CRYOGENIC SYSTEMS
Intelligent. Smart. Economical.
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Complete cryogenic systems

With regard to the increasing requirements of the market, Leybold fulfills the expectations of customers with its new range of cryogenic systems combining performant components.

The cryogenic systems offer a great range of economical products which can be easily combined to meet your application’s requirements.

Performant cooling components for your application

Our aim is to provide high quality, intelligent and reliable products and thus meet the customers’ demands.

The Leybold cooling systems consist of:
- COOLPAK i: Compressor unit &
- COOLPOWER i: Cryogenic refrigerator

The cryogenic pump systems consist of:
- COOLPAK i: Compressor unit &
- COOLVAC i: Cryogenic pump

Our systems are generally certified according to all respective standards and regulations (RoHS, EU conformity, safety), specifically IEC/EN 61010 as well as UL 61010.
Cryogenic Systems - Application Areas

The Leybold Cryogenic Systems perform in a broad range of applications in various industries.

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**Low temperature cooling systems**

- Magnetic Resonance Imaging (MRI)
- Proton therapy
- Superconducting magnets
- Accelerators
- Crystal growing
- Nuclear Magnetic Resonance (NMR)

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**Research & Development**

- Space simulation chambers
- Fusion energy
- Radiotelescopy
- Sample and detector cooling
- Cooling of pumping surfaces
- Pumping for accelerators, beamlines and research chambers
— New technologies

- High temperature superconducting devices
- Gas cleaning
- Gas liquefaction

— Industrial coating & processing

- Pumping for thin film coating in flexible and flat panel display technology
- Precision optics
- Electron beam welding
- Pumping of furnaces for brazing and heat treatment
Leybold’s new COOLPAK i compressors are synonymous for innovation, intelligence and energy savings.

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**COOLPAK i - Innovation and intelligence**

Oil lubricated scroll technology and a variable speed drive offer excellence in system performance, energy demand and work space environment. With highly efficient separation and filtration systems the COOLPAK i generates continuous helium gas flow of high purity to the cryogenic systems.

The water cooled helium compressor is controlled and maintained by an internal controller: the Atlas Copco Elektronikon used in several thousands of industrial air compressors. The system offers superior performance for our cryogenic refrigerators and pumps for a wide range of applications.

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**Innovative scroll technology**

- Highly efficient hermetical scroll compressor
- Motor speed control
- Outstanding performance with high helium gas flow
- Robust design
Improved workspace

- Very efficient oil retention system
- Compact design
- Small footprint
- “Plug and play” system set up

Guaranteed oil retention

- Optimum filter design for maximum oil retention
- Design ensures that the oil separators are never overloaded which extends the filter cartridge lifetime
- The innovative oil restraint system minimizes the discharge of oil mist into the helium system

Integrated frequency converter & controller

- Frequency converter for industrial use
- Variable motor speed of the scroll compressor
- Variable motor speed control of the refrigerator drive unit
- Minimal components: compact, simple and user-friendly
Energy saving options & Cost of Ownership

- Energy savings due to variable motor speed of compressor and cold head
- Up to 25% power input saving by using the ECO mode
- Programmable operation modes
- Adaptable power demand
- Elongated maintenance period
- Highly efficient filtration system

Easy to use

- The "plug & play" system design supports quickest installation and start-up without complicated programming
- Easy serviceability (adsorber exchange)
- Maintenance interval of up to 22,000 h (30,000 h)
8 Different Models

This new generation of intelligent helium compressor features variable motor speed technology. Its complete and innovative design with highly efficient filtration systems enables a plug-and-play installation and long term operation. A broad range of variants for your application.
2 different types of voltage ranges can be selected 3ph/200V@50/60Hz, and 3ph/400V@50/60Hz

This variant is especially well suited for applications with cryogenic pumps. Variants for the operation of one or two pumps are available

This variant is recommended for applications with 1 or 2 cold heads
## Compressor Unit Variants

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Compressor Unit</th>
<th>Mains Power</th>
<th>Max. Power</th>
<th>Weight</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>840000V5401</td>
<td>COOLPAK 5000i</td>
<td>400V@50Hz/460V@60Hz 3ph</td>
<td>8 kW @ 50 Hz; 8,7 kW @ 60 Hz</td>
<td>130 kg</td>
<td>1 Cold Head</td>
</tr>
<tr>
<td>840000V5201</td>
<td>COOLPAK 5000i LV</td>
<td>200V@50Hz/230V@60Hz 3ph</td>
<td></td>
<td></td>
<td>1 Cryo Pump</td>
</tr>
<tr>
<td>840000V5411</td>
<td>COOLPAK 5000i; 1 CP</td>
<td>400V@50Hz/460V@60Hz 3ph</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>840000V5211</td>
<td>COOLPAK 5000i LV; 1 CP</td>
<td>200V@50Hz/230V@60Hz 3ph</td>
<td></td>
<td>130 kg</td>
<td></td>
</tr>
<tr>
<td>840000V5402</td>
<td>COOLPAK 5000i; 2 CH</td>
<td>400V@50Hz/460V@60Hz 3ph</td>
<td></td>
<td>2 Cold Heads</td>
<td></td>
</tr>
<tr>
<td>840000V5202</td>
<td>COOLPAK 5000i LV; 2 CH</td>
<td>200V@50Hz/230V@60Hz 3ph</td>
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<td></td>
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</tr>
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<td>840000V5422</td>
<td>COOLPAK 5000i; 2 CP</td>
<td>400V@50Hz/460V@60Hz 3ph</td>
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<td>840000V5222</td>
<td>COOLPAK 5000i LV; 2 CP</td>
<td>200V@50Hz/230V@60Hz 3ph</td>
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<td></td>
</tr>
</tbody>
</table>

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**COOLPAK i - Variants**
COOLPOWER i - Cryogenic refrigerators

Gas refrigerators for cryogenic temperature generation based on the Gifford-McMahon principle.

New benchmark

Intelligent. Smart. Economical.

The new i series cold heads with variable motor speed concept are setting a benchmark regarding efficient and powerful cooling systems. Besides their excellent refrigerating capacity they excel through very simple operation, highest reliability, lowest vibration levels and a long and maintenance-free service life. Reliable and efficient cooling systems are decisive when it comes to competitiveness as well as the technological and economic success of new technologies.

High cooling performance

With new sophisticated stepper motor concept

- Variable motor speed by adaption from the compressor unit
- Boost mode operation for increased cooling performance at fast cool down
- Eco mode for long term operation, lifetime and energy saving
- RoHS compatible - leadfree regenerator
- Highly reliable displacer
## Technical data

<table>
<thead>
<tr>
<th>Part number</th>
<th>Cold Head</th>
<th>Cooling power</th>
<th>Cool down time</th>
<th>Lowest temperature</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>842140V0x</td>
<td>COOLPOWER 140i</td>
<td>140 W @ 80 K</td>
<td></td>
<td>25 K</td>
<td>11 kg</td>
</tr>
<tr>
<td>842100V0x</td>
<td>COOLPOWER 5/100i</td>
<td>100 W @ 80 K - 6 W @ 20 K</td>
<td>35 min</td>
<td>30/10 K</td>
<td>12 kg</td>
</tr>
<tr>
<td>842250V0x</td>
<td>COOLPOWER 250 MDi</td>
<td>200 W @ 80 K</td>
<td>25 K</td>
<td>20 kg</td>
<td></td>
</tr>
<tr>
<td>842010V0x</td>
<td>COOLPOWER 10 MDi</td>
<td>110 W @ 80 K - 18 W @ 20 K</td>
<td>30/8.5 K</td>
<td>21 kg</td>
<td></td>
</tr>
</tbody>
</table>

x = 2 CF flange  
x = 6 ISO-K flange  
Please contact Leybold for further information.
COOLVAC i - Cryogenic pumps
Fulfilling the rapidly increasing requirements for cryogenic pump systems.

Guaranteed high quality, high reliability and impressive performance data
The new COOLVAC i serie, with its new smart family of cryogenic pumps is perfectly adapted to both current and future economic trends and cycles.

We have combined the new compact COOL.DRIVE i controller which is easy to operate with the high performance, low vibration and energy efficient cold heads and compressors of the respective i series.

Highly effective pumping speed for all gases, water vapor in particular
- Automatic control via COOL.DRIVE i controller
- Boost, Eco or standard operation mode for fast cool down, energy saving or standard operation via communication with compressor
- Integrated safety valve according EN 4126
- Simple and rapid maintenance
Depending on the variant, the cryogenic pumps offer different features:

- iBL Basic line pumps without automatic control
- iSL Smart line with automatic control and boost/eco mode
- iLN2 liquid nitrogen cooled shield
## Technical data

<table>
<thead>
<tr>
<th></th>
<th>COOLVAC 5000</th>
<th>COOLVAC 10000</th>
<th>COOLVAC 18000</th>
<th>COOLVAC 30000</th>
<th>COOLVAC 60000</th>
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<tbody>
<tr>
<td></td>
<td>8444802Vwxyz</td>
<td>844502Vwxyz</td>
<td>855632Vwxyz</td>
<td>844892Vwxyz</td>
<td>844902Vwxyz</td>
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<tr>
<td>Cold head</td>
<td>5/100i</td>
<td>5/100i</td>
<td>2x 5/100i</td>
<td>2x 5/100i - 140i</td>
<td>2x 5/100 i - 2x 140 i</td>
</tr>
<tr>
<td>Cooldown time</td>
<td>min</td>
<td>100</td>
<td>150</td>
<td>180</td>
<td>260</td>
</tr>
<tr>
<td>Cross over value</td>
<td>mbar*l</td>
<td>700</td>
<td>800</td>
<td>800</td>
<td>1200</td>
</tr>
<tr>
<td><strong>Pumping speed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N₂</td>
<td>l/s</td>
<td>5,200</td>
<td>10,000</td>
<td>16,000</td>
<td>30,000</td>
</tr>
<tr>
<td>H₂O</td>
<td></td>
<td>18,000</td>
<td>30,000</td>
<td>46,000</td>
<td>93,000</td>
</tr>
<tr>
<td>Ar</td>
<td></td>
<td>4,000</td>
<td>8,400</td>
<td>13,500</td>
<td>25,000</td>
</tr>
<tr>
<td>H₂</td>
<td></td>
<td>6,200</td>
<td>10,000</td>
<td>14,000</td>
<td>30,000</td>
</tr>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ar/N₂</td>
<td>bar*l</td>
<td>3,000</td>
<td>5,500</td>
<td>6,000</td>
<td>6,500</td>
</tr>
<tr>
<td>H₂ @ 10⁻⁶ mbar</td>
<td></td>
<td>32</td>
<td>45</td>
<td>65</td>
<td>100</td>
</tr>
<tr>
<td><strong>Maximum volume flow rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ar/N₂</td>
<td>mbar<em>l</em>¹s</td>
<td>10</td>
<td>10</td>
<td>14</td>
<td>14</td>
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<tr>
<td>H₂</td>
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<td>7</td>
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<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>iSmart Line</td>
<td>kg</td>
<td>53</td>
<td>70</td>
<td>131</td>
<td>258</td>
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<tr>
<td>iBasic Line</td>
<td></td>
<td>44</td>
<td>63</td>
<td>123</td>
<td>246</td>
</tr>
</tbody>
</table>

■ **w = 0 iSL, 1 iBL, 3 iLN₂**
■ **x,y = customer specific variants**
■ **z = different flanges**

Contact Leybold application management for further information
Highly Efficient Filtration System

Optimum filter design for retention of the oil from the helium gas flow. Increased maintenance interval of up to 22000 hours (30000 hours).
Enabling variable motor speed of the scroll compressor. Adaption of the power demand to the applications process. For a perfect adaption to the processes you are running.

Control Unit. With the Elektronikon you keep perfect control of the operation.

Reliable, energy efficient helium compressor technology using the well-proven scroll pump principle.

New sophisticated refrigerator series, combining efficiency and reliability with cutting edge smart technology.

Stepper motor with electronics on board.
**Displacer Concept**
Sophisticated material for displacer and regenerator. RoHS compatible.

**Safety Valve**
Certified safety valve according to EN 4016.

**Cryogenic Pump Controller - COOL.DRIVE i**
Managing regeneration and operation modes of the cryo pump.

**Regeneration Heater**
Electrical regeneration without purge gas.
COOLPAK i - COOLPOWER i - COOLVAC i

Pioneering products. Passionately applied.

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