

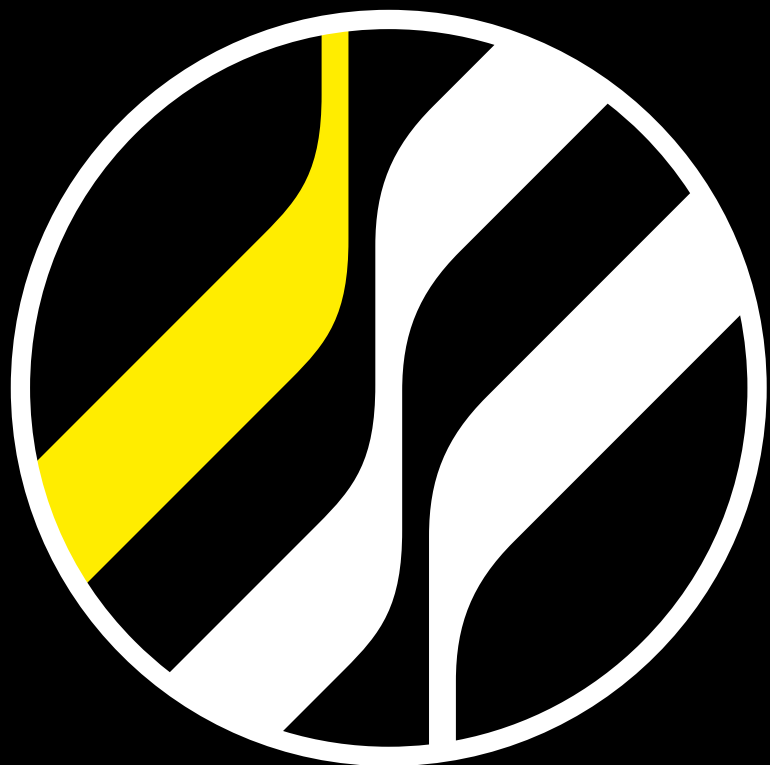
Kelvion



Product Line: Cooling Towers

MODULAR & SUSTAINABLE SOLUTIONS





EXPERTS IN HEAT EXCHANGE – SINCE 1920

Welcome to Kelvion! Where Heat Exchange is our Business. We are one of the leading global manufacturers of heat exchangers and have been providing solutions for almost every industrial application imaginable since the 1920s, specializing in customized solutions suitable for extreme environmental conditions - as of 2015 under the name of Kelvion.

With one of the most extensive selections of heat exchangers in the world, we are a well-known partner in many industries, including transportation, energy, oil and gas, the heavy industry, chemical and marine as well as sugar, food and beverage and the HVAC and refrigeration technology sector. Our products include Compact Fin Heat Exchangers, Plate Heat Exchangers, Single Tube Heat Exchangers, Transformer Cooling Systems, Cooling Towers and Shell & Tube Heat Exchangers.

Our many years of experience and in-depth expertise have made us specialists in this field. Our heat exchangers are designed specifically to meet the needs of the respective machine or equipment system, ensuring outstanding energy efficiency and reliability in any market segment. This gives our customers a cutting-edge over their competitors while also reducing operating costs over the long term.

As your heat exchange partner, we understand that outstanding and reliable after-sales services are critical for you, our customer, and we work alongside with you in close partnership supporting you throughout the full life cycle of your plant and equipment to ensure lasting business success.

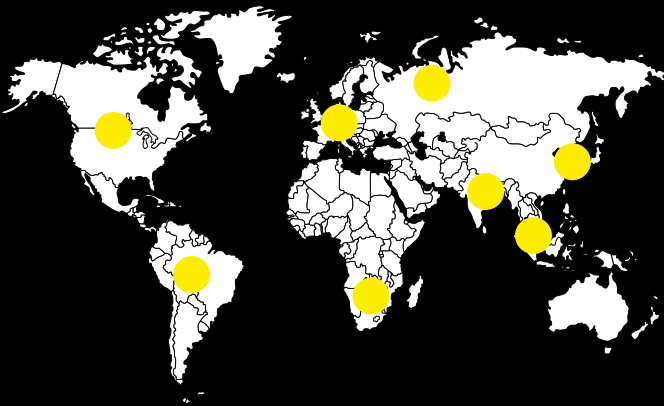
Kelvion – Experts in Heat Exchange.

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

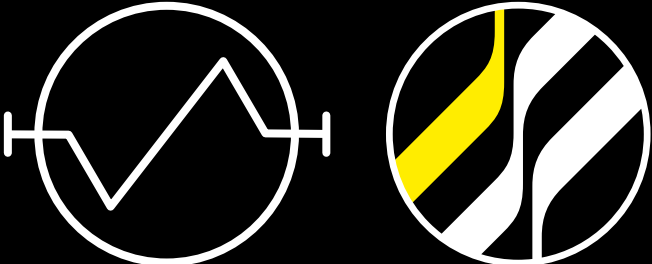


Lord Kelvin formulated the laws of thermodynamics and absolute units of temperature are stated in kelvin, in his honor.

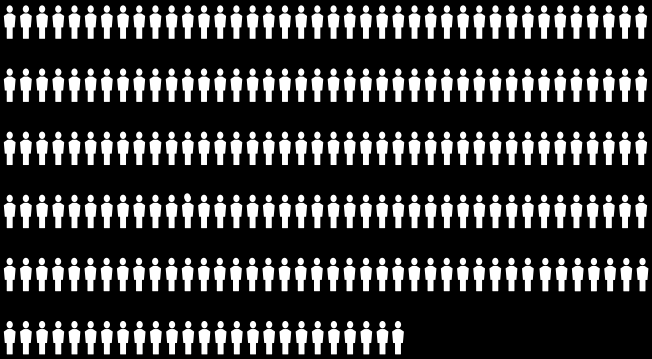
67 BRANCHES AND SALES PARTNERS WORLDWIDE



OUR LOGO – INSPIRED FROM THE SCHEMATIC FOR HEAT EXCHANGER



4,500 EMPLOYEES WORLDWIDE



YOUR MARKETS ARE OUR MARKETS

Chemicals

Food & Beverages

Heavy Industry

HVAC

Refrigeration

Marine

Oil & Gas

Power

Sugar

Transportation

KELVION HAS A LONG HISTORY

2015 With the new name, the former GEA Heat Exchangers is writing its own history as Kelvion.

2014 GEA sells the Heat Exchangers Segment to Triton.

2010 Reorganization of GEA's 9 Divisions into technologically distinct Segments. The largest segment is the Heat Exchangers Segment.

1999 In April 1999, GEA was acquired by mg technologies AG

1920 Foundation of GEA in Bochum by Otto Happel sen. (Born 1882)

We invest in Quality and Sustainability

CUSTOM-MADE FROM STANDARD COMPONENTS



Kelvion designs, manufactures and services cooling towers for process and climate cooling. Our durable and environmentally-friendly cooling towers are expertly engineered to the highest quality standards for years of worry free operation. Our extensive cooling tower portfolio includes open evaporative cooling for nearly any water quality.

Kelvion cooling towers combine the highest cooling capacity with lowest energy consumption. The modules are ready to use and easily adjust to the cooling requirements and available space, whether they are operated individually or in-line.

Evaporative cooling is the most efficient and sustainable way to make cold water. The high efficiency axial fan provides the lowest energy consumption per rejected kilowatt of cooling with minimum water consumption. These benefits, combined with the strength of Kelvion cooling towers, ensure a green footprint.

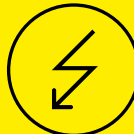
APPLICATIONS



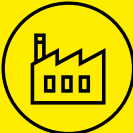
HVAC



CHEMICALS



POWER



HEAVY INDUSTRY



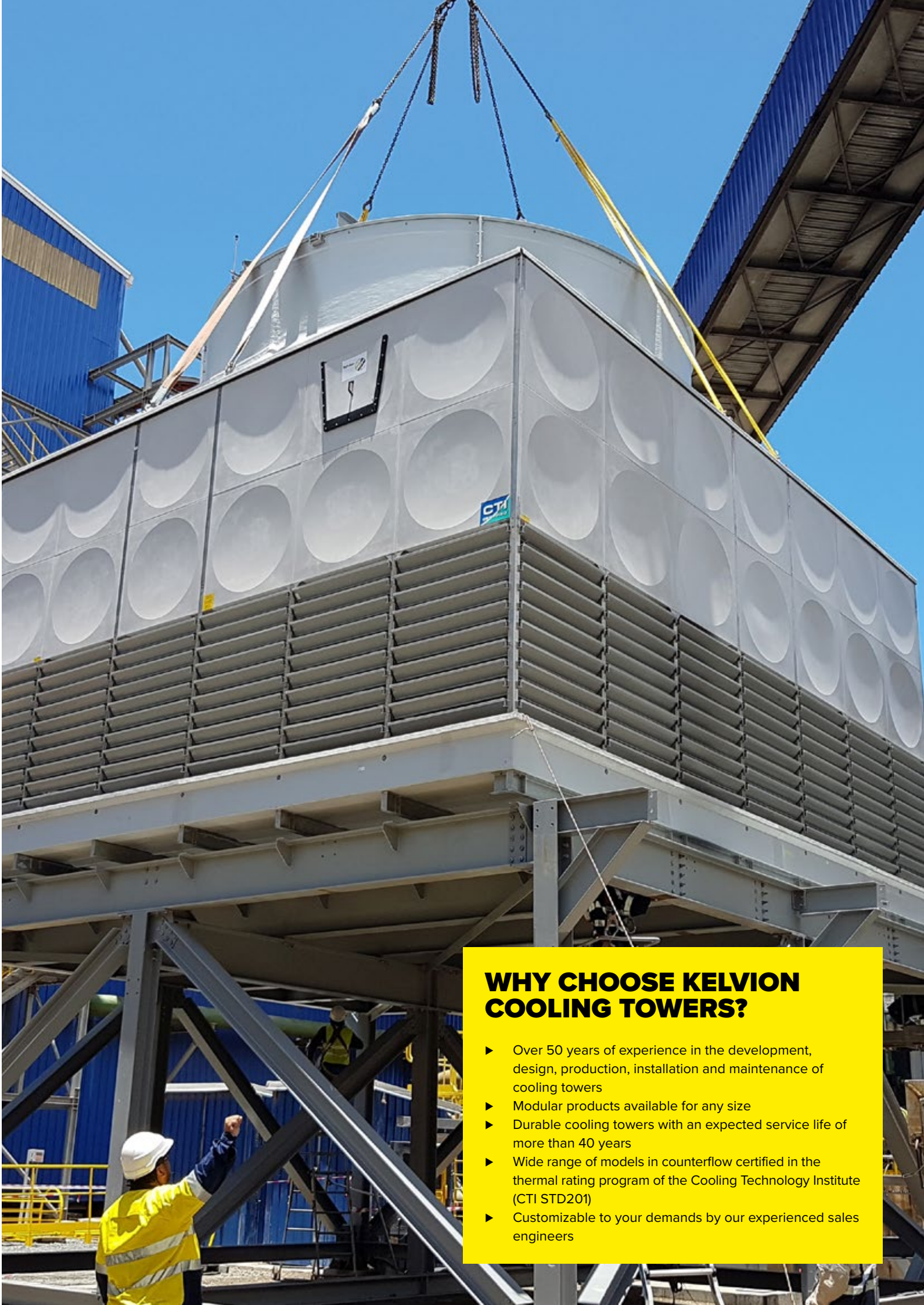
FOOD



OIL & GAS



DATA CENTER

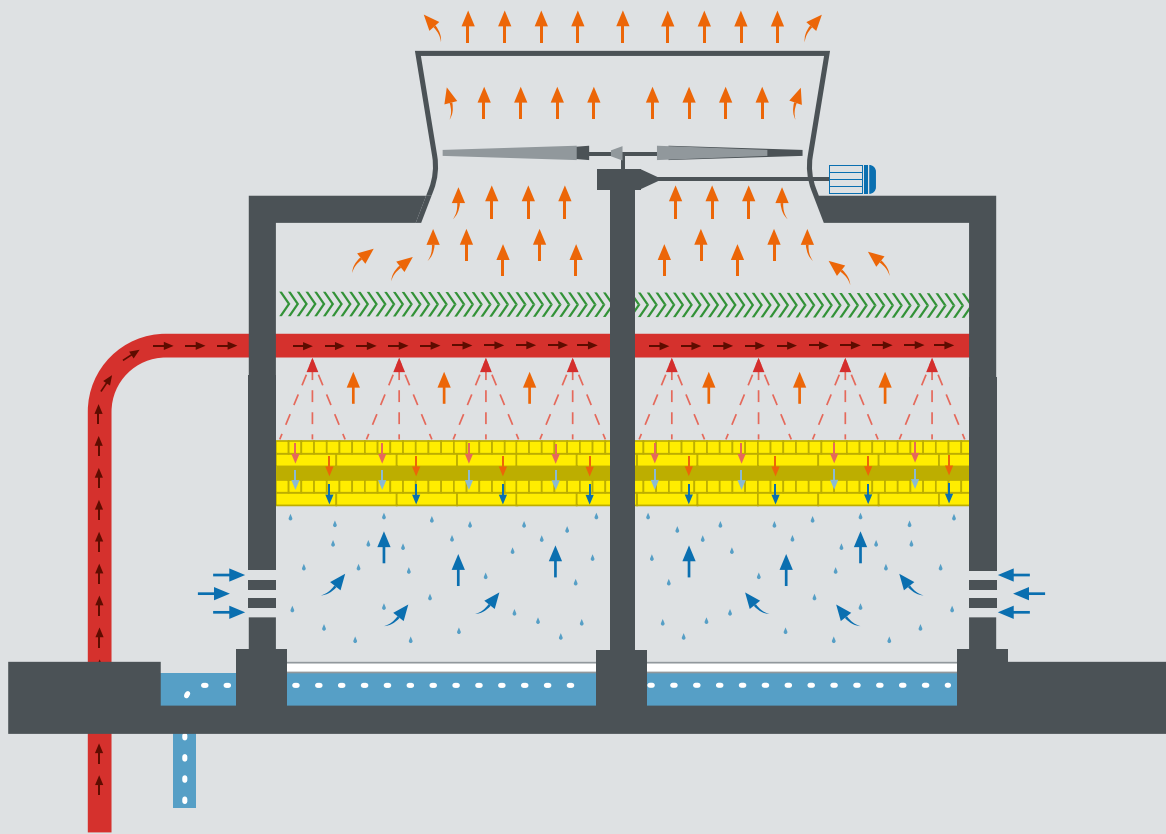


WHY CHOOSE KELVION COOLING TOWERS?

- ▶ Over 50 years of experience in the development, design, production, installation and maintenance of cooling towers
- ▶ Modular products available for any size
- ▶ Durable cooling towers with an expected service life of more than 40 years
- ▶ Wide range of models in counterflow certified in the thermal rating program of the Cooling Technology Institute (CTI STD201)
- ▶ Customizable to your demands by our experienced sales engineers

ENVIRONMENTALLY-FRIENDLY COOLING PERFORMANCE

OPERATION PRINCIPLE COUNTERFLOW



Evaporative Cooling

All cooling tower technology is 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 the required cold water temperature determines the size of the unit. This may result in water that is colder than the ambient dry air temperature.

With the exception of mechanical cooling using refrigerants, evaporative equipment is the only cooling technique to achieve this result. Typical COP values of 80 - 120 are achievable.

The Effect of Counterflow

The principle of counterflow used in Kelvion cooling towers means that the water flows down while the air is drawn upward 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 fill. The cooling towers have a counter flow configuration that 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 when selecting a cooling tower.

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 can be extended and standard solutions are 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 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 in accordance with all environmental regulations

The security of quality

Kelvion designs and manufactures durable cooling towers with minimal maintenance requirements. This is achieved by using the highest quality materials, such as stainless steel, combined with glass fiber and plastics.

The result is a cooling tower that requires low maintenance, is energy efficient, and provides years of exceptional performance.

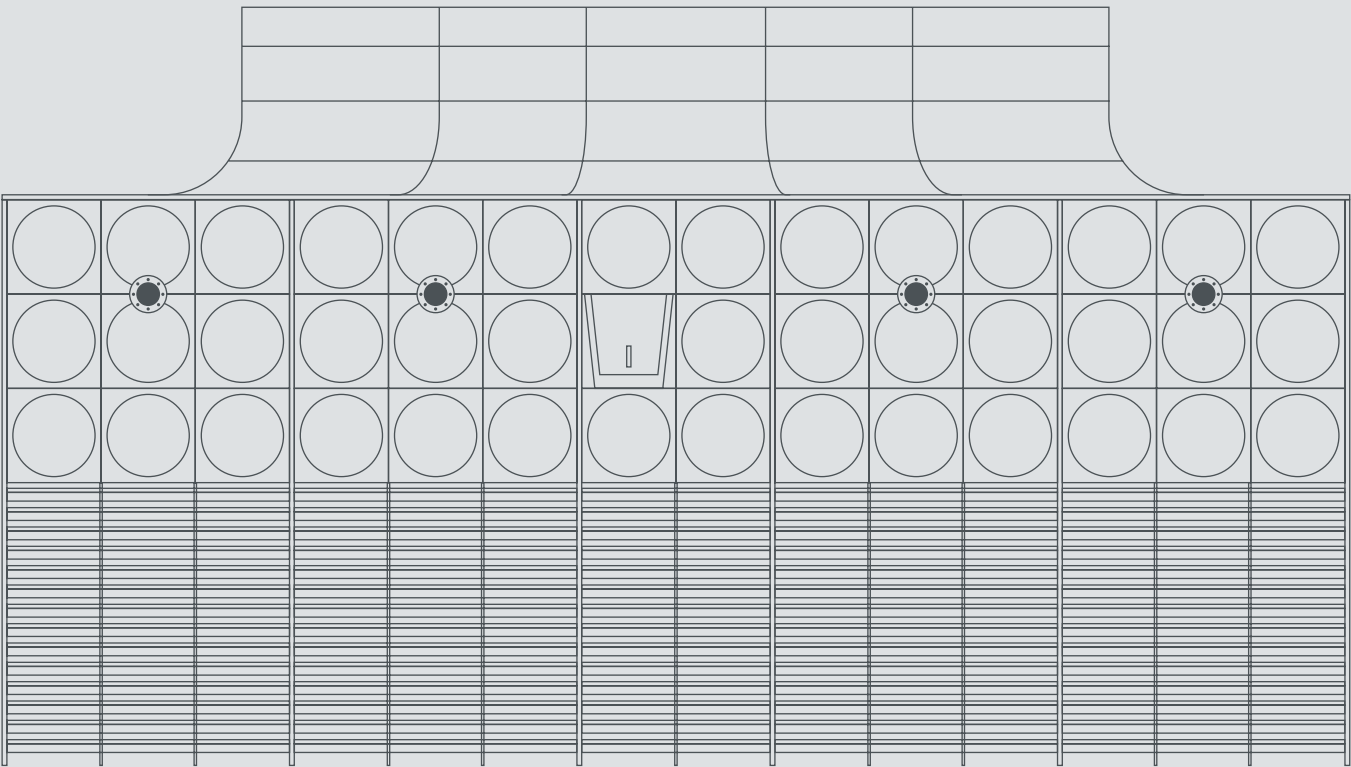
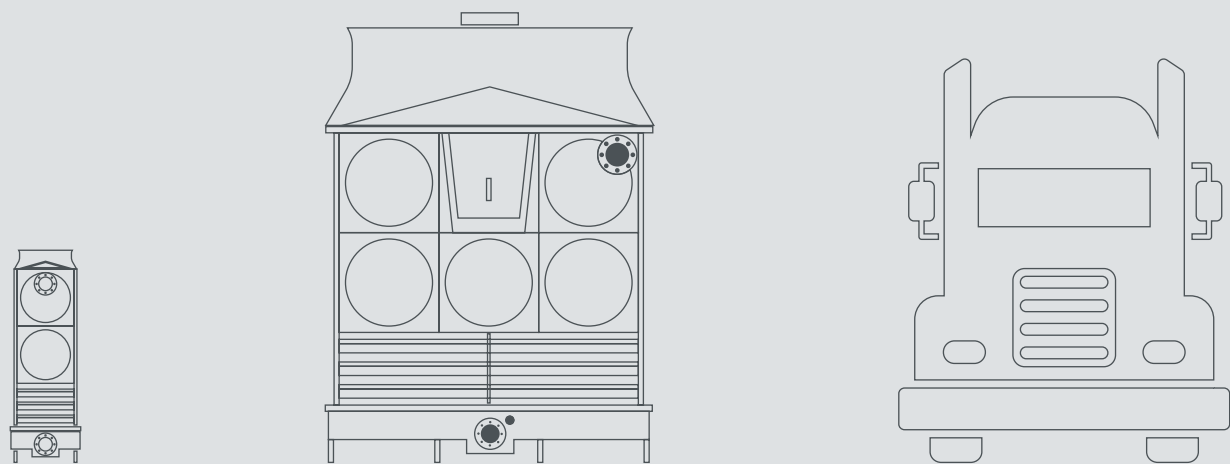
Advice and service

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

Our sales engineers advise, analyze, and design the highest quality products to your specifications thereby ensuring you receive superior products on time to boost performance and reduce costs.

Kelvion's worldwide service facilities also specialize in cooling tower repair and maintenance for most OEM brands. Our maintenance specialists are well versed in cooling tower maintenance and are able to assist with scheduled and unscheduled maintenance of all heat transfer equipment.

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 m²
- ▶ 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 Cooling Towers feature a combined motor gearbox unit that is mounted directly on top of the cooling tower above the axial fan. Kelvion offers a wide range of models with thermal capacities up to 30 MW per cell.

Cells up to 21 m² [226 ft²] can be delivered pre-assembled. Larger cells up to 150m² [1615 ft²], Polacel Smart CMDR Cooling Towers, can be easily assembled onsite, due to the limited number of parts that have to be mechanically mounted. No cutting, grinding or welding is needed onsite and simple 3D instructions are included in the operation's manual.

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 angle gearbox that provides access to the fan deck. These large cells, up to 300m² [3229 ft²], will be mechanically assembled onsite.

Kelvion can build these cooling towers quickly due to the flexible and easy construction offered by the “Polacel Smart” concept.

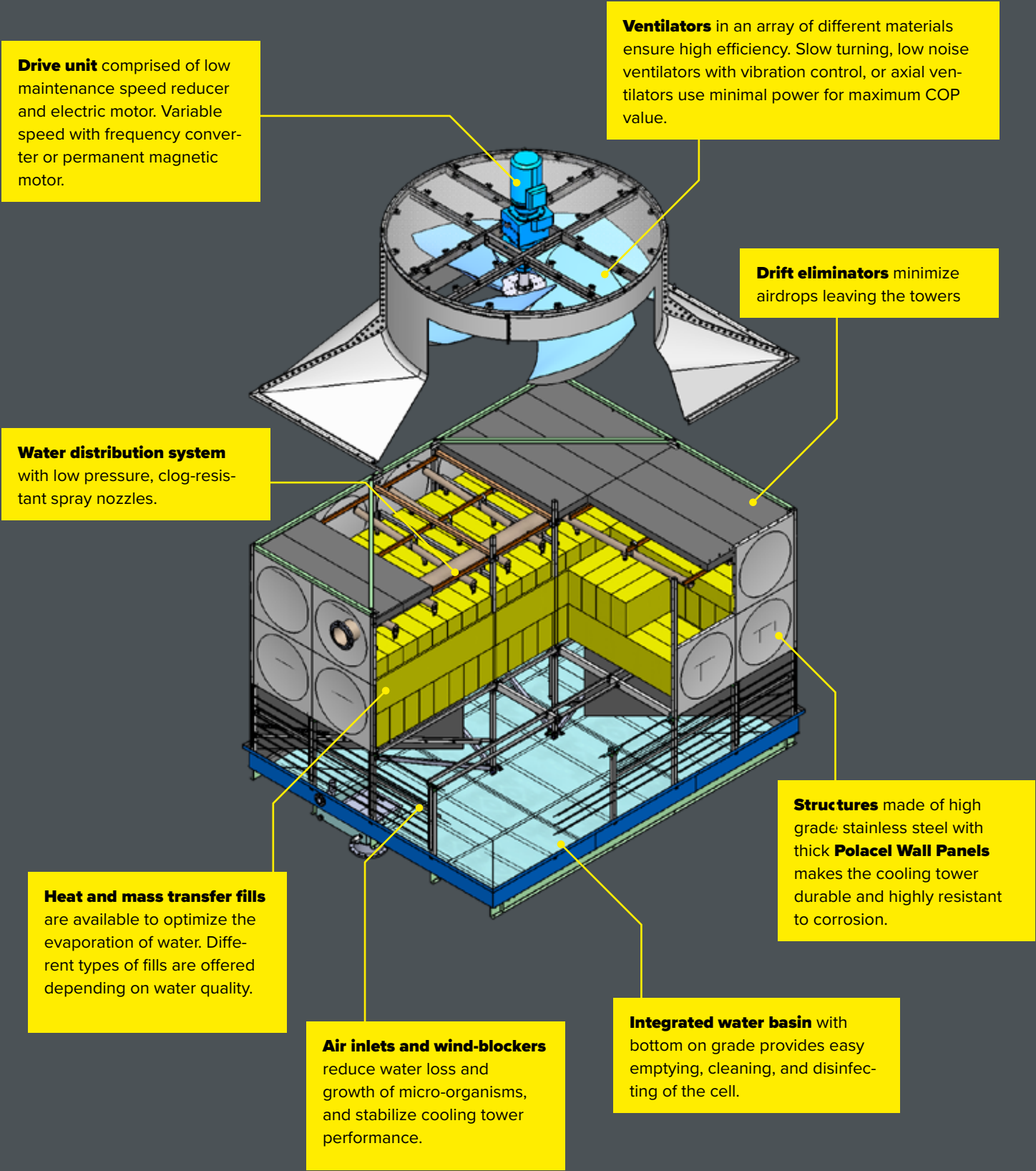
All Polacel units can be assembled prior to a shutdown (alongside the existing operating cooling tower), hoisted as a complete unit, and installed on the existing water basin during the shutdown. This streamlined process is why delivery time of a Kelvion cooling tower always fits into your schedule.

ADVANTAGES



- ▶ Only a minimum number of support points are necessary due to the self-supporting foundations and high internal stiffness.
- ▶ Completely hoistable, ready to be installed.
- ▶ All Cooling Towers can be delivered with an integrated water basin and/or mounted on a concrete water basin.
- ▶ The standardized models have been analyzed and tested by dynamic strength calculations and can meet the most extreme climate conditions.
- ▶ The aerodynamic design of the large fan section ensures lower energy consumption and a substantial reduction in noise.
- ▶ Several types of fans can be selected depending on preference and noise conditions.
- ▶ The spray nozzle water distribution system will be set to the required flow.
- ▶ A wide range of fills can be used based on the expected water quality conditions.
- ▶ High efficiency drift eliminators are available for each cooling tower.
- ▶ Different types of air inlet louvers are also available. They optimize the air inflow and minimize water loss through splashing.

MAIN COMPONENTS AND INTERNALS

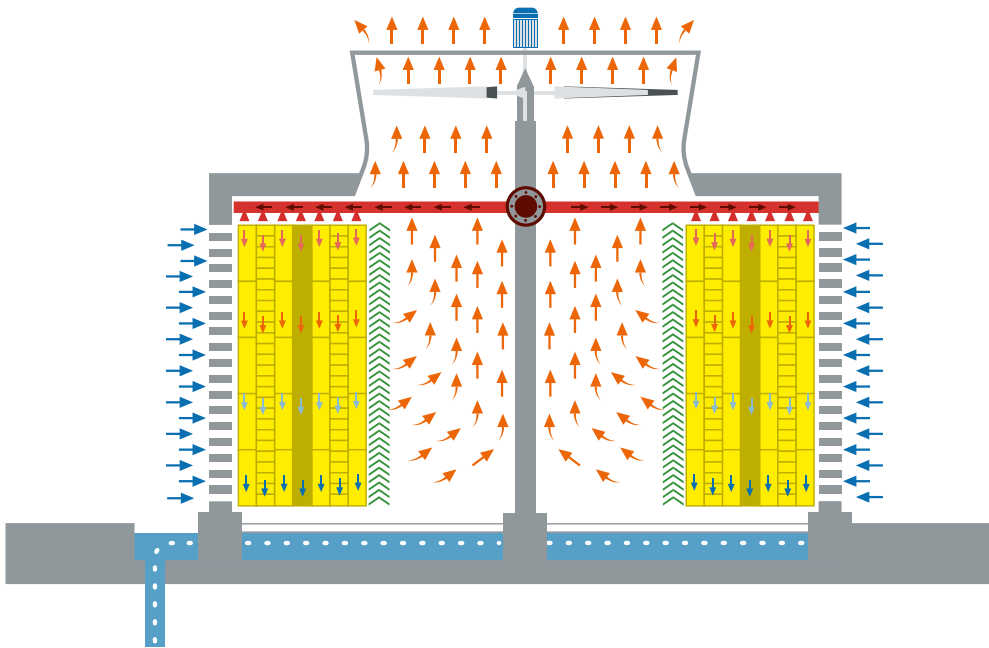


ECONOMICAL & QUIET COOLING

XT - XM - XL – SERIES



OPERATION PRINCIPLE CROSSFLOW



The Kelvion crossflow cooling tower operates quietly and economically with high cooling capacity. The modular system can be easily adjusted to suit the cooling requirements and available space for optimal performance and worry free operation. The considerable savings in water usage and the exceptionally low noise level make the Kelvion crossflow cooling towers the smart choice for 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 transfer cause the temperature to fall rapidly. Compared to counterflow cooling towers, induced draft Polacel crossflow cooling towers are much quieter and smaller.

Kelvion Tundracel: Co-Current Closed Circuit Cooling Tower

KELVION TUNDRACEL

ORIGIN OF PROCESS COLD



Spray System

Gear Motor

Coil

The new Kelvion Tundracel Co-Current Closed Circuit Evaporative Cooling Tower will boost heat transfer efficiency while using less energy and water.

This latest innovation in the Kelvion product portfolio is ideal for a wide range of heavy duty industries including oil & gas, refining, petrochemicals, and power. The Tundracel uses evaporative cooling to remove heat from a process stream.

With the co-current closed circuit technology, the air helps to spread the water evenly over the entire surface of the tubes, causing less scaling and fouling.

Heat transfer is more efficient than in a traditional air-cooled heat exchangers, thereby creating the coldest possible cooling performance for the process fluid. As a result, electricity consumption is lower, reducing the environmental footprint and increasing production capacity.

Water costs are significantly lower with the Tundracel as it is designed to handle water of poor quality, such as blowdown water from a cooling tower, treated waste streams, plant effluent and sea water, as make-up water.

INDUSTRIES



OIL & GAS



CHEMICALS



POWER

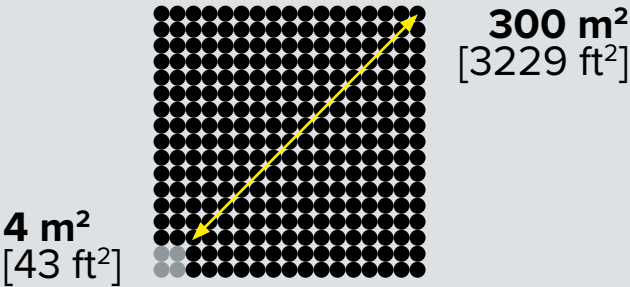


DATA CENTER

ADVANTAGES

- ▶ Colder outlet temperature (Single approach temperature)
- ▶ For poor water application (Waste streams, Plant effluent, etc.)
- ▶ Reduced water consumption
- ▶ Reduced electrical consumption
- ▶ Reduced footprint

CAPACITY RANGE



PROCESSES & MEDIA

LIQUID COOLING

- ▶ Water
- ▶ Industrial Wastewater
- ▶ Seawater
- ▶ Stripped Water
- ▶ Scrubber Waters
- ▶ De-ionized Water
- ▶ Glycol
- ▶ Machine Oils

VAPOR CONDENSING

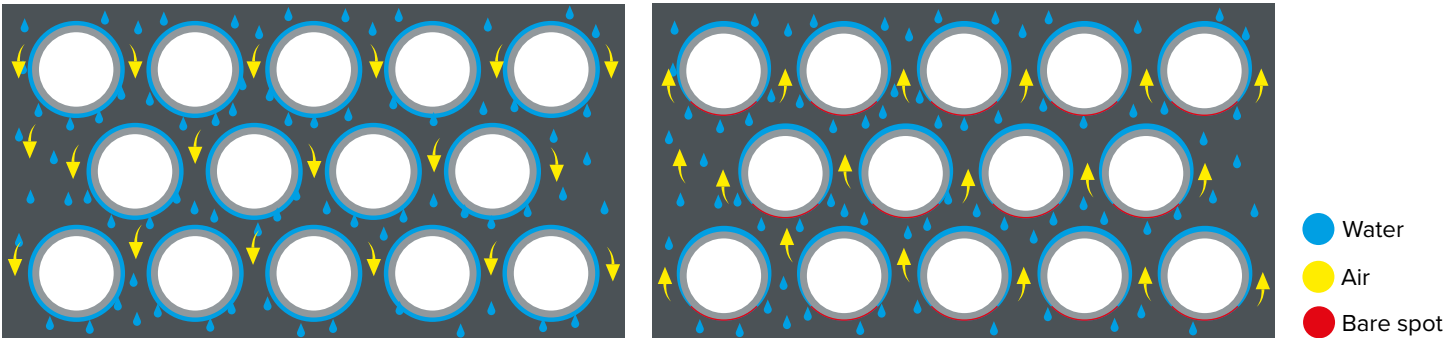
- ▶ Steam
- ▶ Ammonia
- ▶ Freon
- ▶ Propane
- ▶ Acetone
- ▶ Cyclo-butane
- ▶ Ethane
- ▶ Methane

GAS COOLING

- ▶ CO₂
- ▶ Natural Gas
- ▶ Air
- ▶ Nitrogen



FUNCTION AND PRINCIPLE



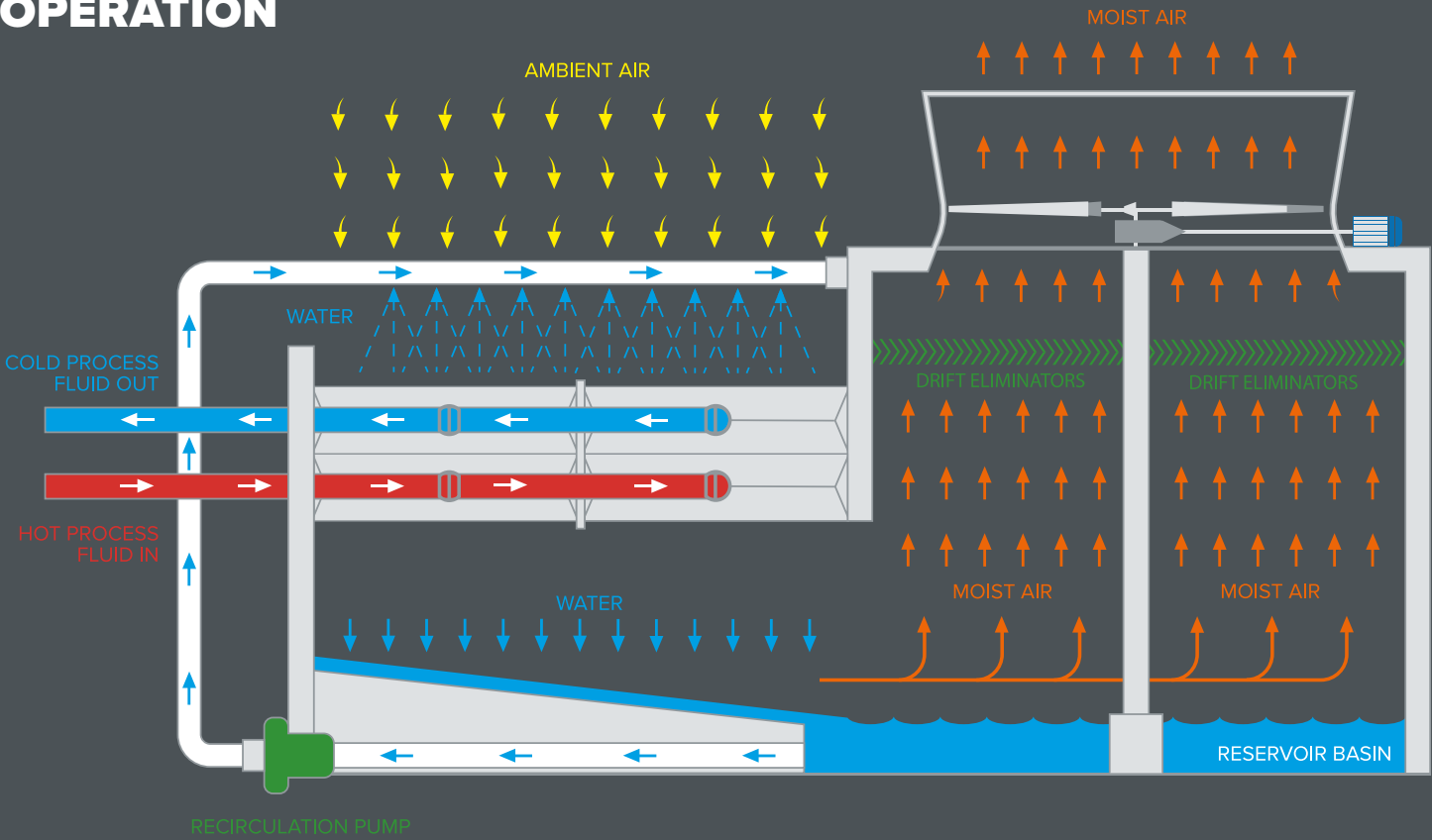
CO-CURRENT AIR & WATER

- ▶ Water and cooling air stream simultaneously through the same current
- ▶ Improved Water Film
- ▶ Air helps to spread water evenly over entire tube surface
- ▶ Prevention of bare spots
- ▶ Less scaling / fouling

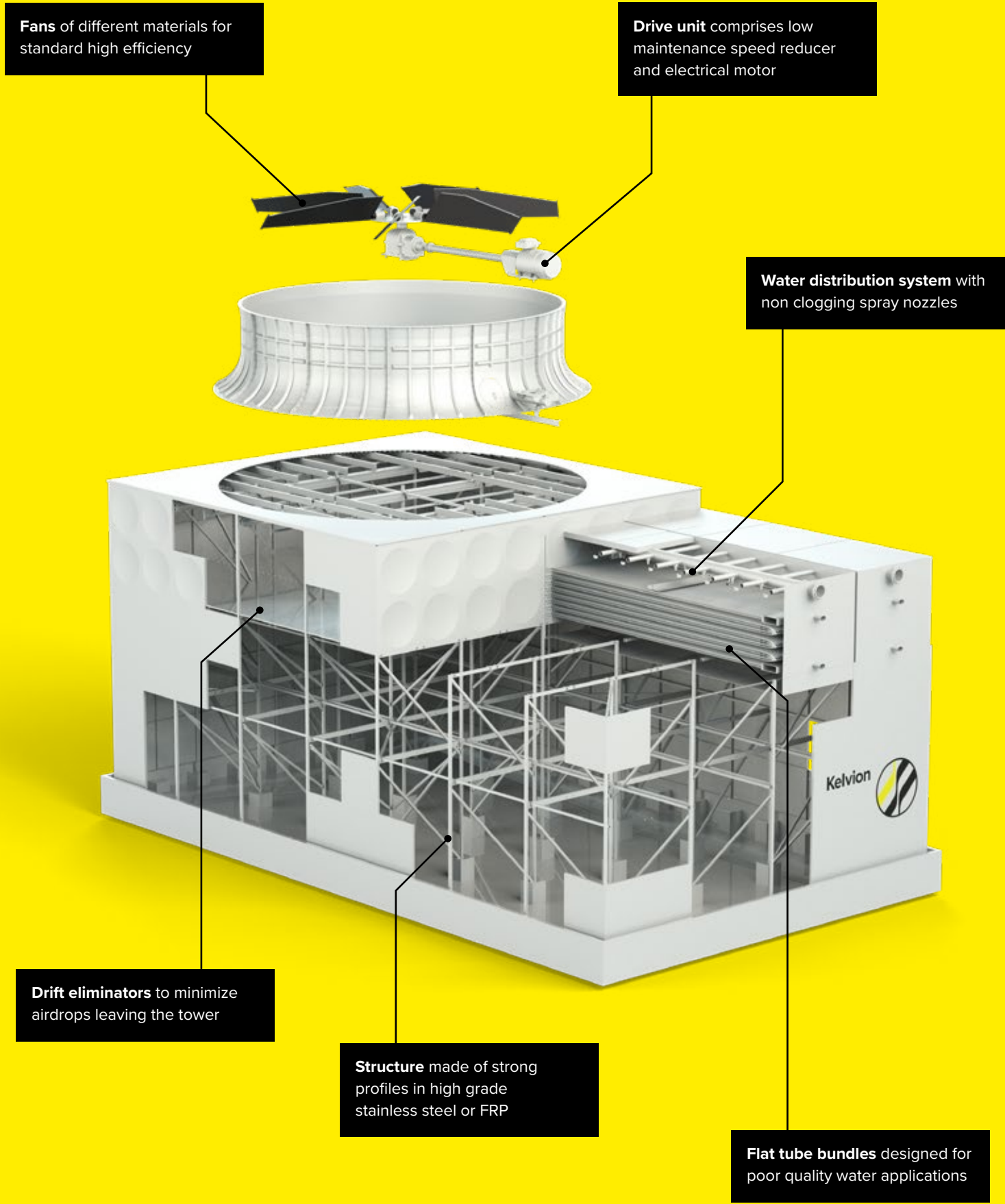
COUNTER CURRENT AIR & WATER

- ▶ Water flows down while the air is pulled upwards by a fan
- ▶ Counter flow cooling approaches the wet bulb temperature
- ▶ Air and water collide on the bottom of the tube causing bare spots

OPERATION



COMPONENTS & INTERNALS



OUR SERVICE 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



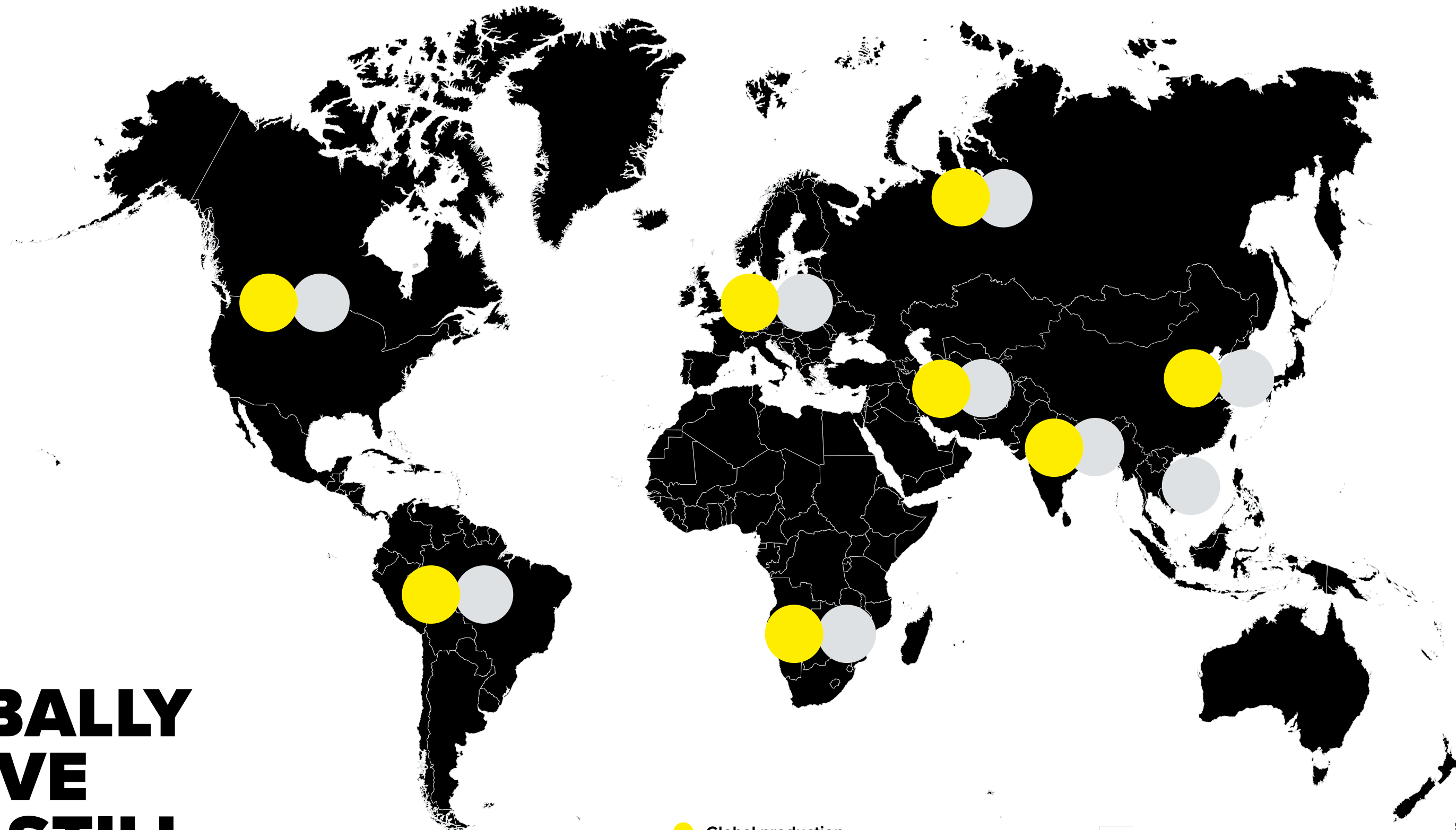
UPGRADES AND REPLACEMENTS

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

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