

# ePM 10/12/15

Patient Monitor

Data Sheet



## 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
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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

## SpO<sub>2</sub>

Meet standards of ISO 80601-2-61.

SpO <sub>2</sub> module	Mindray SpO <sub>2</sub> , Nellcor SpO <sub>2</sub>
SpO <sub>2</sub> range	0 to 100 %
SpO <sub>2</sub> accuracy	Adult/Pediatric: ± 2 % (70 to 100%) Neonate: ± 3 % (70 to 100%)
Perfusion indicator (PI)	Yes, for Mindray SpO <sub>2</sub>
Pitch tone	Yes
Refreshing rate	≤ 1 s

## PR

PR range	20 to 300 bpm (from SpO <sub>2</sub> ) 20 to 350 bpm (from IBP) 30 to 300 bpm (from NIBP)
PR accuracy	± 3 bpm (20 to 300 bpm, from Mindray SpO <sub>2</sub> ) ± 3 bpm (20 to 300 bpm, from Nellcor SpO <sub>2</sub> ) ± 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 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 Max standard deviation: 8 mmHg
NIBP resolution	1 mmHg
Assisting venous puncture	Yes

## IBP

Meet standard of IEC 60601-2-34.

Channels	2 channels
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Sensitivity	5 $\mu$ V/V/mmHg	$\pm 5$ % of the reading (41 to 70 mmHg)	
Impedance range	300 to 3000 $\Omega$	$\pm 8$ % of the reading (71 to 100 mmHg)	
IBP range	-50 to 360 mmHg	$\pm 10$ % of the reading (101 to 150 mmHg)	
IBP accuracy	$\pm 1$ mmHg or $\pm 2$ %, whichever is greater	awRR range	0 to 150 rpm
IBP resolution	1 mmHg	awRR accuracy	$\pm 1$ rpm
PPV range	0 to 50 %	<b>Data Review</b>	
PAWP	Yes.	For 2G storage	
ICP measurement	Support	Trends data	Up to 120 hours @ 1min
Support waveforms overlapping.		Events	Up to 1000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
<b>C.O.</b>		NIBP	Up to 1000 sets
Technique	Thermodilution	Full disclosure	48 hours at Maximum. The specific storage time depends on the waveforms stored and the number of stored waveforms.
C.O. range	0.1 to 20 L/min		
C.O. accuracy	$\pm 0.1$ L/min or $\pm 5$ %, whichever is greater	For 16G storage	
C.O. resolution	0.1 L/min	Trends data	Up to 240 hours @ 1min, 2400 hours @ 10 min
TB range	23 to 43 $^{\circ}$ C	Events	Up to 2000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
TI range	0 to 27 $^{\circ}$ C		
TB, TI accuracy	$\pm 0.1$ $^{\circ}$ C (without sensor)	NIBP	Up to 3000 sets
TB, TI resolution	0.1 $^{\circ}$ C	Full disclosure	48 hours for all parameter waveforms.
<b>Artema Sidestream CO<sub>2</sub></b>		For 2G & 16G storage	
Meet standard of ISO 80601-2-55.		Interpretation of resting	20 sets of 12-lead ECG results
CO <sub>2</sub> sample flow rate	120 ml/min (DRYLINE II™ watertrap for adult/pediatric)	OxyCRG	400 OxyCRG events
	90/70 ml/min (DRYLINE II™ watertrap for neonate)	ST review	Up to 120 hours @ 1 min
CO <sub>2</sub> sample flow rate accuracy	$\pm 15$ ml/min or $\pm 15$ %, whichever is greater.	Minitrend	Yes
CO <sub>2</sub> response time	$\leq 5.0$ s @ 120ml/min (for adult/pediatric)	<b>Alarms</b>	
	$\leq 4.5$ s @ 90 ml/min (for neonate)	Audible indicator	Yes, 3 different alarm tones, and prompt tone
	$\leq 5.0$ s @ 70 ml/min (for neonate)	Visible indicator	Red/yellow/cyan LED, and alarm message display
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s	Provide AlarmSight infographic alarm indicator.	
CO <sub>2</sub> range	0-150 mmHg	<b>Special Functions</b>	
CO <sub>2</sub> accuracy	Full accuracy mode: 0 - 40 mmHg: $\pm 2$ mmHg 41 - 76 mmHg: $\pm 5$ % of reading 77 - 150 mmHg: $\pm 10$ % of reading ISO accuracy mode: Add $\pm 2$ mmHg to the full accuracy mode	Clinical Assistive Application (CAA): ST Graphic™, EWS, GCS, 24h ECG summary, NIBP analysis.	
CO <sub>2</sub> resolution	1 mmHg	Calculations (drug, hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.	
awRR range	0 to 150 rpm	<b>Wi-Fi Communications</b>	
awRR accuracy	$\pm 1$ rpm (0 to 60 rpm) $\pm 2$ rpm (61 to 150 rpm)	Protocol	IEEE 802.11a/b/g/n
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s	Modulation mode	DSSS and OFDM
<b>Oridion Microstream CO<sub>2</sub></b>		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
Meet standard of ISO 80601-2-55.		Channel spacing	5 MHz @ 2.4 GHz, 20 MHz @ 5 GHz
Sample flow rate	50 <sup>-7.5</sup> <sub>+15</sub> ml/min	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
Initialization time	30 s (typical)	Output power	< 20dBm (CE requirement: detection mode- RMS) < 30dBm (FCC requirement: detection mode- peak power)
Response time	2.9 s (typical)	Operating mode	Infrastructure
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s	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
CO <sub>2</sub> range	0 to 150 mmHg		
CO <sub>2</sub> accuracy	$\pm 2$ mmHg (0 to 38 mmHg) $\pm 5$ % of the reading (0.08 % increased in error for every 1 mmHg if the reading is more than 38 mmHg) (39 to 150 mmHg)		
awRR range	0 to 150 rpm		
awRR accuracy	$\pm 1$ rpm (0 to 70 rpm) $\pm 2$ rpm (71 to 120 rpm) $\pm 3$ rpm (121 to 150 rpm)		
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s		
<b>Capnostat Mainstream CO<sub>2</sub></b>			
Meet standard of ISO 80601-2-55.			
Rise time	< 60 ms		
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s		
CO <sub>2</sub> range	0 to 150 mmHg		
CO <sub>2</sub> accuracy	$\pm 2$ mmHg (0 to 40 mmHg)		

## Interfacing

Main unit	AC power connector (1) VGA port (1) Network connector (1), RJ45 USB 2.0 connector (2) Analog output/nurse call/defib. Sync. Port (1) Equipotential grounding terminal (1) DC-in connector and docking (1) for ePM 10
Barcode scanner	Support 1D and 2D barcode
Remote control	Support
Thermal recorder	3 traces (paper 50 mm width, 20 m length)
Network printer	Support

## Power

Line voltage	100 to 240 VAC ( $\pm 10\%$ )
Maximum current	2.0A
Frequency	50/60 Hz ( $\pm 3$ Hz)
Battery	Rechargeable lithium-ion battery, 2600mAh/4500mAh Rechargeable smart lithium-ion battery 5600mAh ePM 10/12/15: $\geq 2$ hours run time (2600mAh) ePM 10/12/15: $\geq 4$ hours run time (4500mAh) ePM 10: $\geq 6$ hours run time (5600mAh x1) ePM 12/15: $\geq 4.5$ hours run time (5600mAh x1) ePM 12/15: $\geq 9$ hours run time (5600mAh x2)

Recharge time (power off)	2.5 hours to 90%(2600mAh) 5 hours to 90% (4500mAh) 5 hours to 90% (5600mAh x1) 10 hours to 90% (5600mAh x2)
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## Environmental requirements

Temperature	Operating: 0 to 40 °C Storage: -30 to 70 °C (ePM 10) Storage: -20 to 60 °C (ePM 12/15)
Humidity	Operating: 15 to 95 % (non condensing) Storage: 10 to 95 % (non condensing)
Barometric	Operating: 427.5 to 805.5 mmHg (57 to 107.4 kPa) Storage: 120 to 805.5 mmHg (16 to 107.4 kPa)

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

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