ePM 10M/12M

Patient Monitor

Data Sheet

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, Vrhythm, 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

SpO_2

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
Dual-SpO_2	Yes, SpO_2, SpO_2b, ΔSpO_2
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 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	Up to 4 channels
Sensitivity	5 µV/V/mmHg
Impedance range	300 to 3000 Ω
IBP range	-50 to 360 mmHg
IBP accuracy	±1 mmHg or ±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 ±0.1 L/min or ±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 ± 0.1 °C (without sensor)
TB, TI resolution 0.1 °C

Artema Sidestream CO_2

Meet standard of ISO 80601-2-55.
**Options: Paramagnetic O_2 sensor.
CO_2 sample flow rate
120 ml/min (DRYLINE II ™ watertrap for adult/pediatric)
90/70 ml/min (DRYLINE II ™ watertrap for neonate)
CO_2 sample flow rate accuracy
±15 ml/min or ±15 %, whichever is greater.
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)
O_2 Response time ≤ 5.0 s @ 120 ml/min
≤ 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_2 range 0 to 150mmHg
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
O_2 range 0 to 100 %
O_2 accuracy ±1 % (0 to 25 %)
±2 % (25.1 to 80 %)
±3 % (80.1 to 100 %)
O_2 resolution 0.1 %
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 CO_2

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 for every 1 mmHg if the reading is more than 38mmHg) (39 to 99 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)
Apnea time 10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s

Capnostat Mainstream CO_2

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_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)
awRR range 0 to 150 rpm
awRR accuracy ±1 rpm

Multi-gas

Meet standard of ISO 80601-2-55.
Technique Infrared absorption, paramagnetic properties for O_2 monitoring
Gas CO_2, O_2, N_2O, 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 ±10 ml/min or ±10%, whichever is greater.
Delay time < 4 s
Response time DRYLINE II ™ watertrap for adult/pediatric, 200 ml/min:
CO_2: ≤ 4.2 s
N_2O: ≤ 4.3 s
Enf/Iso/Hal/Sev/Des: ≤ 4.5 s
O_2: ≤ 4 s
DRYLINE II ™ watertrap for neonate, 120 ml/min:
CO_2: ≤ 4 s
N_2O: ≤ 4.2 s
O_2: ≤ 4 s
Enf/Iso/Hal/Sev/Des: ≤ 4.4 s
CO_2 range 0 to 30 %
CO_2 accuracy ±0.1%ABS (0 to 1%)
±0.2%ABS (1 to 5%)
±0.3%ABS (5 to 7%)
±0.5%ABS (7 to 10%)
O_2 range 0 to 100 %
O_2 accuracy ±1%ABS (0 to 25%REL)
±2%ABS (25 to 80%REL)
±3%ABS (80 to 100%REL)
N_2O range 0 to 100 %
N_2O accuracy ±2%ABS (0 to 20%REL)
±3%ABS (20 to 100%REL)
Enf/Iso/Hal/Sev/Des range 0 to 30 %
awRR range 2 to 100 rpm
awRR accuracy ±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
Impedance range >5 MΩ
EEG 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

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

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) Integrated module rack (1), for 2 slots
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 (±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 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)
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)

Environmental requirements

Temperature	Operating: 0 to 40 °C (without AG), 10 to 40 °C (with AG) Storage: -20 to 60 °C
Humidity	Operating: 15 to 95 % (non condensing) Storage: 10 to 95 % (non condensing)
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)

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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