mLC-KIT – mini Liquid Cooling Kit
compact sealed compressor system for water cooling

- up to 1600 W cooling capacity
- speed control for ease of temperature control
- low vibration, low noise
- lightweight, compact
- easy to integrate
AMS Technologies – where technologies meet solutions

AMS Technologies is a leading solution provider and distributor of high-tech, leading-edge components, systems and equipment, with more than 35 years of experience to date and currently serving more than 2000 European customers.

We are the specialists in both componentry and complete solutions for Optical Technology, Thermal Management and Power Technology fields, with access to and long-standing relationships with the most advanced manufacturers in each of those fields. Drawing extensively on our experience in each of these differing technologies, and coupling this with our broad system-level competence, we are able to offer seamless and comprehensive solutions incorporating complementary aspects from all three key technology fields.

With an appropriate technical education, an element of entrepreneurial spirit and many years of design and consultancy expertise, our sales engineers can rapidly comprehend system requirements and provide you, the customer, with a solution that goes way beyond a simple understanding of our product datasheets. We thrive by working in a ‘customer first’ environment. Our pan-European customers are serviced from a network of local offices in Germany, the UK, France, Italy, Spain, Poland and Sweden, with a focused operations and logistics centre located in Munich, Germany.

Our commitment: Identifying the best solution for your project enabling you to become your customers’ first choice!

Your AMS Technologies team

new possibilities with miniature rotary and linear compressors

mLC-KIT is a sealed vapor compression circuit with either a speed-controlled miniature rotary BLDC compressor (mLC-KIT 500) or two stroke-controlled miniature linear compressors (mLC-KIT 1600). The evaporator is a brazed plate heat exchanger, the interface to the customer liquid coolant circuit. The mLC-KIT comes with inverter boards (external, 24 VDC for mLC-KIT 500 / internal, 230VAC for mLC-KIT 1600). The compressor speed/stroke can be set from the upper control system by frequency signal (mLC-KIT 500 also analog signal). The condenser is an aluminum finned copper tube heat exchanger coil and must be cooled by forced convection, i.e. 120x120 mm fans (1 pc for mLC-KIT 500, 3 pcs for mLC-KIT 1600) or equivalent.

The heat exchanger stainless steel plates are nickel brazed and suitable for a variety of coolant fluids, such as water, DI water and glycol-water mixtures. The plate heat exchanger has male R ¼” R ¼” connectors to connect the water circuit on the customer’s side.

ideal for compact laser cooling up to 500 W (mLC-KIT 500) or 1600 W (mLC-KIT 1600)
ideal for bio reagents cooling
ideal for mobile applications (mLC-KIT 500)
ideal for industry standard 19-inch-racks (mLC-KIT 1600)

key features

- kit to interface with OEM water circuit and electronics control
- utilizes low vibration, low noise mini rotary or linear compressor(s)
- components carefully designed to match each other

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### mLC-KIT 500

**Air Flow**
- Condenser
- Compressor
- Plate heat exchanger (evaporator)
- Liquid coolant in
- Thermal expansion valve
- Liquid coolant out

**Dimensions**
- Weight: 20 kg
- Dimensions (WxHxD): 440 x 184 x 365 mm³
- Electrical connection: 230 V
- Frame: Metal sheet, painted RAL 7035

**R134a Circuit**
- V1 Schrader valve, high pressure port
- V2 Schrader valve, low pressure port
- TT1 Possible position of temperature sensor for fan control, based on condensation temperature; not delivered with unit

**Cooling Capacity (nominal curves for 60 rps)**

<table>
<thead>
<tr>
<th>T_liquid coolant (°C)</th>
<th>Cooling capacity (W, calc. for 4 lpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1141,07143</td>
</tr>
<tr>
<td>15</td>
<td>1420</td>
</tr>
<tr>
<td>20</td>
<td>1680</td>
</tr>
</tbody>
</table>

**Cooling Capacity (nominal curves for full stroke)**

<table>
<thead>
<tr>
<th>T_liquid coolant (°C)</th>
<th>Cooling capacity (W, calc. for 6 lpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>210</td>
</tr>
<tr>
<td>15</td>
<td>410</td>
</tr>
<tr>
<td>20</td>
<td>610</td>
</tr>
<tr>
<td>25</td>
<td>810</td>
</tr>
</tbody>
</table>

### mLC-KIT 1600

**Air Flow**
- Condenser
- Liquid coolant out
- Plate heat exchanger (evaporator)
- Liquid coolant in
- Compressors

**Dimensions**
- Weight: 20 kg
- Dimensions (WxHxD): 440 x 184 x 365 mm³
- Electrical connection: 230 V
- Frame: Metal sheet, painted RAL 7035

**R134a Circuit**
- V1 Schrader valve, high pressure port
- V2 Schrader valve, low pressure port
- TT1 Suggested temperature sensor on high pressure pipe, may be used to control fan speed

**Cooling Capacity (nominal curves for full stroke)**

<table>
<thead>
<tr>
<th>T_water °C</th>
<th>T_cond +50°C</th>
<th>T_cond +42°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>20</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

### mLC-KIT 500 specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply consumption</td>
<td>&lt; 150 W (6A @ 24VDC, 60 rps)</td>
</tr>
<tr>
<td>Cooling capacity (approximately)</td>
<td>500 W (at 100 rps, T_water = +25°C, T_ambient = +25°C)</td>
</tr>
<tr>
<td>Temperature range (ambient, operating)</td>
<td>-10°C .. +40°C</td>
</tr>
<tr>
<td>Hydraulic parameters</td>
<td>Pressure drop 30 kPa @ 4 lpm</td>
</tr>
</tbody>
</table>

### mLC-KIT 500 unit main parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>3.4 kg</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>200 mm x 172 mm x 180 mm</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Frame</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Control</td>
<td>Inverter board</td>
</tr>
</tbody>
</table>

### mLC-KIT 500 controller/inverter board, DC model

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Max current</td>
<td>12 A</td>
</tr>
<tr>
<td>Max input power</td>
<td>210 W</td>
</tr>
<tr>
<td>Operating range</td>
<td>20 rps .. 100 rps</td>
</tr>
<tr>
<td>Speed command</td>
<td>Square wave pulse frequency: 40 Hz – 200 Hz, variable resistor input: 2 kΩ - 10 kΩ</td>
</tr>
</tbody>
</table>

### mLC-KIT 1600 specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply consumption</td>
<td>max 440 W (1.9 A @ 230 VAC, full stroke)</td>
</tr>
<tr>
<td>Cooling capacity (approximately)</td>
<td>1600 W (at full stroke, T_water = +25°C, T_ambient = +25°C)</td>
</tr>
<tr>
<td>Temperature range (ambient, operating)</td>
<td>+15°C .. +48°C</td>
</tr>
<tr>
<td>Hydraulic parameters</td>
<td>Pressure drop 25 kPa @ 6 lpm</td>
</tr>
</tbody>
</table>

### mLC-KIT 1600 unit main parameters

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>20 kg</td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>440 mm x 184 mm x 365 mm</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>230 VAC</td>
</tr>
<tr>
<td>Frame</td>
<td>Metal sheet, painted RAL 7035</td>
</tr>
<tr>
<td>Control</td>
<td>2 inverter boards</td>
</tr>
</tbody>
</table>

### mLC-KIT 1600 controller/inverter board AC model

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>230 VAC</td>
</tr>
<tr>
<td>Max current</td>
<td>5.5 A</td>
</tr>
<tr>
<td>Max input power</td>
<td>2 x 220 W</td>
</tr>
<tr>
<td>Operating range</td>
<td>20 W .. 200 W motor power</td>
</tr>
<tr>
<td>Speed command</td>
<td>Square wave pulse frequency: 20 Hz – 160 Hz</td>
</tr>
</tbody>
</table>
compressors

Our miniature rotary compressors are the result of a breakthrough in compressor technology featuring low vibration and low noise operation. They can be utilized in many thermal management applications from compact recirculating chillers, cabinet coolers, direct cooling of electronic components, and white goods to mobile refrigeration. For smooth and easy temperature adjustment, these miniature rotary BLDC compressors with cooling capacities up to 2000 W are continuously speed controllable adjustment, these miniature rotary BLDC compressors with cooling capacities up to 2000 W are continuously speed controllable via the frequency of a square wave signal. The inverter board is included, a test function board for easy evaluation is also available as an option.

cold plates

Our cold plate technologies range from tubed cold plates and flat tube cold plates to performance-fin cold plates and liquid-cooled chassis. In a world of compact designs with increasing power densities, cold plates are satisfying demanding contact cooling requirements in applications as diverse as high-powered electronics, lasers, power drives, medical equipment, and military and aerospace. For high watt densities, when air-cooled heat sinks are inadequate, liquid-cooled cold plates are the ideal high-performance heat transfer solution.

heat exchangers

AMS Technologies’ heat exchanger portfolio includes tube-fin heat exchangers (copper or stainless steel tubes expanded into copper or aluminum fin for good and cost effective heat removal), oil cooler flat tube heat exchangers (aluminum flat tube fluid channels vacuum brazed with aluminum fin for optimum cooling with poor heat transfer fluids such as oil and EGW) and liquid-to-liquid brazed plate heat exchangers (herringbone construction for efficient maximum heat transfer in a compact and reliable package).

temperature sensors

Accurate and fast temperature sensors are essential for precision temperature control. Amongst the different types of temperature sensors, thermistors provide very high sensitivity, small size and appropriate speed. AMS Technologies’ extensive range of NTC thermistor temperature sensor probes with base resistance values from 5 kΩ to 231.5 kΩ include various types from ultraminiature bare bead, epoxy coated and pipe versions (polyimide, brass, brass nickel, stainless steel) threaded and unthreaded to flange mount and plate models. Sizes range from 0.6 mm to 6.5 cm with Teflon coated lead lengths from 5 cm to 45 cm.

associated products

from technology components to turnkey solutions

We want to accelerate your success, which is why AMS Technologies has invested in two design centers: in Krakow, Poland, and in the United Kingdom. Our goal is to augment your team’s key competencies by providing engineering services that are not core to you or where you may struggle with available resources to finish your projects.

From design services to prototype development to complete turnkey solutions, our collaborative approach has already helped many customer projects to move from concept to production.

- Design, prototyping and “proof of concept”
- Development of turnkey solutions to the customer’s order
- Design-in, systems integration, realization of entire design projects
- Development of customized specification sheets
- Effective project management of any product development
- Interdisciplinary system-level integrated design
- Appropriate subcontractor selection and production support
- Simulations and modeling of system-level designs
- Installation, training and servicing

custom cooling unit for biomedical reagents

A haemostasis analyzing instrument performs various tests to measure blood coagulation. In one area of the instrument the blood samples are kept at a constant temperature of +37°C. Right next to the blood samples the reagents need to be conserved at constant +15°C. The cooling of the reagents is done by forced air flow. For a redesign of the cooling system in their STA-R® haemostasis analyzer, French pharmaceutical laboratory STAGO turned to AMS Technologies.

After careful empirical investigation and determination of the cooling capacity, AMS Technologies developed a customized cooling unit with a powerful 24 VDC mini compressor with linear speed control, small evaporator and condenser heat exchangers, fans and other components of a refrigeration cycle – and successfully placed all these components inside the given restricted space. During the development the AMS Technologies experts also optimized air flow rate and duct to achieve uniform temperatures across the reagents.

directed air flow for precise temperature profile

In order to avoid condensation in plastic containers filled with reagents and mounted on a carousel, the customer had asked AMS Technologies to find a solution that would create the same temperature profile of +4°C to +8°C bottom to top in every container’s reagent. With the help of computational fluid dynamic simulations, the AMS Technologies experts showed that simply cooling the bottom disc of the carousel would not work, as insufficient thermal contact between plastic containers and cooled surface prevents effective cooling and does not allow to create the desired temperature profile. Instead AMS Technologies developed an air conditioning system based on two peltier cooling units and fans, distributing the air flow evenly to all containers. And designed the thermal insulation such that a perfectly defined temperature profile was achieved.

Contact us
enabling your ideas.

Optical, Power and Thermal Management Technologies

**GERMANY**
AMS Technologies AG
Fraunhoferstr. 22
82152 Martinsried, Germany
Phone + 49 (0) 89 895 77 0

**FRANCE**
AMS Technologies S.A.R.L.
Silic 649 – Bâtiment Magnolia
16, avenue du Québec
91945 Courtabœuf Cedex
Phone + 33 (0) 1 64 86 46 00

**ITALY**
AMS Technologies S.r.l.
Corso Sempione, 215/B
20025 Legnano (MI), Italy
Phone + 39 0331 596 693

**POLAND**
AMS Technologies Sp. z o.o.
Mogilska 69 St, Floor 2
31-545 Krakow, Poland
Phone + 48 (0) 12 346 24 16

**SPAIN**
AMS Technologies S.L.
C/Filadors 35, 3º, 7º
08208 Sabadell, Spain
Phone + 34 93 580 84 20

**SWEDEN**
AMS Technologies Nordic
Azpect Photonics AB
Aminogatan 34
43153 Mölndal, Sweden
Phone + 46 (0) 8 55 44 24 80

**UNITED KINGDOM**
AMS Technologies Ltd.
Nene House, Drayton Way
Daventry, Northamptonshire
NN11 8EA, United Kingdom
Phone + 44 (0) 1455 556360

info@amstechnologies.com
www.amstechnologies.com
www.amstechnologies-webshop.com