BeneVision VMAX

Patient Monitor

Physical Specifications

Weight	9.5 kg Main unit, standard configuration, including battery, excluding recorder and iView. ≤0.295 kg (MRV Pod)
Size	555 x 356 x 58 mm Main unit, excluding handle and cable ties. 147 x 70 x 28.5 mm (MRV Pod)

Display

Type	Medical-grade color TFT LCD, capacitive multi-point touch screen, support zooming in or out on waveforms using gesture operations. Rotatable screen (Landscape and portrait)
Resolution	3840 x 2400 pixels (UHD)
Screen	25-inch, 178° viewing angle
Waveforms	Up to 16 waveforms (portrait) Up to 13 waveforms (landscape)

ECG

Meet standards of IEC 60601-2-27:2011 and IEC 60601-2-25:2011.

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	×0.125, ×0.25, ×0.5, ×1, ×2, ×4, auto
Waveform Format	Standard, Cabrera
Input Signal Range	± 10 mV (p-p)
Electrode Offset Potential Tolerance	± 850 mV
Bandwidth	
Diagnostic Mode:	0.05 to 150 Hz
Monitor Mode:	0.5 to 40 Hz(adult) 0.5 to 55 Hz(pediatric/neonate)
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 150 Hz), 35 Hz (0.05 to 35 Hz), or 20 Hz (0.05 to 20 Hz)
CMRR	
Diagnostic:	> 100 dB
Monitor, Surgical, ST mode:	> 110 dB (with notch filter on)
High Freq Cut-off:	> 100 dB
Pace Detection	
Amplitude:	± 2 mV to ± 700 mV
Width:	0.1 to 2 ms
Rise Time:	10 to 100 µs (no greater than 10% of pulse width)
Defibrillation Protection	Withstand 5000VAC (360J) defibrillation
Baseline Recovery Time	≤ 5 s (after defibrillation)
ESU Recovery Time	≤ 10 s

Provides Mindray & Glasgow resting 12-lead ECG algorithm.
Provides Mindray Multi(4)-lead ECG monitoring analysis algorithm.

Heart Rate

Measurement Range	
Adult:	10 to 300 bpm
Pediatric/Neonate:	10 to 350 bpm
Accuracy	± 1 bpm or ± 1%, whichever is greater.
Resolution	1 bpm

Arrhythmia Analysis

Patient	Adult/Pediatric/Neonate.
Monitored Arrhythmias	Asystole, V-Fib/V-Tach, V-Tach, Vent Brady, Extreme Tachy, Extreme Brady,Vent Rhythm, PVCs/min, Pauses/min, Couplet, Bigeminy, Trigeminy, R on T,Run PVCs, PVC, Tachy, Brady, Missed Beat, Pacer Not Pacing, Irr Rhythm, Irr Rhythm End,Pacer Not Capture, Pause, Multiform PVC, Nonsus V-Tach, A-Fib, SVT, SVCs/min, A-Fib End, 1st Degree AV Block, 2nd Degree AV Block Mobitz I, 2nd Degree AV Block Mobitz II, 3rd Degree AV Block

ST Segment Analysis

Patient	Adult/Pediatric/Neonate.
Range	- 2.5 to + 2.5 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 rpm
Resolution	1 rpm
Apnea Alarm Time	10, 15, 20, 25, 30, 35, 40 s
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 80601-2-61:2017.

Module	Mindray, Masimo, Nellcor
Range	0 to 100 % (Mindray, Nellcor) 1 to 100% (Masimo)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 (1 to 69%) ±2%, Pulse amplitude: >0.02%, Light penetration: >5%
Perfusion Indicator (PI)	Yes, for Mindray/Masimo SpO_2
Pitch Tone	Yes
Dual-SpO_2	Yes, SpO_2, SpO_2b, ΔSpO_2
Pulse Rate Range	
Mindray/Nellcor:	20 to 300 bpm
Masimo:	25 to 240 bpm
Pulse Rate Accuracy	
Mindray:	± 2 bpm (20 - 300 bpm)
Nellcor:	± 3 bpm (20 - 250 bpm) Unspecified (251 - 300 bpm)
Masimo:	± 3 bpm (non-motion) ± 5 bpm (motion)
PR Refresh Rate	≤ 1 s

Patented CPR Quality (CQI) is optional with Mindray SpO2 monitoring.

Temperature

Meet standard of ISO 80601-2-56:2018.

Method	Thermal resistance
Channels	Up to 8 channels
Units of Measure	Selectable °C or °F
Range	0 to 50 °C / 32 to 122 °F
Resolution	0.1 °C
Accuracy	± 0.1 °C or ± 0.2 °F (excluding probe error)
Refresh Rate	≤ 1 s

Raiing iThermometer® Wireless Temp Patch

Meet standard of ISO 80601-2-56:2018.

Units of Measure	Selectable °C or °F
Range	25 to 45 °C / 77 to 113 °F
Resolution	0.1 °C

Accuracy	± 0.1 °C or ± 0.2 °F

TrueTymp™ Tympanic Thermometer

Meet standards of ISO 80601-2-56

Units of Measure	Selectable °C or °F
Range	33 to 42 °C / 91.4 to 107.6 °F
Resolution	0.1 °C
Accuracy	Without probe cover At a room temperature of 16 °C to 40 °C: ±0.1 °C in measurement range 35.0 °C to 42.0 °C; ±0.2 °C in measurement range 33.0 °C to 35.0 °C (not included). At a room temperature of 10 °C to 16 °C (not included): ±0.2 °C With probe cover At a room temperature of 16°C to 40°C: ±0.2°C in measurement range 35.0°C to 42.0°C; ±0.3°C in measurement range 33.0°C to 35.0°C (not included). At a room temperature of 10°C to 16°C (not included): ±0.3°C
Measurement Time	≤ 2 s

Non-Invasive Blood Pressure

Meet standards of ISO 80601-2-30:2018.

Method	Oscillometry, support inflation and deflation
Modes	Manual, Auto(Interval, Clock), 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
Typical measurement time	≤ 15 s (Inflation algorithm, Adult: use CM1203/ CM1303/ CM1503 cuff, PR: 60 to 200 bpm, systolic pressure: 80 to 120 mmHg; Pediatric: use CM1202/CM1302/CM1502 cuff, PR:60 to 200 bpm, systolic:80 to 120 mmHg)
Cuff Deflation Technique	Step bleed
Initial Cuff Inflation (Deflation)	
Adult:	80 to 280 mmHg (default: 160 mmHg)
Pediatric:	80 to 210 mmHg (default: 120 mmHg)
Neonate:	60 to 140 mmHg (default: 90 mmHg)
Over Pressure Protection (Software)	
Adult/ Pediatric:	297 ± 3 mmHg
Neonate:	147 ± 3 mmHg
Max Measurement time	
Adult/Pediatric:	180 s
Neonate:	90 s
Assisting Venous Puncture	Yes
Pulse Rate Range	30 to 320 bpm
Pulse Rate Accuracy	± 3 bpm or ± 3 %, whichever is greater

IBP

Meet standard of IEC 60601-2-34:2011.

Number	Up to 8 channels
Measurement Range	-50 to 370 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 %
SPV Range	0 to 50 mmHg
PAWP	Yes
ICP Measurement	Support

Support waveforms overlapping by gesture operations.

Pulse Rate Range	20 to 350 bpm
Pulse Rate Accuracy	±1 bpm or ±1 %, whichever is greater

Cardiac Output

Meet standard of ISO 80601-2-56:2018.

Method	Thermodilution
Measurement Range	0.1 - 20 L/min
Resolution	0.1 L/min
Accuracy	±0.1 L/min or ±5%, whichever is greater
TB Range	23 to 43 °C / 73.4 to 109.4 °F
TI Range	0 to 27 °C / 32 to 80.6 °F
SV Range	0 to 300 mL
SVI Range	0 to 200 mL/m^2
TB, TI Accuracy	± 0.1 °C (without sensor)
TB, TI Resolution	0.1 °C

PiCCO

Meet standard of ISO 80601-2-56:2018.

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.

TB Range	25 to 45 °C / 77 to 113 °F
TI Range	0 to 30 °C / 32 to 86 °F
TB, TI Accuracy	± 0.1 °C (excluding probe error)
TB, TI Resolution	0.1 °C
pArt/pCVP Range	-50 to 300 mmHg
pArt/pCVP Accuracy	± 1 mmHg or ± 2 % (excluding sensor error), whichever is greater

Provides Monitoring Parameters C.O., C.I, TI, CCO, CCI, SV, SVI, HR, GEF, CFI, dPmx, GEDV, GEDI, ITBV, ITBI, SVV, PPV, SVR, SVRI, pCVP, pArt-M, pArt-D, pArt-S, EVLW, ELWI, CPO, CPI, PVPI, TB

FloTrac

Meet standard of IEC 60601-2-34:2011.

CCO Range	1.0 to 20.0 L/min
CCO Reproducibility	± 6% or 0.1 L/min, whichever is greater
CCI Range	0.0 to 20.0 L/min/m^2
SV Range	0 to 300 mL
SVI Range	0 to 200 ml/m^2
SVV/PPV Range	0 to 99%
SVR Range	0 to 5000 DS/cm^5
SVRI Range	0 to 9950 DS-m^2/cm^5
ftArt Range	0 to 300 mmHg
ftArt Accuracy	± 4 mmHg or ± 4 %, whichever is greater, from -30mmHg to 300 mmHg
PR Range	0 to 220 bpm
PR Accuracy	A_{rms} ≤ 3 bpm

Provides Monitoring Parameters CCO, CCI, SV, SVI, PR, EF, PPV, SVV, EDVI, SVR, SVRI, ftArt-S, ftArt-M, ftArt-D

ICG

Method	Thoracic electrical bioimpedance (TEB)
HR Range	44 to 185 bpm (ICG), accuracy ±2 bpm
C.O. Range	1.0 to 15 L/min
SV Range	5 to 250 ml

Provides Monitoring Parameters C.O., C.I., SV, SVI, HR, LCW, LCWI, LVSW, LVSWI, ACI, PEP, VI, STR, LVET, EF, TFI, TFC, CVP, PAWP, EDVI, SVR, SVRI, PVR, PVRI, Art-M, Art-S, Art-D

Continuous Cardiac Output Interface

Measured Parameter	Consistent with CCO-related parameters outputted by Vigilance II®, Vigileo™, EV1000 or HemoSphere

Artema Sidestream CO_2

Meet standard of ISO 80601-2-55:2018.

Measurement Range	
$EtCO_2$:	0 to 152 mmHg
O_2 (optional):	0 to 100 %
CO_2 Accuracy (full accuracy mode)	
0 to 40 mmHg:	± 2mmHg
41 to 76 mmHg:	± 5% of reading
77 to 100 mmHg:	± 8% of reading
101 to 152 mmHg:	± 10% of reading
O_2 Accuracy	
0 to 25%:	±1 %
26 to 80%:	±2 %

81 to 100%: ±3 %
Resolution
$EtCO_2$: 1 mmHg
O_2 (optional): 1 %
Sample Flow Rate(with O2 monitoring)
Adult/Pediatric: 120 ml/min (without RM module)
150 ml/min (with RM module)
Neonate: 90 ml/min
Sample Flow Rate(without O2 monitoring)
Adult/Pediatric: 120 ml/min
Neonate: 90 ml/min or 70 ml/min, selectable
Sample Flow Rate(Connected a DRYLINE PRIME watertrap)
Adult/Ped/ Neo: 50ml/min
Sample Flow Rate Tolerance
±10 ml/min or ±10 %, whichever is greater.
Start-up Time 90 s (maximum), 20 s (typically)
Measured with a DRYLINE II neonatal watertrap and 2.5-meter neonatal sampling line, or a DRYLINE II adult watertrap and a 2.5-meter adult sampling line, or a DRYLINE PRIME watertrap and an Oridion CO2 sampling line:
Rise Time
$EtCO_2$ without O_2: <240 ms @ 70 ml/min (Neonate watertrap)
<240 ms @ 90 ml/min (Neonate watertrap)
<300 ms @ 120 ml/min (Adult watertrap)
<280 ms @ 50 ml/min(Drylineprime watertrap)
$EtCO_2$ with O_2: <240 ms @ 90 ml/min (Neonate watertrap)
<300 ms @ 120 ml/min (Adult watertrap)
<280 ms @ 50 ml/min(Drylineprime watertrap)
$EtCO_2$ with O_2 &RM: <240 ms @ 150 ml/min (Adult watertrap)
O_2 (optional): ≤ 800 ms @ 90 ml/min (Neonate watertrap)
≤ 750 ms @ 120 ml/min (Adult watertrap)
O_2 (optional) with RM: ≤650 ms @ 150 ml/min (Adult watertrap)
Response Time
$EtCO_2$ without O_2: ≤ 5.0 s @ 70 ml/min (Neonate watertrap)
≤ 4.5 s @ 90 ml/min (Neonate watertrap)
≤ 5.0 s @ 120 ml/min (Adult watertrap)
<5 s @ 50 ml/min(Drylineprime watertrap)
$EtCO_2$ with O_2: ≤ 4.5 s @ 90 ml/min (Neonate watertrap)
≤ 5.0 s @ 120 ml/min (Adult watertrap)
<5 s @ 50 ml/min(Drylineprime watertrap)
$EtCO_2$ with O_2 &RM: ≤ 4.5 s @ 150 ml/min (Adult watertrap)
O_2 (optional): ≤ 4.5 s @ 90 ml/min (Neonate watertrap)
≤ 5.0 s @ 120 ml/min (Adult watertrap)
O_2 (optional) with RM: ≤ 4.5 s @ 150 ml/min (Adult watertrap)
awRR Range 0 to 150 rpm
awRR Accuracy ± 1 rpm
Apnea Time 10, 15, 20, 25, 30, 35, 40 sec
Provide VCO_2, VO_2, $MVCO_2$, MVO_2, EE, RQ parameters, when monitoring with RM module.

Oridion Microstream CO_2

Meet standard of ISO 80601-2-55:2018.
Measurement Range 0 to 99 mmHg
Resolution 1 mmHg
Accuracy
0 to 38 mmHg: ±2 mmHg
39 to 99 mmHg: ±(5 % × reading + 8 % × (reading – 39 mmHg)
Sample Flow Rate 50 ml/min
Initialization Time 30 s (typical)
Response Time ≤ 4.3 s (with any 2m FilterLine)
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

Mainstream CO_2

Meet standard of ISO 80601-2-55:2018.
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 ms
awRR Range 0 to 150 rpm
awRR Accuracy ±1 rpm
Provide VCO_2, $MVCO_2$, $FeCO_2$, $SlopeCO_2$, Vtalv, MValv, Vdaw, Vdaw/Vt, Vdalv, Vdalv/Vt, Vdphy, Vd/Vt, when monitoring with RM module.

Anesthesia Gases

Meet standard of ISO 80601-2-55:2018.
Sampling Rate
Adult/pediatric: 200 ml/min
Neonate: 120 ml/min
Sampling Rate Accuracy ±10 ml/min or ±10%, whichever is greater.
Refresh Rate ≤ 1 s
Warm-up Time 45 s (Iso accuracy mode)
10 min (full accuracy mode)
Measurement Range
CO_2: 0 to 30 %
N_2O: 0 to 100 %
Des/Sev/Enf/Iso/Hal:
0 to 30 %
O_2: 0 to 100 %
awRR: 2 to 100 rpm
Resolution
CO_2: 0.1 %
N_2O: 1 %
Des/Sev/Enf/Iso/Hal:
0.1 %
O_2: 1 %
awRR: 1 rpm
Full Accuracy

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

Rise Time (10% to 90%)
Sampling flow 120 ml/min, using the DRYLINE II ™ neonatal watertrap and a 2.5m sampling line,
CO_2/ N_2O: ≤ 250 ms
Iso/Hal/Sev/Des: ≤ 300 ms
Enf: ≤ 350 ms
O_2: ≤ 600 ms
Sampling flow 200ml/min, using the DRYLINE II ™ adult watertrap and a 2.5m sampling line:
CO_2/ N_2O: ≤ 250 ms
Iso/Hal/Sev/Des: ≤ 300 ms
Enf: ≤ 350 ms
O_2: ≤ 500 ms
Response Time
Sampling flow 120 ml/min, using the DRYLINE II ™ neonatal watertrap and a 2.5m sampling line,
CO_2: ≤ 4 s
N_2O: ≤ 4.2 s
O_2: ≤ 4 s
Enf /Iso/Hal/Sev/Des: ≤ 4.4 s
Sampling flow 200ml/min, using DRYLINE II ™ adult watertrap and a 2.5m sampling line:
CO_2: ≤ 4.2 s
N_2O: ≤ 4.3 s
O_2: ≤ 4 s
Enf/Iso/Hal/Sev/Des: ≤ 4.5 s
Apnea Time 10,15,20,25,30,35,40 sec
Provide MAC value (support calibrated by age).
Support two mixed gas identify and monitoring.

RM

Method Diff-Pressure flow

Measurement Range
- Flow: Adult/Pediatric: ± (2 to 120) L/min; Neonate: ± (0.5 to 30) L/min
- Paw: -20 to 120 cmH_2O
- MVe/MVi: Adult/Pediatric: 2 to 60 L/min; Neonate: 0.5 to 15 L/min
- TVe/TVi: Adult/Pediatric: 100 to 1500 ml; Neonate: 20 to 500 ml
- awRR Range: 4 to 120 rpm

Resolution
- Flow: 0.1 L/min
- Paw: 0.1 cmH_2O
- MVe/MVi: 0.01 L/min (airflow < 10 L/min); 0.1 L/min (airflow ≥ 10 L/min)
- TVe/TVi: 1 ml
- awRR: 1 rpm

Accuracy
- Flow: Adult/Pediatric: ± 1.2 L/min or ± 10% of the reading, whichever is greater. Neonate: ± 0.5 L/min or ± 10%, whichever is greater.
- Paw: ± 3% of reading
- MVe/MVi: ± 10% of reading
- TVe/TVi: Adult/Pediatric: ±10% or ±15 ml, whichever is greater. Neonate: ±10% or ±6 ml, whichever is greater.
- awRR: ±1 rpm (4 to 99 rpm); ±2 rpm (100 to 120 rpm)

Provide loops display.
Monitoring parameters include PEEP, Pmean, PIP, Pplat, PEF, PIF, MVe, MVi, TVe, TVi, RR, I:E, FEV1.0, Compl, RSBI, NIF, WOB, RAW.

rSO_2

Patient	Adult/Pediatric/Neonate.
Method	NIRS (Near Infrared Spectroscopy)
Number	Up to 4 channels (rSO2-a module)
Measurement Range	15 to 95 % (rSO2-a module)

NMT

Meet the standard of IEC 60601-2-10:2023

Sensor Type	Acceleromyography sensor
Stimulation Modes	ST, TOF, PTC, DBS
Stimulation Current Range	0 to 60 mA in increments of 5 mA
Stimulation Current Accuracy	± 5% or ±2 mA, whichever is greater.
Stimulation Pulse Width	100, 200 or 300μs, monophasic rectangle pulse
Stimulation Pulse Width Accuracy	± 10 %
Max. Output Voltage	300 V

BISx/BISx4

Meet standard of IEC 80601-2-26:2019.

Method	Bispectral Index
Input Impedance	> 5 MΩ
Frequency Range and Bandwidth	0.25 to 100 Hz
BIS Range	0 to 100 (BIS, BIS L, BIS R)
SQI Range	0 to 100 % (SQI, SQI L, SQI R)
ASYM	0 to 100%
DSA Trend	Yes, both BISx & BISx4 support

EEG/aEEG

Meet standard of IEC 80601-2-26:2019.

EEG/aEEG Channels	Up to 4 channels
Input Signal Range	± 2 mVac
Max. Offset Voltage	± 500 mV DC
CMRR	≥ 100 dB @50 Hz / 60 Hz
Noise Level	≤ 0.5 μV rms (0.5 to 70 Hz)
Differential Input Impedance	≥ 15 MΩ @10 Hz
Electrode Impedance	
- Range	1 to 90 kΩ
- Accuracy	± 1 kΩ or ± 10%, whichever is greater
Sampling Frequency	EEG-1 module/aEEG module: 256Hz
Frequency Range and Bandwidth	EEG-1/aEEG module: 0.1 to 110 Hz
Spectrum Analysis	SEF, MF, PPF, TP, SR, Delta, Theta, Alpha, Beda, Alpha/Delta
Trend	DSA, CSA

ANI

Patient	Adult, Pediatric (over 12 years old)
Measurement Range	ANIi: 12 to100 ANIm: 12 to 100 Energy: 0.00 to 65.54

Recorder

Type	Thermal dot array
Speed	25 mm/sec, 50 mm/sec
Trace	Up to 3 (paper 50 mm width, 20 m length)

Supports two-slots recorder module.

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, combined alarms, etc.)

Data Storage

Trends Data	≥ 168 hrs @ 1min
Events	≥6000 events, including alarms events
Arrhythmia Events	≥3000 events
NIBP	1000 sets
Interpretation of Resting 12-lead ECG Results	≥20 sets
Full Disclosure	≥72 hrs, including 12-ch ECG, 8-ch IBP, 1-ch CO2 and 2-ch RM waveforms
EEG waveforms	≥48 hrs
OxyCRG	≥24 hrs, including HR, SPO2 trend and Resp waveform
ST Review	≥120 hrs @1 min
Minitrend	Yes

Special Functions

Clinical Assistive Application (CAA):
HemoSight™, ST Graphic™, SepsisSight™, BoA Dashboard™, NeuroSight, EWS, GCS, ECG 24h Summary, Pace View, InfusionView, AF Summary, CPR Dashboard in Resus Mode
Support calculations (Drug, Hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.
Support wireless connection with BeneVision TM80 and BP10.
Support nView remote display tool
Support wireless connection with TE Air handheld Ultrasound.
Support voice control for high-frequency monitoring operations.

Wi-Fi Communications（Wi-Fi 6 technology）

Protocol	IEEE 802.11a/b/g/n/ac/ax
Modulation Mode	BPSK, QPSK, 16QAM, 64QAM, 256QAM and 1024QAM
Operating Frequency	2400 to 2483.5 MHz 5150 to 5250 MHz, 5250 to 5350 MHz, 5470 to 5725 MHz, 5725 to 5850 MHz 5.925 to 7.125 GHz
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: MCS0 to MCS7 IEEE 802.11ac: MCS0 to MCS9 IEEE 802.11ax: MCS0 to MCS11
Output Power	< 20dBm (detection mode: RMS)
Operating Mode	As station, access AP for data transmission P2P mode(communicate with TE Air)
Data Security	As station: Standards: WPA-PSK, WPA2-PSK, WPA-Enterprise, WPA2-Enterprise, WPA3-OWE WPA3-SAE, WPA3-Enterprise EAP methods: EAP-FAST, EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, PEAP-TLS, LEAP Encryption: TKIP and AES P2P mode: Standards: WPA2-PSK Encryption: AES

Bluetooth Communications

Protocol	Bluetooth 5.0
Modulation Mode	GFSK
Data Security	Encryption: AES

NFC Communications

Protocol	ISO/IEC 14443 A; ISO/IEC 14443 B
Working Mode	READER, CARD
Modulation Mode	ASK
Data Security	Encryption: private

Output

Auxiliary Output

Standard	Meets the requirements of IEC 60601-1: 2020, 1min short-circuit to the ground, no fault

ECG Analog Output

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

Diagnostic Mode:	0.05 to 150 Hz
Monitor Mode:	0.5 to 40 Hz(adult), 0.5 to 55Hz(Ped/Neo)
Surgical Mode:	1 to 20 Hz
ST Mode:	0.05 to 40 Hz
Max. QRS Delay	25 ms (in diagnostic mode, and non-paced)
Sensitivity	1 V/mV, ± 5 %

Pace Enhancement

Signal Amplitude:	V_{oh} ≥ 2.5 V
Pulse Width:	10 ms ± 5 %
Signal Rising and Falling Time:	≤ 100 µs

IBP Analog Output

Bandwidth (- 3 dB; reference frequency: 1 Hz)

	0 to 40 Hz
Max. Transmission Delay	30 ms
Sensitivity	1 V/100 mmHg, ± 5 %

Interfacing

Main Unit

- 1 AC Power Connector
- 1 RJ45 Network Connector, 1000 Base-T
- 2 USB 2.0 Connector
- 2 USB 3.0 Connector
- 2 Satellite Module Rack Connector for SMR/N1 dock station
- 1 HDMI for the secondary display
- 1 BNC Connector (on SMR)
- 1 Equipotential Grounding Terminal

Modular iView

- 1 HDMI Video Output Connector
- 2 USB 2.0 Connector
- 2 USB 3.0 Connector
- 1 RJ45 Network Connector, 1000 Base-T

Multifunction Connector for Defib Sync and Analog Output

1 on multi-parameter module

Barcode Scanner	Support 1D and 2D barcode
Keyboard & Mouse	Support wire and wireless type
Remote Control	Support
Network Printer	Support

Battery

Type	Rechargeable lithium-ion
Number of Battery	1
Capacity	5600 mAh (for main unit) 1900 mAh (for MRV Pod)
Run Time	≥ 1 hrs (main unit) when powered by a new fully-charged battery at 25 °C ± 5 °C, with 12-lead ECG, Resp, SpO2, 4-ch IBP, 2-ch Temp, CO2, C.O. , and NIBP measurements taken every 15 minutes, WiFi enabled, and screen brightness set to 1. ≥ 4 hrs (MRV Pod) when powered by a new fully-charged battery at 25 °C ± 5 °C, with 5-lead ECG, SpO2, 2-ch IBP, and NIBP measurements taken every 15 minutes, MRV Pod communicates with the monitor.
Recharge Time	Battery for main unit 5 hrs to 90% when the monitor is off. Battery for MRV Pod 6 hrs to 90%

Power Requirements

AC Voltage	Man unit: 100 to 240 VAC (±10 %) MRV Pod: 12 VDC (range: 8 to 13 VDC)
Current	2.8 to1.6 A
Frequency	50 Hz/60 Hz (±3 Hz)

Environmental

Temperature	Main unit & MRV Pod Operating: 0 to 40 °C (32 to 104 °F) Storage: -20 to 60 °C (-4 to 140 °F)
Humidity	Main unit Operating: 15 to 95 % (non condensing) Storage: 5 to 95 % (non condensing) MRV Pod Operating: 15 to 95 % (non condensing) Storage: 10 to 95 % (non condensing)
Barometric	Main unit & MRV Pod 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)

Safety

Type of Protection	Class I
Degree of Protection	ECG/Resp/Temp/IBP/SpO2/C.O./PiCCO/NIBP/EEG/NMT/ANI/FloTrac module: CF TympanicTemp/CO2/AG/ICG/BIS/RM/rSO2 module: BF
Protection Against Ingress of Fluids	IP21(Main unit) IP22(MRV Pod connecting accessories)
Protection Against Hazard of Dropping	No damage by dropping from a height of 1.5m on six faces (MRV Pod)

Some of functions marked with an asterisk may not be available. Please contact your local Mindray sales representative for the most current information.

www.mindray.com

P/N:ENG- BeneVision VMAX Datasheet-210285x5P-20250428

mindray
healthcare within reach