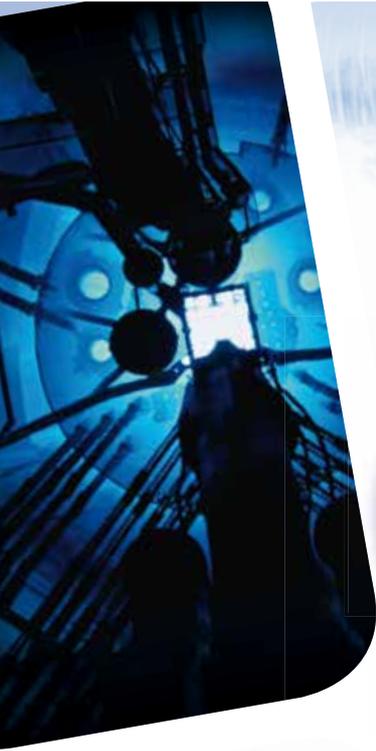


# **HELIAL** refrigerators

Range of automatic helium refrigerators



**HELIAL** refrigerators is a complete range of refrigerators that can provide cooling power from 100 W to 1 kW (@ 4.5 K.).

To simplify matters, all your operations are controlled automatically: compressor management, system cooling, nominal operating conditions and refrigerator shutdown. Pre-cooling with nitrogen may enable you to increase your refrigeration capacity.

Our experts can tailor-made the system to meet your specific needs, through a wide range of solutions.



## Guarantee from a world leader in cryogenics

Air Liquide is the world leader in gases, technologies and services for Industry and Health with more than fifty years of technical, industrial and commercial experience in mechanical cold production, liquefaction, storage and distribution of cryogenic fluids at very low temperatures: a benchmark in expertise.

Air Liquide's teams addresses the specific needs of each customer using a global approach that combines consulting, design, commissioning, testing and maintenance.



# The turnkey refrigeration system

Air Liquide offers a comprehensive refrigeration system: compression, refrigeration and distribution.

Legend:

Basic offer

Optionnal offer

## APPLICATIONS

Synchrotron/Cyclotron  
Tokamak  
Space simulation chamber  
Cold neutron source  
RF Cavities  
Magnet  
FEL

## 1. PURE GAS STORAGE

### Medium pressure pure helium storage unit

It maintains a constant cycle pressure in the refrigeration-compression loop.

It is also used to get back the helium during a long-term shutdown of the system.



## 2. DISTRIBUTION

### Cryogenic transfer line

It ensures the transfer of the fluid between the cold box and the storage unit.

The length can be adapted upon request.

### Valve box

It distributes the cryogenics fluids towards the application. It recovers the cold steams and returns them towards the cold box.



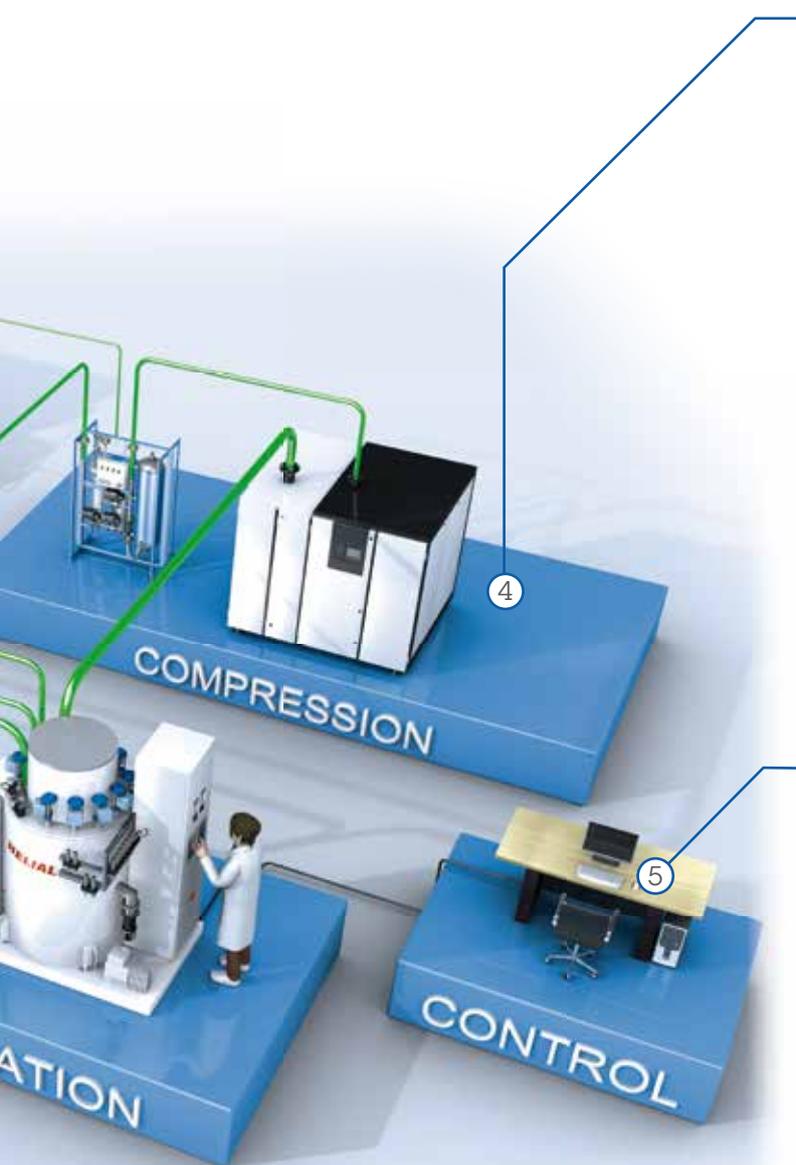
## 3. REFRIGERATION

### Cold box

The heart of the refrigeration system, it includes the heat exchangers, the turbines and the cryogenic valves. The control panel is included with this module.

### Liquid helium storage tank

It ensures that the liquid helium produced can be stored, with a static evaporation rate of less than 0.5% per day.



## 4. COMPRESSION



### Compression station with oil lubricated screws

Air- or water-cooled, it compresses helium gas at the start of the cycle and includes a primary de-oiling.



### Oil removal unit

Once compressed, the gas must then be purified. The oil is removed using coalescent cartridges and then by adsorbing the oil vapors on activated charcoal.

It is connected with the storage unit and also includes the cycle pressure management system (*high pressure and low pressure regulation*). At output, the helium has no trace of oil and can be used in the cold box.

## 5. CONTROL



### Monitoring station

You can monitor your refrigeration system remotely and continuously through a network connection.

Your system can also be placed under the control of Air Liquide technical team via a remote access, offering a monitoring, notification and diagnosis.



### Gas analysis system

The gas can be analyzed continuously at different points in the facility so that any anomalies can be detected.

Air Liquide supports you throughout the different phases of design, commissioning and operation of your liquefaction system.

### Design

- Support you with designing specifications
- Advice on the choice of components

### Commissioning

- From monitoring on site equipment installation and connections to complete on site facility implementation
- Start-up supervision and support
- Acceptance tests on-site
- Provision of appropriate fluids for start-up

### Operation

- Training of operation teams
- Maintenance contract
- Extension of warranty

### After-sales service

- Technical support
- Spare parts
- Advice and optimization
- Customer network

# Key benefits of **HELIAL** refrigerators

## ✓ High reliability

- **Manufacturing quality complies with prevailing international standards and codes**
- Systems in operation **for more than 30 years**
- **Quality assurance system** of production processes

## ✓ Easy to use

- **Automatic and programmable operations**
- **Communication interfaces are user-friendly**
- **Remote monitoring**

## ✓ Low maintenance

- **No wearing parts** for the refrigerator
- **Low maintenance** on the compressor
- **Reliability of turbines** based on static gas-bearing technology
- **Reliability and robustness** of integrated components
- **Continuous self-diagnosis** of system so that any breakdowns can be anticipated

## ✓ Controlled operating costs

- **Minimum consumption of utilities** (*nitrogen, water, electricity and compressed air*)
- The production of liquid helium can be **adjusted to meet your needs**
- **Team training** for optimum use of refrigerators
- **Customized support and advice**



## Turbines with the highest MTBF\* value on the market

**HELIAL** refrigerator is equipped with turbo expanders which constitute the core system of the liquefaction process.

Specifically developed by Air Liquide to operate in harsh industrial environments, our turbines are tested in real conditions on dedicated test benches.

Our turbines use extremely reliable static gas-bearing technology, reaching rotation speeds of up to 300,000 revs per minute with the highest measured on-site MTBF value on the market, namely 150,000 hours.

\* *Mean Time Between Failures*

## Main technical features



Refrigeration capacities and consumption	<b>HELIAL SF</b>	<b>HELIAL MF</b>	<b>HELIAL LF</b>
Cooling power	From 100 to 300 W @ 4,5 K	From 300 to 600 W @ 4,5 K	From 600 to 1,000 W @ 4,5 K
Electrical consumption	45 to 132 kW	132 to 210 kW	210 to 315 kW
Power range	The power range is tailor-made specification		

## Contacts

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The world leader in gases, technologies and services for Industry and Health, Air Liquide is present in 80 countries with approximately 65,000 employees and serves more than 3.5 million customers and patients.