



## Display

Type:	12.1" color TFT
Resolution:	800 x 600 pixels
Waveforms:	8 selectable

## ECG (3 and 5-Lead)

Leads:	I, II, III, aVR, aVL, aVF, V
Gain Selection:	x0.125, x0.25, x0.5, x1, x2, auto
Sweep Speed:	12.5mm/sec, 25mm/sec, 50mm/sec
Bandwidth:	Diagnostic Mode: 0.05-150Hz (M08A module) Monitor Mode: 0.5-40Hz Surgical Mode: 1-20Hz
Defibrillator Overload Protection:	Withstand 4000 VAC/50Hz voltage in isolation against electrosurgical interference and defibrillation
Recovery Time:	<5sec
CMRR:	Diagnostic Mode: $\geq 90$ dB Monitor Mode: $\geq 105$ dB Surgical Mode: $\geq 105$ dB (Notch filter set to off)

## Heart Rate Meter

Measurement Range:	Adult: 15-300bpm Pediatric/Neonate: 15-350bpm
Accuracy:	$\pm 1$ bpm or $\pm 1\%$ , whichever is greater
Resolution:	1bpm
Pacer Rejection:	When tested in accordance with ANSI/AAMI EC13-1992 Section 4.1.4, the 3/5 Lead ECG derived heart rate meter shall reject all pacer pulses $\pm 2.0$ mV to $\pm 700$ mV and duration 0.1ms to 2ms with no tail
Tall T-Wave Rejection:	When tested in accordance with the ANSI/AAMI EC13-2002 Section 4.1.2.1 c, the heart rate meter will reject all T-waves with amplitudes less than 1.2mV, 100ms QRS, a T-wave duration of 180ms and a Q-T interval of 350ms
Scaling Signal:	1mV $\pm 5\%$

## Pace Pulse

Pulse Indicator:	Pace pulses meeting the following conditions are marked by the PACE indicator Amplitude: $\pm 4$ to $\pm 700$ mV (3/5-lead) Width: 0.1 to 2ms Rise time: 10 to 100 $\mu$ s
Pulse Rejection:	When tested in accordance with the ANSI/AAMI EC13-2002: Sections 4.1.4.1 and 4.1.4.3, the heart rate meter rejects all pulses meeting the following conditions Amplitude: $\pm 2$ to $\pm 700$ mV Width: 0.1 to 2ms Rise time: 10 to 100 $\mu$ s Minimum input slew rate: 20V/s RTI

## ST Analysis

Adult/Pediatric Only	
Measurement Range:	-2.0mV to 2.0mV
Accuracy:	-0.8mV to 0.8mV; $\pm 0.02$ mV or $\pm 10\%$ , whichever is greater
ST Adjust Scale:	60ms after J point, 80ms after J point (default: 60ms after J point)
ISO Adjust Scale:	4 to 200ms before R-Wave (default: 80ms) Step: 4ms
J Point Adjust Scale:	4 to 200ms after R-Wave (default: 48ms)

## Arrhythmia Analysis

Adult/Pediatric Only	Asystole, ventricular fibrillation, ventricular tachycardia, pacer non-paced, pacer non-capture, ventricular rhythm, couplet, VT>2, bigeminy, trigeminy, R on T PVC, multiform PVC, irregular rhythm, missed beats, bradycardia, tachycardia
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## Respiration

Range:	Adult: 0-120bpm Pediatric/Neonate: 0-150bpm
Resolution:	1bpm
Accuracy:	7-150bpm: $\pm 2$ bpm or $\pm 2\%$ , whichever is greater 0-6bpm: undefined
Lead:	I or II (default: lead II)
Sweep Speed:	6.25mm/sec, 12.5mm/sec, 25mm/sec

## Non-Invasive Blood Pressure

Measurement Method:	Oscillometric
Measurement Modes:	Manual, auto, continuous
Connector Type:	Rectus
Units of Measure:	mmHg, kPa (user-selectable)
Resolution:	1mmHg
Systolic Range:	Adult: 40-270mmHg Pediatric: 40-200mmHg Neonate: 40-135mmHg
Diastolic Range:	Adult: 10-210mmHg Pediatric: 10-150mmHg Neonate: 10-100mmHg
Mean Range:	Adult: 20-230mmHg Pediatric: 20-165mmHg Neonate: 20-110mmHg
Accuracy:	Mean error: $< \pm 5$ mmHg Standard deviation: $< 8$ mmHg
Cuff Deflation Technique:	Step bleed
Cuff Inflation:	Volume of 500cc to 300mmHg in $< 20$ sec
Over Pressure Protection:	Double safety protection (hardware and software)
Pulse Rate Range:	40-240bpm
Pulse Rate Accuracy:	$\pm 3$ bpm or $\pm 3\%$ , whichever is greater



### Invasive Blood Pressure

Measurement Range:	-50-300mmHg
Resolution:	1mmHg
Accuracy:	1mmHg or $\pm 2\%$ , whichever is greater
Zero Offset Range:	$\pm 200$ mmHg
Excitation:	5VDC, $\pm 2\%$ Minimum load resistance will be 300 $\Omega$ per transducer
Frequency Response:	DC to 12.5Hz $\pm 1$ Hz, -3db
Waveform Scales:	ART: 0 to 300mmHg PA: -6 to 120mmHg CVP: -10 to 40mmHg RAP: -10 to 40mmHg LAP: -10 to 40mmHg ICP: -10 to 40mmHg IBP1/IBP2: -50 to 300mmHg

### Pulse Rate from Invasive Blood Pressure

Measurement Range:	25-350bpm
Resolution:	1bpm
Accuracy:	25-200bpm: $\pm 1$ bpm or $\pm 1\%$ , whichever is greater 201-350bpm: $\pm 2\%$

### Pulse Oximetry

#### With Masimo SET® SpO<sub>2</sub>

Measurement Range:	1-100%
Resolution:	1%
Accuracy:	$\pm 2\%$ (70-100%, Adult/Pediatric, no motion) $\pm 3\%$ (70-100%, Neonate, no motion) $\pm 3\%$ (70-100%, Adult/Pediatric/Neonate, motion) 0-69% unspecified

#### Pulse Rate with Masimo SET® SpO<sub>2</sub>

Measurement Range:	25-240bpm
Resolution:	1bpm
Accuracy:	$\pm 3$ bpm (no motion) $\pm 5$ bpm (motion)

#### With Mindray™ SpO<sub>2</sub>

Measurement Range:	0-100%
Resolution:	1%
Accuracy:	$\pm 2\%$ (70-100%, Adult/Pediatric, no motion) $\pm 3\%$ (70-100%, Neonate, no motion) $\pm 3\%$ (70-100%, Adult/Pediatric/Neonate, motion) 0-69% unspecified

#### Pulse Rate with Mindray SpO<sub>2</sub>

Measurement Range:	20-254bpm
Resolution:	1bpm
Accuracy:	$\pm 3$ bpm (no motion) $\pm 5$ bpm (motion)

### Temperature

Scale:	Selectable °C or °F
Channels:	2
Measurement Range:	0°C to 50°C (32°F to 122°F)
Resolution:	0.1°C
Accuracy:	$\pm 0.1^\circ\text{C}$ (excluding sensor) $\pm 0.2^\circ\text{C}$ (including YSI 400 series sensor)
Measurement Time:	Body surface: <100sec (using YSI 400 series sensor) Body cavity: <80sec (using YSI 400 series sensor)

### CO<sub>2</sub> with Mindray Sidestream

Measurement Range:	0-99mmHg
Resolution:	1mmHg
Accuracy:	0-40mmHg: $\pm 2$ mmHg 41-76mmHg: $\pm 5$ mmHg 77-99mmHg: $\pm 10$ mmHg
CO <sub>2</sub> Waveform Recognition:	0-40mmHg: $\pm 2$ mmHg 41-76mmHg: $\pm 5\%$ of reading 77-99mmHg: $\pm 10\%$ of reading
Start-up Time:	<1min from start-up, module enters warming-up status. 1min later, module enters ready-to-measure status (full accuracy mode).
Sampling Rate:	70ml/min or 100ml/min (default: 100ml/min)
Auto-Zeroing Interval:	30sec, 10min and 30min after entering measurement mode and at every odd hour (1, 3, 5, 7, etc.) during operation after that
Respiration	
Measurement Range:	0-120bpm
Respiration Accuracy:	0-70bpm: $\pm 2$ bpm >70bpm: $\pm 5$ bpm

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

Measurement Range:	0-99mmHg
Resolution:	Numeric: 1mmHg Waveform: 0.1mmHg
Accuracy:	0-38mmHg: $\pm 2$ mmHg 39-99mmHg: $\pm 5\% + 0.08\% \times (\text{reading} - 38\text{mmHg})$
CO <sub>2</sub> Waveform Recognition:	0-38mmHg: $\pm 2$ mmHg 39-99mmHg: $\pm 5\%$ of reading + 0.08% for every 1mmHg
Start-up Time:	30sec typical. Reaches 5% steady-state accuracy within 3min
Sampling Rate:	50ml/min: -7.5ml/min +15ml/min
Auto-Zeroing Interval:	At start-up, and every 12hrs thereafter
Respiration	
Measurement Range:	0-150bpm
Respiration Accuracy:	0-70bpm: $\pm 1$ bpm 71-120bpm: $\pm 2$ bpm 121-150bpm: $\pm 3$ bpm



### Anesthesia Gases

Sampling Rate:	Adult/pediatric: 120, 150, 200ml/min (user-selectable) (default: 120ml/min) Neonatal: 70, 90, 120ml/min (user-selectable) (default: 70ml/min)
Sampling Delay Time:	<4sec
Refresh Rate:	1sec
Warm-up Time:	45sec to warm-up status 10min to ready-to-measure status
Normal Operating Conditions After Warm-up:	Ambient Temperature: 10°C to 55°C (50°F to 131°F) Ambient Pressure: 700–1200hPa Ambient Humidity: 10–95% RH, non-condensing
Measurement Range:	CO <sub>2</sub> : 0-30% N <sub>2</sub> O: 0-100% Des: 0-30% Sev: 0-30% Enf/Iso/Hal: 0-30% O <sub>2</sub> : 0-100% AwRR: 2-100bpm
Resolution:	CO <sub>2</sub> : 1mmHg, AwRR: 1bpm
Accuracy:	CO <sub>2</sub> : 0-1%: ±.1% 1-5%: ±.2% 5-7%: ±.3% 7-10%: ±.5% >10%: unspecified N <sub>2</sub> O: 0-20%: ±2% 20-100%: ±3% Des: 0-1%: ±.15% 1-5%: ±.2% 5-10%: ±.4% 10-15%: ±.6% 15-18%: ±1% >18%: unspecified Sev: 0-1%: ±.15% 1-5%: ±.2% 5-8%: ±.4% >8%: unspecified Enf/Iso/Hal: 0-1%: ±.15% 1-5%: ±.2% >5%: unspecified O <sub>2</sub> : 0-25%: ±1% 25-80%: ±2% 80-100%: ±3% AwRR: 2-60bpm: ±1bpm >60bpm: unspecified

### Anesthesia Gases (continued)

Measurement	
Rise Time:	Sampling flow 120ml/min, using the DRYLINE™ water trap and neonatal DRYLINE™ 2.5m sampling line CO <sub>2</sub> : 250ms N <sub>2</sub> O: 250ms O <sub>2</sub> : 600ms Hal/Iso/Sev/Des: 300ms Enf: 350ms Sampling flow 200ml/min, using the DRYLINE™ water trap and adult DRYLINE™ 2.5m sampling line CO <sub>2</sub> : 250ms N <sub>2</sub> O: 250ms O <sub>2</sub> : 500ms Hal/Iso/Sev/Des: 300ms Enf: 350ms

### Data Storage

Trend Data:	96hrs at selectable resolutions: 1min, 5min, 10min 1hr at selectable resolutions: 1sec, 5sec
Alarm Events:	70 alarm events and associated waveforms (selectable waveform lengths: 8sec, 16sec or 32sec)
NIBP Measurements:	800 (systolic, diastolic, mean pressure and measurement time)

### Recorder

Type:	Thermal array
Speed:	25mm/sec, 50mm/sec
# Traces:	3

### Battery

Type:	Rechargeable lithium ion
Number of Batteries:	2
Run Time:	5hrs using a new, fully charged battery and monitoring ECG, SpO <sub>2</sub> and NIBP measurements every 15min at 25°C
Recharge Time:	6.5hrs

### Interfacing

Connectors:	1 AC power connector 1 RJ45 network connector 100 BASE-TX 1 VGA connector 15-PIN D-sub 1 BNC connector 1 equipotential grounding connector
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### Physical Dimensions

Monitor Size:	27cm(H) x 31.8cm(W) x 13.7cm(D) 10.6"(H) x 12.5"(W) x 5.4"(D)
Monitor Weight:	Less than 4.7kg (10.4lbs) standard configuration (ECG, Resp, SpO <sub>2</sub> , 2-Temperature, NIBP with 1 lithium ion battery)

### Environmental

Operating Temperature:	0°C to 40°C 5°C to 35°C (Sidestream CO <sub>2</sub> module) 5°C to 35°C (Microstream CO <sub>2</sub> module) 10°C to 35°C (AG module)
Storage Temperature:	-20°C to 60°C
Operating Humidity:	15% to 95%, non-condensing
Storage Humidity:	10% to 95%, non-condensing
Operating Altitude:	-500 to 4600m (-1640 to 15092 ft) -305 to 3014m (-1000 to 9889 ft) (Masimo SpO <sub>2</sub> /CO <sub>2</sub> modules/AG modules)
Storage/Transportation Altitude:	-500 to 13100m (-1640 to 42979ft) -305 to 6096m (-1000 to 20000ft) (Masimo SpO <sub>2</sub> /CO <sub>2</sub> modules/AG modules)

### Power Requirements

AC Voltage:	100–240VAC, 50/60Hz
Power:	110VA

### Safety

Type of Protection:	Class I with internal electric power supply
Degree of Protection:	Sidestream/Microstream CO <sub>2</sub> modules: BF ECG/Resp/Temp/SpO <sub>2</sub> /NIBP/IBP module: CF
Protection Against Ingress of Fluids:	Not protected

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