

# Rad-87™

Upgradable rainbow® technology in a versatile, easy-to-use bedside monitor



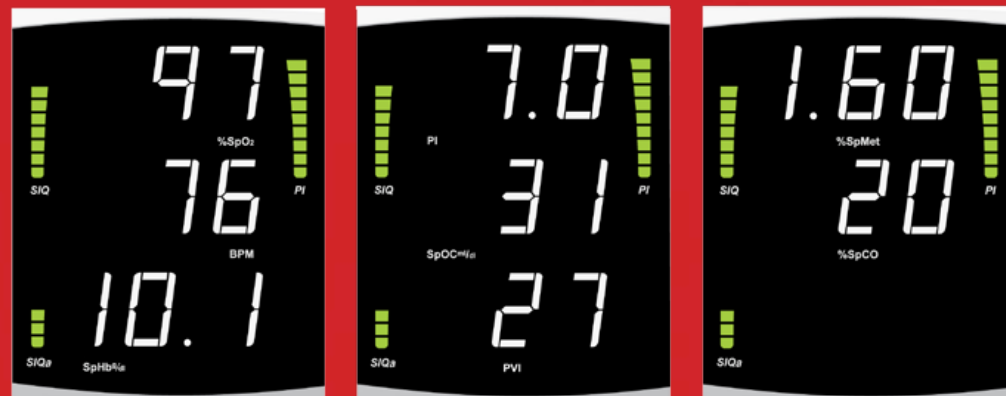
Choose the noninvasive measurements that are right for your clinical setting—oxygen saturation, pulse rate, and perfusion index in addition to total hemoglobin, total arterial oxygen content, pleth variability index, carboxyhemoglobin, methemoglobin, and respiration rate

# Masimo Rad-87



- > Featuring Masimo SET<sup>®</sup> pulse oximetry, proven in more than 100 independent and objective studies.<sup>1</sup>
- > Upgradable Masimo rainbow<sup>®</sup> SET technology platform lets you add total hemoglobin (SpHb<sup>®</sup>) and total arterial oxygen content (SpOC<sup>™</sup>) through simple field-installed software upgrades.
- > Additional upgrades allow you to continuously and noninvasively measure carboxyhemoglobin (SpCO<sup>®</sup>), methemoglobin (SpMet<sup>®</sup>), pleth variability index (PVI<sup>®</sup>), and acoustic respiration rate (RRa<sup>™</sup>).

## CUSTOM CONFIGURATION OPTIONS:



Instantly access, view, or modify alarm settings at the bedside.



Choose APOD<sup>®</sup>, Normal, or Max sensitivity with the touch of a button and verify settings at a glance.



In addition to SpO<sub>2</sub> and pulse rate, the Rad-87 allows you to select and display either SpHb, PVI, or RRa on the main screen, with additional measurements displayed on subsequent screens accessed with the press of a button.



- > The Rad-87 features a built-in 802.11 radio, allowing for bidirectional wireless communication with Masimo Patient SafetyNet<sup>™</sup>, the remote monitoring and clinician notification system that helps you keep patients safe on general care floors.

## FEATURES:

- > A simple, user-centered design allows activation of many features with a single touch.
- > Easy-to-read, high-contrast display eliminates confusion common with many bedside monitors.
- > One platform, multiple measurements—fully upgradable to all rainbow measurements.
- > Alarms and alerts can be modified at the bedside or via the Masimo Patient SafetyNet Remote Monitoring and Clinician Notification System.
- > Perfusion Index (PI) with trending capability indicates arterial pulse signal strength and may identify patient compromise.
- > Compatible with Phillips Vuelink<sup>™</sup> device interface module.
- > Adaptive Threshold Alarm<sup>™</sup> option is designed to reduce nuisance alarms by dynamic adjustment of the audible alarms based on the patient's baseline value and the fixed alarm threshold.
- > Signal IQ<sup>®</sup> provides signal identification and quality indication during excessive motion and low signal-to-noise situations.
- > Compatible with 802.11a/b/g.

## AT-A-GLANCE DISPLAYS:

Top-side LCD Display: confirms changes to settings of the device and, when used as part of Patient SafetyNet, displays patient information.

Wireless Connectivity Indicator: provides easy verification of network connection when used as part of Patient SafetyNet.

Device Profile Indicator: verifies through color-coding that the device is in the correct care area and is configured properly.

System Status Indicator: notifies users of alarm and data-collection alerts, even when parameter display screen is not visible to clinician.



\* The use of the trademark Patient SafetyNet is under license from University HealthSystem Consortium.

# PERFORMANCE

## Measurement Range

SpO <sub>2</sub>	0 – 100%
SpMet	0 – 99.9%
SpCO	0 – 99%
SpHb	0 – 25 g/dL
SpOC	0 – 35 ml of O <sub>2</sub> /dL of blood
Pulse Rate	25 – 240 bpm
Perfusion Index	0.02 – 20%
PVI	0 – 100%
RRa	0 – 70 breaths per minute

## Oxygen Saturation Accuracy SpO<sub>2</sub><sup>2</sup>

Saturation	60 – 80%
No Motion	
Adults/Infants/Pediatrics	± 3%
Saturation	70 – 100%
No Motion	
Adults/Infants/Pediatrics	± 2%
Neonates	± 3%
Motion	
Adults/Infants/Pediatrics/Neonates	± 3%
Low Perfusion	
Adults/Infants/Pediatrics/Neonates	± 2%

## Pulse Rate Accuracy<sup>2</sup>

Pulse Rate	25 – 240 bpm
No Motion	
Adults/Infants/Pediatrics/Neonates	± 3 bpm
Motion	
Adults/Infants/Pediatrics/Neonates	± 5 bpm
Low Perfusion	
Adults/Infants/Pediatrics/Neonates	± 3 bpm

## Carboxyhemoglobin Saturation Accuracy (%SpCO)<sup>2</sup>

Adults/Infants/Pediatrics	1 – 40% ± 3%
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## Methemoglobin Saturation Accuracy (%SpMet)<sup>2</sup>

Adults/Infants/Pediatrics/Neonates	1 – 15% ± 1%
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## Total Hemoglobin Accuracy (SpHb g/dL)<sup>2</sup>

Adults/Pediatrics	8 – 17 g/dL ± 1 g/dL
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## Respiration Rate Accuracy<sup>2</sup>

Adults	4 – 70 ± 1 breaths per minute
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## Resolution

Oxyhemoglobin Saturation (%SpO <sub>2</sub> )	0.1%
Carboxyhemoglobin Saturation (%SpCO), Digital Display	0.1%
Methemoglobin Saturation (%SpMet), Digital Display	0.1%
Total Hemoglobin (SpHb g/dL)	0.1 g/dL
Pulse Rate (bpm)	1 bpm

## Electrical

AC Power Requirements	100-240 VAC, 47-83 Hz
Power Consumption	15 VA Max

## Batteries

Type	Sealed lead acid
Capacity (battery life)	up to 4 hours <sup>3</sup>
Charging Time	8 hours

## Environmental

Operating Temperature	5°C to 40°C (41°F to 104°F)
Storage Temperature	-40°C to +70°C (-40°F to 158°F)
Operating Humidity	5% to 95%, noncondensing
Operating Altitude	500 mbar to 1060 mbar pressure -304 m to 5,486 m (-1000 ft to 18,000 ft)

## Physical Characteristics

Dimensions	20.8 cm x 15.2 cm x 7.6 cm (8.2" x 6.0" x 3.0")
Weight	2.1 lbs = .908 kg = 32 oz
Trending	72 hours of trending at 2-second resolution

## Modes

Averaging Mode	2, 4, 8, 10, 12, 14, or 16 seconds
Sensitivity	APOD, Normal, and Max

## Alarms

High/low audible and visual alarms for parameters (SpO <sub>2</sub> range 1 – 99% then "---", SpHb range 0.1 – 24.5 g/dL then "---" SpCO, range 1 – 99% then "---", SpMet range 1 – 99% then "---", pulse rate range 25 – 240 bpm), sensor condition, system failure and low battery alarms	
Alarm Volume Range	45 – 85 db

## Display/Indicators

Data Display: %SpO <sub>2</sub> , %SpMet, %SpCO, SpHb g/dL, SpOC ml/dl, PVI, wireless, sensitivity, system status light, device profile light, pulse rate, alarm status, alarm silenced status, AC power, Signal IQ / pleth bar, perfusion index bar, battery status, no sensor, sensor off	
Display Language	English (default)
APOD, Normal, and Max	LED

## Output Interface

1) Serial RS-232	
2) Nurse Call	
3) Wireless Radio (if installed)	802.11 a/b/g
4) Patient SafetyNet, RadNet, Philips Vuelink	

## Compliance

Safety Standard for Medical Equipment	IEC 60601-1 2nd Edition UL 60601-1 CAN/CSA C22.2 No. 601-1 JIS T 6061-1
Type of Protection	Class 1 (AC Power) Internally Powered (Battery Power)
Degree of Protection (Pulse CO-Oximeter Cable)	Type BF, Defib Proof (Applied-Part)
Mode of Operation	Continuous
EMC Standard	60601-1-2

## Radio

USA	FCC ID VKF-Rad87 FCC Parts 15.247 and 15.407
Canada	IC ID 7362A-Rad87 RSS-210
Europe	EN 300328 EN 301893 EN 301489-17

<sup>1</sup> Shah N et al. *Journal of Clinical Anesthesia*. 2012. In press.

<sup>2</sup> SpO<sub>2</sub>, SpCO, and SpMet accuracy have been validated on healthy adult male and female volunteers with light to dark skin pigmentations in the range of 60% - 100% SpO<sub>2</sub>, 0% - 40% SpCO, and 0% - 15% SpMet against a laboratory CO-Oximeter. SpHb accuracy has been validated on healthy adult male and female volunteers and on surgical patients with light to dark skin pigmentations in the range of 8 g/dL to 17 g/dL SpHb against a laboratory CO-Oximeter. The SpCO, SpMet and SpHb have not been validated with motion or low perfusion. Pulse Rate accuracy has been validated in the range of 25-240 bpm in bench top testing against a Biotek Index2 simulator. Respiration rate accuracy has been validated for the range of 4 to 70 breaths per minute in bench top testing. Clinical validation for up to 30 breaths per minute was also performed with the Masimo Acoustic Respiration sensor and instrument. The variation in accuracy specifications equals plus or minus 1 standard deviation which encompasses 68% of the population. Contact Masimo for testing specifications.

<sup>3</sup> This represents approximate runtime at the lowest indicator brightness and pulse tone turned off using a fully charged battery without radio power.