

JOHNSON CONTROLS

GLOBAL MARINE & NAVY



PROFILE BROCHURE

TABLE OF CONTENTS

Introduction

Page 4

Merchant



Page 6

Wind



Page 8

Oil & Gas



Page 10

Cruise & Ferries



Page 12

Fishery



Page 14

Navy & Non Combat



Page 16

Marine Services



Page 18



JOHNSON CONTROLS GLOBAL MARINE & NAVY

With the aim of being the preferred partner for HVAC&R (heating, ventilation, air conditioning and refrigeration) solutions through the lifecycle of your maritime investment, we are committed to deliver world-class service, energy and operational performance.

It's challenging times and the environmental, social and economic demands on our customers have never been higher. Our ability to help customers meet these demands and be sustainable is however not new; it has been our daily focus at Johnson Controls for more than 130 years. Our brand portfolio covers SABROE, YORK, Frick & Stal within HVAC&R systems and Tyco Marine Solutions within Fire & Security providing every form of fire protection imaginable.

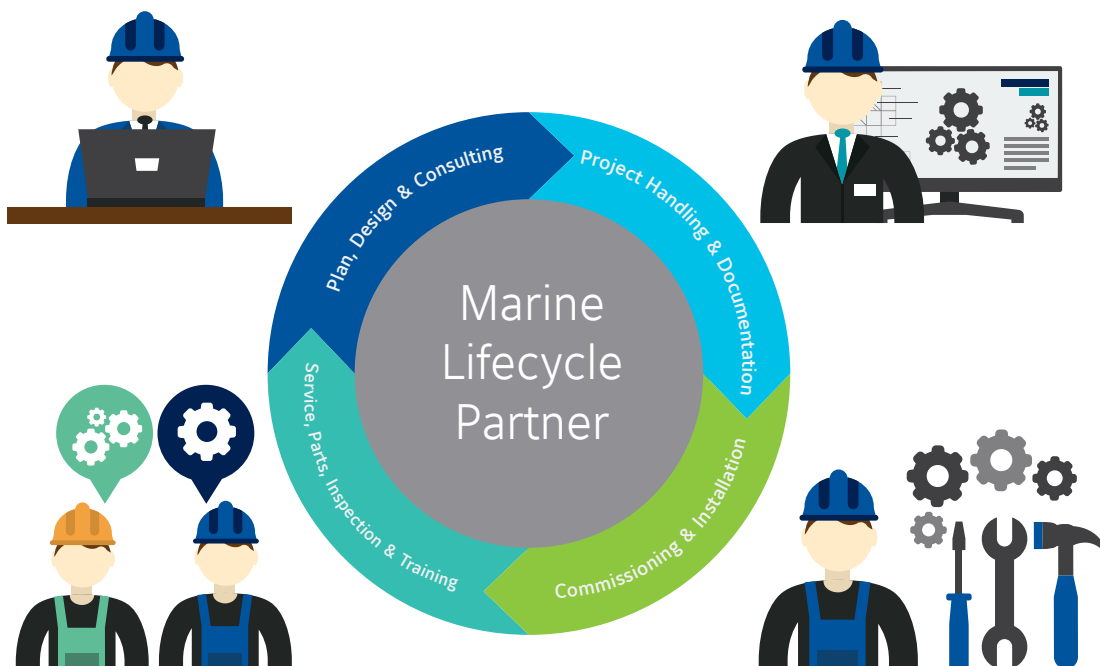
New advanced technologies, energy policies, legislation and education are drivers for change. We are dedicated to address these factors in our work – whether it be building or retrofitting of your vessel or platform, and through all phases of planning, project execution, commissioning and aftermarket services. We call it the Sustainable Maritime Lifecycle Assessment.

Sustainability will continue to play a significant role in any future development between our competencies and our customers' needs. Elements like energy optimization, natural gas retrofit and fleet optimization are already key drivers in our innovation. Our experience and expertise in HVAC&R combined with our controls know-how will secure that we create quality and sustainable products, services and solutions.

We continue to grow our installed base, which now covers more than 10,000 of our customers' ships. The installed base delivers operational intelligence of our core branded HVAC&R products.

Our global organization addresses all segments such as Navy, Cruise, Merchant & Offshore and Services. Johnson Controls Global Marine & Navy solutions and products are tailored and optimized for each specific segment and application and are based on the actual operating scenarios and energy monitoring/audits.

Johnson Controls Global Marine & Navy challenges the status quo and continuously rethink the way we do business with you. We foster an environment where new ideas, technologies and processes are explored to create differentiated products, services and solutions that deliver value proposition to you as an important customer.



PRODUCT OVERVIEW

Packaged Air Conditioners (PAC)



Provision Plants



Fans



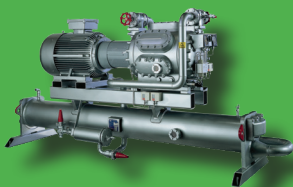
Air Handling Units



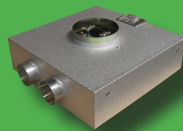
Services/Retrofit



A/C Condensing Units



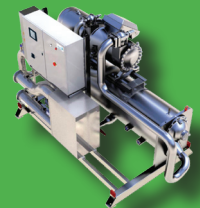
Cabin Units



HVAC&R Automations



A/C Chiller Units



At Johnson Controls Global Marine & Navy, we continuously advance our product portfolio by introducing new, state-of-the-art green technologies for new buildings as well as smart upgrades and optimal refrigerant conversions for existing fleets. Our solutions and products are tailored and optimized for each specific application and based on the actual operating conditions and energy monitoring.



A reliable partner with more than 100 years of marine experience

Johnson Controls Marine, your first choice as global partner for design and supply of HVAC&R (heating, ventilation, air conditioning and refrigeration) solutions for all kinds of merchant vessels.

The standard by which others are assessed

With more than 10,000 ships equipped with our marine systems and covering the brands SABROE, YORK and Johnson Controls, we are among the world's most experienced and leading suppliers, and thereby being the benchmark by which other systems are assessed.

The systems used for merchant vessels will be based on a common global range of products, securing the customers the same well-known equipment quality, user-friendly PLC based control systems and a high reliability from each of the globally based marine entities. This also results in less downtime and quick repair due to the highly skilled, 24/7 global marine service team with a unique equipment and system knowledge.

The strategy of Johnson Controls Marine combining internal key competencies and partnerships with our customers and suppliers results in a series of products that is among the best in the market with regards to reliability, life cycle costs and quality.

Focus on green technology

Johnson Controls Marine is offering tailored environmentally friendly and innovative solutions for your comfort both in regards to the HVAC&R system as well as the automation package. By focusing on designing and supplying equipment with high efficiency and an environmentally friendly choice of refrigerant, we trust this will influence our stakeholders to a cooperative reduction of the greenhouse effect and global warming – giving our children opportunities for a good future.

Not just a supplier

As the largest manufacturer of refrigeration and HVAC equipment globally, we ensure you as a customer the highest industry standard and know-how around the products used in your systems. As a manufacturer, we have full control of the product quality, ensuring a highly reliable system with low life cycle cost.



Products and solutions

- HVAC systems including hardware and equipment associated with an air conditioning system
- Specialist design, planning and heat-load calculation services to ensure a successful and profitable operation
- Ventilation systems and air treatment units for technical areas, such as car decks, machinery spaces, engine rooms, technical installations, etc.
- Refrigeration plants and equipment for use in air conditioning systems, provision rooms, etc.
- Automation systems to support the specific needs of the customer
- Process cooling for special vessels
- Natural refrigerant solutions





Reduce the cost of your offshore installation

A perfect mix of offshore standards and best-practice experience creates an HVAC&R environment of cost-effective reliability and planned maintenance. The Johnson Controls Marine offshore wind team knows the nature of the projects and will implement the requirements in high value HVAC&R (heating, ventilation, air conditioning and refrigeration) solutions. Our global line of products will be your guarantee for the highest product, design and engineering quality, system performance and reliability.

State-of-the-art automation

Our automation solutions range from individual unit control panels to combined HVAC&R platform alarm and control systems, enabling effective running of the plants saving resources as well as onshore supervision of the complete HVAC&R plant. We use standard marine approved automation components for increased reliability and best performance.

Making offshore installations highly reliable

Our mission is to understand, inspire and enable our customers by satisfying all their needs on offshore installations. We develop partnerships with offshore owners, designers and builders through industry leading quality, innovative, reliable and robust technical solutions based on systems tailored to the individual needs of every customer.

Offshore installations

In more than a decade, Johnson Controls Marine has been a reliable global supplier of systems for offshore installations. The focus on performance and product quality, skilled global service network and an expert offshore knowledge from the global engineering team are the cornerstones of Johnson Controls Marine's customer value proposition for offshore installations.

Reduced operation cost

Johnson Controls Marine offers service contracts including web-based remote monitoring and data analysis as just one way of reducing maintenance cost.

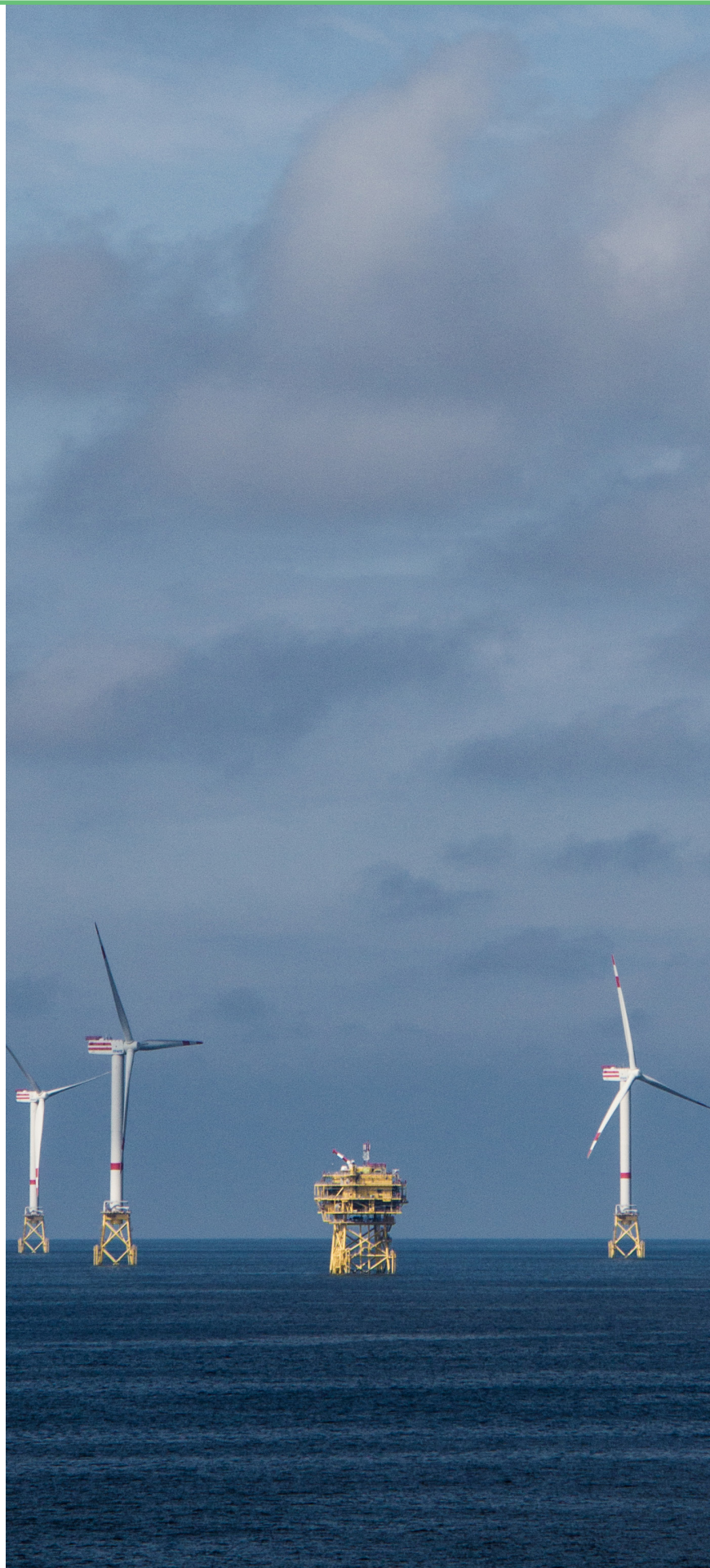
Environmentally friendly solutions

Green technology is a cornerstone at Johnson Controls Marine. We supply solutions that can operate on natural refrigerants, providing an attractive, economical and environmentally responsible solution for our customers in terms of fulfilling their HVAC&R needs on offshore installations.



Products and solutions

- Reduced HVAC&R total cost by adapted offshore design for renewable energy projects
- Package solution provider 24/7 global service network
- Refrigeration plants and equipment for air conditioning systems
- Individual automation systems as well as complete platform systems
- Airside products such as fans, air handling units, fan coils, etc.
- Explosion proof equipment, e.g. ATEX
- Deliveries according to NORSOK, NR13, etc.
- Natural refrigerant solutions





A global package solution provider

Johnson Controls Marine is your reliable partner with vast experience and expert knowledge of HVAC&R (heating, ventilation, air conditioning and refrigeration) solutions and automation in oil & gas applications. The competent global offshore team and a global line of products will be your guarantee as customer for the highest product, design and engineering quality, system performance and reliability.

The technical knowledge and experience of the offshore team ensures full compliance with the yard and owner's specific requirements and strict conformity with specifications, rules and classification requirements. Furthermore, high product quality as well as personal comfort are attributes of systems delivered by Johnson Controls Marine.

Making offshore installations highly reliable

Our mission is to understand, inspire and enable our customers in satisfying all their needs on offshore installations. We develop partnerships with offshore owners, designers and builders through industry leading quality, innovative, reliable and robust technical solutions based on systems tailored to the individual needs of every customer.

Advanced offshore vessels

For the offshore sector where advanced offshore vessels have a high dependability of the HVAC&R (heating, ventilation, air conditioning and refrigeration) and automation systems, Johnson Controls Marine has a global proven track record with deliveries according to some of the strictest requirements for personal comfort on board the vessels as well as high system reliability.

The rules and notations for the systems used in the offshore sector require expert skills from the supplier to ensure both the shipyards and the ship owners tailored equipment from own factories and a support from the 24/7 global service network.

Offshore installations

In more than a decade, Johnson Controls Marine has been a reliable global supplier of systems for offshore installations. The focus on performance and product quality, skilled global service network and an expert offshore knowledge from the global engineering team are the cornerstones of Johnson Controls Marine's customer value proposition for offshore installations.



Products and solutions

- Highly skilled design and engineering team to meet customer requirements
- Package solution provider 24/7 global service network
- Refrigeration plants and equipment for air conditioning systems
- Refrigeration plants for provision cooling
- Automation systems for both refrigeration and ventilation systems
- Airside products such as fans, air handling units, fan coils, etc.
- Explosion proof equipment, e.g. ATEX
- Deliveries according to NORSOK, NR13, etc.
- Natural refrigerant solutions





Global leader in cooling and refrigeration for cruise & ferries

For more than half a century, Johnson Controls Marine has been recognized as the industry leader in cooling and refrigeration solutions for cruise vessels and ferries as well as special marine applications. Our systems and equipment have been installed on nearly 500 passenger vessels; our installed base includes over 1,300 water chillers for air conditioning of accommodation and 150 refrigeration installations for provision stores.

Making ship construction and operation more efficient

Our mission is to understand, inspire and enable our customers in satisfying all their HVAC and refrigeration needs on passenger vessels. Through industry leading quality, innovative yet reliable and robust technical solutions based on solid marine application know-how and systems tailored to the individual needs of every customer, we strive to be the preferred partner of shipbuilders and ship owners. The added value is created in co-development with our customers, aiming at a hassle-free integration at the lowest possible total cost for the shipbuilder and the lowest possible life cycle cost for the ship owner – maximum efficiency & up-time and minimum maintenance over a ship's lifetime.

A sustainable solution for every requirement

The offering includes a full range of HVAC chillers and HVAC systems for cruise and other passenger vessels, refrigeration systems for provision stores, galleys, technical spaces and ice rinks, as well as refrigeration solutions for special purposes; all tailored to the application, rules and regulations. For provision plants, we supply both well-proven HFC units and modern CO₂ technologies per the latest regulations. In addition to this, we also provide absorption chillers for waste heat recovery.

This customer value proposition is supported by own application engineering and unique ship integration capability, all administered by a highly skilled project management team and contract execution aligned with the customer's processes.

State-of-the-art technology and optimized solutions ensure reliable and the most efficient day-to-day operations. The added benefit of the markets' best energy efficiency is an important reduction in CO₂ emissions – today crucial to success for cruise operators, as both investors and consumers become more and more environmentally conscious.



Products and solutions

- Full range of marine centrifugal and screw chillers
- Variable geometry diffusers and OptiSound controls for centrifugal chillers
- Magnetic bearing centrifugal chillers
- Absorption chillers
- Variable speed drives
- Refrigeration systems and equipment for provision stores, technical spaces & ice rinks
- Air distribution & refrigeration systems and equipment for cargo spaces
- HFC and CO2 technologies
- Application and ship integration expertise and engineering
- Radar remote monitoring system
- HVAC systems including hardware and equipment associated with an AC system
- Specialist design, planning and heat-load calculation services to ensure a successful and profitable operation





Johnson Controls Marine safeguards your catch all the way

In the tough world of ocean-going fishing fleets, success means getting the best possible catch from each voyage. Johnson Controls Marine has a unique know-how and expertise within HVAC and refrigeration systems, backed by a truly global footprint. Our extensive offering for fishing vessels allows us to enhance the business of our customers by providing environmentally sustainable, efficient, flexible, and economically sound solutions that will enable you to safeguard the quality and value of your catch as well as the best possible indoor climate comfort.

Johnson Controls Marine has worked closely to understand the marine refrigeration machinery requirements of fishermen and as a result has developed the most advanced and effective HVAC and refrigeration systems available to the fishing industry today.

Advanced RSW concept

The RSW concept has been developed to meet tomorrow's demands for top-quality fish and versatility. The concept is intended for installation aboard fishing vessels, where the most important single factor affecting the quality of fish is the post-catch refrigeration and temperature control processes.

Benefits:

- The quality of the fish on landing
- High COP value, which means lower operation costs
- Lower cleaning and maintenance costs
- Faster installation times

Ammonia/CO₂ cascade concept for large fishing vessels

Our freezing cascade plants use CO₂ refrigerant on the low-temperature side and NH₃ refrigerant on the high-temperature side. Compared to a normal plant (NH₃ direct), the freezing capacity is 25% higher on the same floor space.

Benefits:

- Up to 30% capacity increase in the freezing plant
- 25% reduction in the required space for freezers
- Faster defrosting at lower temperature
- Operating with positive pressure, which ensures that air in the system is not an issue
- Wet return lines are reduced to half the diameter in comparison with ammonia / R22
- Coefficient of performance (COP) is increasing up to 15% at evaporation temperature of -45°C
- The increased COP gives savings in diesel and generator capacity – up to 10% saving in power
- In case of leakage, the cargo will not be affected
- CO₂ is a safe, natural and future proven refrigerant
- CO₂ gives a constant freezing capacity output in everyday operation



Products and solutions

- Custom-designed, custom-built refrigerated seawater (RSW) systems
- RSW chillers
- Condensers & seawater cooled Condensers
- Freezing solutions, plate, tunnel and spiral freezers
- Air conditioning and ventilation systems which include all the hardware and equipment associated with an air conditioning system
- Refrigeration plants and equipment for use in air conditioning systems, provision rooms, etc.
- Automation systems to support the specific needs of the customer
- True 24/7 and experienced technical support
- One stop shop for both refrigeration and HVAC systems





A market leader in heating, ventilation and air conditioning for navy vessels

Johnson Controls Navy Systems is dedicated to the supply of HVAC&R (heating, ventilation, air conditioning and refrigeration) systems for use on all types of navy vessels. All equipment supplied by Johnson Controls is designed, manufactured, tested and installed to meet the specific demands of customers working in the challenging and unique navy environment.

Total global solutions for every naval vessel

Navy Systems applies its extensive experience in shipboard air conditioning and refrigeration systems to ensure that knowledge based solutions are applied to naval vessels of all kinds, from submarines to aircraft carriers. Johnson Controls can design and manufacture equipment to meet the stringent naval requirements of any application.

Whether it is a bespoke design to meet exacting criteria demanded by a submarine, or a commercial off-the-shelf product more suited to a fleet auxiliary vessel, all equipment is manufactured to the highest quality standards. Rest assured that our global support infrastructure ensures that vessels are kept operational wherever they may be deployed. Our support network can conduct equipment installation, setting to work, maintenance, repairs and retrofits anywhere in the world.

Naval System Support (NSS)

Johnson Controls Navy Systems also offers a complete through life support package for naval ships, including all preventative and corrective maintenance for the complete HVAC&R system and a spares inventory held and controlled by Johnson Controls. This solution is aligning to the system design and hardware procurement phase thus enabling value based decisions which add significant value by reducing through life system costs and increased system performance and reliability. Financing and lease arrangement are available to further add value, allowing linear support costs with low capital expenditure, thereby providing our client with a fixed budget, low risk approach to support.

Providing naval safety and the most environmentally friendly conditions

Navy Systems is unrivalled in the supply of air conditioning and refrigeration equipment for naval applications. With environmentally friendly equipment in service on over 1,300 ships worldwide, including all NATO nuclear powered submarines. Johnson Controls is unequalled in experience, with the soul mission of standing behind our products and services. From a small refrigeration plant for a coastal patrol vessel to a complete HVAC package for an aircraft carrier, Johnson Controls Navy Systems has the solution.



Products and solutions

- Total turn-key package
- Navy magnetic bearing chillers
- Chilled water plants
- Air treatment units
- Air filtration units
- Fan coil units
- Including but not limited to:
All other HVAC equipment
- Provision plants





Global reach and local presence

Johnson Controls Marine Services operates through our own or carefully selected business entities located around the world. This ensures customers an organisation with a global reach that is also known and active at the local level. This is essential for marine customers who need on-the-spot assistance while their vessels are in service. Our installed base currently includes more than 10,000 installations meaning that more than 20 percent of all ocean-going vessels have our equipment installed.

True 24/7 and experienced technical support

Johnson Controls Marine maintains a global marine service and parts network that provides customers with a full 24-hour, 7-days-a-week technical support for Johnson Controls Marine plants and equipment including SABROE, Stal, YORK, Gram and Frick compressors.

Besides our own manufactured parts, Johnson Controls Marine Services offers competitive prices for electrical and control components, general refrigeration accessories and other refrigeration brands. We also provide intelligent preventive maintenance to ensure that operation efficiency remains at a maximum throughout the working life of the system. This also increases safety and minimizes operational downtime.

Our marine services staff are experts in their field, supported by experienced HVAC & refrigeration marine engineers, in dealing with all aspects of services such as replacement of HVAC and refrigeration equipment, refrigerant conversions and energy efficiency upgrades. We meet the latest global demands and comply with legislation regarding the use of environmentally friendly refrigerants and the increased focus on reducing CO₂ emissions.

Great customer experience

Based on marine HVAC&R (heating, ventilation, air conditioning and refrigeration) systems, we seek to maximize efficiency and value for all our stakeholders.

Planned service agreement

Johnson Controls Marine Services provides different options regarding service agreements, from remote monitoring of the total plant to servicing compressors.

Just ask us and we will show you how we can solve your needs.



Products and solutions

- Service on-demand
- Original spare parts
- Service agreements
- Compressor factory overhauls & exchange
- R22 phase out - refrigerant conversion
- HVAC&R service & survey
- Retrofit & upgrade
- Controls equipment



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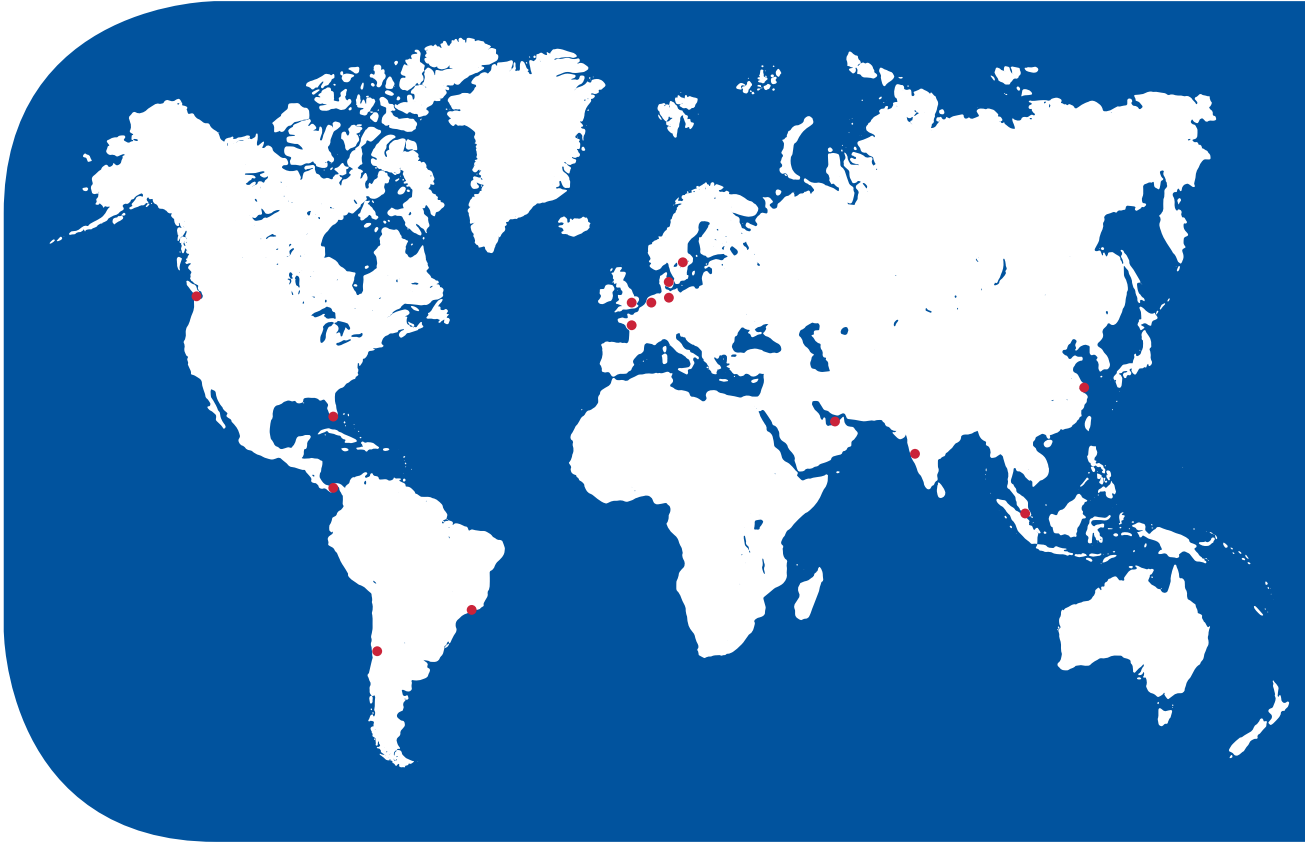
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Global Reach - Local Presence



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