CARDIOHELP SYSTEM
EXTRACORPOREAL SUPPORT SOLUTION

CAUTION: Federal (US) law restricts this device to sale by or on the order of a physician. Refer to Instructions for Use for current indications, warnings, contraindications, and precautions.
For many years, MAQUET Cardiovascular has been one of the world’s leading manufacturers of heart-lung machines and components for extracorporeal circulation. Together with experienced doctors and perfusionists, MAQUET has developed the CARDIOHELP System, which can be deployed quickly in the fields of critical care, emergency medicine, cardiology and cardiac surgery. The compact and portable CARDIOHELP System is ideal for the treatment of patients who require circulatory and/or pulmonary support up to six hours.

Throughout the world, more people die of cardiovascular failure than any other illness. An estimated 17.5 million people die annually from CVD, representing 30% of all global deaths.* Many of these people experience cardiogenic shock because vital organs are not adequately supplied with oxygen. If patients could be connected quickly to a mechanical life support system, such as the CARDIOHELP System, clinicians may gain valuable time.

MAQUET—The Gold Standard.

MORE THAN PARTIAL SUPPORT
MECHANICAL CIRCULATORY SUPPORT UP TO 7 LITERS
RAPIDLY DEPLOYABLE

Smallest portable heart-lung support system:
It is ideal for use in critical care, cardiac catheterization laborato-
ries, the operating room and trauma rooms. Furthermore, it is the perfect solution for safe, and effective patient transport.
As a result, there are now new opportunities and treatment possibilities for extracorporeal circulation for cardiac and or pulmonary support up to six hours.

Circulatory and or pulmonary support:
- CARDIOHELP provides oxygen and carbon dioxide removal.
- In circulatory failure, CARDIOHELP System can help protect against insufficient oxygen supply to vital organs.
- CARDIOHELP’s portability allows for patient transport for other therapeutic measures (e.g., critical care) and diagnostic investigations (e.g. CT scan).

New possibilities:
- Within the hospital
- Outside of the hospital environment

CARDIOHELP System

<table>
<thead>
<tr>
<th>Application »</th>
<th>Respiratory Support</th>
<th>Respiratory &amp; Cardiac Support</th>
<th>Cardiopulmonary Bypass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable »</td>
<td>HLS Set Advanced 5.0*</td>
<td>HLS Set Advanced 7.0*</td>
<td>Custom Tubing Pack*</td>
</tr>
<tr>
<td></td>
<td>HLS Module Adv. 5.0 Tubes, Connectors BIOLINE Coating</td>
<td>HLS Module Adv. 7.0 Tubes, Connectors BIOLINE Coating</td>
<td>QUADROX-iR Venous Bubble Trap Tubes, Connectors BIOLINE Coating</td>
</tr>
<tr>
<td>Cannulae »</td>
<td>HLS Cannulae</td>
<td>HLS Cannulae</td>
<td>venous multi stage catheter, arterial cannula</td>
</tr>
<tr>
<td>Disposable approved for »</td>
<td>Up to 6 hours</td>
<td>Up to 6 hours</td>
<td>Up to 6 hours</td>
</tr>
<tr>
<td>Flow »</td>
<td>0.5 - 5 l/min</td>
<td>0.5 - 7 l/min</td>
<td>0.5 - 7 l/min</td>
</tr>
<tr>
<td>Temperature regulation »</td>
<td>33 - 40 °C</td>
<td>15 - 40 °C</td>
<td>15 - 40 °C</td>
</tr>
<tr>
<td>Place »</td>
<td>Critical Care/ER</td>
<td>Critical Care/Cath Lab/ER</td>
<td>OR</td>
</tr>
<tr>
<td>Transport »</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>thApp »</td>
<td>v-v ECLS</td>
<td>v-a ECLS</td>
<td>MECC</td>
</tr>
</tbody>
</table>

*SOFTLINE coated versions available for HIT patients.
The Cardiohelp System uses specially developed disposables: In combination with the HLS Cannulae, HLS Set Advanced or the HIT Set Advanced creates the innovative CARDIOHELP System.

CARDIOHELP-i device—the core piece: The combined drive and control unit boasts a compact, functional design and is ready for operation very quickly. The disposable Heart-Lung Support Set (HLS Set) can be easily primed, making the system rapidly deployable. The device is easy to use with just a single rotary knob, in combination with an intuitive touchscreen and touchpad interface.

The Cardiohelp System incorporates all the parameters necessary for use in operating rooms, critical care, cardiac catheterization laboratories and during patient transportation:
- Specific OR, ISM and TM software applications
- Venous Probe for the measurement of venous oxygen saturation, hemoglobin, hematocrit and venous temperature
- Connection cable for integrated sensors of the HLS Modules
- Flow/bubble sensor
- CARDIOHELP Emergency Drive
- Display brightness can be adjusted
- Nursing Station call system compatibility

The device can be connected to an AC or DC power supplies, including the electrical system on a helicopter or mobile intensive care ambulance. In addition, the integrated lithium ion batteries offer a minimum of 90 minutes of independent operation—e. g., during patient transportation.
The HLS Module Advanced, part of the HLS Set Advanced, is unique in the world: it integrates a gas ex-changer (equipped with a diffusion membrane), a highly efficient heat exchanger, and a cutting-edge centrifugal pump. In addition, the integrated measuring cell is used to measure the important blood parameters of venous oxygen saturation ($S\textsubscript{v}O\textsubscript{2}$), hematocrit (Hct) and hemoglobin (Hb), plus venous temperature ($T_{\text{Ven}}$). Until now, this was only possible using an external blood analysis device or a sensor in the blood-carrying tubes. Sensors for three pressure parameters and the arterial temperature are also integrated.

The HLS Module Advanced is available in two versions: for a blood flow of up to 5 l/min (HLS Module Advanced 5.0) and up to 7 l/min (HLS Module Advanced 7.0).

- For up to 6-hour use
- BIOLINE Coating (SOFTLINE in HIT Advanced Set)
- DEHP — Plasticizer free set
- Safety de-airing function
- 3 integrated pressure sensors
  - venous pressure at the module
  - arterial pressure at the module
  - internal pressure at the module
- Integrated arterial temperature sensor
- Integrated measuring cell for venous oxygen saturation, hemoglobin, hematocrit, and venous temperature

The HLS Cannulae from MAQUET connects the HLS Set to the patient’s blood vessels. These specially developed cannulae can be gently inserted into the veins and arteries, either percutaneously or by surgical cut-down for use up to 6 hours. HLS Cannulae are made of biocompatible polyurethane and, like all other blood-carrying components of the HLS Set, are coated with BIOLINE Coating. Their thin walls ensure excellent flow with minimal pressure drop. In order to insure a high degree of flexibility and kink resistance, all cannulae are wire reinforced.

The HLS Cannulae are available in several outside diameters (from 15 to 29Fr) and lengths (from 15 to 55 cm), allowing individual selection based on the patient’s needs.

MAQUET provides two special insertion kits for particularly gentle percutaneous vascular access. These kits are fitted with guide wires of different lengths and fulfill the requirements of arterial and venous cannulation. Further components of the insertion kit are multi-step dilators in four different sizes, a puncture needle, a scalpel and a syringe. This ensures that everything is at hand in an emergency.
CARDIOHELP DEVICE AND HLS MODULE ADVANCED
TECHNICAL DATA

CARDIOHELP Device

HLS Module Advanced 7.0

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>CARDIOHELP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (H x W x D) Guard closed</td>
<td>14 x 10 x 17 in (315 x 255 x 427 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 22 lbs (10 kg)</td>
</tr>
<tr>
<td>Display</td>
<td>5.7 in LCD Touchscreen</td>
</tr>
<tr>
<td>Sensor values</td>
<td>4 x External pressures 3 x Internal pressures 2 x External temperatures 2 x Internal temperatures 1 x Venous oxygen saturation 1 x Hemoglobin 1 x Hematocrit 1 x Flow sensor with integrated bubble sensor 1 x Bubble sensor 1 x Level sensor</td>
</tr>
<tr>
<td>Operating voltage range</td>
<td>11 – 28 Volt DC 100 – 240 Volt AC / 50 – 60 Hz</td>
</tr>
<tr>
<td>Interfaces for</td>
<td>1 x USB for memory stick 1 x USB for external data recording 1 x Connection for alarm output (ward call)</td>
</tr>
<tr>
<td>Battery operation time</td>
<td>Minimum 90 min (fully charged batteries)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical Data</th>
<th>HLS Set Advanced 5.0</th>
<th>HLS/HIT Set Advanced 7.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. blood flow</td>
<td>0.5 – 5 l/min</td>
<td>0.5 – 7 l/min</td>
</tr>
<tr>
<td>Surface area gas exchange membrane</td>
<td>1.3 m²</td>
<td>1.8 m²</td>
</tr>
<tr>
<td>Surface area heat exchange</td>
<td>0.3 m²</td>
<td>0.4 m²</td>
</tr>
<tr>
<td>Priming volume HLS Module Advanced</td>
<td>240 ml</td>
<td>273 ml</td>
</tr>
<tr>
<td>Priming volume HLS Set</td>
<td>570 ml</td>
<td>600 ml</td>
</tr>
<tr>
<td>Membrane</td>
<td>Diffusion membrane (PMP)</td>
<td>Diffusion membrane (PMP)</td>
</tr>
<tr>
<td>Coating</td>
<td>BIOLINE Heparin Coating</td>
<td>BIOLINE and SOFTLINE (HIT)</td>
</tr>
<tr>
<td>Integrated sensors</td>
<td>- 3 pressures (venous, arterial, internal) - venous oxygen saturation S(_{\text{V2}}) - hemoglobin - hematocrit - venous and arterial temperature</td>
<td>- 3 pressures (venous, arterial, internal) - venous oxygen saturation S(_{\text{V2}}) - hemoglobin - hematocrit - venous and arterial temperature</td>
</tr>
<tr>
<td>Duration of use</td>
<td>Max. 6 hours</td>
<td>Max. 6 hours</td>
</tr>
</tbody>
</table>
SMALL, LIGHT AND COMPACT
AN OVERVIEW OF THE CARDIOHELP DEVICE

- CARDIOHELP Emergency Drive Holder
- Adjustment of flow and speed
- Battery pack for minimum of 90 min
- The special guard protects the CARDIOHELP Device against crushing.
- Display: User-friendly touchscreen
- External data recording, e.g., with JOCAP XL
- Alarm output, e.g., ward call

Main power supply: CARDIOHELP Device can be used with common voltages and currents all over the world.

- Grounding pin (Equipotential bonding connection)

Venous Probe to measure venous oxygen saturation, hemoglobin, hematocrit, and venous temperature

Connection for integrated sensors

HLS Module Advanced:
Integrated diffusion membrane oxygenator and centrifugal pump

- Integrated sensors:
  - venous pressure ($P_{ven}$)
  - internal pressure ($P_{int}$)
  - arterial pressure ($P_{aor}$)
  - arterial temperature ($T_{aor}$)

- Integrated cell for measurement of:
  - venous oxygen saturation ($SO_{2}$)
  - hemoglobin (Hb)
  - hematocrit (Hct)
  - venous temperature ($T_{ven}$)

- Four external pressure sensors
- Two external temperature sensors
- Level sensor
- Flow/bubble sensor
FULLY EQUIPPED SPRINT CART
ACCESSORIES

- Infusion pole (height adjustable)
- Handle for pulling or pushing
- CARDIOHELP Device
- CARDIOHELP Emergency Drive Hand Crank
- Height-adjustable shelf
- Standard rails
- Equipotential bonding connection
- Retractable shelf for accessories
- Electrically conductive wheels with parking brakes
GETINGE GROUP is a leading global provider of products and systems that contribute to quality enhancement and cost efficiency within healthcare and life sciences. We operate under the three brands of ArjoHuntleigh, GETINGE and MAQUET. ArjoHuntleigh focuses on patient mobility and wound management solutions. GETINGE provides solutions for infection control within healthcare and contamination prevention within life sciences. MAQUET specializes in solutions, therapies and products for surgical interventions, interventional cardiology and intensive care.