

Kelvion



Refrigeration market

TAKING HEAT OFF AROUND THE WORLD



**Kelvion –
a tribute to
Lord Kelvin**

**70 branches and
sales partners
worldwide**

**More than 4,000
employees
worldwide**

Lord Kelvin (1824 – 1907) formulated
the laws of thermodynamics



EXPERTS IN HEAT EXCHANGE – SINCE 1920

Welcome to Kelvion. As successor to the GEA Heat Exchangers Group, we continue to break new ground, making discerning customers more successful than ever with our integrated heat exchanger solutions.

Our solutions for your applications:

We offer our customers one of the world's largest product portfolios in the field of heat exchangers. It includes individual solutions for practically all conceivable applications and complex environmental conditions: plate heat exchangers, shell and tube heat exchangers, finned tube heat exchangers, modular cooling tower systems, and refrigeration heat exchangers.

Your markets are our markets, too:

The markets in which you and we together operate are among the most important in the world: the chemical industry, food and beverages, the heavy industry, climate and environment, marine applications, the oil and gas industry, energy, refrigeration technology, sugar and transportation. We provide every single market segment with solutions of outstanding efficiency, safety, and sustainability.

We are highly committed to earning your trust:

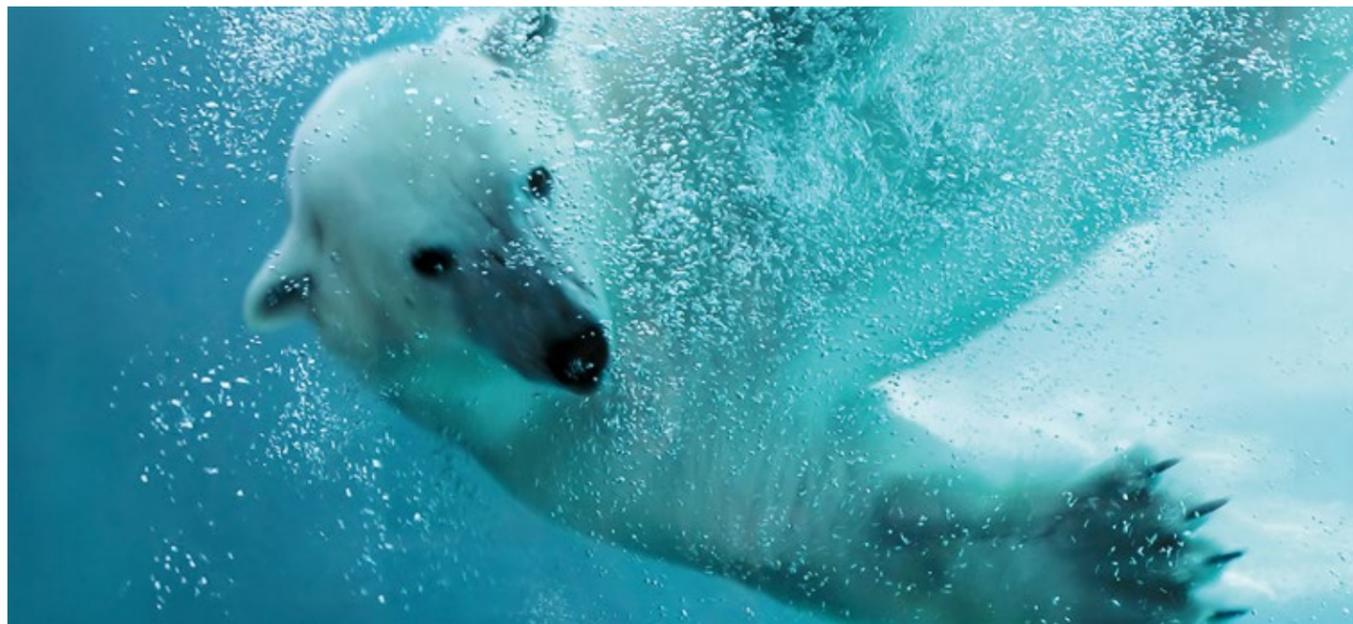
We want to win your trust with everything we do and convince you with the solutions we offer. With this high aim in mind, we invest our extensive know-how, our great precision, and our passion in everything we do: including product development, manufacturing, installation, and after-sales support.

Seeing things from the customer perspective:

Your specific requirements count – and nothing else. Whatever we offer you, it must meet these requirements. Our entire way of thinking and working is geared towards this aim. Our customers truly appreciate this: after all, this is how we make their companies more efficient.

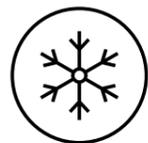
We are at your service.

Kelvion – Experts in Heat Exchange.



The Refrigeration market – facts and figures

TAKING HEAT OFF AROUND THE WORLD



Refrigeration has made it possible to enjoy fresh food all year round, however far it has to travel to reach the consumer. It also plays a major role in keeping down the temperature in the global healthcare, commercial, industrial, residential and leisure sectors.

Changing eating habits create demand

Rapid urbanization and increased purchasing power in developing economies have created an appetite for more ready-to-eat, packaged foods, which need to be kept cool to preserve their freshness and nutritional content. In order to meet the demand, shops are investing in a range of refrigerated storage cabinets, display cases and coolers. By 2020, the Asia Pacific region, particularly China and India, is expected to dominate the commercial refrigeration market. Meanwhile, developed economies are contributing to the upswing in the sector through replacement purchases.

Keeping cool naturally

The US Food and Drug Administration (FDA) and the EU have recommended that, by 2017, synthetic refrigerants with a high global warming potential should be replaced by more environmentally friendly solutions. Growing awareness of the negative impact of HFCs and HCHCs on the ozone layer has prompted a shift towards natural refrigerants, such as ammonia and CO₂.

The drive towards energy efficiency

Improving the energy efficiency of commercial and industrial refrigeration equipment is essential for end users looking to reduce operating costs. This is a particular priority in the food processing industry, where profit margins are narrow.

Market-leading cooling

Air coolers are crucial components in refrigeration systems and have a significant influence both on their running costs and on ensuring product quality. At Kelvinio we are experts in cooler design, backed by 75 years of innovation and close collaboration with our customers. We have developed market-leading solutions for a wide range of applications, from food storage and processing to coolers for complex automotive test chambers.

Refrigeration market shows no signs of cooling off

CHANGING LIFESTYLES AND ADVANCES IN ECO-FRIENDLY AND ENERGY-EFFICIENT TECHNOLOGY FUEL REFRIGERATION DEMAND

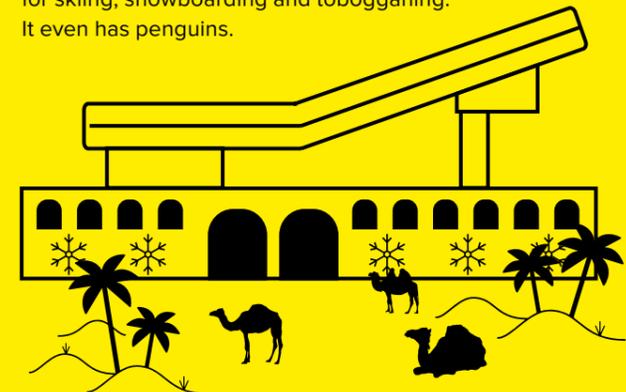
Green cooling

Regulatory bodies worldwide have recognized that synthetic refrigerants (HFCs and HCFCs) have a damaging effect on the ozone layer. These are gradually being phased out in favor of natural refrigerants, including ammonia and CO₂, which have a much lower GWP. As well as reducing the environmental footprint of refrigeration systems, they are more energy-efficient.



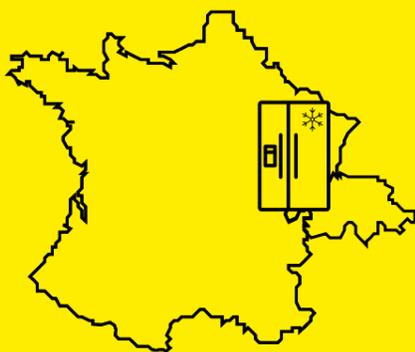
Snow in the desert

Refrigeration technology has made it possible to create a ski resort in the Middle East. Ski Dubai is the largest indoor ski park in the world, featuring 3,000 square meters of snow for skiing, snowboarding and tobogganing. It even has penguins.



The big chill

The 27-kilometer long cryogenic distribution line between France and Switzerland is the world's largest refrigerator. It is part of the Large Hadron Collider particle accelerator project at CERN.



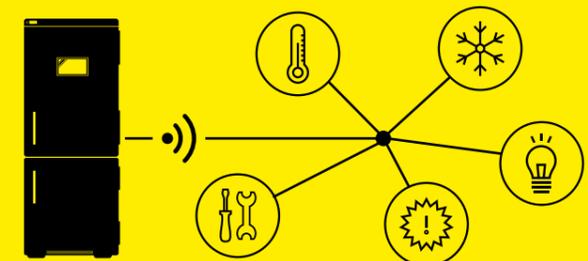
Market on the rise

Between 2015 and 2020 the value of the global commercial refrigeration industry is set to increase from US\$ 34.43 billion to US\$ 45.06 billion – a CAGR of 5.53%. By 2018, the demand for refrigerants is expected to grow by 5.2% to 1.6 million tonnes. Economic growth and changing lifestyles in developing nations, rising global temperatures and sales of replacement products in developed economies are key factors, as well as a focus on energy-efficient technology and environmentally-friendly refrigerants.



Refrigeration the smart way

Rapid technological advances are making fridges smarter. It is now possible to control temperature, automated defrost and anti-short cycling from just one controller, instead of three separate systems. In 2016 a new, wi-fi enabled, cloud fridge was unveiled at the China Refrigeration Exhibition. Aimed at the commercial sector, it can regulate temperature automatically and measure and control energy consumption.



The main drivers behind Refrigeration demand



Increasing urbanization



Energy efficiency



Switching to natural refrigerants

Source: Technavio and MarketsandMarkets

Source: Technavio

Source: www.historyofrefrigeration.com



Agricultural Greenhouses

THE COOL ANSWER TO GROWING GOODS

Refrigeration plays a major role in the global food supply chain by keeping perishable items fresher for longer and preserving their nutritional content. Agricultural greenhouses have made it possible to grow certain fruits, vegetables and flowers year round, while cold stores extend their shelf life.

Air coolers are crucial for absorbing the heat in greenhouses and controlling the relative humidity, temperature and CO₂ levels. In storage plants, they ensure that dehumidification is kept to minimum to preserve both weight and quality.

At Kelvion we excel in air cooler design, backed by 75 years of innovation and close collaboration with our customers. Our market-leading coolers are renowned for their long air throw range and high air volume flow. Whether as standard or customized units, Kelvion air coolers are guaranteed to operate reliably and energy efficiently.

Agricultural greenhouses

Plants grown outdoors are at risk from extreme temperatures and harmful pests. Agricultural greenhouses act as a shield against these, enabling fruits, vegetables and flowers to thrive. While greenhouses are designed to keep the heat inside, summer temperatures can be too high for the optimum growth of the plants. With effective cooling technology, the right environmental conditions are assured throughout the year.



Fruit and Vegetable Storages

STORING AND STOCKING CAN REPRESENT HUGE CHALLENGES

Storing and stocking fruit and vegetables as well as flowers can represent huge challenges in the context of minimal dehumidification, prudent air circulation and mild cooling.

Fruit and vegetable storage

Once fruit and vegetables have been harvested, the challenge is to preserve their nutritional value and freshness. They must be stored at specific temperatures and humidity, depending on the product. Root and leafy vegetables should be kept at ± 0°C, with 85 - 95% humidity, while apples require a temperature of +1°C to +4°C and 92 - 95% humidity. Minimal dehumidification is important to ensure the minimum loss of weight and quality. For example, lettuces that have been subjected to more than 5% dehumidification can no longer be sold. As well as cooling, a controlled atmosphere is needed to counteract fungal decay and putrefaction.

Kelvion air coolers feature fans with speed controllers, which can be adapted precisely for your specifications and set for the required air circulation. Seeded fruits for example need an air exchange of 14-25 times per hour. For most kinds of vegetables it must be exchanged twice as often.

Flowers

Preserving the lush blossoms and strong stems of cut flowers is extremely complex. It requires a precise air temperature from +2°C to +4°C – +5°C and +8°C for orchids, anthuriums and gerbera daisies – and 85-95% humidity. Even the slightest drop in humidity can cause the blooms to wither. Mild, even, draft-free cooling is important for maintaining the conditions for long-lasting freshness. Kelvion industrial coolers are well-known for their long air throw range and high air volume flow. When set correctly, they cool cut flowers gently.



Display Cases & Bar Counters

RELIABLE, COST-EFFECTIVE AND ENERGY-EFFICIENT COOLING POWER

The rapid growth in urbanization has led to an increase in the numbers of food stores, bars and restaurants worldwide. This in turn has boosted demand for refrigerated display cabinets and bar counters. As well as providing a showcase for a wide range of beverages and fresh packaged foods, they perform the essential duty of keeping the contents cool and preserving their quality.

Stringent regulations apply to the temperatures at which food and drink must be kept. This is usually +6 °C for beverage counters and between +2 °C and -20 °C for foodstuffs. High ambient temperatures and the constant opening and closing of cabinets are a challenge to refrigeration systems which rely on efficient heat transfer and air flow to maintain the correct temperature.

Our range of air coolers and condensers offer reliable and cost-efficient cooling power, however challenging the conditions. Whatever the cooling demands of your individual application, we can tailor our units to meet them. Kelvion air coolers and condensers are energy-efficient and optimized for CO₂ system designs.



Supermarkets

UNRIVALLED PORTFOLIO FOR MAINTAINING THE COLD CHAIN

Refrigeration is the foundation of the supermarket business, enabling retailers to stock extensive ranges of perishable goods throughout the year. From fruit and vegetables, meat and dairy products to pre-packed meals and frozen foods, it is essential that the cold chain temperatures are maintained constantly.

The rate of sales and restocking mean that storage times can be as short as one to three days. Choosing the best cold cabinets and freezers for the purpose depends not just on the goods themselves but, importantly, the cold storage space available. Units that are designed and built to suit allow optimum storage with less loss of space in the room. The storage dimensions are an important factor in the cooling capacity of the evaporator, to ensure a constant indoor temperature.

Our vast knowledge of refrigeration technology and industrial refrigeration systems means we can offer an unrivalled portfolio of air coolers, condensers and heat exchangers, tailored to the specific needs of our customers. We are also leading the way in using natural refrigerants to reduce the carbon footprint of refrigeration installations and make a positive contribution to the preserving the environment.



General Food Processing

RELIABLE FREEZING AND REFRIGERATION PARTNER

The demand for processed and ready-to-eat packaged food is on the rise, fueled by today's hectic work schedules, new lifestyle habits and higher disposable income in developing economies.

To meet the growing appetite for processed foods, manufacturers require reliable, precision technology, including optimum cooling solutions. Whether it's fresh meat and vegetables or ready-made pizzas, pastries and French fries, Kelvion is the reliable partner for all your cooling and freezing needs. Our range of air coolers, condensers and coils are industry standard components which are custom-designed to suit everything from compact to mega IOF freezers, carton freezers, spiral freezers, multi-belt tunnels and special inline freezers/chillers. We also design OEM products for clients to use in modular set-ups. This optimizes the product and means lower engineering costs.

Kelvion is proud to be a leader in green technology. We are developing our equipment to run on environmentally-friendly refrigerants, including CO₂ and ammonia (NH₃) and secondary refrigerants, such as mono propylene glycol.

Cheese and bakery products require special cooling and freezing specifications, which are categorized as complex. Kelvion has the solutions to meet these challenges head on.

Cheese

Hygiene plays a significant role in the initial steps of turning milk into cheese. The corrosive substances found in cleaning agents make this environment a particularly complex one. Although air movement must be kept to a minimum, the temperature level in the aging and storage areas must be uniform, so that all of the cheeses ripen evenly. As a result of the chemical reactions that occur during aging and storage, cheese releases substances that can have a corrosive effect on air coolers. Our range of air coolers are manufactured from high quality stainless steel, with epoxy resin-coated fins for guaranteed maximum protection against corrosion. Hinged fans and fold-down drip trays make our air coolers easier to clean.

Bakery

Production processes have undergone major changes in recent years in order to provide customers with fresh baked goods at any time – day and night. So that products can be baked on site, they are made at a central location, blast frozen, and then distributed. The challenge is in cooling the baked items rapidly, without blowing air onto them directly. Pastries must be cooled down to -7 °C at the core, while the temperature of partially baked goods should go down from +65 °C to +10 °C in three hours. High cooling capacity and air flow rates are essential for guaranteeing these specifications. Our blast freezer's sophisticated tube/fin systems and refrigerant distributors ensure short defrosting phases.



Meat Processing

SOLUTIONS YOU CAN RELY ON FROM FARM TO SHOP

Delivering meat and meat products from the farm to the consumer involves a wide variety of processing, preparation and storage systems. Good refrigeration is paramount throughout the supply chain.

Animal carcasses must be cooled rapidly in order to maintain the flawless, hygienic quality of the meat and prevent weight loss. To achieve this, the core temperature after slaughter is lowered in a continuous cooling curve. For half carcasses of pork and beef, this internal temperature must be reached within a certain period. Air flows over the chilled goods need to be maintained at a speed of 2-3 m/sec. The core temperature for poultry is specified in the hygiene ordinance 2004/853 EC for foods of animal origin.

In addition to storage, deep freezing and general cold rooms, meat processing plants have workrooms for cutting and preparing the finished products. Maintaining a suitable environment for the workforce requires a constant temperature, comfortable air movement and as little noise as possible.

Long evaporator run times can only be guaranteed with a combination of optimum refrigerant distribution, effective air flow, and efficient cooling surfaces with adequate fin spacing.

At Kelvion we have a wide range of high performance unit coolers that you can rely on for keeping meat fresh and preserving quality and nutritional content. Our sophisticated and cost-efficient technology, built on decades of experience, ensures that the correct temperature is maintained and weight loss is prevented. In addition, our solutions are optimized for natural, environmentally-friendly, refrigerants.



Leisure & Test Facilities

INDOOR SKIING GUARANTEED WITH KELVION AIR COOLERS

Leisure

It was the lack of natural, snow-covered slopes in their own countries that prompted European entrepreneurial ski enthusiasts to develop artificial ski slopes. Today indoor ski facilities can be found all over the world, including Dubai where outdoor temperatures can be as high as 50°C. The snow is created using special cannons and the environment must be maintained at -1 to -2°C to prevent it from melting.

Kelvion was the chosen partner in co-developing air coolers for this specific application. Our state-of-the-art technology is precision-engineered to meet the special demands of indoor ski slopes, including air throw, frost accumulation and sound levels. This is why you will find our air coolers benefitting ski lovers at artificial slopes around the globe.

Test Facilities

Research and modern industrial production rely on tests. Car manufacturers regularly test vehicles' capacity to withstand extreme temperatures, varying from -60°C to +100°C, as well as wind speed and humidity. In the food industry, testing engineers study the behavior of the food in relation to several freezing methods, going down to -70°C and beyond.

Studying the human body during sporting activities, under varying conditions, provides valuable data to support athletes' quest for gold at the Olympic Games and other major championships.

Air cooling technology is vital for providing the optimum environment to support accurate and reliable testing. Our air coolers enable customers to change the environment in a blink of an eye. There is no need for complicated modifications as the units are specially designed to create all conditions by using multiple circuiting and other innovative solutions. This saves serious time for testing.



Marine Sector

COOLING EXCELLENCE ON BOARD

The marine industry is an essential link in the global economic chain, supplying goods to meet the world's growing demand. Whether it's the design, delivery schedules, materials or order processing, accuracy is of the essence. Every vessel, from reefer and trawler to cargo ship and cruise liner, relies on cooling equipment to keep engines running efficiently, reduce emissions, recover waste heat and supply fresh water.

Our contribution to the ship-building industry underlines our reputation as a reliable team player. As well as providing standard solutions, we specialize in tailor-made units. This is crucial where space is limited, particularly on fishing trawlers and vessels used for freezing and cooling and transporting frozen and fresh products.

With Kelvion on board, you can be assured of excellent and effective cooling technology that is built to withstand the most turbulent conditions at sea.



Distribution Centers

SOLUTIONS FOR THE MOST DEMANDING DUTIES

Distribution warehouses are the foundation of a supply network for a wide variety of foods and beverages. Whether packaged or unsealed, in cold storage or freezers, the goods must be in perfect condition to maintain their freshness and nutritional quality.

Market demands require a high stock turnover, which means extensive vehicular activity in the loading area. As a result, debris from tires and pavements, combined with dust from cardboard boxes, gets drawn into the air coolers and partially blown back out again. It is therefore crucial that loading areas and cooling rooms are easy to clean. Due to the sheer size of distribution centers, air coolers need to have a long air throw range, as well as a high cooling capacity and long operating capability.

The Kelvion range of air coolers meets the demanding cooling duties required by distribution centers. As well as a long air flow range and high volume air flow, our air coolers assure fast temperature control of freshly stored goods and keep defrosting intervals to a minimum. Speed-controlled fans assure sufficient air movement when the air flow needs to be reduced, such as during stocking phases.

Kelvion Case Story | Distribution Center

ASROPA FOOD GMBH



Growth represents challenges.

As Ropa Food GmbH, the Truong family has grown quickly in recent years. The business, that began in the 1980s in Hamburg with a small Asian food shop, has developed into one of the largest importers of Asian food.

Our customer and his job

The company imports Asian cooking ingredients – from Vietnam, Cambodia, Laos and Thailand – for customers all over Europe. Two containers arrive every day: noodles, rice, fish, meat, vegetables, spices, an increasing number of which is frozen.

The solution and its features

- ▶ A transcritical CO₂ booster rack system with glycol defrosting, and a 3,000 liter thermal energy storage system using thermal discharge to heat the offices and social areas.
- ▶ Compared to a traditional deep-freeze system the installed, environmentally-friendly CO₂ system saves Euro 20,000 – every year! This reduces the investment volume.
- ▶ Picking room with Medium Temperature Cooling: Two Kelvion ceiling air coolers, which blow out on both sides, create a uniform air distribution, ensuring that the cold chain reliably maintains an optimum flow and reduced air speed.
- ▶ A Medium Temperature Cooling in a fresh food room for fruit and vegetables: Two Kelvion high-performance cubic coolers ensure constant room temperatures. A Deep-Freeze room features five high-performance unit coolers.
- ▶ EC (Electronically Commutated) Fans offer considerable energy cost savings and long life.
- ▶ Defrost on demand, controlled by air intake and air output temperature sensors, resulting in a constant -23 °C room temperature.
- ▶ Trendsetting technology means that the system is highly efficient.

Overview of our products for refrigeration

GLOBAL SOLUTIONS YOU CAN RELY ON

With one of the most extensive product ranges on the market, Kelvion is the experienced partner that you can rely for providing innovative solutions for efficient cooling and heat exchange solutions. Our commercial and customized air coolers, condensers, coils and heat exchangers are designed to meet the highest standards required by refrigeration plants.



Commercial Aircoolers

The Kelvion range of Commercial Air Coolers is designed for most refrigeration applications. In addition to predefined variants, there is the flexibility to include options and accessories to meet our customers' demands.

Their capacity and size are optimized to facilitate the stocking and competitive transportation of products directly, or via our distribution and wholesale channels. Commercial products are defined within the sales brochures, selection software and product configurator – all with specific price lists.

If the products in the Commercial portfolio do not meet your requirements, we have a customized range of Air Coolers that can be configured uniquely to suit.



Customized Aircoolers

If a commercial product does not meet the market demands, our Customized Air Cooler product line offers a design-to-order process, with your application needs as the starting point. We optimize the total quotation process and tailor our manufacturing to fulfil your requirements.

We start with the widest possible product portfolio, offered in our selection software. Our Sales teams can provide non-standard, design-to-order, industrial or OEM solutions. It is a critical feature of our quotation and manufacturing process that we check the design at the earliest opportunity to avoid risk.

In conformity with lead times, we design the best air cooler for your application.



Condensers & Dry Coolers

Kelvion Condensers and Dry Coolers are based upon modular designs. We offer various fan sizes, multiple speeds and suppliers, coupled with an extensive range of tube and fin profiles, to enable products to be tailored accurately to meet the application demands.

The wide range of fan choices ensures that the optimal balance between air volume and capacity, operational noise levels and power consumption to meet market price levels are achieved. The tube and fins can be supplied in various materials, depending on the internal or external corrosion properties.

The products can be deployed in multiple applications, from standard commercial stock products to customized, made-to-order units.



Coils

Kelvion heat exchanger coils are manufactured with copper tubes and aluminum or copper fins. Special fin profiles, developed by our R&D department, enhance heat transfer and maintain pressure drop at a moderate level. Collars allow for customized fin spacing, as well as providing the contact between the fin block and the tubes. Mechanical expansion of the tubes guarantees a perfect bonding between the fins and tubes for maximum heat transfer. Several tubes are interconnected via brazed return bends to form the coil circuits, which receive the working fluid via brazed tubular headers. The thermodynamic design is created with our in-house developed selection software, based on the measurements in our laboratory conform to DIN EN1216. Rigorous testing supports quality control of our coils.

Our extensive product portfolio, with diverse options, means we can configure our coils to suit specific requirements and applications, leading to cost-optimized and energy-efficient products. Short delivery times and an excellent service ensure customer satisfaction.

Overview of our products for refrigeration

GLOBAL SOLUTIONS YOU CAN RELY ON



Fully Welded Plate Heat Exchangers

Our fully welded plate heat exchangers offer convincing performance in applications with increased temperature and pressure requirements as well as evaporators and condensers. They are particularly robust and require very little maintenance. The design advantages are of particular importance where not only performance but also robustness and cleanability are desired. Each model series has its own specific advantages and areas of application.



Shell & Tubes

Custom designed shell and tubes are used as evaporators or condensers in a data center chiller or heat pump. Water or refrigerant evaporates, absorbing heat from the chilled water, creating a cooling source. We can customize according to the size and connection requirements and use various materials, depending on media restrictions, in order to reduce corrosion. Refrigerant, Coolant options NH₃, CO₂, R448A, R449A, R410A and other standard refrigerants available upon request. Various global pressure vessel approvals available upon request.



Modular cooling towers

Our modular cooling towers have a variety of advantages: maximum water savings, heat pollution of surface waters that is far below the legal thresholds, and substantially lower climate-control costs. Thanks to these factors, our individual cooling towers offer particularly long service lives and low service costs.

We construct cooling tower modules that meet the requirements of our customers precisely. Our sales engineers provide you with expert consulting, analyze your specific wishes, and assume personal responsibility to the delivery – with the result that our execution of your order will meet your specifications fully and exactly.



Gasketed Plate Heat Exchangers

Kelvion's gasketed plate heat exchangers reveal what passion, scientific curiosity and technological expertise can achieve. They offer high efficiency at low operating costs and greater application possibilities at lower investment costs. Continuous further development of the plate series, targeted to meet your demands concerning the thermodynamic and fluid-dynamic performance, also ensures that you can achieve maximum economic efficiency. The range of plate corrugations, connection sizes, plate widths and lengths enables them to be made to measure to your requirements. In addition, maintenance-friendly assembly and sealing technologies are applied, which assure that service and maintenance costs are kept low.



Brazed Plate Heat Exchangers

Our brazed heat exchangers offer tailor-made solutions for the greatest possible range of applications.

Thanks to the automated manufacture and compact design of our BrazePHE Series, we can assemble a customized heat exchanger in the shortest time possible. We choose between copper and nickel-brazed or Vaclinox plate heat exchangers, made of stainless steel, depending on the field of application. We look for the most economical solution from the various sizes and diverse accessories available to us and adapt them precisely to your requirements with customized connections.

KEEPING INNOVATION AT THE FOREFRONT



Kelvion's comprehensive research and development facilities enable us not only to validate the performance of our products, but also to optimize customized solutions directly for your application.

Our extensive, decades-long, experience of working as a nominated technical partner with end users, technology start-ups, universities and established engineering organizations has given us a diverse knowledge base. This enables us to find a solution to meet the most challenging cooling and heat transfer requirements. Continuously researching heat exchanger optimization is critical to achieving our innovation goals and understanding our application is pivotal to this success. Our laboratory facilities across Europe can test air coolers with a thermal balance up to a nominal maximum capacity of 600kW (from 100W), and dry air coolers/ ambient rejecters up to a 1.4MW.

A calibrated calorimeter chamber capable of holding units with dimensions of up to 12 m long, 4 m high and 3 m wide, allows for the largest of heat exchangers to be tested.

The in-house wind tunnels can test air volumes up to 50,000 m³/hour and higher air volumes can be calculated from lower fan speed testing. Synthetic refrigerants can be tested up to a nominal capacity of 600kW and CO₂ systems can be tested up to 150 kW; a range of other working fluid (synthetic and natural) can also be tested at various conditions and capacities. With a range of facilities available, we will try and find rapid testing solutions to meet requirements.



Unit under test in large calorimeter room



Wind Tunnel – Discharge Chamber 3m²



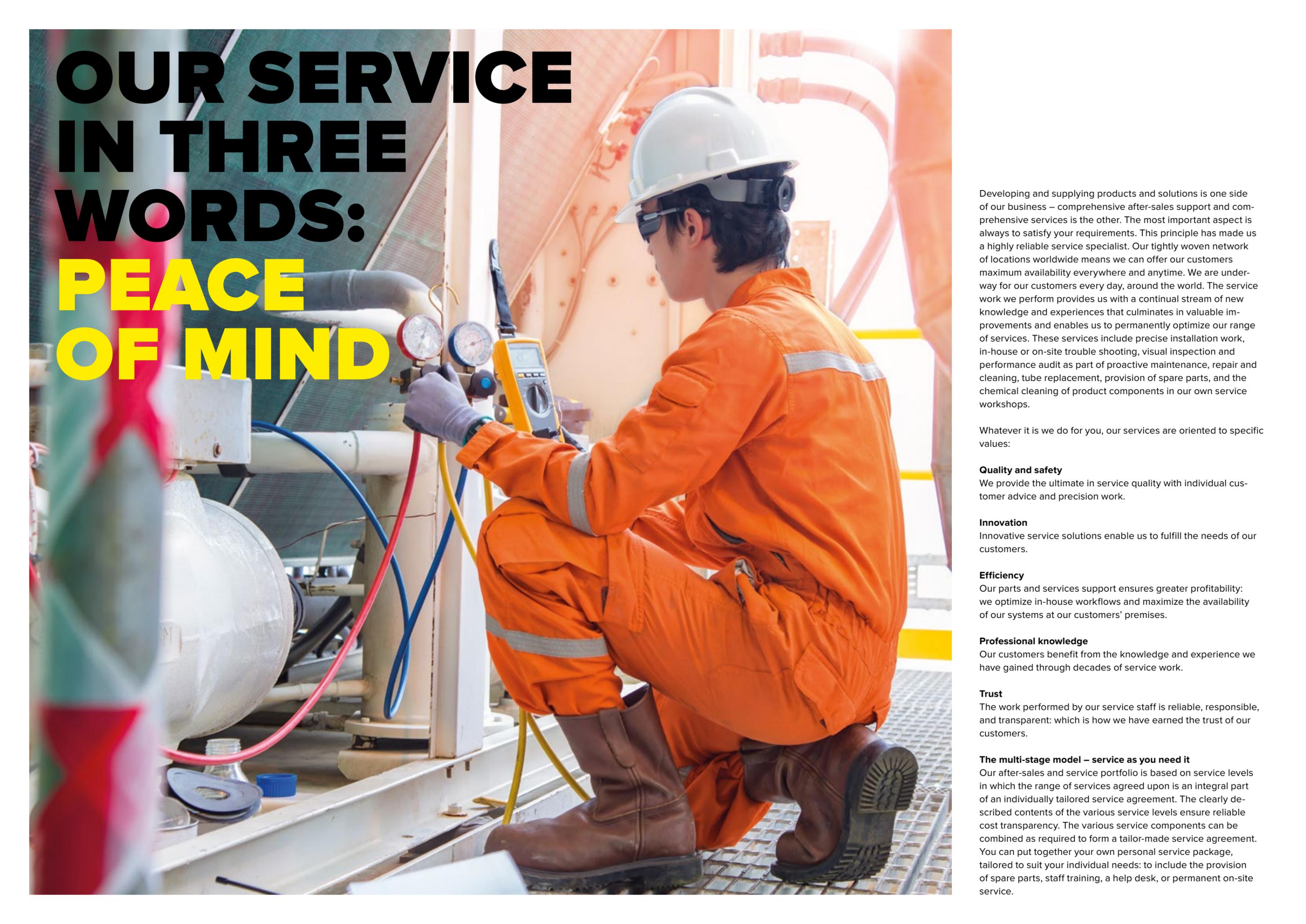
Component analysis using the x-ray micro-tomography ensures the quality of fin press and joint integrity, and is also available to validate contractor joints or other component analysis on request.

Resident CFD and FEA can be used for a range of investigations, which can also be validated against physical simulations of most scenarios in the laboratory.

We take great pride in offering a high quality, robust, efficient and reliable solution specific to application environments and the laboratory is there to help facilitate innovation and remove the risk from application critical environments.

Summary of laboratory facilities:

- ▶ Temperature controlled chamber with full control from -40°C to +60°C
- ▶ Dimension of chamber: 16 m long, 7 m wide, 8 m high
- ▶ R507A refrigeration plant with nominal cooling capacity range 0.1 kW - 600 kW
- ▶ Natural refrigerant plant (CO₂) with nominal loading of 2.5 kW - 150 kW
- ▶ Boiler system capable of 2kW - 1,400 kW
- ▶ Wind tunnel with flow range of 720 to 50,000 m³/hr and up to 1000 Pa back pressure
- ▶ Heat transfer coefficient test rig, with air flow rate from 0.5 m/s to 9 m/s
- ▶ Free field sound pressure and reverberant sound power measurements
- ▶ X-Ray micro-tomography for finite analysis of components
- ▶ Burst pressure testing up to 620 Bar
- ▶ Small environmental chamber with full humidity control, -60°C to +150°C
- ▶ Smoke generation and air distribution testing
- ▶ Prototype fabrication, motor test facilities



OUR SERVICE IN THREE WORDS: PEACE OF MIND

Developing and supplying products and solutions is one side of our business – comprehensive after-sales support and comprehensive services is the other. The most important aspect is always to satisfy your requirements. This principle has made us a highly reliable service specialist. Our tightly woven network of locations worldwide means we can offer our customers maximum availability everywhere and anytime. We are under-way for our customers every day, around the world. The service work we perform provides us with a continual stream of new knowledge and experiences that culminates in valuable improvements and enables us to permanently optimize our range of services. These services include precise installation work, in-house or on-site trouble shooting, visual inspection and performance audit as part of proactive maintenance, repair and cleaning, tube replacement, provision of spare parts, and the chemical cleaning of product components in our own service workshops.

Whatever it is we do for you, our services are oriented to specific values:

Quality and safety

We provide the ultimate in service quality with individual customer advice and precision work.

Innovation

Innovative service solutions enable us to fulfill the needs of our customers.

Efficiency

Our parts and services support ensures greater profitability: we optimize in-house workflows and maximize the availability of our systems at our customers' premises.

Professional knowledge

Our customers benefit from the knowledge and experience we have gained through decades of service work.

Trust

The work performed by our service staff is reliable, responsible, and transparent: which is how we have earned the trust of our customers.

The multi-stage model – service as you need it

Our after-sales and service portfolio is based on service levels in which the range of services agreed upon is an integral part of an individually tailored service agreement. The clearly described contents of the various service levels ensure reliable cost transparency. The various service components can be combined as required to form a tailor-made service agreement. You can put together your own personal service package, tailored to suit your individual needs: to include the provision of spare parts, staff training, a help desk, or permanent on-site service.

FAIRNESS FIRST: FOR CUSTOMERS, EMPLOYEES, COMPETITORS, AND THE ENVIRONMENT

Companies such as Kelvion that are internationally active are obliged to conform to internationally accepted conventions: of social, political, and legal nature. Our corporate code of conduct describes the principles and procedures behind our corporate actions. This code applies to all our employees worldwide. We ensure compliance with the regulations in a working environment that is characterized by integrity, respect, fairness, and responsibility.

We respect and observe the law.

The basis for all action at Kelvion is the observation of all applicable laws and other regulations. We supplement these rules with especially designed, particularly strict internal guidelines and training with regard to certain aspects of the law.

We act internationally.

Kelvion strictly observes as binding the statutory regulations that apply to our products and services involved in international commerce. We observe all applicable bans on exports and imports and observe all official authorization procedures.

We wholly reject corruption.

Kelvion rejects any type of commercial corruption, both domestically and on foreign markets. In order to underline this fact, we have drawn up our own anti-corruption guidelines that enforce rules of proper conduct to which we adhere at all times. These rules apply both in our dealings with officials and with the bodies and employees of other companies.

We support fair competition.

In a spirit of fair competition, we work hard, orient this work to our customers' needs and ensure the quality of our products and services. We observe all applicable domestic, supranational, and foreign anti-trust laws as well as any laws pertaining to unfair competition. We also expect this level of fairness from our competitors.

We ensure socially acceptable working conditions.

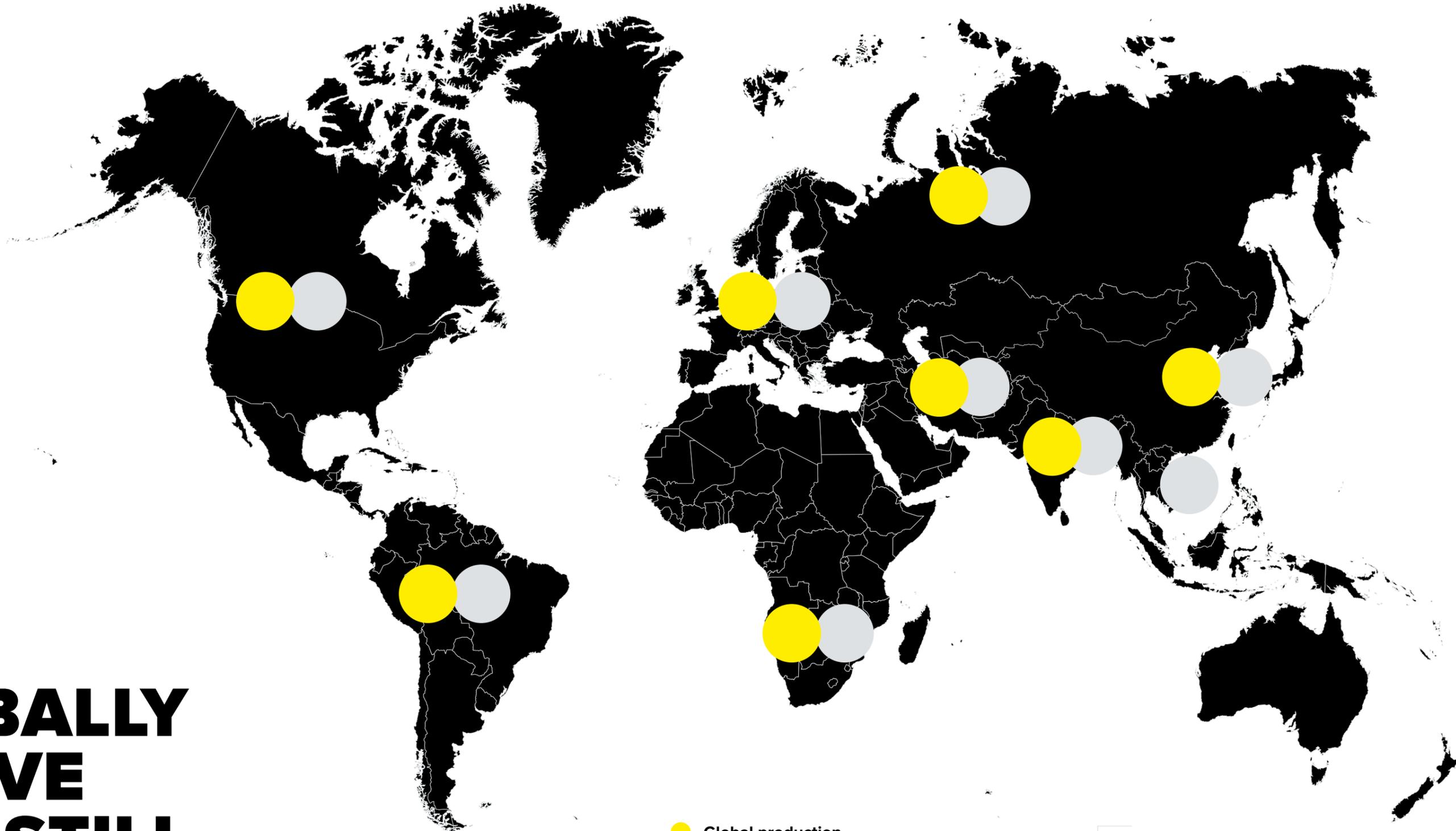
We are committed to the principles of social responsibility towards our employees and society. Kelvion offers its employees fair working conditions worldwide. We reject any form of discrimination, with respect to gender, sexual orientation, origin, skin color, or any other personal characteristics. We see ourselves as a socially responsible employer that treats its employees with respect.

We protect the environment.

From development, to manufacturing, and to the sale of our products, we protect the environment throughout each of these phases. This principle applies not only to the energy we employ, but also to the protection of our natural environment at every workplace worldwide.

We ensure product safety.

For our customers, we develop innovative, high-quality products and processes – and product safety enjoys top priority.



GLOBALLY ACTIVE AND STILL CLOSE BY

No matter where your market is, regardless of country, we are never far away. We are always happy to answer any questions you may have and meet your requirements. Even the largest, most successful project begins with an initial, profitable conversation. We look forward to hearing from you.

- Global production footprint
- Global sales and service



Just scan this QR code with your smartphone or visit our website at: www.kelvion.com – there you will find a highly competent contact in your immediate vicinity.

www.kelvion.com