis

Patient	Adult/Pediatric.
Range	- 2.0 to + 2.0 mV (RTI)
Accuracy	± 0.02 mV or ± 10%, whichever is greater (- 0.8 to + 0.8 mV)
Resolution	0.01 mV

QT Analysis

Patient	Adult/Pediatric/Neonate.
Parameters	QT, QTc, ΔQTc
QTc Formula	Bazett, Fridericia, Framingham, or Hodges
Range	
QT/QTc:	200 to 800 ms
QT-HR:	Adult: 15 to 150 bpm Pediatric/Neonate: 15 to 180 bpm
QT Accuracy	± 30 ms
Resolution	QT 4 ms; QTc 1 ms

Respiration

Range	0 to 200 bpm
Resolution	1 rpm
Apnea Alarm Time	10, 15, 20, 25, 30, 35, 40 sec
Accuracy	
0 - 120 rpm:	± 1 rpm
121 - 200 rpm:	± 2 rpm
Lead	I, II, or auto (default: lead II)

Pulse Oximetry

Meet standards of ISO 80601-2-61.

Module	Mindray, Masimo, Nellcor
Range	0 to 100 %
Resolution	1%
Accuracy	
Mindray/Nellcor:	± 2 % (70 to 100%, Adult/Pediatric); ± 3 % (70 to 100%, Neonate) Unspecified (0 to 69%)
Masimo:	± 2 % (70 to 100%, Adult/Pediatric, non-motion) ± 3 % (70 to 100%, Neonate, non-motion) ± 3 % (70 to 100%, motion) Unspecified (0 to 69%)
Perfusion indicator (PI)	Yes, for Mindray/Masimo SpO2
Pitch Tone	Yes

Dual-SpO2	Yes, SpO2, SpO2b, ΔSpO2
Pulse Rate Range	
Mindray/Nellcor:	20 to 300 bpm
Masimo:	25 to 240 bpm
Pulse Rate Accuracy	
Mindray:	± 3 bpm (20 - 300 bpm)
Nellcor:	± 3 bpm (20 - 250 bpm)
Masimo:	± 3 bpm (non-motion) ± 5 bpm (motion)
PR Refresh Rate	1 sec

Temperature

Meet standard of ISO 80601-2-56.

Method	Thermal resistance
Channels	Up to 2 channels
Units of Measure	Selectable °C or °F
Range	0 to 50 °C / 32 to 122 °F
Resolution	0.1 °C, 0.1°F
Accuracy	± 0.1 °C or ± 0.2 °F (without probe)
Refresh Rate	1 sec

Non-Invasive Blood Pressure

Meet standards of ISO 80601-2-30.

Method	Oscillometry
Modes	Manual, Auto, STAT, Sequence
Units of Measure	mmHg, kPa (user-selectable)
Resolution	1 mmHg
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
Accuracy	
Max Mean Error:	± 5 mmHg
Max Standard Deviation:	8 mmHg
Cuff Deflation Technique	Step bleed
Initial Cuff Inflation	
Adult:	80 to 280 mmHg (default: 160 mmHg)
Pediatric:	80 to 210 mmHg (default: 140 mmHg)
Neonate:	60 to 140 mmHg (default: 90 mmHg)
Over Pressure Protection	
Adult/ Pediatric:	297 ± 3 mmHg
Neonate:	147 ± 3 mmHg
Max Measurement time	
Adult/Pediatric:	180 sec
Neonate:	90 sec
Assisting Venous Puncture	Yes
Pulse Rate Range	30 to 300 bpm
Pulse Rate Accuracy	± 3 bpm or ± 3 %, whichever is greater

IBP

Meet standard of IEC 60601-2-34.

Number	Up to 4 channels
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Measurement Range	-50 to 360 mmHg
Resolution	1 mmHg
Accuracy	± 1 mmHg or ± 2 %, whichever is greater (excluding sensor error)
Sensitivity	5 μV/V/mmHg
Impedance Range	300 to 3000 Ω
PPV Range	0 to 50 %
PAWP	Yes
ICP measurement	Support
Support waveforms overlapping.	
Pulse Rate Range	25 to 350 bpm
Pulse Rate Accuracy	± 1 bpm or ± 1 %, whichever is greater

PiCCO

Parameters	Measurement Range	Coefficient of Variation
CCO	0.25 to 25.0 L/min	≤ 2%
C.O.	0.25 to 25.0 L/min	≤ 2%
GEDV	40 to 4800 ml	≤ 3%
SV	1 to 250 ml	≤ 2%
EVLW	10 to 5000 ml	≤ 6%
ITBV	50 to 6000 ml	≤ 3%

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

TB Range	23 to 43 °C / 73.4 to 109.4 °F
TB, TI Accuracy	± 0.1 °C (without sensor)
TB, TI Resolution	0.1 °C
pArt/pCVP Range	-50 to 300 mmHg
pArt/pCVP Accuracy	± 1 mmHg or ± 2 %, whichever is greater

Internal Sidestream CO₂

Meet standard of ISO 80601-2-55.

Patient	Adult/Pediatric/Neonate.
Measurement Range	0 to 150 mmHg
CO ₂ Accuracy	
0 to 40 mmHg:	± 2mmHg
41 to 76 mmHg:	± 5% of reading
77 to 99 mmHg:	± 10% of reading
100 to 150 mmHg:	± (3 mmHg+8% of reading)
Sample Flow Rate	50 ml/min
Sample Flow Rate Tolerance	±15 ml/min or ±15 %, whichever is greater.
Sweep speed	3 mm/sec, 6.25 mm/sec, 12.5 mm/sec, 25 mm/sec, 50 mm/sec
awRR range	0 to 150 rpm
awRR accuracy	
0 to 60 rpm:	± 1 rpm
61 to 150 rpm:	± 2 rpm
Apnea time	10, 15, 20, 25, 30, 35, 40 sec

Artema Sidestream CO₂

Meet standard of ISO 80601-2-55.

Measurement Range	
etCO ₂ :	0 to 150 mmHg
O ₂ (optional):	0 to 100 %
CO ₂ Accuracy	
0 to 40 mmHg:	± 2mmHg
41 to 76 mmHg:	± 5% of reading
77 to 99 mmHg:	± 10% of reading
100 to 150 mmHg:	± (3 mmHg+8% of reading)
O ₂ Accuracy	

0 to 25 %:	±1 %
25.1 to 80 %:	±2 %
80.1 to 100 %:	±3 %
Resolution	
etCO ₂ :	1 mmHg
O ₂ (optional):	1 %
Sample Flow Rate	
Adult/Pediatric:	120 ml/min (with or without O ₂ monitoring)
Neonate:	70 ml/min or 90 ml/min, selectable 90 ml/min (with O ₂ monitoring)
Sample Flow Rate Tolerance	±15 ml/min or ±15 %, whichever is greater.
Warm-up Time	90 sec (maximum), 20 sec (typically)
Measured with a neonatal watertrap and 2.5-meter neonatal sampling line, or an adult watertrap and a 2.5-meter adult sampling line:	
Rise Time	
etCO ₂ :	≤ 250 ms @ 70 ml/min (Neonate watertrap) ≤ 250 ms @ 90 ml/min (Neonate watertrap) ≤ 300 ms @ 120 ml/min (Adult watertrap)
O ₂ (optional):	≤ 800 ms @ 90 ml/min (Neonate watertrap) ≤ 750 ms @ 120 ml/min (Adult watertrap)
Sampling Delay Time	
etCO ₂ :	≤ 5.0 sec @ 70 ml/min (Neonate watertrap) ≤ 4.5 sec @ 90 ml/min (Neonate watertrap) ≤ 5.0 sec @ 120 ml/min (Adult watertrap)
O ₂ (optional):	≤ 4.5 sec @ 90 ml/min (Neonate watertrap) ≤ 5.0 sec @ 120 ml/min (Adult watertrap)
awRR Range	0 to 150 rpm
awRR Accuracy	
0 to 60 rpm:	± 1 rpm
61 to 150 rpm:	± 2 rpm
Apnea Time	10, 15, 20, 25, 30, 35, 40 sec

Oridion Microstream CO₂

Measurement Range	0 to 99 mmHg
Resolution	1 mmHg
Accuracy	
0 to 38 mmHg:	±2 mmHg
39 to 99 mmHg:	±5 % + 0.08 % of the reading – 38 mmHg
Sample Flow Rate	50 ^{-7.5} ₊₁₅ ml/min
Start-up Time	30 sec (typical)
Response Time	2.9 s (typical)
awRR Range	0 to 150 rpm
awRR Accuracy	
0 to 70 rpm:	±1 rpm
71 to 120 rpm:	±2 rpm
121 to 150 rpm:	±3 rpm
Apnea time	10, 15, 20, 25, 30, 35, 40 sec

Capnostat Mainstream CO₂

Measurement Range	0 to 150 mmHg
Resolution	1 mmHg
Accuracy	
0 to 40 mmHg:	± 2mmHg
41 to 70 mmHg:	± 5% of reading
71 to 100 mmHg:	± 8% of reading
101 to 150 mmHg:	± 10% of reading
Rise time	< 60 msec
awRR Range	0 to 150 rpm
awRR Accuracy	±1 rpm

Data Storage

Trends Data	> 120 hrs @ 1min, 4 hrs @ 5 sec.
Events	1000 events, including parameter alarms, arrhythmia events, technical alarms, and so on.
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.
OxyCRG¹	48 hrs
Minitrend¹	Yes

Alarms

Audible indicator	Yes, 4 different alarm tones, and prompt tone
Visible indicator	Red/yellow/cyan LED, and alarm message
Provide AlarmSight infographic alarm indicator.	
Support iAlarm features (alarm limits recommendations, etc.)	
Support iStatus combined alarms ¹	

Special Functions¹

Clinical Assistive Application (CAA):

ST Graphic™, BoA Dashboard™, SepsisSight™, NeuroSight, AF Summary, ECG 24h Summary, EWS, GCS,

Support calculations (drug, hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.

Support nView remote display tool

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	5 MHz @ 2.4 GHz (802.11 b/g/n) 20 MHz @ 5 GHz (802.11 a/n)
Wireless Baud Rate	IEEE 802.11a: 6 to 54 Mbps IEEE 802.11b: 1 to 11 Mbps IEEE 802.11g: 6 to 54 Mbps IEEE 802.11n: 6.5 to 72.2 Mbps
Output Power	< 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

Output

Auxiliary Output

Standard Meets the requirements of ANSI/AAMI/IEC 60601-1 for short-circuit protection and leakage current

ECG Analog Output

Bandwidth (- 3 dB; reference frequency: 10 Hz)

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 1 V/mV, ± 5 %

Pace Enhancement

Signal Amplitude: $V_{oh} \geq 2.5 V$

Pulse Width: 10 ms ± 5 %

Signal Rising and Falling Time:
≤ 100 μs

IBP Analog Output

Bandwidth (- 3 dB; reference frequency: 10 Hz)
0 to 40 Hz

Max. Transmission Delay 30 ms

Sensitivity 1 V/100 mmHg, ± 5 %

(* These output signals are from MP1 connector of N1.)

Interfacing

Main Unit

DC power input 1

Multifunction Connector for Defib Sync and Analog Output
1

Multi-pin connector 1

Dock

AC power connector 1

RJ45 Network Connector, 100 Base-TX, IEEE 802.3
1

VGA connector 1

USB 2.0 connector 2

Host monitor connector 1

Modular Rack Slot

N1: 2 slots

Extended module: 1 slot

Barcode Scanner Support 1D and 2D barcode via dock

Keyboard & Mouse Support wire and wireless type via dock

Network Printer Support

Battery

Type Rechargeable lithium-ion

Capacity 2500mAh

Number of Battery 2 without internal CO₂

1 with internal CO₂

Run Time

When powered by two new fully-charged batteries at 25 °C±5 °C with 5-lead ECG , SpO₂, and auto NIBP measurements every 15 min, and factory default screen brightness, Wi-Fi disabled.

> 8 hrs without internal CO₂

When powered by one new fully-charged battery at 25 °C±5 °C with 5-lead ECG , SpO₂, IBP, CO₂ sampling, and auto NIBP measurements every 15 min, and factory default screen brightness, Wi-Fi enabled.

> 3 hrs with internal CO₂

Recharge Time When the monitor is off,
6 hours to 90% Without internal CO₂ module
3 hours to 90% With internal CO₂ module

Power Requirements

N1 Main Unit

Input 12VDC (±10 %), 2A

AC adapter/Transport dock

Input: 100 to 240 VAC (-15%, +10 %), 50/60 Hz

Output: 12VDC (±10 %), 2.5A

Docking Station

Input 100 to 240 VAC (±10 %), 50/60 Hz

Input Current 0.65A to 0.35A

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.

Type of Protection Class I
Degree of Protection ECG/TEMP/SpO₂/IBP/NIBP: CF
CO₂: BF

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.