

# 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) 3840 x 2400 pixels (UHD)
Resolution 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) Unspecified (1 to 69%) ± 2%, Pulse amplitude: >0.02%, Light penetration: >5%
Perfusion Indicator (PI)	Yes, for Mindray/Masimo SpO <sub>2</sub>
Pitch Tone	Yes
Dual-SpO <sub>2</sub>	Yes, SpO <sub>2</sub> , SpO <sub>2</sub> b, ΔSpO <sub>2</sub>
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 SpO <sub>2</sub> 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<sup>2</sup>  
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 0.1L/min, whichever is greater  
CCI Range 0.0 to 20.0 L/min/m<sup>2</sup>  
SV Range 0 to 300 mL  
SVI Range 0 to 200 ml/m<sup>2</sup>  
SVV/PPV Range 0 to 99%  
SVR Range 0 to 5000 DS/cm<sup>5</sup>  
SVRI Range 0 to 9950 DS-m<sup>2</sup>/cm<sup>5</sup>  
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<sub>rms</sub> ≤ 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<sub>2</sub>

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

Measurement Range  
EtCO<sub>2</sub>: 0 to 152 mmHg  
O<sub>2</sub> (optional): 0 to 100 %  
CO<sub>2</sub> 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<sub>2</sub> Accuracy  
0 to 25%: ± 1 %  
26 to 80%: ± 2 %

81 to 100%:	±3 %
<b>Resolution</b>	
EtCO <sub>2</sub> :	1 mmHg
O <sub>2</sub> (optional):	1 %
<b>Sample Flow Rate(with O2 monitoring)</b>	
Adult/Pediatric:	120 ml/min ( without RM module) 150 ml/min ( with RM module)
Neonate:	90 ml/min
<b>Sample Flow Rate(without O2 monitoring)</b>	
Adult/Pediatric:	120 ml/min
Neonate:	90 ml/min or 70 ml/min, selectable
<b>Sample Flow Rate(Connected a DRYLINE PRIME watertrap)</b>	
Adult/Ped/ Neo:	50ml/min
<b>Sample Flow Rate Tolerance</b>	
	±10 ml/min or ±10 %, whichever is greater.
<b>Start-up Time</b>	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 CO <sub>2</sub> sampling line:	
<b>Rise Time</b>	
EtCO <sub>2</sub> without O <sub>2</sub> :	<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 <sub>2</sub> with O <sub>2</sub> :	<240 ms @ 90 ml/min (Neonate watertrap) <300 ms @ 120 ml/min (Adult watertrap) <280 ms @ 50 ml/min(Drylineprime watertrap)
EtCO <sub>2</sub> with O <sub>2</sub> & RM:	<240 ms @ 150 ml/min (Adult watertrap)
O <sub>2</sub> (optional):	≤ 800 ms @ 90 ml/min (Neonate watertrap) ≤ 750 ms @ 120 ml/min (Adult watertrap)
O <sub>2</sub> (optional) with RM:	≤650 ms @ 150 ml/min (Adult watertrap)
<b>Response Time</b>	
EtCO <sub>2</sub> without O <sub>2</sub> :	≤ 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 <sub>2</sub> with O <sub>2</sub> :	≤ 4.5 s @ 90 ml/min (Neonate watertrap) ≤ 5.0 s @ 120 ml/min (Adult watertrap) <5 s @ 50 ml/min(Drylineprime watertrap)
EtCO <sub>2</sub> with O <sub>2</sub> & RM:	≤ 4.5 s @ 150 ml/min (Adult watertrap)
O <sub>2</sub> (optional):	≤ 4.5 s @ 90 ml/min (Neonate watertrap) ≤ 5.0 s @ 120 ml/min (Adult watertrap)
O <sub>2</sub> (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 <sub>2</sub> , VO <sub>2</sub> , MVCO <sub>2</sub> , MVO <sub>2</sub> , EE, RQ parameters, when monitoring with RM module.	

#### Oridion Microstream CO<sub>2</sub>

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

Measurement Range	0 to 99 mmHg
Resolution	1 mmHg
<b>Accuracy</b>	
0 to 38 mmHg:	±2 mmHg
39 to 99 mmHg:	±(5 % × reading + 8 % × (reading - 39 mmHg))
<b>Sample Flow Rate</b>	50 ml/min
<b>Initialization Time</b>	30 s (typical)
<b>Response Time</b>	≤ 4.3 s (with any 2m FilterLine)
awRR Range	0 to 150 rpm
<b>awRR Accuracy</b>	
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<sub>2</sub>

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

Measurement Range	0 to 150 mmHg
Resolution	1 mmHg
<b>Accuracy</b>	
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
<b>Rise Time</b>	< 60 ms
awRR Range	0 to 150 rpm
awRR Accuracy	±1 rpm
Provide VCO <sub>2</sub> , MVCO <sub>2</sub> , FeCO <sub>2</sub> , SlopeCO <sub>2</sub> , 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.

<b>Sampling Rate</b>		
Adult/pediatric:	200 ml/min	
Neonate:	120 ml/min	
<b>Sampling Rate Accuracy</b>	±10 ml/min or ±10%, whichever is greater.	
<b>Refresh Rate</b>	≤ 1 s	
<b>Warm-up Time</b>	45 s (Iso accuracy mode) 10 min (full accuracy mode)	
<b>Measurement Range</b>		
CO <sub>2</sub> :	0 to 30 %	
N <sub>2</sub> O:	0 to 100 %	
Des/Sev/Enf/Iso/Hal:	0 to 30 %	
O <sub>2</sub> :	0 to 100 %	
awRR:	2 to 100 rpm	
<b>Resolution</b>		
CO <sub>2</sub> :	0.1 %	
N <sub>2</sub> O:	1 %	
Des/Sev/Enf/Iso/Hal:	0.1 %	
O <sub>2</sub> :	1 %	
awRR:	1 rpm	
<b>Full Accuracy</b>		
Gases	Range (%)	Accuracy (%ABS)
CO <sub>2</sub> :	0 ≤ CO <sub>2</sub> ≤ 1	± 0.1
	1 < CO <sub>2</sub> ≤ 5	± 0.2
	5 < CO <sub>2</sub> ≤ 7	± 0.3
	7 < CO <sub>2</sub> ≤ 10	± 0.5
	CO <sub>2</sub> > 10	Not specified
N <sub>2</sub> O:	0 ≤ N <sub>2</sub> O ≤ 20	± 2
	20 < N <sub>2</sub> O ≤ 100	± 3
Des:	0 ≤ Des ≤ 1	± 0.15
	1 < Des ≤ 5	± 0.2
	5 < Des ≤ 10	± 0.4
	10 < Des ≤ 15	± 0.6
	15 < Des ≤ 18	± 1
	Des > 18	Not specified
Sev:	0 ≤ Sev ≤ 1	± 0.15
	1 < Sev ≤ 5	± 0.2
	5 < Sev ≤ 8	± 0.4
	Sev > 8	Not specified
Enf/Iso/Hal:	0 ≤ Enf/Iso/Hal ≤ 1	± 0.15
	1 < Enf/Iso/Hal ≤ 5	± 0.2
	Enf/Iso/Hal > 5	Not specified
O <sub>2</sub> :	0 ≤ O <sub>2</sub> ≤ 25	± 1
	25 < O <sub>2</sub> ≤ 80	± 2
	80 < O <sub>2</sub> ≤ 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<sub>2</sub>/ N<sub>2</sub>O: ≤ 250 ms  
Iso/Hal/Sev/Des: ≤ 300 ms  
Enf: ≤ 350 ms  
O<sub>2</sub>: ≤ 600 ms

Sampling flow 200ml/min, using the DRYLINE II™ adult watertrap and a 2.5m sampling line:  
CO<sub>2</sub>/ N<sub>2</sub>O: ≤ 250 ms  
Iso/Hal/Sev/Des: ≤ 300 ms  
Enf: ≤ 350 ms  
O<sub>2</sub>: ≤ 500 ms

#### Response Time

Sampling flow 120 ml/min, using the DRYLINE II™ neonatal watertrap and a 2.5m sampling line,  
CO<sub>2</sub>: ≤ 4 s  
N<sub>2</sub>O: ≤ 4.2 s  
O<sub>2</sub>: ≤ 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<sub>2</sub>: ≤ 4.2 s  
N<sub>2</sub>O: ≤ 4.3 s  
O<sub>2</sub>: ≤ 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

<b>Measurement Range</b>	
Flow	Adult/Pediatric: $\pm (2 \text{ to } 120) \text{ L/min}$ Neonate: $\pm (0.5 \text{ to } 30) \text{ L/min}$
Paw	-20 to 120 cmH <sub>2</sub> O
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
<b>Resolution</b>	
Flow	0.1 L/min
Paw	0.1 cmH <sub>2</sub> O
MVe/MVi	0.01 L/min (airflow < 10 L/min) 0.1 L/min (airflow $\geq 10 \text{ L/min}$ )
TVe/TVi	1 ml
awRR:	1 rpm
<b>Accuracy</b>	
Flow	Adult/Pediatric: $\pm 1.2 \text{ L/min}$ or $\pm 10\%$ of the reading, whichever is greater. Neonate: $\pm 0.5 \text{ L/min}$ or $\pm 10\%$ , whichever is greater.
Paw	$\pm 3\%$ of reading
MVe/MVi	$\pm 10\%$ of reading
TVe/TVi	Adult/Pediatric: $\pm 10\%$ or $\pm 15 \text{ ml}$ , whichever is greater. Neonate: $\pm 10\%$ or $\pm 6 \text{ ml}$ , whichever is greater.
awRR:	$\pm 1 \text{ rpm}$ (4 to 99 rpm) $\pm 2 \text{ rpm}$ (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.	

<b>rSO<sub>2</sub></b>	
Patient	Adult/Pediatric/Neonate.
Method	NIRS (Near Infrared Spectroscopy)
Number	Up to 4 channels (rSO <sub>2</sub> -a module)
Measurement Range	15 to 95 % (rSO <sub>2</sub> -a module)

<b>NMT</b>	
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	$\pm 5\%$ or $\pm 2 \text{ mA}$ , whichever is greater.
Stimulation Pulse Width	100, 200 or 300 $\mu\text{s}$ , monophasic rectangle pulse
Stimulation Pulse Width Accuracy	$\pm 10\%$
Max. Output Voltage	300 V

<b>BISx/BISx4</b>	
Meet standard of IEC 80601-2-26:2019.	
Method	Bispectral Index
Input Impedance	> 5 M $\Omega$
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

<b>EEG/aEEG</b>	
Meet standard of IEC 80601-2-26:2019.	
EEG/aEEG Channels	Up to 4 channels
Input Signal Range	$\pm 2 \text{ mVac}$
Max. Offset Voltage	$\pm 500 \text{ mV DC}$
CMRR	$\geq 100 \text{ dB @ } 50 \text{ Hz} / 60 \text{ Hz}$
Noise Level	$\leq 0.5 \mu\text{V rms}$ (0.5 to 70 Hz)
Differential Input Impedance	$\geq 15 \text{ M}\Omega @ 10 \text{ Hz}$

<b>Electrode Impedance</b>	
Range	1 to 90 k $\Omega$
Accuracy	$\pm 1 \text{ k}\Omega$ or $\pm 10\%$ , 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, Beta, Alpha/Delta
Trend	DSA, CSA

<b>ANI</b>	
Patient	Adult, Pediatric (over 12 years old)

<b>Measurement Range</b>	ANli: 12 to 100 ANlm: 12 to 100 Energy: 0.00 to 65.54
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<b>Recorder</b>	
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.	

<b>Alarms</b>	
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.)	

<b>Data Storage</b>	
Trends Data	$\geq 168 \text{ hrs @ } 1 \text{ min}$
Events	$\geq 6000$ events, including alarms events
Arrhythmia Events	$\geq 3000$ events
NIBP	1000 sets
Interpretation of Resting 12-lead ECG Results	$\geq 20$ sets
Full Disclosure	$\geq 72 \text{ hrs}$ , including 12-ch ECG, 8-ch IBP, 1-ch CO <sub>2</sub> and 2-ch RM waveforms
EEG waveforms	$\geq 48 \text{ hrs}$
OxyCRG	$\geq 24 \text{ hrs}$ , including HR, SPO <sub>2</sub> trend and Resp waveform
ST Review	$\geq 120 \text{ hrs @ } 1 \text{ min}$
Minitrend	Yes

<b>Special Functions</b>	
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.	

<b>Wi-Fi Communications (Wi-Fi 6 technology)</b>	
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

<b>Bluetooth Communications</b>	
Protocol	Bluetooth 5.0
Modulation Mode	GFSK
Data Security	Encryption: AES

<b>NFC Communications</b>	
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,  $\pm 5\%$

## Pace Enhancement

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

**Pulse Width:** 10 ms  $\pm 5\%$

**Signal Rising and Falling Time:**  
 $\leq 100 \mu s$

## IBP Analog Output

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

0 to 40 Hz

**Max. Transmission Delay** 30 ms

**Sensitivity** 1 V/100 mmHg,  $\pm 5\%$

## 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**  $\geq 1$  hrs (main unit)

when powered by a new fully-charged battery at 25 °C  $\pm 5$  °C, with 12-lead ECG, Resp, SpO<sub>2</sub>, 4-ch IBP, 2-ch Temp, CO<sub>2</sub>, C.O., and NIBP measurements taken every 15 minutes, WiFi enabled, and screen brightness set to 1.  
 $\geq 4$  hrs (MRV Pod)

when powered by a new fully-charged battery at 25 °C  $\pm 5$  °C, with 5-lead ECG, SpO<sub>2</sub>, 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 ( $\pm 10\%$ )

MRV Pod: 12 VDC (range: 8 to 13 VDC)

### Current

2.8 to 1.6 A

### Frequency

50 Hz/60 Hz ( $\pm 3$  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/SpO<sub>2</sub>/C.O./PiCCO/NIBP/EEG/  
NMT/ANI/FloTrac module: CF  
Tympanic Temp/CO<sub>2</sub>/AG/ICG/BIS/RM/rSO<sub>2</sub>  
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](http://www.mindray.com)

### Supplied by:

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