



*Equipment and expertise*

*for Industrial Gas, LNG, Hydrocarbons and Clean Energy*





### Unmatched in business and technology

Cryostar is at the forefront of cryogenic technology. As a market leader, Cryostar has developed a wide range of products unique to the process industry.

## *The Cryostar spirit*



The Cryostar name is synonymous with commitment, professionalism, innovative solutions and flexibility.

At Cryostar, we are driven by the highest standards in customer care, continually striving to meet the technical and business needs of our markets.

Technical edge and business leadership are critical elements in the Cryostar strategy.



## *The Cryostar Group*

### **Worldwide**

Cryostar is an international company with headquarters in France, and bases in Brazil, China, Singapore, Britain, India and across the United States of America. Our customers benefit from a large inventory of state-of-the-art pumps, turbines, compressors, vaporizers, heat exchangers and filling stations. The cultural diversity of its staff also gives Cryostar a unique perspective in the global market. Through its business centres and agent networks, Cryostar provides local solutions, to international standards.



## Innovation

Forty years spent studying the art of cryogenics has seen Cryostar introduce a host of innovative solutions, new applications and technological improvements. Cryostar experts have invested thousands of hours to ensure Cryostar is at the cutting edge of technology, setting the standards of the future. And behind all this a group of highly qualified, experienced engineers, who exploit advanced computer technology and test equipment to ensure Cryostar is a byword for quality and safety. More than just a manufacturer of cryogenic equipment, Cryostar extends its expertise to forming close partnerships with customers, and providing customized solutions.

## Cryogenics – R&D





### The leadership test

When it comes to its products Cryostar's ethos is simple: equipment reliability and high performance, guaranteed. Which is why quality control is paramount and every product – be it fresh off the assembly line or recently refurbished – is subject to stringent testing before delivery. To maintain this guarantee, Cryostar has made considerable investments.

## Testing



### Our guarantee

These include a unique LN2 pump test stand, allowing different simulations, and a turbine/compressor tests site, complete with data capture facilities. R&D also plays a central role – Cryostar technicians test equipment in 'real time', seeking innovative improvements upon existing technology. For Cryostar, leadership of the global cryogenic equipment market is synonymous with being at equipment testing technology's leading edge.



### Distribution solutions

Cryostar provides solutions for every process, transfer and distribution application for the cryogenic industry. Be it centrifugal, single- or multi-stage, reciprocating for high pressure, modular, vertical, horizontal, skid mounted, or road trailer mounted – Cryostar has developed it. Need increasing reliability and product life, safety of operation, ease of installation and reduced maintenance costs? Cryostar delivers all of these, and more.

The modular concept and latest technical improvements have made Cryostar's process and transfer pumps the international industrial gases industry's equipment of choice. Looking for seals – composite, gas riding, and labyrinth, or dual – Cryostar has the best to suit the application. Need high-pressure pumps to fill cylinders?

Cryostar can provide not only the pumps but also a complete turnkey installation. The name Cryostar stands for solutions.



### Turnkey solutions for filling and fuelling

With more than 20 years of experience, Cryostar Distribution is at the leading edge of the manual and automatic high pressure, liquid filling solutions market. Our expertise encompasses two main applications: industrial gas in cylinder filling systems and natural gas for vehicle refuelling stations, in gaseous or liquefied form. Thanks to their robust and compact design Cryostar's road tanker pumps have become standard worldwide.



### Filling stations

Cryostar Distribution brings added value through engineered turnkey solutions that meet the most stringent requirements in terms of project management and integration, as well as installation and start-up. Cryostar Distribution is the ideal partner to maximise both your project's return on investment, and its safety and reliability.

### Savings through high performance

Cryostar's Process Machinery business is the first point of call for process pumps and turbines for industrial gases and hydrocarbons companies.

### Turbines

Cryostar's turbines are the industry standard for industrial gas companies everywhere: our wide range of robust turbines is used for all gases, ensuring reliability and minimising operating costs. Cryostar is also the only manufacturer capable of providing a full range of special application turbines.



Engineering companies and oil and gas industry customers choose Cryostar turbines for hydrocarbon gas processing for their superior design, and proven track record. Final element analysis, computational fluid dynamics, 3D modelling, and laser holographic testing are just some of the techniques Cryostar employs to deliver products to your most exacting specifications.

As the first company to develop expanders equipped with active magnetic bearings (AMBs) and the first to supply these for natural gas processing applications, Cryostar today boasts the largest base of AMB-equipped expanders in the world. Always a pioneer, Cryostar was also among the first companies to gain ISO certification.

Liquid expanders, centrifugal blowers and companders (multistage compressors/expanders) complete the range.



## Pumps

Cryostar is the world's market leader in industrial gas pumps, thanks to the quality and the variety of products to choose from.

Cryostar's centrifugal pumps include a range of 15 single-stage modular centrifugal pumps (MCPs). These meet the most demanding requirements of today's air separation units and other process installations, with optimal hydraulic efficiency and perfect reliability in continuous duty.

Cryostar also offers a multi-stage vertical pump (VP) range. Modular and available in several sizes, Cryostar's VPs easily meet the most demanding requirements in discharge high pressures up to 130 bars in air separation applications, and other process installations. Like the MCP, the VP pump is easy to service whatever seal system is chosen: labyrinth, dry gas or mechanical seal.

Cryogenic process piston pumps are a further area of Cryostar expertise. Used in air separation or LNG applications, these KPL piston pumps are reliable 24 hours a day even for the most demanding applications. Cryostar can also supply special pumps for extreme high pressure (up to 700 bar) and very low temperature applications.

### LNG Ship

Cryostar is the leading supplier of cargo handling and fuel gas supply systems and machinery for the growing liquefied natural gas (LNG) carriers market. We offer equipment for all propulsion classes and capacities of LNG carrier, and can engineer a range of fuel gas supply systems.

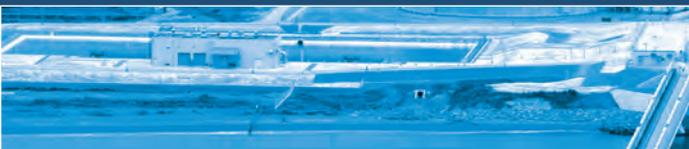


### Integrated boil-off solution

The world's largest LNG carriers, Qatargas' Q-Max series of vessels, are among those Cryostar has equipped with its famous EcoRel reliquefaction plants. Cryostar's patented process uses nitrogen as an inexpensive and safe cooling medium, which, along with a compander and heat exchangers, returns boil-off gas (BOG) to the cargo tank in transit.

Cryostar's diverse and comprehensive offering for LNG transport also includes on-board regasification solutions using either steam or seawater as a heating medium.





### Off Shore

Floating storage and regasification units (FSRUs) are gaining popularity among LNG customers. Cryostar has the necessary equipment on hand: its EcoVAP system incorporates LNG drum, booster pump, vaporization and heating modules tailored to FSRU use.

### On Shore

Cryostar's expertise also extends to on-shore reliquefaction plants to recover and return BOG for a zero send-out strategy. We offer proven single stage compressor technology for gas blowers, along with multi-stage compressors for BOG with a choice of either standard or API 617 design. BOG recondensing systems complete the package.



### Clean Energy, powering the future

Cryostar's Clean Energy business is dedicated to low carbon technologies for energy recovery. With rising energy prices and expectations for today's corporations to cut emissions, Cryostar's Clean Energy radial in-flow turbines, with or without magnetic bearings, hold the key to exploiting pressure let down, geothermal plants, waste heat and natural gas liquefaction.

### Geopressure

Natural gas travels at high pressure through the gas distribution system, but before it reaches end users, pressure is reduced at a pressure let down (PLD) station. Cryostar has honed and implemented systems to harness this released pressure and convert it to carbon-free, green energy using turbo-expander-based generator systems.

Low carbon energy recovery technology is affordable, cost-effective and once installed, effortlessly harvests un-harnessed energy.



### Geothermal and industrial heat

Cryostar also has expertise to convert the heat beneath our feet - from geothermal sources - into a long-term energy source. Our radial inflow turbine technology is highly efficient, and a single MW installed can supply 2500 homes with power all year long.

Industrial heat sources can also be tapped: In addition to its turbo expander generators, Cryostar also supplies complete closed loop binary systems based on organic Rankine cycles to make use of thermal energy, from geothermal or industrial heat sources. Some of Cryostar's European customers are already looking forward to 'free' energy for years to come thanks to these innovations.



### Small scale liquefaction

Cryostar's experience with reliquefaction technology, honed onboard LNG carriers, is also available tailored to small-scale LNG or LBG (liquid biogas) plants. Covering the entire supply chain from natural or biogas source to the end user, Cryostar is the ideal partner for on shore natural gas or biogas liquefaction applications. In realising tomorrow's energy solutions today, Cryostar Clean Energy has developed a long term and strategic commitment – both to its customers and to the environment.

# SERVICES

## CRYOSTAR

### Full service

Customer service stands at the heart of Cryostar. At its leading edge is the global network of business centres and local agents spanning all five continents. Besides day-to-day support, the network offers a combination of local resource solutions and an international pool of experience and expertise. As a natural extension of the network, Cryostar provides added value services in a number of areas. On-site installation advice, commissioning support, troubleshooting expertise, equipment upgrades, 24-hour service, and maintenance contracts with spare parts management are just some proactive solutions Cryostar customers can enjoy.





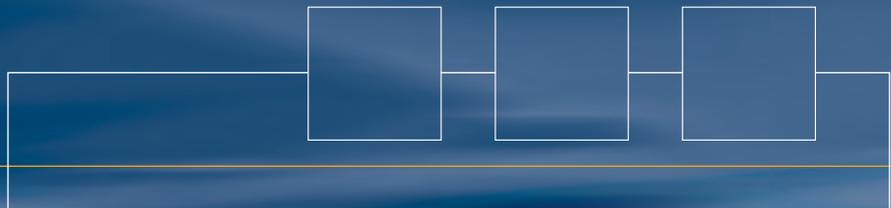
### Tailor-made sessions for efficient results

The Cryostar Training Centre is a global resource staffed by highly qualified Cryostar engineers. The team is available to travel to customer sites or Cryostar business centres anywhere in the world to train equipment users on how to get the most out of Cryostar technologies.

## Training

No one knows better how to maintain and exploit Cryostar's massive range of equipment and auxiliary products than our engineers – and as part of the company's commitment to partnership and service, the Cryostar Training Centre resource is here to increase the skills of customers' operators, with tangible results.

Be it cryogenic pumps or turbo machinery, Cryostar Training Centre's specialist and tailored workshops add value to customer partnerships across all applications and locations.



*Cryostar's commitment to the gases and renewable energy industries is to constantly strive to set the highest standards, now and in the future.*

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**BRAZIL**

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**CHINA**

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**FRANCE**

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**INDIA**

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**SINGAPORE**

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**UK**

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**USA**

For contact and address of the Cryostar locations worldwide, please go to **[www.cryostar.com/locations](http://www.cryostar.com/locations)**

