

# ePM 12M Vet

Veterinary Monitor

Data Sheet



## Physical Specifications

Weight	4.8 kg (Standard configuration, excluding modules, recorder, battery and accessories.)
Size	310 x289 x169mm
Display screen	Capacitive screen, support multi-touch operation. 12.1-inch, 1280 x 800 pixels
Display channel	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	15 to 350 bpm
HR accuracy	± 1 bpm or ± 1%, whichever is greater.
HR resolution	1 bpm

## Arrhythmia Analysis

Intended use for Canine, Feline and Others.

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.

## ST Segment Analysis

Intended use for Canine, Feline and Others.

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 Canine, Feline and Others.

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	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.

Module	Mindray, Masimo, Nellcor
Range	0 to 100 %
Resolution	1%
Accuracy	

Mindray/Nellcor:	± 3% (70 to 100%) Unspecified (0 to 69%)
Masimo:	± 3 % (70 to 100%, non-motion) ± 3 % (70 to 100%, motion) Unspecified (1 to 69%)

Perfusion indicator (PI) Yes, for Mindray/Masimo SpO<sub>2</sub>

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	± 3 bpm (20 to 300 bpm, from Mindray SpO <sub>2</sub> ) ± 3 bpm (20 to 250 bpm, from Nellcor SpO <sub>2</sub> ) ± 3 bpm (non-motion, from Masimo SpO <sub>2</sub> ) ± 5 bpm (motion, from Masimo 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	120 s
Systolic range	Weight>23kg: 25-290mmHg 23kg>Weight>10kg: 25-240mmHg, 10kg>Weight: 25-240mmHg
Diastolic range	Weight>23kg: 10 to 250 mmHg 23kg>Weight>10kg: 10 to 200 mmHg 10kg>Weight: 10 to 200 mmHg
Mean range	Weight>23kg: 15 to 260 mmHg 23kg>Weight>10kg: 15 to 215 mmHg 10kg>Weight: 15 to 215 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 measurementSupport	
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<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 Large animal) 90/70 ml/min (DRYLINE II™ watertrap for Small animal)
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CO <sub>2</sub> sample flow rate accuracy	± 15 ml/min or ± 15 %, whichever is greater.
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CO <sub>2</sub> Response time	≤ 5.0 s @ 120ml/min (for Large animal) ≤ 4.5 s @ 90 ml/min (for Small animal) ≤ 5.0 s @ 70 ml/min (for Small animal)
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O <sub>2</sub> Response time	≤ 5.0 s @ 120 ml/min ≤ 4.5 s @ 90ml/min
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Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
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CO <sub>2</sub> range	0 to 150mmHg
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CO <sub>2</sub> 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
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CO <sub>2</sub> resolution	1 mmHg
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O <sub>2</sub> range	0 to 100 %
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O <sub>2</sub> accuracy	± 1 % (0 to 25 %) ± 2 % (25.1 to 80 %) ± 3 % (80.1 to 100 %)
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O <sub>2</sub> resolution	0.1 %
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awRR range	0 to 150 rpm
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awRR accuracy	± 1 rpm (0 to 60 rpm) ± 2 rpm (61 to 150 rpm)
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Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s
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#### Oridion Microstream CO<sub>2</sub>

Meet standard of ISO 80601-2-55.

Sample flow rate	50 <sup>-7.5</sup> +15 ml/min
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Initialization time	30 s (typical)
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Response time	2.9 s (typical)
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Sweep speed	3 mm/s, 6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s
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CO <sub>2</sub> range	0 to 150 mmHg
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CO <sub>2</sub> 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)
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awRR range	0 to 150 rpm
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awRR accuracy	±1 rpm (0 to 70 rpm) ±2 rpm (71 to 120 rpm) ±3 rpm (121 to 150 rpm)
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Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s
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#### 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
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CO <sub>2</sub> 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)
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awRR range	0 to 150 rpm
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awRR accuracy	±1 rpm
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#### Multi-gas

Meet standard of ISO 80601-2-55.

Technique	Infrared absorption, paramagnetic properties for O <sub>2</sub> monitoring
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Gas	CO <sub>2</sub> , O <sub>2</sub> , N <sub>2</sub> O, Des, Iso, Enf, Hal, Sev
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Warm-up time	ISO accuracy mode: 45 s Full accuracy mode: 10 min
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Sample flow rate (with DRYLINE II™ watertrap)	Large animal: 200 ml/min Small animal: 120 ml/min
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Sample flow rate accuracy	±10 ml/min or ±10%, whichever is greater.
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Delay time	< 4 s
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Response time	DRYLINE II™ watertrap for Large animal, 200 ml/min: CO <sub>2</sub> : ≤ 4.2 s N <sub>2</sub> O: ≤ 4.3 s
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	Enf/Iso/Hal/Sev/Des: ≤ 4.5 s O <sub>2</sub> : ≤ 4 s
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	DRYLINE II™ watertrap for Small animal, 120 ml/min: CO <sub>2</sub> : ≤ 4 s N <sub>2</sub> O: ≤ 4.2 s O <sub>2</sub> : ≤ 4 s Enf/Iso/Hal/Sev/Des: ≤ 4.4 s
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CO <sub>2</sub> range	0 to 30 %
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CO <sub>2</sub> 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%)
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O <sub>2</sub> range	0 to 100 %
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O <sub>2</sub> accuracy	±1%ABS (0 to 25%REL) ±2%ABS (25 to 80%REL) ±3%ABS (80 to 100%REL)
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N <sub>2</sub> O range	0 to 100 %
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N <sub>2</sub> O accuracy	±2%ABS (0 to 20%REL) ±3%ABS (20 to 100%REL)
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Enf/Iso/Hal/Sev/Des range	0 to 30 %
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awRR range	2 to 100 rpm
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awRR accuracy	±1 rpm (2 to 60 rpm)
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Apnea time	10 s, 15 s, 20 s, 25 s, 30 s, 35 s, 40 s
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Provide MAC value (support calibrated by age).

Support two mixed gas identify and monitoring.

#### 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
<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™, 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 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)	
Integrated module rack (1), for 2 slots	
Support 1D and 2D barcode	
Support	
3 traces (paper 50 mm width, 20 m length)	
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 >2 hours run time (2600mAh) >4 hours run time (4500mAh) >4.5 hours run time (5600mAh x1) >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)
<b>Environmental requirements</b>	
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)

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

[www.mindray.com](http://www.mindray.com)

P/N:ENG- ePM 12MVet Datasheet-210285x4P-20200119

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