

# R Series

## Taking Resuscitation to Heart



The ZOLL® R Series® monitor/defibrillator provides clinicians with comprehensive support for resuscitation. This includes cutting-edge technology to help you meet current guidelines for achieving high-quality CPR, as well as OneStep™ electrodes that simplify and speed therapy. And to help ensure that the R Series will be Code-Ready®, it conducts an automated self-test daily.

### Driving High-Quality CPR

- CPR Dashboard™ featuring Real CPR Help® — Guides rescuers with real-time audio and visual feedback on CPR quality measures. It provides numeric displays of depth and rate and visual indicators of compression release, as well as a unique Perfusion Performance Indicator™.
- See-Thru CPR® — Reduces the duration of pauses during CPR by filtering out the CPR artifact so rescuers can see whether an organized underlying rhythm has developed without stopping compressions.

## Technical Specifications

### General

**Size:** 8.2 in (20.8 cm) high x 10.5 in (26.7 cm) wide x 12.5 in (31.7 cm) deep.

**Weight:** 13.6 lbs (6.2 kg) with OneStep™ Cable and SurePower™ battery pack; 15.2 lbs (6.9 kg) with paddles.

**Power Sources:** AC Mains: 100 to 120 V AC (50/60 Hz), 220 to 240 V AC (50 Hz); Battery: Rechargeable lithium ion battery pack.

**Low Battery Indicator:** A "LOW BATTERY" message appears on the monitor when there are less than 15 minutes of ECG monitoring.

**Design Standards:** Meets or exceeds applicable requirements of UL 60601, AAMI DF80, IEC 60601-2-4, EN 60601-2-25, and 60601-2-27.

**Patient Safety:** All patient connections are electrically isolated.

**Environmental:** Operating Temperature: 0°C to 40°C; Storage and Shipping Temperature: -20°C to 60°C; Humidity: 5% to 95% relative humidity, noncondensing; Vibration: IEC 68-2-6 and IEC 68-2-34; Shock: IEC 68-2-27, 50 g 6mS half-sine; Operating Pressure: 594 to 1060 millibars; Particle and Water Ingress: IEC 529, IP22; Electromagnetic Compatibility (EMC): CISPR 11 Class B Radiated and Conducted Emissions; Electromagnetic Immunity:

AAMI DF80, EN 61000-4-3 to 10 V/m; Electrostatic Discharge: AAMI DF80, EN 61000-4-2; Conducted Susceptibility: EN 61000-4-4, 61000-4-5, 61000-4-6.

### Defibrillator

**Waveform:** Rectilinear Biphasic.™

**Patient Impedance Range:** 15 to 300 ohms.

**Energy Selections:** 1 to 10, 15, 20, 30, 50, 75, 100, 120, 150, and 200 joules selected using controls on front of the defibrillator or sternum paddles. (Note: When using appropriate pediatric resuscitation electrodes, the 75-joule setting is replaced by 70- and 85-joule settings.)

**Smart Step Energy Levels:** Automatically escalates energy through a configured adult or pediatric protocol.

**Energy Display:** Shown on monitor for both selected and delivered.

**Charge Time:** Less than 7 seconds with a new, fully charged battery (first 15 charges to 200 joules); longer charge times may result with a depleted or older battery.

**Synchronized Mode:** Synchronizes defibrillator pulse to patient's R wave. "SYNC" message displayed on monitor and markers shown on both monitor and recorded ECG.

**Charge Controls:** Control from front of defibrillator

or apex paddle.

**Paddles:** External apex/sternum paddles; adult plates slide off to expose pediatric electrode surface.

**Code Readiness Testing:** Verifies defibrillator hardware, therapy delivery cable (with both paddles and electrodes), electrode condition and expiration (with select OneStep electrodes) without the need for a separate test fixture.

### ECG Monitoring

**Patient Connection:** 3-lead ECG cable, 5-lead ECG cable, paddles, or hands-free electrodes; selectable by front panel switch.

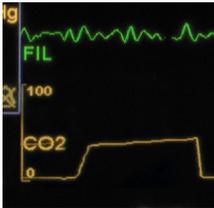
**Input Protection:** Fully defibrillator protected. Circuits designed to prevent distortion of ECG signal by pacer pulse.

**Implanted Pacemaker Spike Display:** Circuits designed to detect most implanted pacemaker spikes and display a marker on the ECG trace.

**Bandwidth:** 0.5 to 21 Hz (-3dB) standard; 0.05 to 150 Hz diagnostic with configurable options of 0.5 Hz to 40 Hz or 1 Hz to 21 Hz.

**Lead Selection:** I, II, III aVR, aVL, aVF, V, P1, P2, P3 with OneStep Pacing electrode.

**ECG Size:** 0.5, 1.0, 1.5, 2.0 or 3.0 cm/mV display on monitor.



## Mainstream and sidestream capnography options available

## CPR Dashboard™ featuring Real CPR Help®



**Heart Rate Display:** 0 to 300 bpm  $\pm 5\%$ .

**Heart Rate Alarm:** User selectable for tachycardia at 60 to 280 bpm; for bradycardia at 20 to 100 bpm. On/Off status displayed on the screen.

### CPR Dashboard Featuring Real CPR Help

Activated when OneStep Complete, OneStep CPR, or OneStep Pediatric CPR electrodes are connected.

**Detection Technology:** Accelerometer.

**Compression Depth:** Detected between 0.75 in (1.9 cm) and 3.0 in (7.6 cm), with an accuracy of  $\pm 0.25$  inches (0.6 cm).

**Compression Rate:** Detected between 50 and 150 compressions per minute.

**Release Bar:** Ensures proper release off of the chest.

**Feedback:** Configurable audio and visual prompts for rate and depth issued when compressions fall outside of AHA/ERC recommendations.

**CPR Idle Time Display:** Indicates elapsed time since last detected chest compression.

**Perfusion Performance Indicator (PPI):** Integrates compression depth and rate in order to rapidly visualize CPR performance per AHA/ERC recommendations.

### See-Thru CPR Filter

Removes compression-related artifact from the ECG via an adaptive filtering technique.

### Display

**Screen Type:** Color, VGA liquid crystal display (LCD).

**Screen Size:** 6.5 inches (16.5 cm) diagonally.

**Sweep Speed:** 25 mm/sec.

**Viewing Time:** 5 seconds with standard display format.

**Channels:** 3.

**Information:** Heart Rate, Leads/Pads, Alarm On/Off, Selected Energy, Delivered Energy, User Prompts and Warnings, Code Readiness Test Results, SpO<sub>2</sub>, NIBP, ETCO<sub>2</sub>, Pacer Functions, Code Markers, CPR Dashboard.

### Battery Packs\*

**Type:** 10.8 V (nominal) rechargeable lithium ion.

**Capacity:** 5.8 amp hours.

**Weight:** 1.7 lb (0.77 kg).

**Recharge Time:** 5 hours or less with integral charger.

**Operating Time:** >4 hours of continuous ECG monitoring; 100 maximal energy (200 joules) discharges; 3.5 hours of continuous ECG monitoring and pacing at 60 mA, 80 ppm.

### Recorder

**Technology:** 90 mm thermal array; 80 mm grid width.

**Speed:** 25 mm/sec, 6-second delay.

**Printing Modes:** Manual or automatic.

**Annotations:** Time, date, defibrillation energy, patient impedance, heart rate, pacer output, QRS synchronization marker, ECG size, ECG lead, alarm, defibrillator test results, analyze ECG, ECG bandwidth.

### I/O, Storage, Communications

**Sync In:** 0 to 5 V (TTL Level) pulse, active high, 5 to 15 ms in duration, no closer than 200 ms apart; energy transfer begins within 25 ms of the leading edge of the sync in pulse.

**Marker Out:** 0 to 5 V (TTL Level) pulse, active high, 10 ms in duration, the leading edge of the pulse occurs within 35 ms of R wave peak.

**ECG Output:** 1.0 V/cm of deflection on recorder;

<25 ms delay from the patient ECG input.

**Card Slot:** Compact flash compatible.

**Internal Memory:** Disk on chip.

### Advisory Defibrillation

#### Shock Advisory Function:

Evaluates ECG rhythm to determine if shock delivery is required.

**Shockable Rhythms:** Ventricular fibrillation with amplitudes >100  $\mu\text{V}$ , and wide-complex ventricular tachycardia with rates >150 bpm for adults or >200 bpm for pediatric applications. Refer to Operator's Manual for details on sensitivity and specificity performance.

**Protocol Configurations:** Configurable for either CPR or shock-first-driven protocols. Energy sequences can be configured for single or multiple shocks with fixed or escalating energy levels. The CPR interval length is configurable in 1-minute increments up to 4 minutes.

### External Pacing

**Type:** VVI demand; asynchronous (fixed rate) when used without ECG leads or in asynchronous (ASYNCR) pacing mode.

**Pulse:** Rectilinear, constant current: 40 ms  $\pm 2$  ms; variable 0 to 140 mA  $\pm 5\%$  or 5 mA, whichever is greater. Rate is variable from 30 to 180 ppm  $\pm 1.5\%$ .

**Output Protection:** Fully defibrillator protected and isolated.

**OneStep Pacing:** Eliminates the need to connect separate ECG leads when used in conjunction with OneStep Pacing and OneStep Complete electrodes.

### Pulse Oximetry with Masimo SET® Technology

**Saturation Range:** 1-100% (%SpO<sub>2</sub>) with a resolution of 1%.

**Pulse Rate Range:** 25-240 ppm with a resolution of 1 ppm.

**Saturation Accuracy:** Non-motion conditions  $\pm 2\%$  for adults/pediatrics;  $\pm 3\%$  for neonates. During motion  $\pm 3\%$  for all patients.

**Pulse Rate Accuracy:** Non-motion conditions  $\pm 3$  ppm. During motion  $\pm 5$  ppm.

### Mainstream CO<sub>2</sub> Capnostat 5 Sensor

**Principle of Operation:** Nondispersive infrared (NDIR) single-beam optics, dual wavelength, no moving parts.

**Warm-up Time:** Full specifications within 2 minutes at an ambient temperature of 25°C. Capnogram in 20 seconds.

**Environmental:** Operating Temperature: 0°C to 45°C, Storage and Shipping Temperature: -40°C to 70°C.

### Sidestream CO<sub>2</sub> LoFlo Sensor

**Principle of Operation:** Nondispersive infrared (NDIR) single-beam optics, dual wavelength, no moving parts.

**Warm-Up Time:** Full specifications within 2 minutes at an ambient temperature of 25°C. Capnogram in 20 seconds

**Environmental:** Operating Temperature: 0°C to 40°C, Storage and Shipping Temperature: -40°C to 70°C.

### NIBP

**Patient Population:** Adult, Pediatric.

**Method:** Oscillometric.

**Control:** Automatic and manual measurement.

### WiFi Capable

WiFi 802.11 a/b/g/n Ambicom-specific 1100C-CF Card P/N 8005-000101-01 compatibility.

**Typical Readiness File:** 750K.

**Typical Code Data File:** 1.2 MB.

\*Values listed for a new battery operating at 20°C.

\*Zoll PM, et al. *Circulation*. 1985;71(5):937-44.

# ZOLL MEDICAL CORPORATION

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