



# ePM 10/12/15

Patient Monitor

Data Sheet



## Physical Specifications

Weight	ePM 10: 3.2 kg
	ePM 12: 3.4 kg
Size	ePM 15: 4.9 kg
	(Standard configuration, excluding recorder, battery and accessories.)
Display screen	ePM 10: 271 x 226 x 173 mm
	ePM 12: 312 x 258 x 174 mm
Display channel	ePM 15: 397 x 293 x 181 mm
	Capacitive screen, support multi-touch operation.
Drop test:	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
	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	

## 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 $\pm 10$ mV (p-p)	
Electrode offset potential tolerance $\pm 800$ 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
CMRR	Surgical mode: 1 to 20 Hz
	ST mode: 0.05 to 40 Hz
Pace detection	Diagnostic mode: > 90 dB
	Monitor, Surgical, ST mode: > 105 dB
Defib. protection	Amplitude: $\pm 2$ mV to $\pm 700$ mV
	Width: 0.1 to 2 ms
Recovery time	Rise time: 10 to 100 $\mu$ s
	Withstand 5000V (360J) defibrillation
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	$\pm 1$ bpm or $\pm 1\%$ , 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	$\pm 0.02$ mV or $\pm 10\%$ , 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, $\Delta$ QTc
QTc formula	Bazett, Fridericia, Framingham, or Hodges
QT/QTc range	200 to 800 ms
QT accuracy	$\pm 30$ 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	$\pm 1$ rpm (0 to 120 rpm)
	$\pm 2$ 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.	
Module	Mindray, Masimo, Nellcor
Range	0 to 100 %
Resolution	1%
Accuracy	
Mindray/Nellcor:	$\pm 2$ % (70 to 100%, Adult/Pediatric:)
	$\pm 3$ % (70 to 100%, Neonate)
Masimo:	Unspecified (0 to 69%)
	$\pm 2$ % (70 to 100%, Adult/Pediatric, non-motion)
	$\pm 3$ % (70 to 100%, Neonate, non-motion)
	$\pm 3$ % (70 to 100%, motion)
Perfusion indicator (PI) Yes, for Mindray/Masimo SpO <sub>2</sub>	Unspecified (1 to 69%)
Pitch Tone	Yes
PR Refresh Rate	1 sec

## PR

PR range	20 to 300 bpm (from Mindray/Nellcor SpO <sub>2</sub> )
	25 to 240 bpm (from Masimo SpO <sub>2</sub> )
	20 to 350 bpm (from IBP)
	30 to 300 bpm (from NIBP)
PR accuracy	$\pm 3$ bpm (20 to 300 bpm, from Mindray SpO <sub>2</sub> )
	$\pm 3$ bpm (20 to 250 bpm, from Nellcor SpO <sub>2</sub> )
	$\pm 3$ bpm (non-motion, from Masimo SpO <sub>2</sub> )
	$\pm 5$ bpm (motion, from Masimo SpO <sub>2</sub> )
	$\pm 1$ bpm or $\pm 1$ %, whichever is greater (from IBP)
Refreshing rate	$\pm 3$ bpm or $\pm 3$ %, whichever is greater (from NIBP)
	$\leq 1$ 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	$\pm 0.1$ °C or $\pm 0.2$ °F (without probe)
Temp resolution	0.1 °C
Refreshing rate	$\leq 1$ 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: $\pm 5$ 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
Sensitivity	5 $\mu$ V/V/mmHg
Impedance range	300 to 3000 $\Omega$
IBP range	-50 to 360 mmHg
IBP accuracy	$\pm 1$ mmHg or $\pm 2$ %, whichever is greater
IBP resolution	1 mmHg
PPV range	0 to 50 %
PAWP	Yes.
ICP measurement	Support
Support waveforms overlapping.	

### C.O.

Technique	Thermolulution
C.O. range	0.1 to 20 L/min
C.O. accuracy	$\pm 0.1$ L/min or $\pm 5$ %, whichever is greater
C.O. resolution	0.1 L/min
TB range	23 to 43 °C
TI range	0 to 27 °C
TB, TI accuracy	$\pm 0.1$ °C (without sensor)
TB, TI resolution	0.1 °C

### Artema Sidestream CO<sub>2</sub>

Meet standard of ISO 80601-2-55.

CO <sub>2</sub> sample flow rate	120 ml/min (DRYLINE II™ watertrap for adult/pediatric) 90/70 ml/min (DRYLINE II™ watertrap for neonate)
CO <sub>2</sub> sample flow rate accuracy	$\pm 15$ ml/min or $\pm 15$ %, whichever is greater.
CO <sub>2</sub> response time	$\leq 5.0$ s @ 120ml/min (for adult/pediatric) $\leq 4.5$ s @ 90 ml/min (for neonate) $\leq 5.0$ s @ 70 ml/min (for neonate)
Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
CO <sub>2</sub> range	0-150 mmHg
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
CO <sub>2</sub> resolution	1 mmHg
awRR range	0 to 150 rpm
awRR accuracy	$\pm 1$ rpm (0 to 60 rpm) $\pm 2$ rpm (61 to 150 rpm)
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

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

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 <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

### Capnostat Mainstream CO<sub>2</sub>

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) $\pm 5$ % of the reading (41 to 70 mmHg) $\pm 8$ % of the reading (71 to 100 mmHg) $\pm 10$ % of the reading (101 to 150 mmHg)
awRR range	0 to 150 rpm
awRR accuracy	$\pm 1$ rpm

### Data Review

For 2G storage

Trends data	Up to 120 hours @ 1min
Events	Up to 1000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
NIBP	Up to 1000 sets
Full disclosure	48 hours at Maximum. The specific storage time depends on the waveforms stored and the number of stored waveforms.

For 16G storage

Trends data	Up to 240 hours @ 1min, 2400 hours @ 10 min
Events	Up to 2000 events, including parameter alarms, arrhythmia events technical alarms, and so on.
NIBP	Up to 3000 sets
Full disclosure	48 hours for all parameter waveforms.

For 2G & 16G storage

Interpretation of resting	20 sets of 12-lead ECG results
OxyCRG	400 OxyCRG events
ST review	Up to 120 hours @ 1 min
Minitrend	Yes

### Alarms

Audible indicator	Yes, 3 different alarm tones, and prompt tone
Visible indicator	Red/yellow/cyan LED, and alarm message display

Provide AlarmSight infographic alarm indicator.

### Special Functions

Clinical Assistive Application (CAA): ST Graphic™, EWS, GCS, 24h ECG summary, NIBP analysis.  
Calculations (Drug, Hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.

### 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, 20 MHz @ 5 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: 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
<b>Interfacing</b>	
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

<b>Power</b>	
Line voltage	100 to 240 VAC (±10 %)
Maximum current	2.0A
Frequency	50/60 Hz (±3 Hz)
Battery	Rechargeable lithium-ion battery, 2600mAh/4500mAh Rechargeable smart lithium-ion battery 5600mAh ePM 10/12/15 ≥ 2 hours run time (2600mAh) ePM 10/12/15 ≥ 4 hours run time (4500mAh) ePM 10 ≥ 6 hours run time (5600mAh x1) ePM 12/15 ≥ 6 hours run time (5600mAh x1) ePM 12/15 ≥ 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) 5 hours to 90% (5600mAh x2)

#### 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.

**www.mindray.com**

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