

ePM 10M/12 Modular 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

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
Dual-SpO ₂	Yes, SpO ₂ , SpO ₂ b, 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 $\pm 5\%$, 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 ± 0.1 °C (without sensor)
 TB, TI resolution 0.1 °C

Artema Sidestream CO₂

Meet standard of ISO 80601-2-55.

**Options: Paramagnetic O₂ sensor.

CO₂ sample flow rate
 120 ml/min (DRYLINE II™ watertrap for adult/pediatric)
 90/70 ml/min (DRYLINE II™ watertrap for neonate)

CO₂ sample flow rate accuracy
 ± 15 ml/min or $\pm 15\%$, whichever is greater.

CO₂ 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)

O₂ 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

CO₂ range 0 to 150mmHg
 CO₂ accuracy Full accuracy mode:
 0 - 40 mmHg: ± 2 mmHg
 41 - 76 mmHg: $\pm 5\%$ of reading
 77 - 150 mmHg: $\pm 10\%$ of reading
 ISO accuracy mode:
 Add ± 2 mmHg to the full accuracy mode

CO₂ resolution 1 mmHg
 O₂ range 0 to 100 %
 O₂ accuracy $\pm 1\%$ (0 to 25 %)
 $\pm 2\%$ (25.1 to 80 %)
 $\pm 3\%$ (80.1 to 100 %)

O₂ 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 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

CO₂ range 0 to 150 mmHg
 CO₂ accuracy ± 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 ± 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 CO₂

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

CO₂ range 0 to 150 mmHg
 CO₂ accuracy ± 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 ± 1 rpm

Multi-gas

Meet standard of ISO 80601-2-55.

Technique Infrared absorption, paramagnetic properties for O₂ monitoring

Gas CO₂, O₂, N₂O, 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 $\pm 10\%$, whichever is greater.

Delay time < 4 s
 Response time DRYLINE II™ watertrap for adult/pediatric, 200 ml/min:

CO₂: ≤ 4.2 s
 N₂O: ≤ 4.3 s
 Enf/Iso/Hal/Sev/Des: ≤ 4.5 s
 O₂: ≤ 4 s

DRYLINE II™ watertrap for neonate, 120 ml/min:

CO₂: ≤ 4 s
 N₂O: ≤ 4.2 s
 O₂: ≤ 4 s
 Enf/Iso/Hal/Sev/Des: ≤ 4.4 s

CO₂ range 0 to 30 %
 CO₂ 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%)

O₂ range 0 to 100 %
 O₂ accuracy $\pm 1\%$ ABS (0 to 25%REL)
 $\pm 2\%$ ABS (25 to 80%REL)
 $\pm 3\%$ ABS (80 to 100%REL)

N₂O range 0 to 100 %
 N₂O 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 ± 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)
 SQL range 0 to 100 % (SQL, SQL L, SQL 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

Data Review cont.

Interpretation of resting 20 sets of 12-lead ECG results

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.

OxyCRG 400 OxyCRG events
 ST review Up to 120 hours @ 5 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
 Support 1D and 2D barcode
 Barcode scanner Support
 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

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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