

ePM 10/12/15

Patient monitor



Physical Specifications

Weight	ePM 10: 3.2 Kg ePM 12: 3.4 Kg ePM 15: 4.9 Kg (Standard configuration, excluding recorder, battery and accessories.)
Size	ePM 10: 271 x 226 x 173 mm ePM 12: 312 x 258 x 174 mm ePM 15: 397 x 293 x 181 mm
Display screen	Capacitive screen, support multi-touch operation. ePM 10: 10.1-inch, 1280 x 800 pixels ePM 12: 12.1-inch, 1280 x 800 pixels ePM 15: 15.6-inch, 1366 x 768 pixels
Display channel	ePM 10: Up to 8 waveform channels ePM 12: Up to 10 waveform channels ePM 15: Up to 12 waveform channels
ePM 10 main unit complies with the requirements of 6.3.4.3, EN1789	
Drop test:	0.75m for each of the 6 surfaces (ePM 10)

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	± 10 mV (p-p)
Electrode offset potential tolerance	± 800 mV
Sweep speed	6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Gain	x 0.125, x 0.25, x 0.5, x 1, x 2, x 4, auto
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
CMRR	Diagnostic mode: > 90 dB Monitor, Surgical, ST mode: > 105 dB
Pace detection	Amplitude: ± 2 mV to ± 700 mV Width: 0.1 to 2 ms Rise time: 10 to 100 µs
Defib. protection	Withstand 5000V (360J) defibrillation
Recovery time	<5 s
Provides glasgow resting 12-lead ECG algorithm, and 12-lead ECG is not available for ePM 10	

Heart Rate

HR rang	Adult: 15 to 300 bpm Pediatric/Neonate: 15 to 350 bpm
HR accuracy	± 1 bpm or ± 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, 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 (for adult only).

ST Segment Analysis

Intended use for adult, pediatric and neonate.

ST range	- 2.5 to + 2.5 mV
ST accuracy	± 0.02 mV or ± 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, ΔQTc
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
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

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: ± 2 % (70 to 100%) Neonate: ± 3 % (70 to 100%)

Perfusion indicator (PI)	Yes, for Mindray SpO ₂
Pitch tone	Yes
Refreshing rate	≤ 1 s

PR

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

Temperature

Meet standard of ISO 80601-2-56.

Technique	Thermal resistance
Channels	2 channels
Temp range	0 to 50 °C (32 to 122 °F)
Temp accuracy	± 0.1 °C or ± 0.2 °F (without probe)
Temp resolution	0.1 °C
Refreshing rate	≤ 1 s

NIBP

Meet standards of ISO 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

Diastolic range	Neonate: 25 to 140 mmHg Adult: 10 to 250 mmHg Pediatric: 10 to 200 mmHg	for every 1 mmHg if the reading is more than 38 mmHg) (39 to 150 mmHg)
Mean range	Neonate: 10 to 115 mmHg Adult: 15 to 260 mmHg Pediatric: 15 to 215 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)
NIBP accuracy	Neonate: 15 to 125 mmHg Max mean error: ± 5 mmHg Max standard deviation: 8 mmHg	Apnea time 10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s
NIBP resolution	1 mmHg	Capnostat Mainstream CO₂ Meet standard of ISO 80601-2-55.
Assisting venous puncture	Yes	Rise time < 60 ms Sweep speed 3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
IBP		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)
Meet standard of IEC 60601-2-34.		awRR range 0 to 150 rpm awRR accuracy ± 1 rpm
Channels	2 channels	Data Review For 2G storage
Sensitivity	5 μ V/V/mmHg	Trends data Up to 120 hours @ 1min
Impedance range	300 to 3000 Ω	Events Up to 1000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
IBP range	-50 to 360 mmHg	NIBP Up to 1000 sets
IBP accuracy	± 1 mmHg or ± 2 %, whichever is greater	For 16G storage
IBP resolution	1 mmHg	Trends data Up to 240 hours @ 1min, 2400 hours @ 10 min
PPV range	0 to 50 %	Events Up to 2000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
PAWP	Yes.	NIBP Up to 3000 sets
ICP measurement	Support	For 2G & 16G storage
Support waveforms overlapping.		Interpretation of resting 20 sets of 12-lead ECG results
C.O.		Full disclosure Up to 48 hours for all parameter waveforms. The specific storage time depends on the waveforms stored and the number of stored waveforms.
Technique	Thermodilution	OxyCRG 400 OxyCRG events
C.O. range	0.1 to 20 L/min	ST review Up to 120 hours @ 5 min
C.O. accuracy	± 0.1 L/min or $\pm 5\%$, whichever is greater	Minitrend Yes
C.O. resolution	0.1 L/min	Alarms
TB range	23 to 43 °C	Audible indicator Yes, 3 different alarm tones, and prompt tone
TI range	0 to 27 °C	Visible indicator Red/yellow/cyan LED, and alarm message display
TB, TI accuracy	± 0.1 °C (without sensor)	Provide AlarmSight infographic alarm indicator.
TB, TI resolution	0.1 °C	Special Functions Clinical Assistive Application (CAA): ST Graphic TM , EWS, GCS, 24h ECG summary, NIBP analysis. Calculations (drug, hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.
Artema Sidestream CO₂		Wi-Fi Communications
Meet standard of ISO 80601-2-55.		Protocol IEEE 802.11a/b/g/n
CO ₂ sample flow rate	120 ml/min (DRYLINE II TM watertrap for adult/pediatric) 90/70 ml/min (DRYLINE II TM watertrap for neonate)	Modulation mode DSSS and OFDM
CO ₂ sample flow rate accuracy	± 15 ml/min or ± 15 %, whichever is greater.	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
CO ₂ response time	≤ 5.0 s @ 120ml/min (for adult/pediatric) ≤ 4.5 s @ 90 ml/min (for neonate) ≤ 5.0 s @ 70 ml/min (for neonate)	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
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s	Channel spacing 5 MHz @ 2.4 GHz, 20 MHz @ 5 GHz
CO ₂ range	0-150 mmHg	Wireless baud rate IEEE 802.11a: 6 to 54 Mbps
CO ₂ accuracy	Full accuracy mode: 0 - 40 mmHg: ± 2 mmHg 41 - 76 mmHg: ± 5 % of reading 77 - 150 mmHg: ± 10 % of reading ISO accuracy mode: Add ± 2 mmHg to the full accuracy mode	
CO ₂ resolution	1 mmHg	
awRR range	0 to 150 rpm	
awRR accuracy	± 1 rpm (0 to 60 rpm) ± 2 rpm (61 to 150 rpm)	
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s	
Oridion Microstream CO₂		
Meet standard of ISO 80601-2-55.		
Sample flow rate	50 ^{-7.5} ₊₁₅ ml/min	
Initialization time	30 s (typical)	
Response time	2.9 s (typical)	
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 38 mmHg) ± 5 % of the reading (0.08 % increased in error)	

Output power	IEEE 802.11b: 1 to 11 Mbps	Frequency	50/60 Hz (±3 Hz)
	IEEE 802.11g: 6 to 54 Mbps	Battery	Rechargeable lithium-ion battery, 2600mAh/4500mAh
Operating mode	IEEE 802.11n: 6.5 to 72.2 Mbps	Recharge time (power off)	Rechargeable smart lithium-ion battery 5600mAh
	< 20dBm (CE requirement: detection mode- RMS)		ePM 10/12/15: ≥2 hours run time (2600mAh)
Data security	< 30dBm (FCC requirement: detection mode- peak power)		ePM 10/12/15: ≥4 hours run time (4500mAh)
	Infrastructure		ePM 10: ≥6 hours run time (5600mAh x1)
Interfacing	WPA-PSK, WPA2-PSK, WPA-Enterprise, WPA2-Enterprise (EAP-FAST, EAP-TLS, EAP-TTLS, PEAP-GTC, PEAP-MSCHAPv2, PEAP-TLS, LEAP)		ePM 12/15: ≥4.5 hours run time (5600mAh x1)
	Encryption: TKIP and AES		ePM 12/15: ≥9 hours run time (5600mAh x2)
Main unit	AC power connector (1)	Environmental requirements	
	VGA port (1)	Temperature	Operating: 0 to 40 °C
Barcode scanner	Network connector (1), RJ45	Humidity	Storage: -30 to 70 °C (ePM 10)
	USB 2.0 connector (2)		Storage: -20 to 60 °C (ePM 12/15)
Remote control	Analog output/nurse call/defib. Sync. Port (1)	Barometric	Operating: 15 to 95 % (non condensing)
	Equipotential grounding terminal (1)		Storage: 10 to 95 % (non condensing)
Thermal recorder	DC-in connector and docking (1) for ePM 10		Operating: 427.5 to 805.5 mmHg (57 to 107.4 kPa)
	Support 1D and 2D barcode		Storage: 120 to 805.5 mmHg (16 to 107.4 kPa)
Network printer	Support	-----	
	3 traces (paper 50 mm width, 20 m length)	Some of functions marked with an asterisk may not be available. Please contact your local Mindray sales representative for the most current information.	
Power			
Line voltage	100 to 240 VAC (±10 %)		
Maximum current	2.0A		

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