The Hemolung RAS is the only completely integrated solution for providing simple, effective, and minimally invasive ECCO₂R. Three devices, the Hemolung CARTRIDGE, Hemolung CATHETER, and Hemolung CONTROLLER, work together seamlessly to ensure safe, simple, and reliable delivery of ECCO₂R.

**SYSTEM HIGHLIGHTS**

- Fully integrated low-flow ECCO₂R system
- Efficient CO₂ removal at blood flow rates of just 350-550 mL/min
- Single 15.5 Fr dual-lumen venous catheter is minimally invasive and permits patient mobility
- Real-time display of CO₂ removal on controller
- Automatic sweep gas handling with digital controls
- Simple extracorporeal circuit takes just minutes to assemble

**SYSTEM APPROVALS**

- CE Mark
- Health Canada

**HEMOLUNG® RAS SYSTEM HIGHLIGHTS**

- **HEMOLUNG® Controller**
  A fully-integrated and simple to use controller.

- **HEMOLUNG® Catheter**
  High performance 15.5 Fr dual lumen venous catheter (jugular or femoral).

- **HEMOLUNG® Cartridge**
  Integrated blood pump and gas exchange membrane in one.
The HEMOLUNG Cartridge Kit Specifications

The Hemolung Cartridge combines a centrifugal blood pump with an advanced gas exchange membrane in one device. It provides efficient extracorporeal CO₂ removal at dialysis-like blood flow rates of 350-550 mL/min. The Hemolung Cartridge Kit contains all components required to perform up to seven days of Hemolung RAS therapy.

HEMOLUNG Cartridge Kit Features

- Integrated gas exchange membrane and centrifugal blood pump
- Patented ActivMix™ technology for efficient CO₂ removal at low blood flow rates
- Typical CO₂ removal rate: 50 to 100 mL/min (depending on conditions)
- Blood flow rate: 350 to 550 mL/min
- Advanced dual-layer (siloxane/heparin) thromboresistant membrane coating

HEMOLUNG Cartridge Kit Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂ Removal Rate</td>
<td>&gt; 50 mL/min (condition dependent)</td>
</tr>
<tr>
<td>Gas Exchange Enhancement Technology</td>
<td>ActivMix™ Technology</td>
</tr>
<tr>
<td>Membrane Type</td>
<td>Microporous polypropylene hollow fibers coated with siloxane and heparin</td>
</tr>
<tr>
<td>Membrane Surface Area</td>
<td>0.59 m²</td>
</tr>
<tr>
<td>Sweep Gas Flow Rate Range</td>
<td>0–10 LPM</td>
</tr>
<tr>
<td>Blood Pump Type</td>
<td>Integrated centrifugal pump with magnetic coupling</td>
</tr>
<tr>
<td>Blood Flow Range</td>
<td>350–550 mL/min</td>
</tr>
<tr>
<td>Static Priming Volume</td>
<td>144 mL (Cartridge) + 115 mL (blood tubing) = 259 mL (entire circuit)</td>
</tr>
<tr>
<td>Venous Inlet Port</td>
<td>¼ in (0.64 cm) barb connector</td>
</tr>
<tr>
<td>Arterial Outlet Port</td>
<td>¼ in (0.64 cm) barb connector</td>
</tr>
<tr>
<td>Oxygen Inlet Port</td>
<td>⅜ in (0.48 cm) barb connector</td>
</tr>
<tr>
<td>Gas Outlet Port</td>
<td>Pre-connected ⅜ in (0.48 cm) silicone tubing</td>
</tr>
<tr>
<td>Blood Tubing</td>
<td>¼ in (0.64 cm) ID x ⅜ in (0.24 cm) Wall Tygon S-50-HL, two 1.83 m (6 ft) lengths</td>
</tr>
<tr>
<td>Seal Flush</td>
<td>30 mL/hr 0.45% to 0.9% NaCl via provided infusion pump</td>
</tr>
<tr>
<td>Approved duration of use</td>
<td>7 days</td>
</tr>
<tr>
<td>Additional Supplies Provided in kit</td>
<td>Priming components, blood rinseback components, IV administration sets, vacuum canisters for sweep gas condensate collection</td>
</tr>
</tbody>
</table>

Transportation/Storage Conditions

- Temperature Range: Avoid exposure to temperatures below 10 °C or above 40 °C
- Relative Humidity: Store in a dry location at room temperature
The **HEMOLUNG 15.5 Fr Catheter Kit Specifications**

The Hemolung 15.5 Fr Catheter provides blood flow rates of up to 550 mL/min when connected to the Hemolung Cartridge. The dual-lumen catheter is wire-reinforced for kink resistance. Jugular (17 cm) and femoral (26 cm) versions are available and essential insertion accessories are provided in each kit.

**HEMOLUNG 15.5 Fr Catheter Features**

- 15.5 Fr dual lumen venous catheter
- Low resistance design provides high blood flow rates at low pressures
- Wire-reinforced catheter body to prevent kinking
- Available in jugular (17 cm) and femoral (26 cm) versions

**HEMOLUNG 15.5 Fr Catheter Specifications**

<table>
<thead>
<tr>
<th>Catheter Material</th>
<th>Polyurethane/silicone blend with stainless steel wire reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumens</td>
<td>Inner - Infusion (to patient, RED)</td>
</tr>
<tr>
<td></td>
<td>Outer - Drainage (from patient, BLUE)</td>
</tr>
<tr>
<td>Nominal Outer Diameter</td>
<td>15.5 Fr (5.17 mm)</td>
</tr>
<tr>
<td>Connectors</td>
<td>¼ in (0.64 cm) Barb</td>
</tr>
<tr>
<td>Max Pressure</td>
<td>200 mmHg</td>
</tr>
<tr>
<td>Implant Length</td>
<td>Femoral: 26 cm (10.24 in)</td>
</tr>
<tr>
<td></td>
<td>Jugular: 17 cm (6.69 in)</td>
</tr>
<tr>
<td>Guidewire Compatibility</td>
<td>Stylet fits 0.038 in. (0.97 mm) guidewire</td>
</tr>
<tr>
<td>Lumen Volumes</td>
<td>Femoral</td>
</tr>
<tr>
<td>(with priming adapters)</td>
<td>5.5 mL</td>
</tr>
<tr>
<td></td>
<td>Jugular</td>
</tr>
<tr>
<td></td>
<td>6.9 mL</td>
</tr>
<tr>
<td></td>
<td>Femoral</td>
</tr>
<tr>
<td></td>
<td>7.8 mL</td>
</tr>
<tr>
<td></td>
<td>Jugular</td>
</tr>
<tr>
<td></td>
<td>9.3 mL</td>
</tr>
<tr>
<td>Additional Supplies Provided in kit</td>
<td>Guidewire: 0.038 x 100 cm</td>
</tr>
<tr>
<td></td>
<td>Needle: 18 Ga</td>
</tr>
<tr>
<td></td>
<td>Dilators: 6 Fr, 9 Fr, 12 Fr, 14 Fr &amp; 16 Fr</td>
</tr>
<tr>
<td></td>
<td>Priming adapters: two luer lock adapters</td>
</tr>
<tr>
<td></td>
<td>Catheter securement devices</td>
</tr>
</tbody>
</table>

**Transportation/Storage Conditions**

- Temperature Range: Avoid exposure to temperatures below 10 °C or above 40 °C
- Relative Humidity: Store in a dry location at room temperature
The HEMOLUNG Controller Specifications

The Hemolung Controller provides on-screen priming instructions, a real-time display of Hemolung CO₂ removal, smart gas flow controls, and one hour of battery life to make the delivery of Hemolung therapy safe and simple.

HEMOLUNG Controller Features

- Intuitive user interface with on-screen instructions
- Real-time and historical display of CO₂ removal and blood flow
- Vacuum driven sweep gas flow is digitally controlled (between 0 and 10 L/min) with automatic gas switching (O₂/air)
- Automatic membrane condensation removal for steady gas exchange
- 1 hour battery life
- Provides safety monitoring with a full set of alarms

HEMOLUNG Controller Specifications

Operating Conditions

Temp Range  
10 °C to 35 °C (50 °F to 95 °F)

Relative Humidity  
20% to 90%, non-condensing, steady state

Transportation/Storage Conditions—Controller

Ambient Temperature  
−20 °C to +50 °C (−4 °F to +122 °F)

Relative Humidity (non-condensing, steady state)  
15% to 95%

Cable Lengths

Power Cord  
2.5 m (98 in)

Display Cable  
0.91 m (36 in)

Dimensions (L x W x H)

Power Cord  
2.5 m (98 in)

Display Cable  
0.91 m (36 in)

Dimensions (L x W x H)

69 cm x 51 cm x 122 cm

27 in x 20 in x 48 in

Weight

63.5 kg (140 lbs)

Power Requirements

100 to 240 V, 50–60 Hz, 480 VA

O₂ Inlet Pressure Range

280–600 kPa (40.6–87 psig) at 15 L/min flow.

O₂ Connection Type

DISS 1240 (oxygen)

HEMOLUNG Controller Display Specifications

Dimensions (L x W x H)

34.3 cm x 7.6 cm x 26.7 cm

13.5 in x 3.0 in x 10.5 in

Type

Liquid crystal display (LCD)

Viewing Area

18.4 cm x 24.8 cm

7.25 in x 9.75 in

Resolution

800 pixels by 600 pixels
The **HEMOLUNG** Controller Specifications (continued)

### HEMOLUNG Controller Battery Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Battery Type</strong></td>
<td>Sealed lead acid, 2 x 12 V/10.5 A-hr</td>
</tr>
<tr>
<td><strong>Run Time</strong></td>
<td>1 hour minimum</td>
</tr>
<tr>
<td><strong>(1250 RPM and 8 LPM)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Recharge Time from battery cutoff threshold</strong></td>
<td>12 hour maximum to fully recharge</td>
</tr>
<tr>
<td><strong>Battery Low Threshold</strong></td>
<td>23 V Yellow battery bar</td>
</tr>
<tr>
<td><strong>Battery Cutoff Threshold</strong></td>
<td>21 V Red battery bar, low battery alarm</td>
</tr>
</tbody>
</table>

### HEMOLUNG Controller: Sensors

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon Dioxide Analyzer</strong></td>
<td>High precision infrared sensor 0.0% to 5.0% (± 0.1%)</td>
</tr>
<tr>
<td><strong>Oxygen Sensor</strong></td>
<td>0.0 to 100.0% (± 5%)</td>
</tr>
<tr>
<td><strong>Mass flow Sensor</strong></td>
<td>0.0 to 20.0 LPM (± 0.3 LPM)</td>
</tr>
<tr>
<td><strong>Pressure Sensor</strong></td>
<td>−259 to 259 mmHg (± 10%)</td>
</tr>
<tr>
<td><strong>Blood Flow Meter</strong></td>
<td>0 to 1000 mL/min (± 10%)</td>
</tr>
<tr>
<td><strong>Pressure Switch</strong></td>
<td>Triggers at 172 kPa (25 psi)</td>
</tr>
<tr>
<td><strong>Bubble Detector</strong></td>
<td>0.5 mL bubble detection at all flow rates</td>
</tr>
</tbody>
</table>

### HEMOLUNG Controller: Electrical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Power Input-AC</strong></td>
<td>IEC power inlet receptacle</td>
</tr>
<tr>
<td><strong>Line Input Voltage</strong></td>
<td>100 to 240 V, 50–60 Hz, 480 VA</td>
</tr>
<tr>
<td><strong>Internal Battery Fuse</strong></td>
<td>5 x 20 mm, 6.3 A, 250 V</td>
</tr>
<tr>
<td></td>
<td>Fast Blow Fuse, F6.3AL 250 V</td>
</tr>
<tr>
<td><strong>Power Entry Module Fuse</strong></td>
<td>5 x 20 mm, 6.3 A, 250 V</td>
</tr>
<tr>
<td></td>
<td>Time Delay Fuse, T6.3AH 250 V</td>
</tr>
</tbody>
</table>

### HEMOLUNG Controller: Safety & Regulatory

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ANSI/AAMI ES60601-1:2005</td>
</tr>
<tr>
<td></td>
<td>CAN/CSA-C22.2 No. 60601-1-08, CAN/CSA-C22.2.60601-1-6:2011</td>
</tr>
<tr>
<td></td>
<td>CAN/CSA-C22.2.60601-1-8:2008</td>
</tr>
</tbody>
</table>
### The HEMOLUNG® RAS Ordering Information

<table>
<thead>
<tr>
<th>REF NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| 20000      | Hemolung RAS Controller  
(Select: Infusion Pump, Line Cord & Oxygen Hose) |
| 20901      | Infusion Pump, CME BodyGuard 323 Color Vision, Language Pack 1  
(Supports: English, French, German, Dutch & Italian) |
| 20902      | Infusion Pump, CME BodyGuard 323 Color Vision, Language Pack 2  
(Supports: English, Spanish, Portuguese, Turkish & Greek) |
| 20903      | Infusion Pump, CME BodyGuard 323 Color Vision, Language Pack 3  
(Supports: English, Swedish, Finnish, Danish & Norwegian) |
| 20110      | Line Cord [A], CEE 7/7  
(Continental Europe) |
| 20111      | Line Cord [C], AS/NZS 3112  
(Australia / New Zealand) |
| 20112      | Line Cord [D], BS 1363  
(United Kingdom / Ireland) |
| 20113      | Line Cord [E], Afsnit 107-2-D1  
(Denmark) |
| 20114      | Line Cord [G], BS 546  
(India / South Africa) |
| 20115      | Line Cord [K], NEMA 5-15  
(North America) |
| 20116      | Line Cord [L], SEV 1011  
(Switzerland) |
| 20117      | Oxygen Conductive Hose, White, Unifor to DISS Hand Tight Nut, 12 Feet |
| 20118      | Oxygen Conductive Hose, White, SIS to DISS Hand Tight Nut, 12 Feet |
| 20119      | Oxygen Conductive Hose, White, ANFOR to DISS Hand Tight Nut, 12 Feet |
| 20120      | Oxygen Conductive Hose, White, DIN to DISS Hand Tight Nut, 12 Feet |
| 20121      | Oxygen Conductive Hose, White, NIST to DISS Hand Tight Nut, 12 Feet |
| 20122      | Oxygen Conductive Hose, White, BS to DISS Hand Tight Nut, 12 Feet |
| 10000      | Hemolung Cartridge Kit - SM IV Pump Configuration |
| 11000      | Hemolung Cartridge Kit - CME IV Pump Configuration |
| 30000      | Hemolung 15.5 Fr Femoral Catheter Kit |
| 30100      | Hemolung 15.5 Fr Jugular Catheter Kit |