

Kelvion



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Product Line: Cooling Towers

# MODULAR & SUSTAINABLE SOLUTIONS



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.

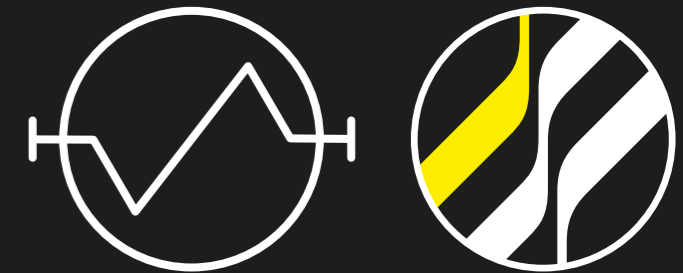
Kelvion – Experts in Heat Exchange.

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

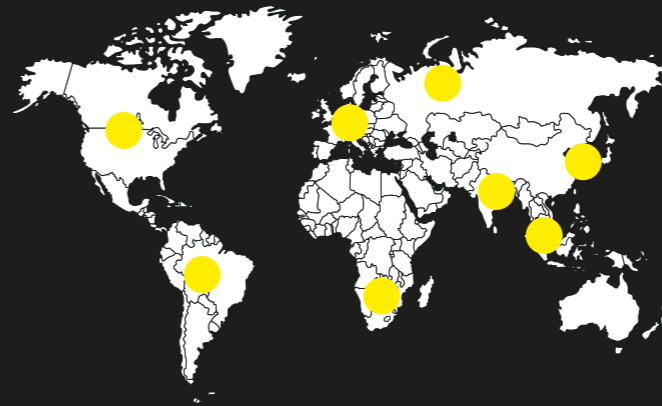


Lord Kelvin formulated the laws of thermodynamics and absolute units of temperature are stated in kelvin, in his honor.

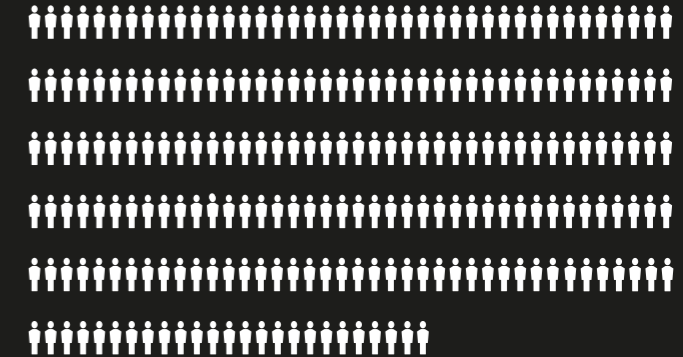
## OUR LOGO – INSPIRED FROM THE SCHEMATIC FOR HEAT EXCHANGER



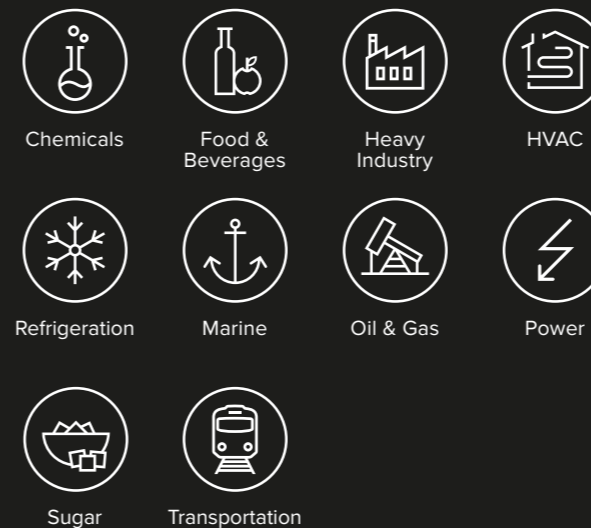
## 67 BRANCHES AND SALES PARTNERS WORLDWIDE



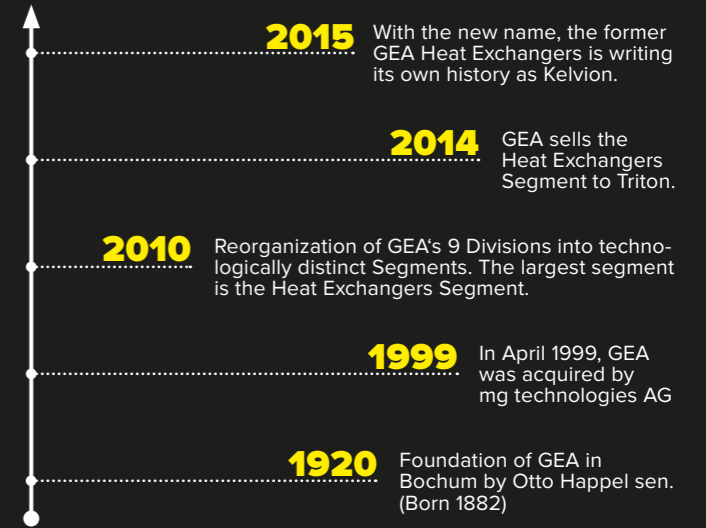
## MORE THAN 4,000 EMPLOYEES WORLDWIDE



## YOUR MARKETS ARE OUR MARKETS



## KELVION HAS A LONG HISTORY





We invest in Quality and Sustainability

# CUSTOM-MADE FROM STANDARD COMPONENTS



Kelvion designs, manufactures and maintains cooling towers for process and climate cooling. Our long lifetime and environmentally-friendly cooling towers stand out because of the complete quality policy we employ. Our wide cooling tower portfolio covers open evaporative cooling processes for any quantity of water.

Kelvion cooling towers combine a high cooling capacity with low energy consumption. The modules are supplied ready to use and they are easy to adjust to cooling requirements and the available space, whether they are operated singly or in-line. The cooling performance of these cooling towers is optimal and operation is problem free.

Evaporative cooling is the most efficient and sustainable way to make cold water. The axial fan has a very high efficiency that provides the lowest energy consumption per rejected kilowatt of cooling. The use of highly corrosion-resistant construction materials allows a high concentration factor with a minimum of water consumption. Together with the long lifecycle of the equipment, the cooling tower ensures a green footprint.

## APPLICATIONS



HVAC



CHEMICALS



POWER



HEAVY INDUSTRY



FOOD



OIL & GAS



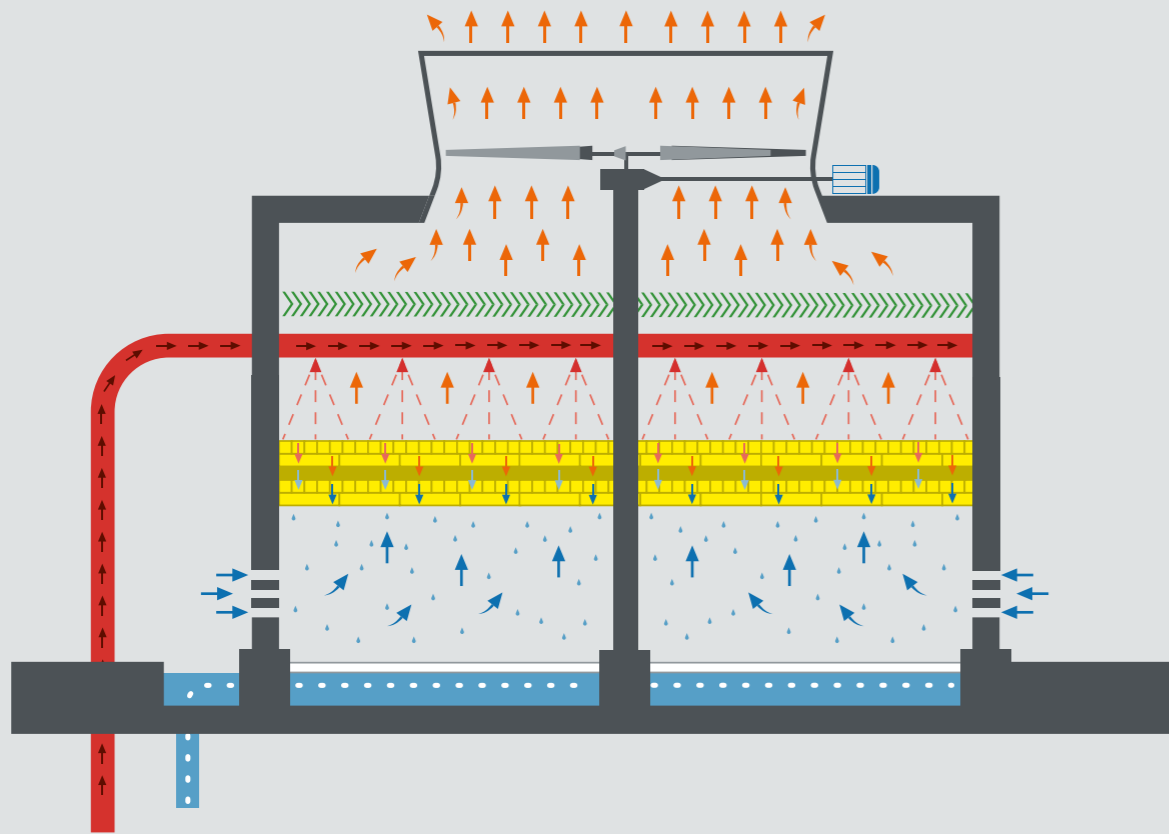
## WHY CHOOSE KELVION COOLING TOWERS?

- ▶ Over 50 years of experience in the development, design, production, installation and maintenance of cooling towers
- ▶ Modular products available for any size
- ▶ Extreme durability by using high quality materials like stainless steel, glass fiber-reinforced plastics and thermoplastics like polypropylene/polyvinylchloride
- ▶ Proven record cooling tower lifetime of more than 40 years
- ▶ Wide range of models in counter and crossflow certified in the thermal rating program of the Cooling Technology Institute (CTI STD201)
- ▶ Customizable to your demands by our own experienced sales engineers



# ENVIRONMENTALLY-FRIENDLY COOLING PERFORMANCE

## OPERATION PRINCIPLE COUNTERFLOW



### Evaporative Cooling

All cooling towers are based on the evaporation of water into the air. Therefore the inlet wet bulb temperature determines the performance of the cooling tower. The gap between wet bulb temperature and required cold water temperature determines the size of the unit. This may result in water that is colder than the ambient dry air temperature.

Evaporative equipment is the only cooling technique to achieve this result, besides mechanical cooling machines with refrigerants. Typical COP values of 80 – 120 are achievable.

### The Effect of Counterflow

The principle of counter flow used in Kelvion cooling towers means that the water flows down while the air is sucked upwards by a fan. Counterflow cooling towers can reach the wet bulb temperature more effectively, compared to crossflow cooling towers. The cooling is generated by evaporation of approximately 1% of the circulating water. The direct contact between water and ambient air is created over the surface of plastic fills. The cooling towers have a counter flow configuration, which provides the most efficient exchange of enthalpy and the coldest water.





# SUSTAINABLE & EFFICIENT COOLING



## Modules to size

The cooling water temperatures (inlet and outlet), the wet bulb temperature, noise and the water load are the four most important criteria in the selection of a CT model.

Kelvion analyzes the requirements together with the client and uses it as a basis of the design for a suitable solution. The modular Kelvion cooling tower unit can be extended, and there are standard solutions available for different capacity needs. Kelvion engineers make customized changes to meet client expectations.

## Noise reduction

Usually cooling towers are located outdoors and installed on a roof or at the edge of the site. The noise produced by the cooling tower caused by the axial fan, falling water and the electrical (geared) motor may require additional noise reduction measures.

Kelvion has extensive experience with noise reducing solutions. These include larger fans (lower speed, less noise and higher efficiency), floating silencers to reduce the noise of splashing water and other noise reducing devices.

Using detailed calculations we identify the cause and level of noise. Kelvion can also make calculations for all cooling towers beforehand in relation to the requirements laid down in environmental permits.

## The security of quality

Kelvion designs and manufactures cooling towers with long lifetimes and minimal maintenance demands. This is achieved through the materials used - stainless steel, combined with glass fiber and technical plastics.

The result is a cooling tower that requires low maintenance, is energy efficient and can give a constant and excellent performance.

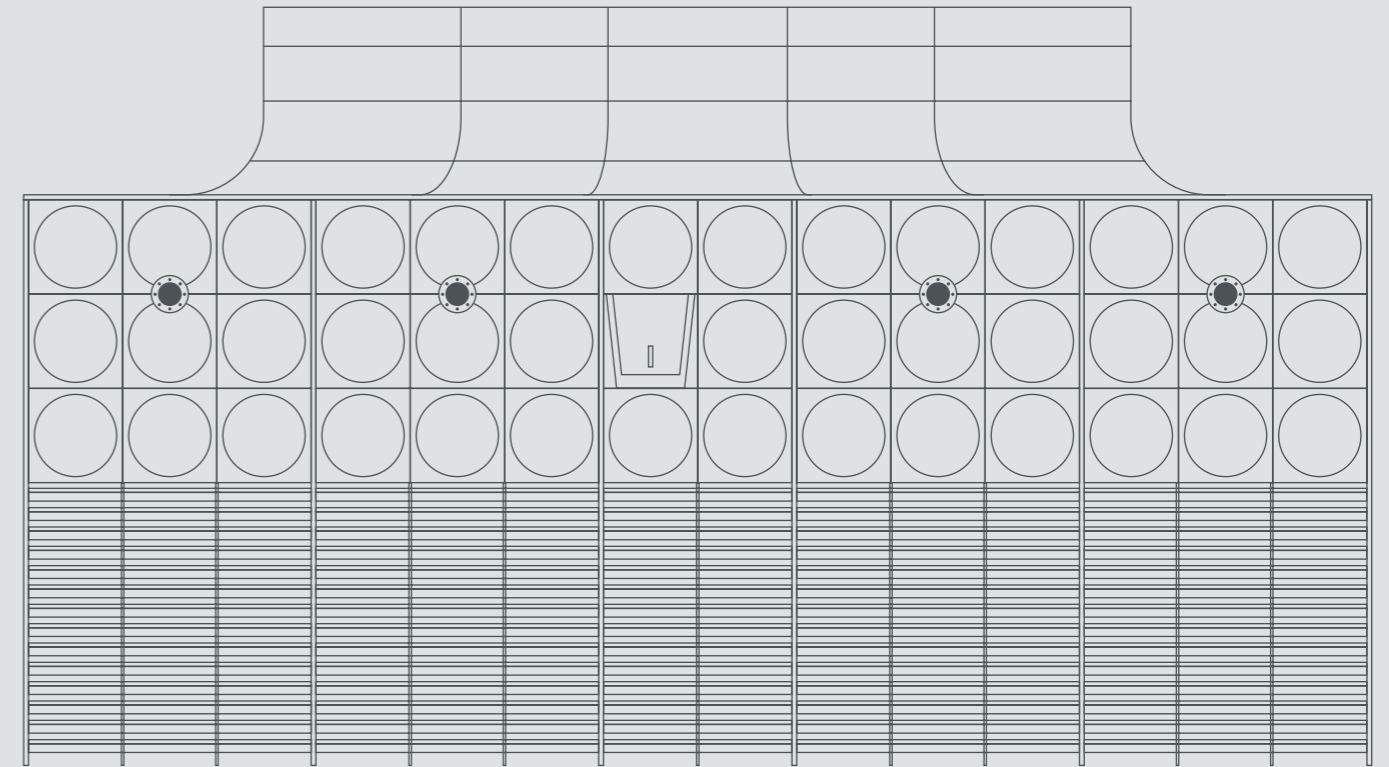
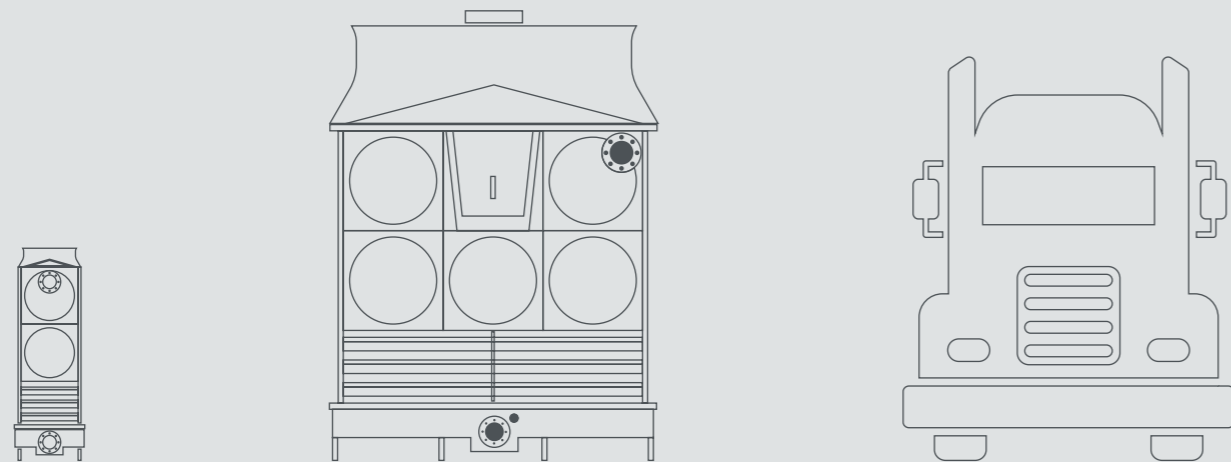
## Advice and service

Kelvion builds cooling modules that meet most international industrial standards and the certificates for ISO, VCA, VDMA, CTI and Eurovent.

Our sales engineers give advice, analyze your wishes and take full responsibility for delivery so that your order is executed in line with your demands.

Kelvion has its own service organization that is specialized in cooling tower maintenance. Irrespective of brand or version, the maintenance specialists know all the ins and outs of the whole technical area and are involved in the latest developments.

# THE WIDEST RANGE ON THE MARKET



## POLACEL CMC SERIES



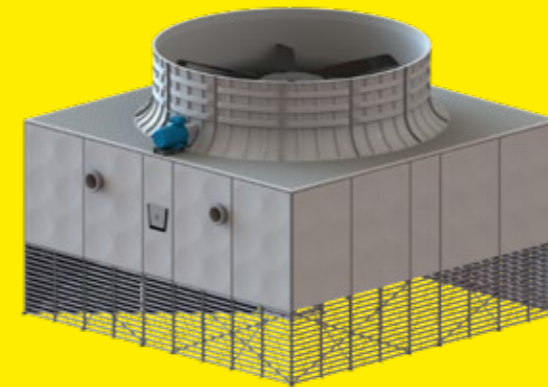
- ▶ Counterflow principle
- ▶ Low energy consumption and a substantial noise reduction
- ▶ Modules are supplied ready to use and they are easy to adjust to cooling requirements and space
- ▶ CTI certified

## POLACEL CMDR SERIES



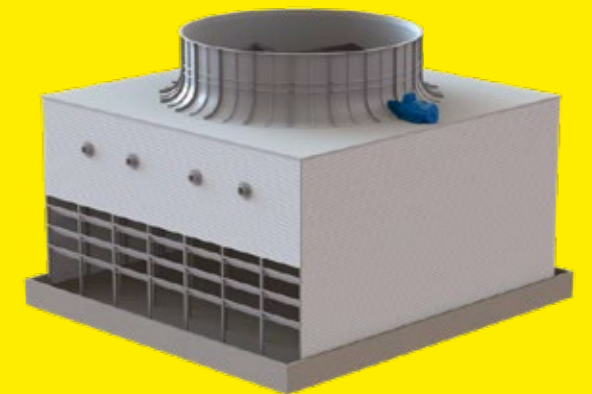
- ▶ Counterflow principle
- ▶ Cells can be positioned on concrete basin or delivered with integrated FRP basin
- ▶ Direct fan drive with geared motor provides economic solution
- ▶ Small modules can be pre-assembled in our premises while larger modules are assembled on site and hoisted during short maintenance stop
- ▶ CTI certified

## POLACEL CMDI SERIES



- ▶ Counterflow principle
- ▶ B2B or in-line configuration
- ▶ Can process large quantities of water and has a substantial cooling capacity, up to 300 m<sup>2</sup>
- ▶ The motor drive line is classical mounted on a torque-tube. A walkable fandeck provides easy access

## POLACEL CMDIF SERIES



- ▶ Counterflow, set-up typical for in-line configuration
- ▶ Large water quantities
- ▶ Cooling tower construction of corrosion-resistant FRP- (Fiber Glas Reinforced Polyester)-profiles
- ▶ Structural design analysed by dynamic computer studies
- ▶ Field erected on new or existing concrete water basins



# STRUCTURAL AND FUNCTIONAL FEATURES



The Polacel counterflow series CMC and CMDR are characterized by a combined motor gearbox unit that is mounted directly on top of the cooling tower above the axial fan. There is a wide range of models with thermal capacities up to 30 MW per cell.

Cells up to 21 m<sup>2</sup> can be delivered pre-assembled. Larger cells up to 150m<sup>2</sup>, Polacel Smart CMDR cooling towers, can be easily assembled on site, due to the limited number of parts that only have to be mounted mechanically. No cutting, grinding and welding on site. Simply using the manuals with 3D instructions.

The large cooling tower cells of the Polacel CMDI and CMDIF series have a classic configuration with a foot motor outside the airflow and a right-angular gearbox. They provide an accessible fan deck. These large cells up to 300m<sup>2</sup> will be Smart assembled on site mechanically.

Kelvion can build these cooling towers in a short time frame thanks to the flexible and easy construction offered by the Polacel Smart concept.

All the Polacel units can be assembled prior to a shutdown (alongside the existing operating cooling tower) and then be hoisted as a complete unit and installed on the existing water basin during the shutdown. This is why the delivery time of a Kelvion cooling tower always fits into your schedule.



## ADVANTAGES

- ▶ Only a minimum number of support points are necessary as a result of the self-supporting foundations and the high internal stiffness.
- ▶ Completely hoist-able, ready to be installed.
- ▶ All Cooling Towers can be delivered with an integrated water basin and/or mounted on concrete water basin.
- ▶ The extendable modular system has virtually no limitations in terms of form and size.
- ▶ The standardized models have been analyzed and tested by dynamic strength calculations and meet severe climate conditions.
- ▶ The aerodynamic design of the fan section and the large fan ensures lower energy consumption and a substantial reduction in noise.
- ▶ Several types of fans can be selected depending on preference, noise conditions.
- ▶ The water distribution system with the spray nozzles will be adapted to the required flow.
- ▶ Based on the expected water quality conditions a wide range of fills can be applied.
- ▶ High efficiency drift eliminators are always available in each cooling tower.
- ▶ Different types of air inlet louvres are available. They optimize the air inflow and minimize water losses through splashing.
- ▶ Floating silencers minimize noise caused by falling water.



# MAIN COMPONENTS AND INTERNALS

**Drive unit** comprises low maintenance speed reducer and electrical motor. Variable speed by frequency converter or permanent magnetic motor

**Ventilators** of different materials for standard high efficiency. Slow turning, low noise ventilators and vibration control. Axial ventilators give minimal power consumption and a maximal COP value.

**Drift eliminators** to minimize airdrops leaving the towers

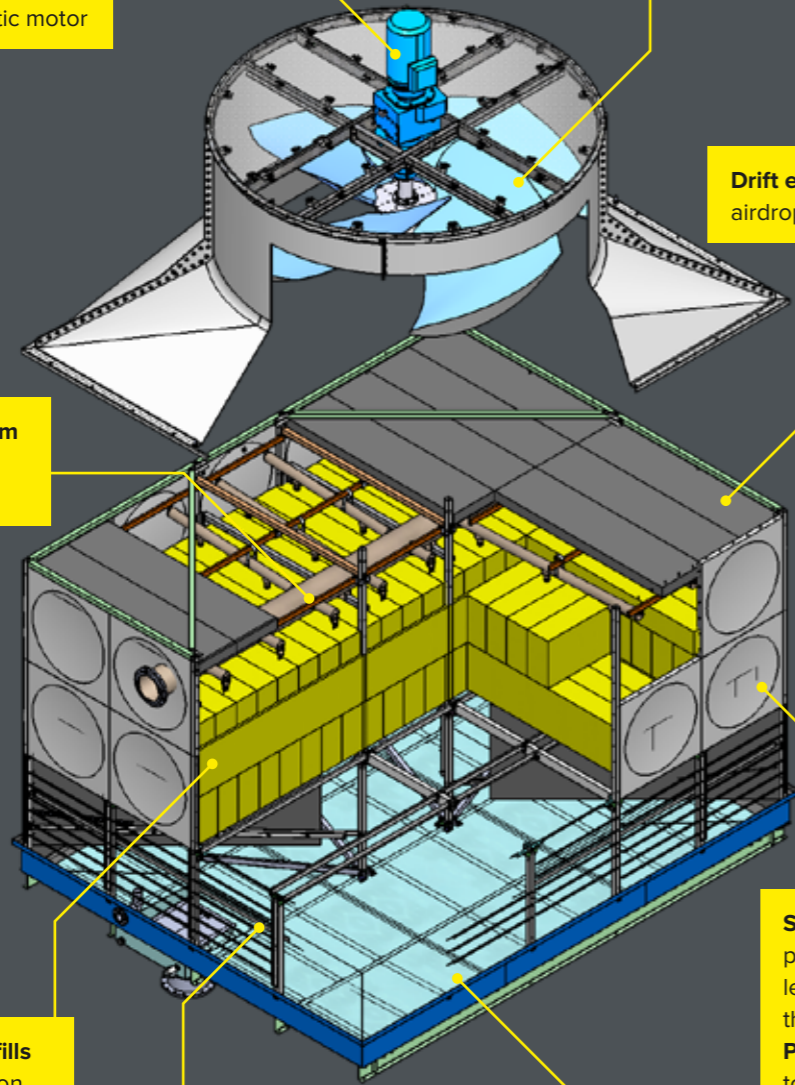
**Water distribution system** with low pressure, non-clogging spray nozzles.

**Structure** made of strong profiles in high-grade stainless steel. In combination with the typical Polacel thick **Wall Panels**, it gives the cooling tower a high resistance to corrosion and a long lifetime (40 years).

**Heat and mass transfer fills** to optimize the evaporation of water. Different types of fills for application with clean water, industrial or grey water, polluted water.

**Air inlets and wind-blockers** avoid water losses, reduce growth of micro-organisms and stabilize cooling tower performance.

**Integrated water basin** with bottom on grade provides easy emptying, cleaning and disinfecting the cell.

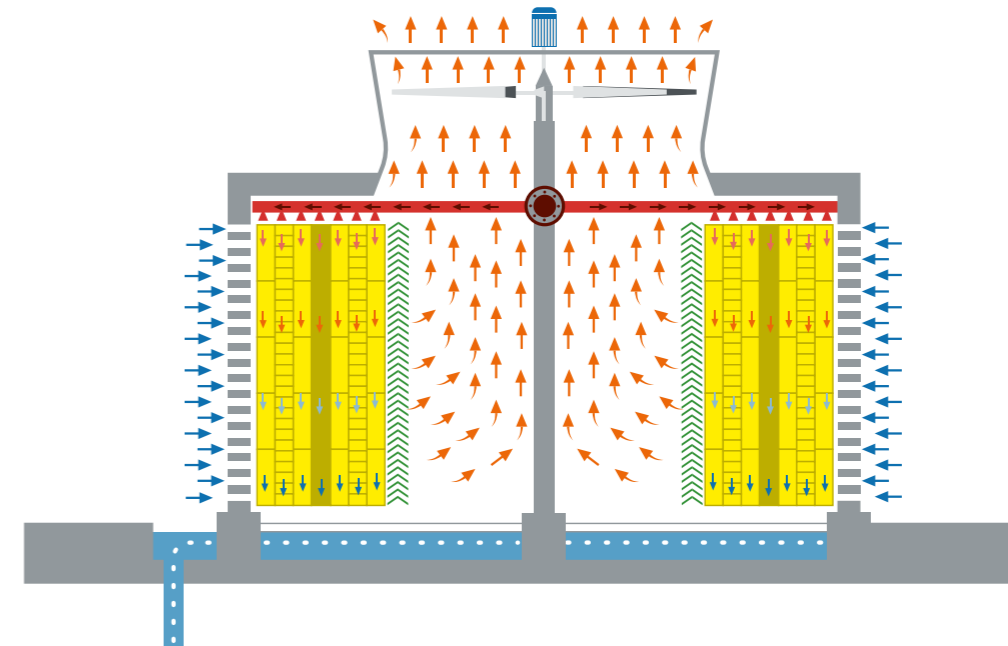


# ECONOMICAL & QUIET COOLING

**XT - XM - XL – SERIES**



## OPERATION PRINCIPLE CROSSFLOW



The Kelvion crossflow cooling tower operates quietly and economically and has a high cooling capacity. The modular system can be easily adjusted to suit cooling requirements and the space available. The cooling towers provide an optimal performance and problem-free operation. The considerable savings in water usage (95%+), and the exceptionally low noise level make the economical crossflow cooling towers the best choice for both people and the environment.

### The Effect of Crossflow

Using the Crossflow principle, warm water flowing down through a cooling unit is cooled by air drawn upwards by a fan. Evaporation and direct heat exchange cause the temperature to fall rapidly. Compared to counterflow cooling towers, induced draught Polacel Crossflow cooling towers are much quieter and smaller.



# OUR SERVICES IN THREE WORDS: PEACE OF MIND



## START-UP SERVICES

We ensure that our products are delivered safely and are fully validated to give a robust and reliable performance over as long a life cycle as possible.

- ▶ Design, manufacturing, delivery, erection and commissioning
- ▶ Supervision of construction on site
- ▶ Commissioning assistance
- ▶ Assistance to erection sub-contractor



## REPAIRS AND OVERHAULS

We understand that unscheduled downtime can be disastrous. That is why our trained engineers are ready to respond quickly in an emergency. We will review and repair components while keeping any disruption to a minimum. Any overhaul work and conforms to the highest quality standards.

- ▶ On-site diagnosis Overhaul
- ▶ MTBF improvement



## SPARE PARTS AND SPARE PARTS SOLUTIONS

Even the best equipment shows signs of wear over time. We use only the highest quality spare parts, designed to match the excellence of the originals. This ensures that the optimum interaction between components is maintained. By safeguarding the original design we offer maximum security of your investment.

- ▶ Design, manufacturing and testing
- ▶ Spare trade parts
- ▶ Certified interchange-ability of spare parts



## INSPECTIONS AND MAINTENANCE

Through regular inspections and maintenance, we help you to reduce costs, extend the lifetime of all your Kelvion products and to achieve a reliable performance. This also helps you with budget planning.

- ▶ Preventive & corrective maintenance
- ▶ Cleaning
- ▶ Disinfection of the cooling tower circuit
- ▶ Renovation and revision
- ▶ Oil change on gearbox



## TESTING AND MONITORING

Having an understanding of the condition of the equipment allows you to secure reliable production, improve safety and energy efficiency and increase equipment lifetime. It can also help you to prevent breakdowns and prepare for the future.

- ▶ Process temperature analysis
- ▶ Noise pressure testing
- ▶ On site thermal performances tests on any cooling tower
- ▶ Vibration analysis
- ▶ Airflow testing
- ▶ Fan speed
- ▶ Legionella test
- ▶ CFD modelling



## CONSULTING AND TRAINING

Would you like a consultancy service that takes into account the special features of your process and were you feel that finding the right solutions are more important than closing the deal quickly? Then you will feel right at home with Kelvion. We will work closely with you to develop the exact solution that is best tailored to your needs.

- ▶ Development of solutions to increase performance, efficiency and reliability
- ▶ Training of operators at site

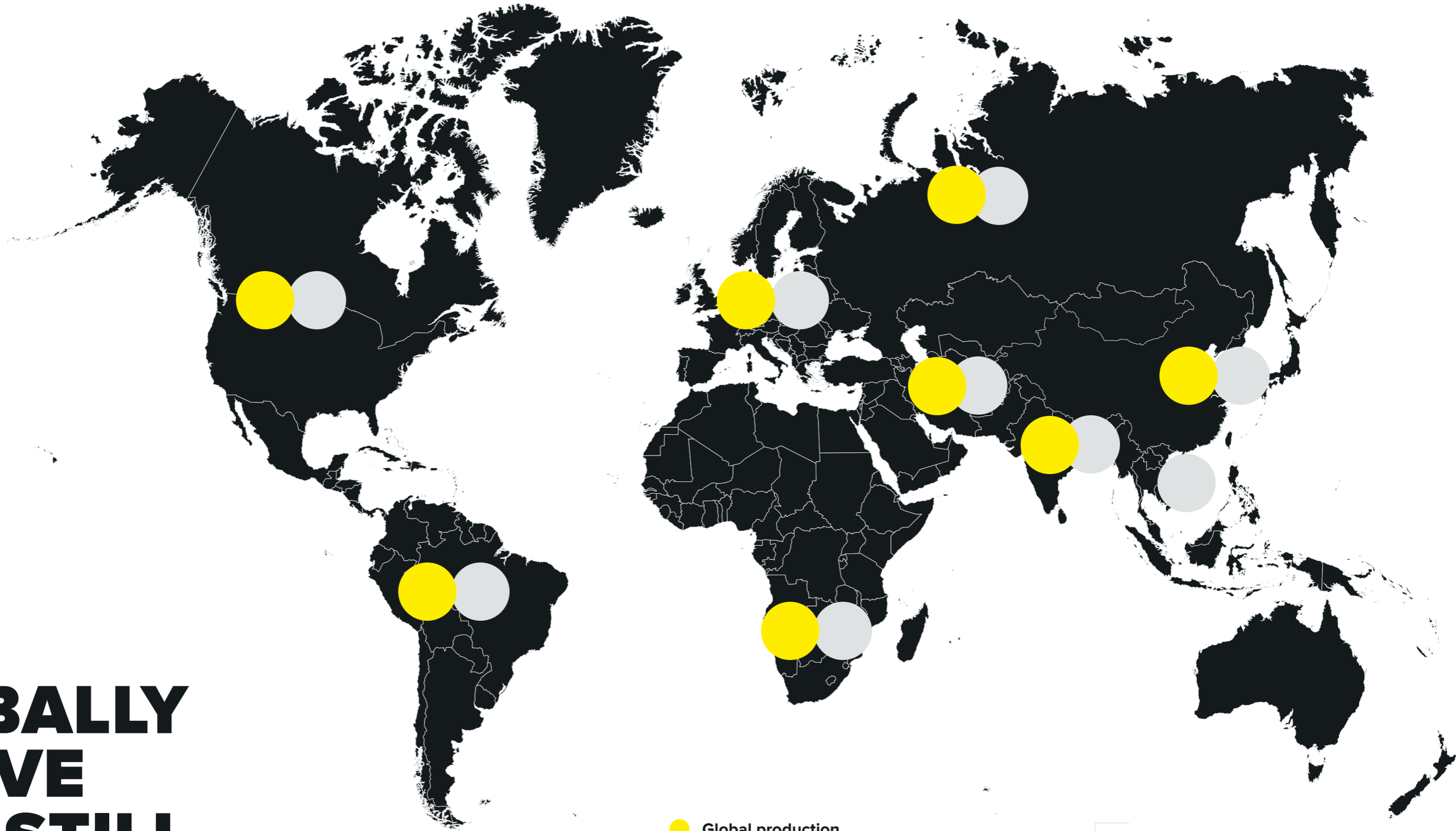


## UPGRADES AND REPLACEMENTS

We replace components to keep our heat exchangers running smoothly and to prevent downtime. Where parts have become obsolete, we will suggest an upgrade.

- ▶ Analysis and assessment of performance bottle-necks





- Global production footprint
- Global sales and service

# 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.