

# ePM 10M/12M

## Patient monitor



### Physical Specifications

Weight	ePM 10M: 4.0 Kg ePM 12M: 4.8 Kg (Standard configuration, excluding modules, recorder, battery and accessories.)
Size	ePM 10M: 269 x252 x159mm ePM 12M: 310 x289 x169mm
Display screen	Capacitive screen, support multi-touch operation. ePM 10M: 10.1-inch, 1280 x 800 pixels ePM 12M: 12.1-inch, 1280 x 800 pixels
Display channel	ePM 10M: Up to 8 waveform channels ePM 12M: Up to 10 waveform channels

### 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.

### 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
Dual-SpO <sub>2</sub>	Yes, SpO <sub>2</sub> , SpO <sub>2</sub> b, ΔSpO <sub>2</sub>
Refreshing rate	≤ 1 s
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

NIBP accuracy	Neonate: 15 to 125 mmHg 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	Up to 4 channels
Sensitivity	5 $\mu$ 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	Thermodilution
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 $^{\circ}$ C
TI range	0 to 27 $^{\circ}$ C
TB, TI accuracy	$\pm 0.1$ $^{\circ}$ C (without sensor)
TB, TI resolution	0.1 $^{\circ}$ C

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

Meet standard of ISO 80601-2-55.

\*\*Options: Paramagnetic O<sub>2</sub> sensor.

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)
O <sub>2</sub> Response time	$\leq 5.0$ s @ 120 ml/min $\leq 4.5$ s @ 90ml/min
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 150mmHg
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
O <sub>2</sub> range	0 to 100 %
O <sub>2</sub> accuracy	$\pm 1$ % (0 to 25 %) $\pm 2$ % (25.1 to 80 %) $\pm 3$ % (80.1 to 100 %)
O <sub>2</sub> resolution	0.1 %
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 <sup>-7.5</sup> <sub>+15</sub> 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 38mmHg) (39 to 99 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

#### Multi-gas

Meet standard of ISO 80601-2-55.

Technique	Infrared absorption, paramagnetic properties for O <sub>2</sub> monitoring
Gas	CO <sub>2</sub> , O <sub>2</sub> , N <sub>2</sub> O, Des, Iso, Enf, Hal, Sev
Warm-up time	ISO accuracy mode: 45 s Full accuracy mode: 10 min
Sample flow rate (with DRYLINE II™ watertrap)	Adult/pediatric watertrap: 200 ml/min Neonate watertrap: 120 ml/min
Sample flow rate accuracy	$\pm 10$ ml/min or $\pm 10$ %, whichever is greater.
Delay time	< 4 s
Response time	DRYLINE II™ watertrap for adult/pediatric, 200 ml/min: CO <sub>2</sub> : $\leq 4.2$ s N <sub>2</sub> O: $\leq 4.3$ s Enf/Iso/Hal/Sev/Des: $\leq 4.5$ s O <sub>2</sub> : $\leq 4$ s DRYLINE II™ watertrap for neonate, 120 ml/min: CO <sub>2</sub> : $\leq 4$ s N <sub>2</sub> O: $\leq 4.2$ s O <sub>2</sub> : $\leq 4$ s Enf/Iso/Hal/Sev/Des: $\leq 4.4$ s
CO <sub>2</sub> range	0 to 30 %
CO <sub>2</sub> accuracy	$\pm 0.1$ %ABS (0 to 1%) $\pm 0.2$ %ABS (1 to 5%) $\pm 0.3$ %ABS (5 to 7%) $\pm 0.5$ %ABS (7 to 10%)
O <sub>2</sub> range	0 to 100 %
O <sub>2</sub> accuracy	$\pm 1$ %ABS (0 to 25%REL) $\pm 2$ %ABS (25 to 80%REL) $\pm 3$ %ABS (80 to 100%REL)
N <sub>2</sub> O range	0 to 100 %
N <sub>2</sub> O accuracy	$\pm 2$ %ABS (0 to 20%REL) $\pm 3$ %ABS (20 to 100%REL)
Enf/Iso/Hal/Sev/Des range	0 to 30 %
awRR range	2 to 100 rpm
awRR accuracy	$\pm 1$ rpm (2 to 60 rpm)
Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

Provide MAC value (support calibrated by age).  
Support two mixed gas identify and monitoring.

#### BISx/BISx4

Meet standard of IEC 60601-2-26.

Technique	Bispectral Index
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Impedance range	>5 MΩ	Output power	IEEE 802.11n: 6.5 to 72.2 Mbps < 20dBm (CE requirement: detection mode- RMS) < 30dBm (FCC requirement: detection mode- peak power)
EEG bandwidth	0.25 to 100 Hz	Operating mode	Infrastructure
BIS range	0 to 100 (BIS, BIS L, BIS R)	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
SQI range	0 to 100 % (SQI, SQI L, SQI R)	<b>Interfacing</b>	
ASYM	0 to 100%	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) Integrated module rack (1), for 2 slots
DSA trend	Yes	Barcode scanner	Support 1D and 2D barcode
<b>Data Review</b>		Remote control	Support
<b>For 2G storage</b>		Thermal recorder	3 traces (paper 50 mm width, 20 m length)
Trends data	Up to 120 hours @ 1min	Network printer	Support
Events	Up to 1000 events, including parameter alarms, arrhythmia events technical alarms, and so on.	<b>Power</b>	
NIBP	Up to 1000 sets	Line voltage	100 to 240 VAC (±10 %)
<b>For 16G storage</b>		Maximum current	2.0A
Trends data	Up to 240 hours @ 1min, 2400 hours @ 10 min	Frequency	50/60 Hz (±3 Hz)
Events	Up to 2000 events, including parameter alarms, arrhythmia events technical alarms, and so on.	Battery	Rechargeable lithium-ion battery, 2600mAh/4500mAh Rechargeable smart lithium-ion battery 5600mAh ePM 10M/12M:>2 hours run time (2600mAh) ePM 10M/12M:>4 hours run time (4500mAh) ePM 10M:>6 hours run time (5600mAh x1) ePM 12M:>4.5 hours run time (5600mAh x1) ePM 12M:>9 hours run time (5600mAh x2)
NIBP	Up to 3000 sets	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)
<b>For 2G &amp; 16G storage</b>		<b>Environmental requirements</b>	
Interpretation of resting 20 sets of 12-lead ECG results	Up to 48 hours for all parameter waveforms. The specific storage time depends on the waveforms stored and the number of stored waveforms.	Temperature	Operating: 0 to 40 °C (without AG), 10 to 40 °C (with AG) Storage: -20 to 60 °C
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.	Humidity	Operating: 15 to 95 % (non condensing) Storage: 10 to 95 % (non condensing)
OxyCRG	400 OxyCRG events	Barometric	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)
ST review	Up to 120 hours @ 5 min		
Minitrend	Yes		
<b>Alarms</b>			
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.		
<b>Special Functions</b>			
Clinical Assistive Application (CAA):	ST Graphic™, EWS, GCS, 24h ECG summary, NIBP analysis.		
Calculations (drug, hemodynamic, Oxygenation, Ventilation, Renal), and Titration table.			
<b>Wi-Fi Communications</b>			
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		

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

