

CARDIOHELP
DESIGNED TO SAVE LIVES

CARDIOVASCULAR





CARDIOHELP

THE PORTABLE HEART-LUNG SUPPORT SYSTEM

MAQUET – THE GOLD STANDARD



For many years now, 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 CARDIOHELP, a comprehensive life-saving system, which can be deployed quickly for a wide range of indications – in the fields of intensive care, emergency medicine, cardiology and cardiac surgery. As a compact and portable system, CARDIOHELP is ideal for the treatment of patients who require respiratory and/or circulatory support while being transported.

Throughout the world, more people die of cardiovascular failure than of any other illness. According to estimates, about 17.5 million people are dying annually from CVD – that corresponds to 30 % of all deaths (Source: World Health Organization, WHO). Many of these people experience cardiogenic shock because vital organs are not adequately supplied with oxygen. If they could be connected quickly to an operational, mechanical circulatory support system like CARDIOHELP, doctors would gain valuable time to save patients' lives – even in situations where no other alternatives were possible in the past.

MAQUET – The Gold Standard.

EVEN MORE POSSIBILITIES FOR TREATMENT AREAS OF APPLICATION WITH CARDIOHELP

CARDIOHELP is the world's smallest portable heart-lung support system. It is ideal for use in intensive care units, the cardiac catheter laboratory, the operating room and the trauma room. Furthermore, it is the perfect solution for safe and effective patient transport. There are, therefore, now new areas of use and treatment possibilities for extracorporeal circulation.



Intensive care medicine: CARDIOHELP opens up new treatment options in intensive care medicine which put far less stress on the patient and are also comparatively inexpensive. In cases of respiratory failure, the device provides the oxygen supply. Further areas of use include:

- Acute respiratory distress syndrome (ARDS)
- Septic shock
- Pulmonary embolism

Cardiology: In the event of a cardiogenic shock, a frequent consequence of a heart attack, it is crucial to provide circulatory support as quickly as possible. This must be guaranteed until the body is able to resume this function itself. CARDIOHELP can prevent organ damage resulting from insufficient oxygen supply to the vital organs. Areas of application include:

- Cardiogenic shock
- As stand-by or prophylactic support during high risk PCI
- As a bridging system (bridge to recovery, bridge to bridge, bridge to decision), e.g., for myocarditis

Cardiac surgery: At the end of the 1990s, MAQUET developed the minimized extracorporeal circulation system (MECC System). Its clinical use in the operating room led to new applications of extracorporeal life support (ECLS) which required immediate or extended circulatory support.

This principle has been perfected with CARDIOHELP and the compact, integrated design of the HLS Module. Thanks to the system's mobility, the patient can undergo further therapeutic measures (e.g., intensive care) and diagnostic investigations (e.g., CT) during extracorporeal life support. The areas of use:

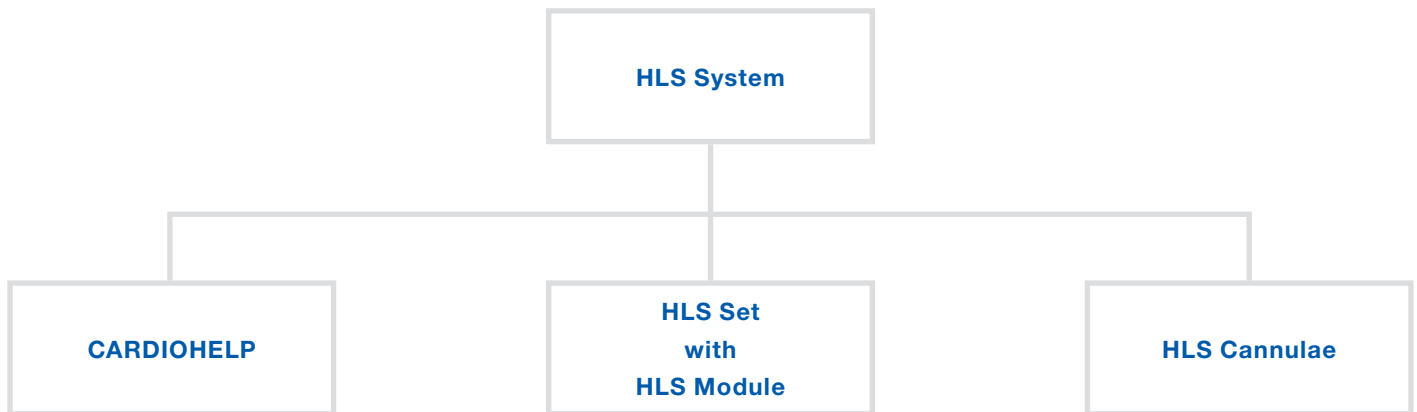
- Pre-operative heart-lung support (e.g., cardiogenic shock)
- Post-operative heart-lung support (e.g., low cardiac output syndrome)
- As a bridging system (bridge to recovery, bridge to bridge, bridge to decision, etc.)

Emergency medicine: CARDIOHELP weighs in at approx. 10 kg and can easily be carried by one person and is sufficiently compact to be used during transport. The system is used in emergencies to restore and stabilize the patient's cardiopulmonary functions. It may have to be used during cardiopulmonary resuscitation caused by following illnesses, amongst others:

- Anaphylactic shock
- Intoxication
- Hypothermia

CARDIOHELP

THE HEART OF THE HLS SYSTEM



CARDIOHELP uses specially developed disposables: the HLS Cannulae and the HLS Set, which comprises the HLS Module. The combination of these innovative components creates the HLS System (Heart-Lung Support System). The ideal interaction of its individual components enables the HLS System to support the patient's circulation and lungs.

CARDIOHELP – the basic product: The combined drive and control unit boasts a compact, functional design and is ready for operation very quickly. The disposables for the Heart-Lung Support Set (HLS Set) can be connected easily. As far as user-friendliness is concerned, this device is exemplary: with just a single rotary knob and a touchscreen, usage is made easy for doctors, perfusionists and nursing staff.

Three different versions are available for the specific requirements in the intensive care unit, the catheter laboratory, the operating room and during transportation: CARDIOHELP, CARDIOHELP-i and CARDIOHELP-iX.

CARDIOHELP comprises:

- OR software
- Flow/bubble sensor
- CARDIOHELP Emergency Drive

CARDIOHELP-i comprises:

- ICU software, also suitable for the catheter laboratory
- Connection cable for integrated sensors of the HLS Module
- Flow/bubble sensor
- CARDIOHELP Emergency Drive

CARDIOHELP-iX comprises:

- TM software, specially designed for transportation
- Venous Probe
- Connection cable for integrated sensors of the HLS Module
- Flow/bubble sensor
- CARDIOHELP Emergency Drive

The device can be connected to the power supply or to the electrical system on a helicopter or mobile intensive care unit. In addition, the integrated lithium-ion batteries guarantee 90 minutes of independent operation – e.g., during patient transportation.

SMALL, LIGHT AND COMPACT AN OVERVIEW OF CARDIOHELP

CARDIOHELP Emergency
Drive Holder

Adjustment of
flow, etc.

Battery pack for 90 min

The special
frame made of
EPDM rubber
protects the
CARDIOHELP
against crush-
ing.

Display: user-friendly touchscreen

Alarm output, e.g., ward call

Main power supply: together with
the DC port, CARDIOHELP can be
used with all voltages and currents.

Online data re-
cording, e.g.,
with JOCAP XL

Equipotential bonding pin

DC port

ECG signal port



Venous Probe to measure venous oxy-
gen saturation, hemoglobin, hematocrit,
and venous temperature

Connection for integrated sensors

HLS Module Advanced 7.0:
Integrated gas exchanger with
diffusion membrane and cutting
edge VAD centrifugal pump

4 external pres-
sure sensors

Unprecedented integrated sensors:

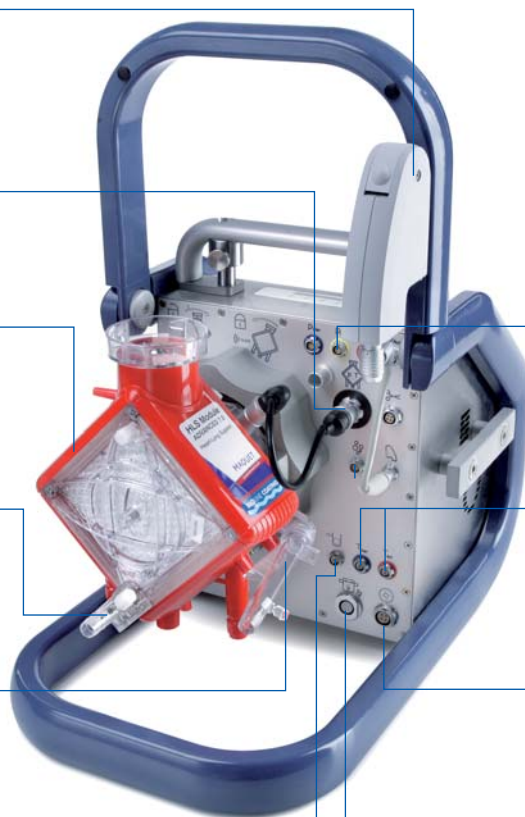
- venous pressure (P_{ven})
- internal pressure (P_{int})
- arterial pressure (P_{art})
- arterial temperature (T_{art})

Two external
temperature
sensors

Integrated cell for:

- venous oxygen saturation (SvO_2)
- hemoglobin (Hb)
- hematocrit (Hct)
- venous temperature (T_{ven})

Connection
for external
CARDIOHELP
drive



Level sensor

Flow/bubble sensor

HLS MODULE ADVANCED INTEGRATION MEETS INNOVATION



HLS Module Advanced 7.0



Arterial outlet

HLS Module Advanced: The HLS Module Advanced was specially developed for long-term use at intensive care units. This disposable product is unique in the world and integrates a specially artificial lung (gas exchanger) and a cutting-edge VAD centrifugal pump. In addition, the integrated high-tech sensor is used to measure the important blood parameters of venous oxygen saturation (SvO_2), hematocrit (Hct) and hemoglobin (Hb), plus venous temperature (T_{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 equipped with a high-quality diffusion membrane and, as with all disposable components in the HLS Set, a blood-friendly BIOLINE Coating. It will therefore receive approval for use for a period of up to 30 days.

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).

- Approval for 30 days use
- BIOLINE Coating
- DEHP-free tubes
- 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
- Unprecedented integrated measuring cell for:
 - venous oxygen saturation, hemoglobin, hematocrit, and venous temperature

The HLS Module is part of an HLS Set.

CARDIOHELP AND HLS MODULE TECHNICAL DATA



CARDIOHELP



HLS Module Advanced 7.0

Technical Data	CARDIOHELP
Dimensions (L x W x H)	420 x 250 x 290 mm
Weight	Approx. 10 kg
Display	5.7" TFT Touch Screen
Sensors	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
Operating voltage range	11 – 28 Volt DC 100 – 240 Volt AC / 50 – 60 Hz
Interfaces for	1 x USB for Memory Stick 1 x USB for Online Data Recording 1 x Connection for alarm output (ward call) Service Interface, External Drive, Remote Interface, ECG signal
Battery operation time	90 min

Technical Data	HLS Module Advanced 5.0	HLS Module Advanced 7.0
Max. blood flow	0.5 – 5 l/min	0.5 – 7 l/min
Surface area gas exchange membrane	1.3 m ²	1.8 m ²
Surface area heat exchange	0.3 m ²	0.4 m ²
Priming volume HLS Module	240 ml	273 ml
Priming volume HLS Set with 2 x 2.3 tubing length	570 ml	600 ml
Membrane	Diffusion membrane (PMP)	Diffusion membrane (PMP)
Heparin coating	BIOLINE Coating	BIOLINE Coating
Integrated sensors	- 3 pressures (venous, arterial, internal) - venous oxygen saturation SvO ₂ - hemoglobin - hematocrit - venous temperature	- 3 pressures (venous, arterial, internal) - venous oxygen saturation SvO ₂ - hemoglobin - hematocrit - venous temperature
Duration of use	max. 30 days	max. 30 days

PERIPHERAL HLS CANNULAE SAFE AND GENTLE



HLS Cannulae



Percutaneous Insertion Kits

The HLS Cannulae from MAQUET constitute the access of the HLS System to the patient's blood vessels. These specially developed cannulae can be safely and gently inserted into the veins and arteries – either percutaneously or by surgically exposing the vessel. MAQUET HLS Cannulae are made of biocompatible polyurethane and, like all other blood-carrying components of the HLS System, are coated with BIOLINE Coating. Their thin walls ensure excellent flow with minimal pressure drop. In order to guarantee a high degree of flexibility and kink resistance particularly in long-term use, all the cannulae have been given wire reinforcement.

The HLS Cannulae are available in several outside diameters (from 15 to 29 Fr.) and lengths (from 15 to 55 cm), allowing an individual selection to be made based on the patient's needs. When used with an HLS Set from MAQUET, the HLS Cannulae are approved for a duration of use of 30 days.

MAQUET provides two sets of special insertion kits for particularly gentle percutaneous vascular access: these sets 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 emergencies.

FULLY EQUIPPED SPRINTER CART ACCESSORIES





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