

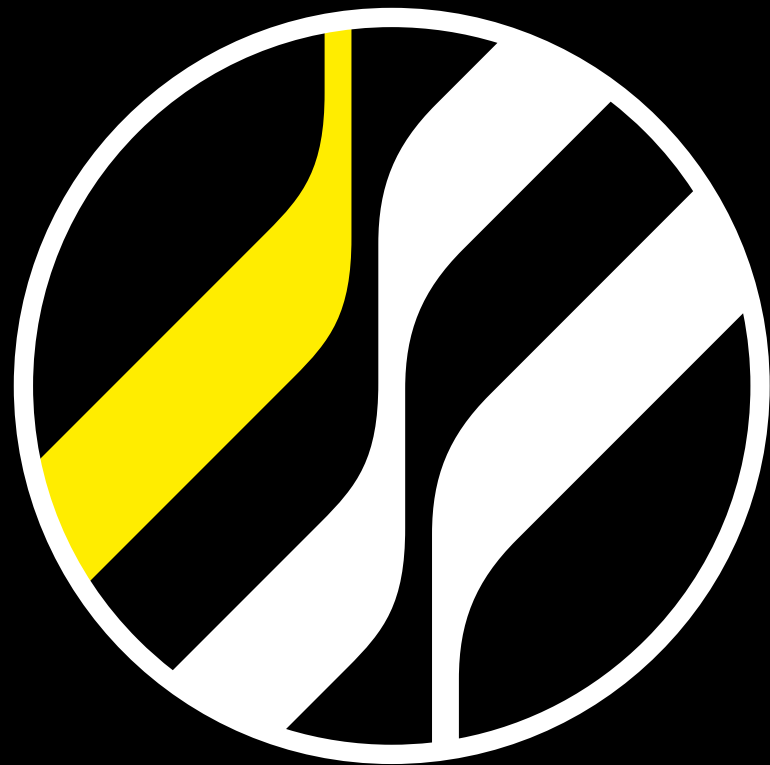
Kelvion



Chemical market

# CHEMICALS RULE THE WORLD

Kelvion



# EXPERTS IN HEAT EXCHANGE – SINCE 1920

Welcome to Kelvion. Heat exchange is our business. Worldwide. As a market leader in the technology sector, we have been producing heat exchangers for virtually every conceivable industrial application since the 1920s, including tailor-made solutions suited for the most complex environmental conditions – as of 2015 under the name of Kelvion.

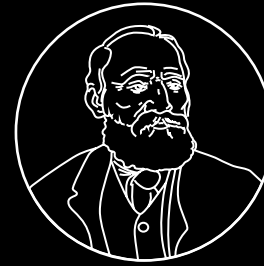
With one of the most comprehensive ranges of heat exchangers in the world, which includes compact finned-tube heat exchangers, plate heat exchangers, single tube heat exchangers, shell and tube heat exchangers, transformer cooling systems and wet cooling towers, we are a sought after partner in a wide variety of industries, such as: the energy industry, the oil and gas industry, the chemical industry, the shipbuilding sector, the food and beverage industry, the heavy industry, the sugar industry, the transport sector, as well as building and refrigeration technology.

Many years of experience and in-depth expert knowledge make us specialists in this field. Our heat exchangers are designed for the requirements of the respective process, thereby ensuring optimum energy efficiency and reliability for all market segments. This provides our customers with a technological advantage that reduces operating costs and has a lasting effect.

A reliable after-sales service is essential with regard to customer loyalty and retention. We have a worldwide service network at our disposal. Our engineers are thereby able to carry out maintenance work and complete repairs on-site at a customer's premises. This prevents unnecessary downtime – because we are highly committed to earning your trust.

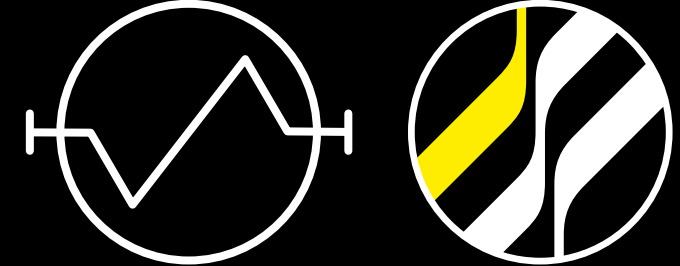
Kelvion – Experts in Heat Exchange.

## KELVION – A TRIBUTE TO LORD KELVIN (1824 - 1907)

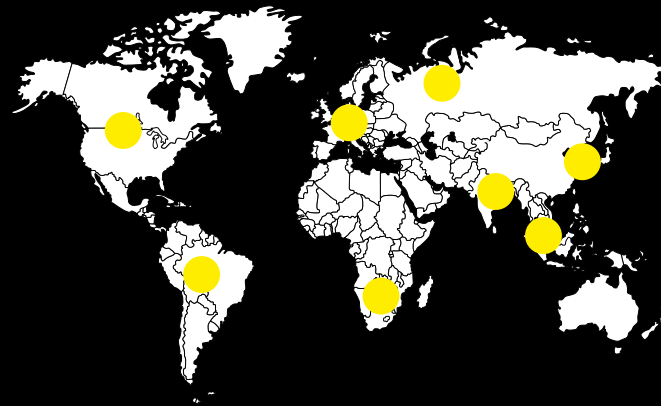


Lord Kelvin formulated the laws of thermodynamics and absolute units of temperature are stated in kelvin, in his honor.

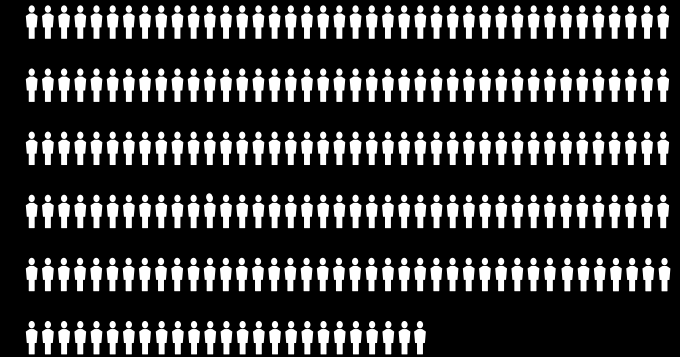
## OUR LOGO – INSPIRED FROM THE SCHEMATIC FOR HEAT EXCHANGER



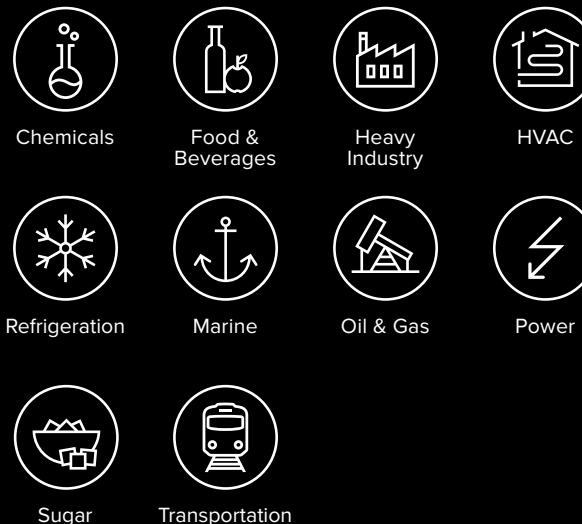
## 67 BRANCHES AND SALES PARTNERS WORLDWIDE



## 4,500 EMPLOYEES WORLDWIDE



## YOUR MARKETS ARE OUR MARKETS



## KELVION HAS A LONG HISTORY

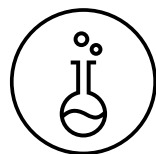






## The chemical market – facts and figures

# RAW MATERIALS FOR EVERYDAY LIFE



Fertilizers, plastics, rubber, commodity products, nylon, soap, medicine and food additives – almost everything we manufacture or extract from the earth is connected to chemistry. The chemical industry is one of the most innovative and fastest-growing sectors, with 70 percent of its output being used by other industries worldwide.

### Global challenges

Rising consumer purchasing power, particularly in Asia, is driving demand for chemicals and the products made from them. At the same time, dwindling oil and gas reserves are fuelling the search for new feedstocks, such as biomass. The major challenge for the industry lies in helping the growing world population to maintain and improve its standard of living sustainably.

### Heading east

Over the last 25 years most of chemical industry growth has shifted to the east, with Asia accounting for 50 percent of global sales. By 2030 around half of the top ten chemical companies will be from Asia or the Middle East, with Asian companies taking two thirds of the market.

### Innovation today for the needs of tomorrow

Pioneering products, particularly those that provide solutions relating to global mega trends – including shrinking natural resources, globalization, demographics and stricter regulation – will be the key to maintaining the industry's momentum.

It is anticipated that advances in areas such as biotechnology, fuel cells, environmental technology and intelligent materials will lead the way in meeting future needs globally.

### Solutions for safe and efficient chemical processes

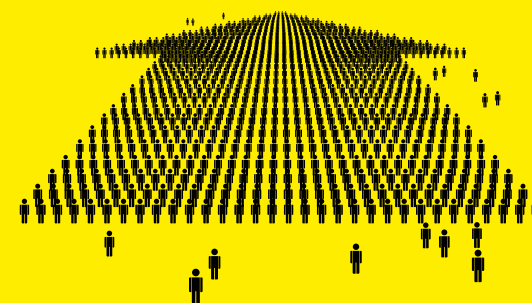
Chemical production involves a complex series of processes, from heating, cooling and condensing to evaporation and separation. All of these need reliable heat exchange technology, which is where Kelvion comes in. Our wide range of heat exchangers and variety of materials allows us to provide the right solution for almost every application in the chemical industry. With Kelvion heat exchangers customers can be assured that their processes will operate energy-efficiently, reliably and safely.

The clamor for chemicals shows no signs of slowing

## PROVIDING ESSENTIAL MATERIALS AND PRODUCTS NOW AND IN FUTURE

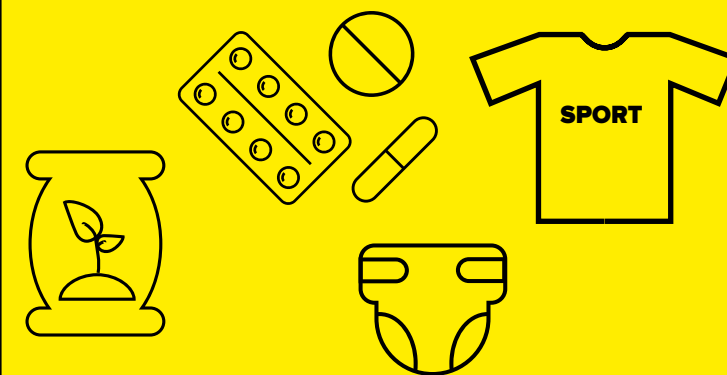
### Chemicals in demand

The ever-increasing world population is expected to reach 8.8 billion over the next 20 years. With more people clamoring for natural resources and manufactured goods, the chemical industry will play a leading role in meeting global needs.



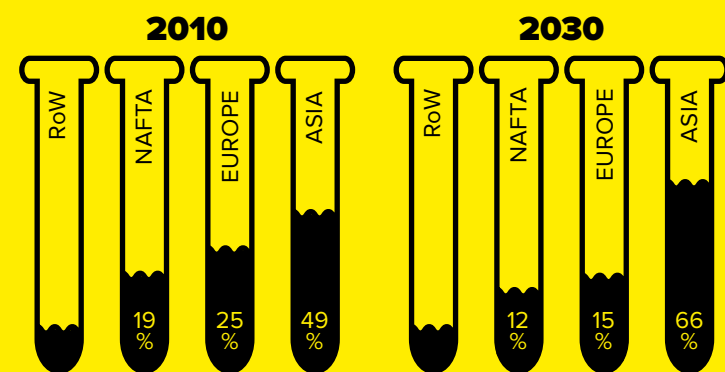
### Everyday products

Thousands of products that we rely on every day are the result of chemistry. From food, fuel and medicine to clothes, baby care products and cleaning fluids, chemistry has shaped the modern world.



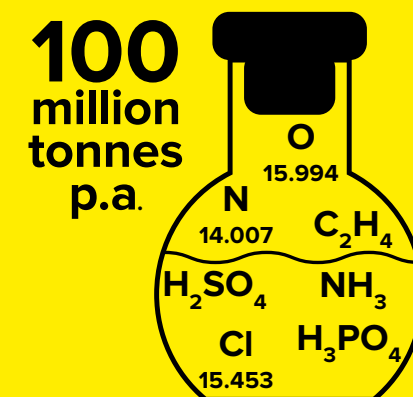
### Chemical industry shift

Asia will host most of the major bulk chemicals production sites, while specialty chemicals will stay strong in the West. Europe is set to lead the way with innovative products, including bio-materials, nano-materials, functional textiles, lightweight materials, energy storage and environmental technology.



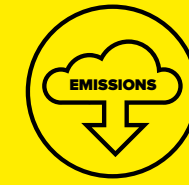
### Top 10 chemicals

The most produced chemicals in the world are used to manufacture a wide range of indispensable everyday products. Sulfuric acid tops the list, followed by nitrogen, ethylene, oxygen, propylene, chlorine, ethylene dichloride, phosphoric acid, ammonia and sodium hydroxide. Each one is produced in excess of a 100 million tonnes annually.



### The circular economy

As raw materials become scarce and environmental regulations increase to offset the impact of emissions and waste, chemical companies are leading the way in responding to the challenges by extending their ecosystems to establish end-to-end stable solutions.



Source: www.digitalistmag.com

### The main drivers of demand for the chemical industry



Population growth



Economic growth (GDP per capita)

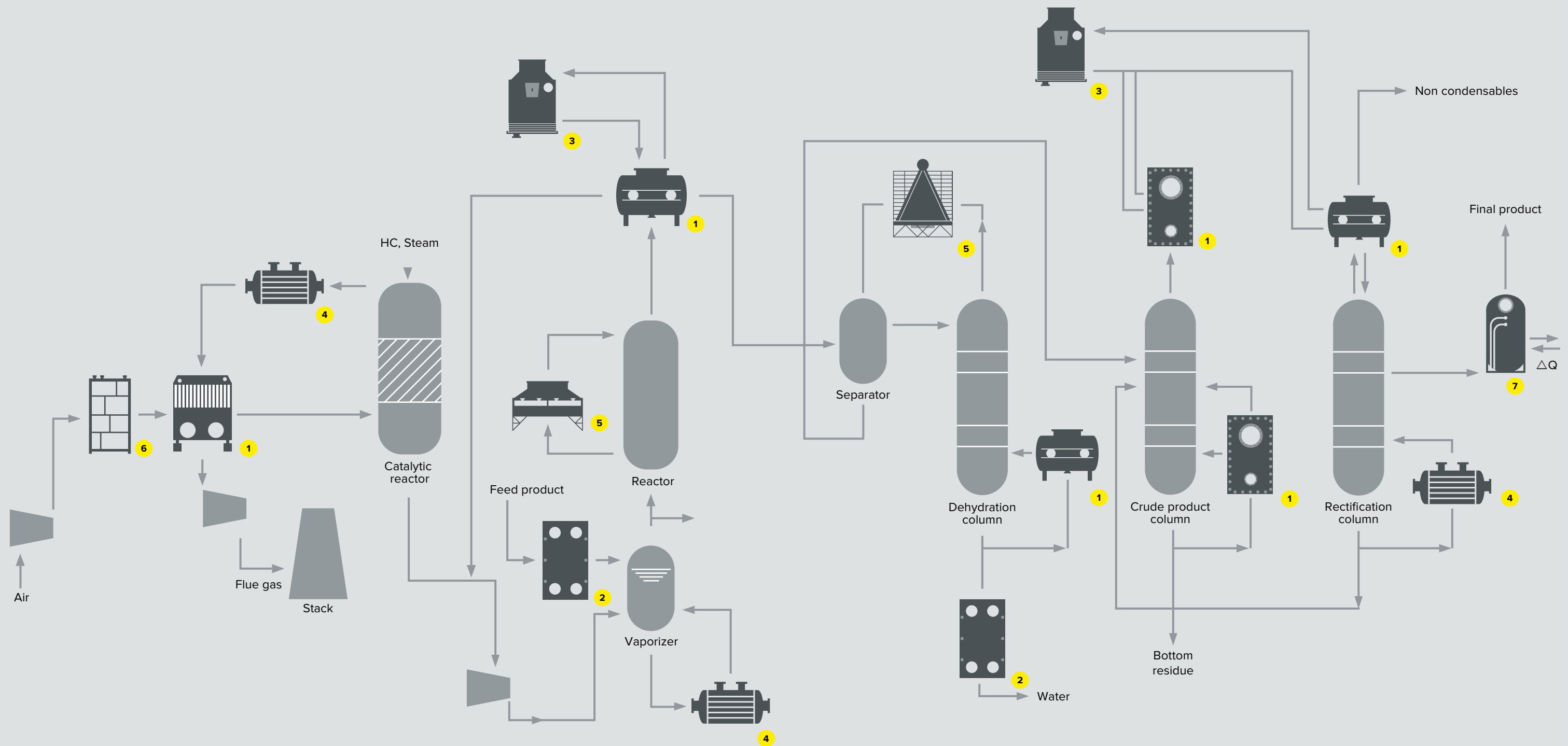


Sustainability

# KELVION SOLUTIONS IN A GENERIC AND COMPLEX CHEMICAL PROCESS

KELVION OFFERS THE RIGHT HEAT EXCHANGER SOLUTION FOR A BROAD RANGE OF COMPLEX CHEMICAL PROCESSES:

- 1 Fully Welded Plate Heat Exchangers** K°Bloc and K°Flex are well suited for single-phase, condensation and evaporation applications. Rekuluvo and Rekuvalo are highly efficient in heat recovery applications for gas and air
- 2 Gasketed Plate Heat Exchangers** are used for process cooling or heating or as utility coolers
- 3 Cooling Towers** are our allrounder to cool down water in the main cooling circuits
- 4 Shell & Tube Heat Exchangers** for different thermal and high pressure applications  
Double tube technology increases process safety
- 5 Air cooled Heat Exchanger** are suitable for condensing and cooling processes in a wide pressure and temperature range
- 6 Air preheaters** for heating and evaporation, for cooling and condensing and for heat recovery  
Air Dryer are especially made for drying processes
- 7 Desublimators** transforming gas directly into solid state







## Basic chemicals

# SAFE SOLUTIONS FOR CHEMICAL PRODUCTION

Basic chemicals are the building blocks for a wide range of products used in industrial processes and by the general consumer. They include sulfuric acid, phosphoric acid, ammonia, sodium hydroxide, and chlorine. Sulfuric acid is the most extensively-produced chemical and is an essential ingredient for hundreds of compounds required by almost every industrial sector.

A country's consumption of H<sub>2</sub>SO<sub>4</sub> indicates its level of industrialization. Over the last 10 years worldwide consumption has grown by 25%. About 17% of global sulfuric acid is used in 20 chemical processes, including phosphoric acid, titanium oxide, ammonium and metallurgical applications.

Manufacturing basic chemicals is energy-intensive and producers face the challenges of obtaining reliable electricity supplies at competitive prices and complying with increasingly strict environmental and safety regulations.

Sulfuric acid, along with many other chemicals, is highly corrosive and requires careful handling. Any equipment that comes into contact with it must be able to withstand its corrosive effects.

At Kelvion we understand the importance of selecting the right material for the task. For sulfuric acid production, we offer gasketed plate heat exchangers with special alloy materials to suit the process requirements. Plate heat exchangers provide the highest heat transfer rates and are easy to maintain. With the right material selection for plates and gaskets, we ensure a long life cycle. Where additional safety is required, we provide laser-welded cassettes in which the critical medium flows in hermetically sealed plate gaps.

Our fully welded K°Bloc is the right choice for processes using hazardous media. For example, chlorine gas from chlorine alkali electrolysis – used to produce chlorine, hydrogen and sodium hydroxide - can be safely cooled down in a K°Bloc unit.

With our extensive process and engineering knowledge we ensure that customers have the right cooling or heating solution for their chemical production plants.



## Agrochemicals

# SUPPORTING ENERGY-EFFICIENCY IN FERTILIZER PLANTS

The increasing world population means a growing number of mouths to feed. At the same time, the amount of land available for growing crops is dwindling and farmers face the challenge of achieving higher yields from their land, while maintaining quality and consistency.

This in turn means a higher demand for agrochemicals. Plants need fertilizers and soil conditioners to help them grow and increase yield as well as agents, such as pesticides and herbicides, to protect them from pests, diseases and weeds. Modern chemical fertilizers include the key nutrients nitrogen, phosphorus, potassium, sulfur, magnesium and calcium.

Most nitrogen fertilizers are made from ammonia – a compound of nitrogen and hydrogen (NH<sub>3</sub>) – synthesized by the Haber-Bosch process. Producing synthetic nitrogen fertilizer is extremely energy intensive.

Kelvion heat exchange technology supports optimum heat transfer duties while recapturing waste heat.

Our Rekuluvo air preheaters are operating in many fertilizer plants globally, transferring waste heat from flue gas to preheated air.

Also the Kelvion range of shell and tube and fully welded plate heat exchangers can recover energy from low temperature vacuum vapors for further thermal use.





## Petrochemicals

# RELIABLE TECHNOLOGY FOR OPTIMUM HEAT EXCHANGE

Petrochemicals, derived from petroleum or natural gas, are used to manufacture thousands of products that people use every day. They include soaps and detergents, electronics, appliances, automobiles, clothing, furniture and medicines. One of the most important petrochemicals is styrene. Its strength and durability, matched by its versatility, makes it an essential building block for polystyrene and several specialty plastics and rubbers. Demand for styrene is expected to continue the upward trend as the world's population increases. Almost all styrene is produced by the catalytic dehydrogenation of ethylbenzene, while 10% is synthesized via a coupling process of indirect oxidation.

Both processes rely on effective heat exchange. Kelvion's leading design and manufacturing technologies are geared towards providing optimum heat exchange for the most demanding duties. Our range of air fin coolers, shell & tube and fully welded plate heat exchangers have proven time and again their suitability and reliability in the toughest process conditions.



## Polymers and plastics

# MARKET-LEADING PRODUCTS FOR KEY PROCESSES

Polymers are an essential part of modern life. Strong, light and versatile, they can be manufactured to look like natural materials, including cotton, silk, wool, marble and aluminum, as well as making it possible to create products not found in the natural world, such as clear waterproof films. One of the most adaptable plastics is polyurethane as it can be molded to suit an almost unlimited number of uses. Polyurethane polymers can be found in mattresses, sofas, foam toys, paints, floor coverings and varnishes. They are increasingly being used in the construction industry as rigid foams, coatings and adhesives, while the automotive sector is harnessing their properties to make vehicles lighter. Polyacrylate, a super absorbent polymer (SAP) – a single gram can soak up 1,000 grams of water – is used extensively in the manufacture of baby diapers and other hygiene and sanitary products.

During polymerization, polyacrylate is produced in a jelly-like form and requires additional thermal and mechanical processing to reach the right consistency before it can be used for product manufacture. Kelvion is a reliable partner in this process. Our air dryers can be found at SAP manufacturing plants around the globe and are renowned for their efficiency and durability. We are also the market leader in supplying desublimators for recovering phthalic acid anhydride (PSA), used in manufacturing resins, dyes and pigments. This technology has been continuously developed and adapted to suit the requirements of our customers who can be assured of reliable and energy-efficient operation.





## Pharmaceuticals and fine chemicals

# QUALITY AND EFFICIENCY GUARANTEED

Fine chemicals are only manufactured in small quantities, involving multiple complicated steps, by batch production or biotechnological processes. Yet they are the foundation for many products that people worldwide rely on, from pharmaceuticals and agrochemicals to food additives and pigments. Due to their complex and changing chemistry, fine chemicals are more expensive to produce than bulk chemicals. Manufacturing pharmaceuticals involves a series of industrial-scale processes, including milling, granulation, coating, tablet pressing, as well as producing the raw materials. Quality and hygiene are paramount and governed by Good Manufacturing Practice (GMP) and strict rules laid down by regulatory bodies, such as the US Food and Drug Administration.

Heat exchange is an important part of the fine chemicals production process and for manufacturing pharmaceuticals. Equipment has to operate under optimum sanitary conditions and in accordance with GMP. It needs to be compact and efficient, but easy to clean and maintain. Kelvion's range of heat exchangers fulfils these requirements and more. As well as ensuring a reliable operation, our solutions aid heat recovery to make processes more economical.



## Speciality chemicals

# PARTNERS IN INNOVATION

Developing innovative products for day-to-day living, the environment and industry is dependent on specialty chemicals. They can be single-chemical entities or formulations and are selected for their performance or function. Specialty chemicals are used to make a wide range of products, from adhesives, soaps and lubricants to industrial gases, resins and food additives. With the growing demand for eco-friendly alternatives, the industry is being driven towards producing chemicals that will make energy storage more efficient, reduce the weight of aviation and automotive components, improve the durability of functional textiles and protect the environment. Kelvion heat exchangers are widely used in many sectors of the specialty chemicals industry.

Our innovative double tube safety heat exchangers and fully-welded plate heat exchangers are second to none. They work effectively across a broad range of liquids, temperatures and pressures, helping to keep down process costs and optimize energy efficiency. Our range of cooling towers and air fin coolers enable trouble-free cooling of chemical processes.

## Overview of our products for the chemical industry

# GLOBAL SOLUTIONS FOR SAFE CHEMICAL PROCESSES

Kelvion offers a wide range of precision-engineered heating and cooling technology that enables critical processes to run safely and efficiently. Our heat exchangers, air fin coolers, air preheaters and cooling towers operate reliably and to the highest standards demanded by the chemical industry. With our network of manufacturing sites, we have a global supply chain that underpins our ability to provide excellent products consistently to wherever in the world our customers need them



### 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 plate heat exchangers offer tailor-made solutions for the greatest possible range of applications.

Thanks to the automated manufacture and compact design of our BrazedPHE Series, we can assemble a customized heat exchanger in the shortest time possible. We choose between copper and nickel-brazed or VacInox 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.



### Fully Welded Plate Heat Exchangers

Our robust, fully-welded plate heat exchangers offer outstanding coefficient heat transfer and require only minimal cleaning and servicing. Their compact size means minimal investment costs. The design advantages come into play where higher output and load capacity are required.



In addition, each series - K°Bloc, K°Flex, Rekuluvo and Rekugavo - has its specific advantages and areas of application. Developed for the challenges of specific applications, our fully-welded plate heat exchangers offer convincing performance even in the most challenging conditions.



Overview of our products for the chemical industry

# GLOBAL **SOLUTIONS** FOR SAFE CHEMICAL PROCESSES



## Shell & Tube Heat Exchangers

Shell & tube heat exchangers are the most common design for many applications. We provide a wide variety of products based on the most suitable design and materials to ensure a cost efficient and reliable solution. Our double tube design increases the process safety. The full range provides standardized product lines for an optimal price/quality ratio as well as customized designs for the most demanding duties in the chemical industry.



## Cooling Towers

We have a range of standard solutions available to suit various capacities. Our modular cooling tower system can also be custom-engineered to meet the specific requirements of our customers. The factory-preassembled modules are employed primarily for smaller projects, for which the customer enjoys significant cost advantages. For larger projects, we recommend field-erected cooling towers.



## Single Tube Heat Exchangers

Our single tube heat exchangers are tailored for individual applications and are available in a wide range of materials. Air fin coolers, air preheaters and air dryers represent the optimal solution in enabling processes to operate more efficiently and cost-effectively.





# 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.**

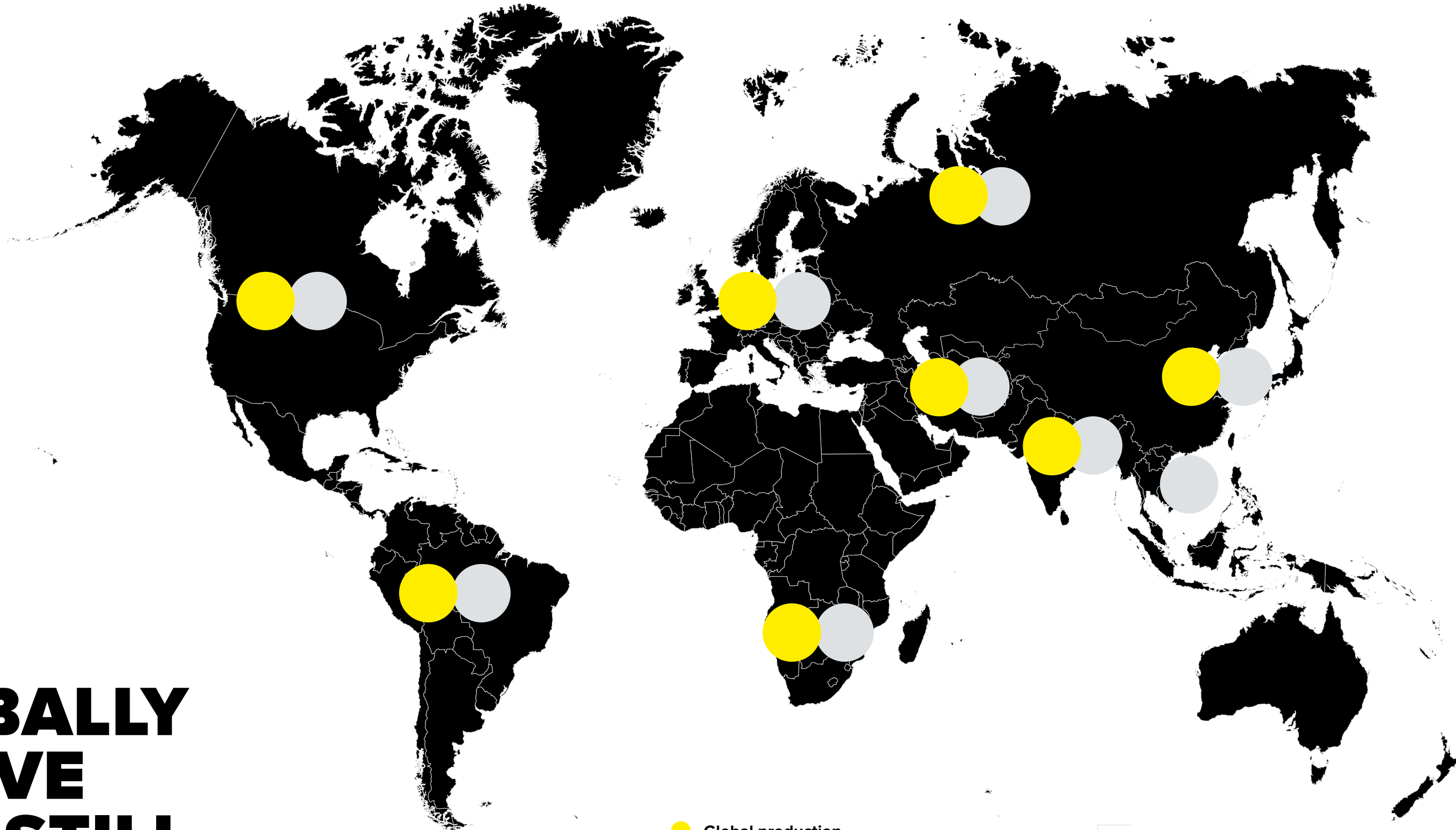
We are committed to the principles of social responsibility towards our employees and society. Kelvion offers its employees fair working conditions worldwide. We reject any form of discrimination, with respect to gender, sexual orientation, origin, skin color, or any other personal characteristics. We 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](http://www.kelvion.com) – there you will find a highly competent contact in your immediate vicinity.



[www.kelvion.com](http://www.kelvion.com)