



COOLTECH

The liquid cooling specialists

LIQUID COLD PLATES

LIQUID COOLING SYSTEMS AND CHILLERS

PHASE-CHANGE SYSTEMS WITH LOW-BOILING LIQUIDS

AIR-WATER HEAT EXCHANGERS

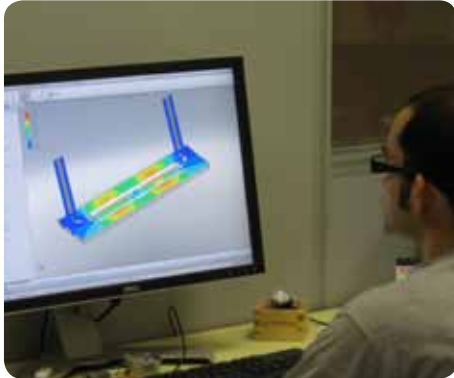
THERMOELECTRIC ASSEMBLIES



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THE COMPANY

WE MAKE SOLUTIONS



Our key-word is customization

COOLTECH is an innovative company that designs and manufactures liquid-cooling, thermoelectric, compressor and phase-change components and systems, both standard and custom. Our strength points are flexibility and the possibility to supply a 360-degree service, from designing to manufacturing. The production of custom solutions represents more than 80% of our turnover and designing, simulation, assembling and testing take place in-house. A qualified sub-suppliers' full network lets us supply maximum productive flexibility and the highest standard on the market.

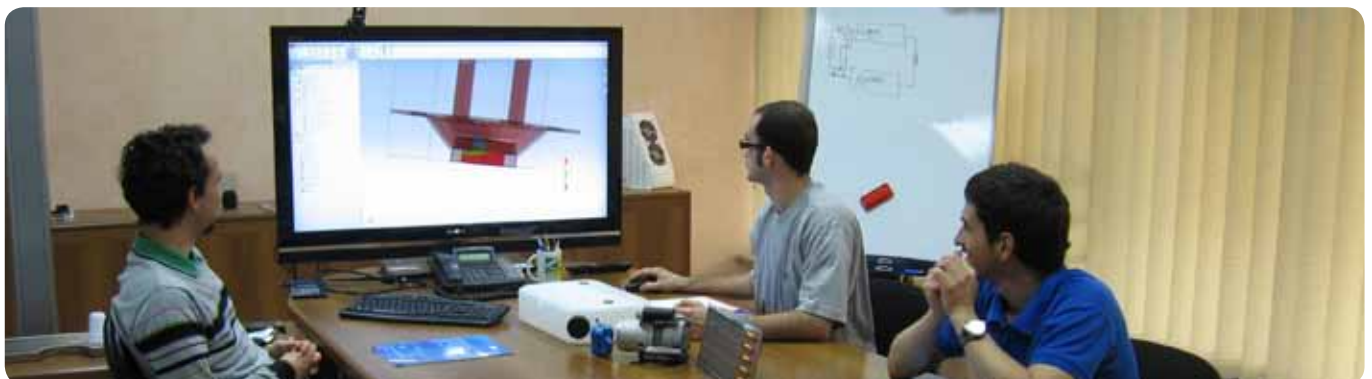
From designing to finished product

All products, ranging from a single cold plate to a complete liquid cooling system, are designed and tested in-house, what lets us closely follow each step of development and optimization. The project follows a well-defined route, which starts from an idea, passes through the thermo fluid dynamics study with the CFD (Computational Fluid Dynamics) simulation until it reaches prototype and final validation.



Our engineering skills, our 3D mechanical designing and our CFD simulation

Our technical staff is able to design and simulate components and systems independently. The use of a 3D mechanics software and a CFD simulation software at a project stage lets us reconstruct the environment where the system works, thus optimizing the project before carrying out a first prototype. CFD simulation software lets us study the flows, both laminar and turbulent, the critical zones, the hot-spots and the dispersion of energy inside the loop and, obviously, evaluate how the system performs. What lets us reduce both costs and time to the minimum and considerably improve the time-to-market of our products.



Quality and standard: ISO 9001:2008

The company has obtained the ISO 9001:2008 certification. Production is submitted to a control system for the single job orders with the opportunity to check their progress status in real time, with full traceability of the components being used.



Our production department

Our production department is able to manage batches of single pieces up to productions. We have a continuous assembling line and single locations for assembling small lots. Besides assembling, our department is able to deal with brazing, sieving, snagging, lapping and visual inspection processes. Thanks to our small lot managing system, we make flexibility a strength point of ours.

The laboratory

In our laboratory the product is tested to warrant the stated performances.

We have a climatic chamber for simulating temperatures ranging from -40°C to $+180^{\circ}\text{C}$, kiln up to 250°C , freezer (down to -30°C), precision scale (0,01g), metrologic station with datalogger for the contemporaneous acquisition from several sources, a machine for the leak test with Helium gas in vacuum chamber (measure of losses up to 1×10^{-6} mbar l/s). We have sensors for temperature, humidity, capacity to measure the related physical values.



Testing

Each product is submitted to a final test and inspection before being delivered to the customer. Thanks to the machine for the leak test with Helium gas in vacuum chamber, we are able to determine extremely small losses, over 1×10^{-6} mbar l/s. For exchangers or large-sized systems, the same system is equipped with a sniffer probe that enables us to determine bigger leaks than 1×10^{-5} mbar l/s. The specific tooling for capturing data lets us make several tests, which are complete with detailed reports with the results of the effected analyses.

TECHNOLOGIES

INNOVATIVE AND RELIABLE SOLUTIONS FOR YOUR THERMAL NEEDS

LIQUID COLD PLATES

LIQUID COOLING SYSTEMS AND CHILLERS

PHASE-CHANGE SYSTEMS WITH LOW-BOILING LIQUIDS

AIR/WATER HEAT EXCHANGERS

THERMOELECTRIC ASSEMBLIES

LIQUID COLD PLATES



VACUPLATE

Vacuum brazed cold plates made of aluminium with internal fins or milled ducts that guarantee reliability and performance. Vacuum brazing technology is used in the most technologically advanced fields, where performance and quality are essential requirements. Vacuum brazing of aluminium gives brazed joints of very high quality, with no impurities and highly reproducible. Our VACUPLATES can be completely customized according to the customer's requests.



COOLPLATE

Aluminium or copper cold plates with orthogonal holes that create the circuit for the cooling liquid. They may be manufactured according to the customer's requests. Caps and joints may be screwed on or brazed, thus ensuring an excellent long lasting seal.



COOLTUBE

Cold plates made with copper or stainless steel tubes that are pressed inside aluminium plates. The housing of the tube inside the aluminium plate is calibrated so that a perfect thermal contact between the two components is obtained: the use of a thermal conductive epoxy resin is minimal and guarantees a high thermal transfer, besides an excellent mechanical fixing.

LIQUID COOLING SYSTEMS AND CHILLERS

Our pressurized compact systems and maintenance-free for OEM applications

We are specialized in pressurized liquid cooling systems. Pressurization offers different benefits: cavitation and micro-boiling effect reduced to the minimum, no malfunction connected to the activation of the pump, no tube kinking, no air inside the circuit. Thanks to our tools also comprising a machine for the leak test with helium gas in vacuum chamber and a specific system for loading the liquid under pressure with degassing, we are able to supply pre-loaded and ready-to-use systems, which may be soon installed inside the customer's equipment. Our experience in permeability of materials allows us to offer guaranteed complete systems with maintenance intervals up to over 5 years. These systems are exclusively designed according to the customer's specifications.

ACS non-pressurized systems for medium and high powers, even for OEM applications

Where very high cooling powers are necessary, our ACS systems are the right solution. Thanks to the large sizes of our heat exchangers and water tanks, these systems are manufactured for both final users and OEM markets. In these systems problems with pump cavitation are solved by using large tanks of liquid that, in fact, form a head for the suction pump. ACS non-pressurized systems offer a wide customization for the customer.

Cooling systems with compressor and refrigerating gas

We design and produce cooling systems based on compressors, from air conditioners to chillers for liquid. With our rotating compact systems, we are in a position to offer high-performing cooling systems for applications that are subject to limited spaces, with COP up to 10 times better than the one offered by thermoelectric solutions. For applications of very high power we use compressors from the most well-known worldwide producers. Our pressurized compact systems do not need any maintenance.

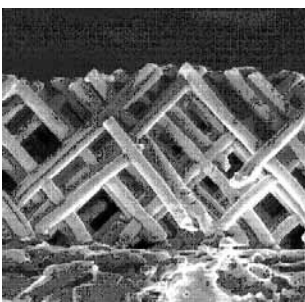
PHASE-CHANGE SYSTEMS WITH LOW-BOILING LIQUIDS

POWER BOIL : phase-change heat transfer

POWERBOIL is a cooling system that uses an electrical insulating liquid that transfers heat by means of an intense boiling process.

The so-produced steam moves from evaporation zone to condensation zone where it condenses by becoming liquid again and releasing the accumulated heat. The condenser can be manufactured with various technologies, according to the application specifications. Efficiency in this system is guaranteed by the micro-structure of the evaporation surface that ensures an extremely high boiling level that turns into a very high transport of heat. This way the temperature of the electronic components can be stabilized up to some kW in power.

The system typology, which is based on a natural circulation of the refrigerating liquid that moves up in a steam state and gets back to evaporation point in a liquid state, guarantees reliability at the highest level.





HEAT EXCHANGERS

Heat exchangers with finned tubes (TFR) and copper flat tubes (CFT)

TFR and CFT radiators are air-to-liquid heat exchangers. TFR radiators consist of copper or stainless steel tubes that are expanded inside copper or aluminium fins. They are easy to customize and offer a good cost/performance ratio. CFT radiators are copper brazed flat tubes with fins made of the same material. These products are less easy to customize compared to TFR ones, but they can offer greater performance for the same sizes, mainly due to higher density of the fins.

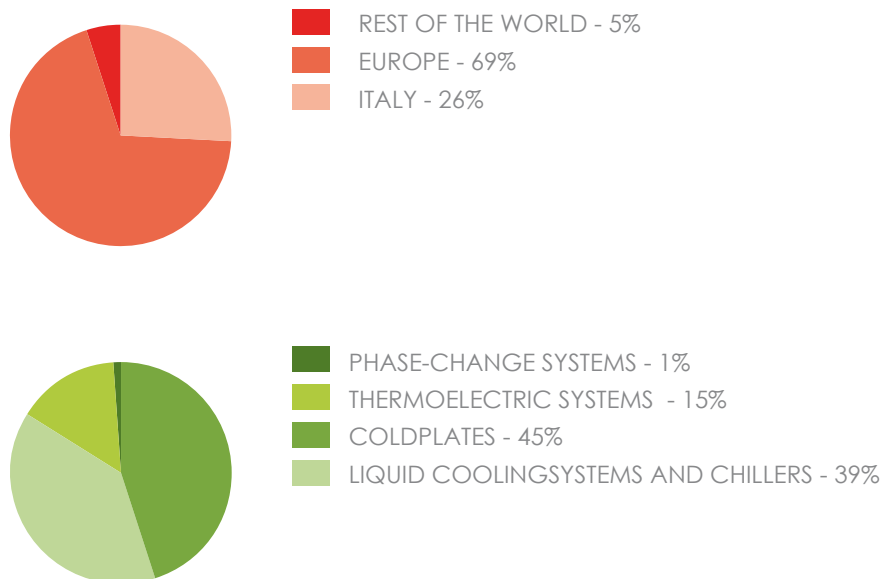


THERMOELECTRIC ASSEMBLIES (PELTIER)

For cooling and heating applications

Our offer of thermoelectric assemblies is particularly wide and includes air-to-air, air-to-plate, air-to-liquid, liquid-to-liquid, liquid-to-plate systems. The physical principle behind these products is known as Peltier effect: a direct current (DC), while passing through a P-N junction, creates a differential in temperature inside the junction; all these junctions are welded to two ceramic plates, thus creating a hot side and a cold side on them. These two sides are easy to commute by inverting the direction of the electric current (DC). The main advantages of these thermoelectric assemblies are an high MTBF, resistance to vibrations, low weight, abolition of the gravitational binding force, temperature accuracy and easy customization.

SALES – PRODUCTS



LIQUID COLD PLATES

VACUPLATE | COOLPLATE | COOLTUBE

VACUPLATE | Vacuum-brazed aluminium cold plates for high-powered applications

VACUPLATE is a family of vacuum brazed water plates made of aluminium. The vacuum brazing of aluminium warrants the highest quality of the brazed joint and the best internal cleaning thanks to the process that needs no flux. This particular process gives great geometric freedom to the designer and the highest cooling performance.

Thanks to the use of turbolators inside the channel of the liquid, the surface in touch with the liquid is maximum, along with very high levels of turbulent flow.

VACUPLATE cold plates are manufactured on customer's request.

Applications :

- Cooling of IGBT high-powered modules
- Power supplies
- Electric vehicles
- Traction
- UPS



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Product**

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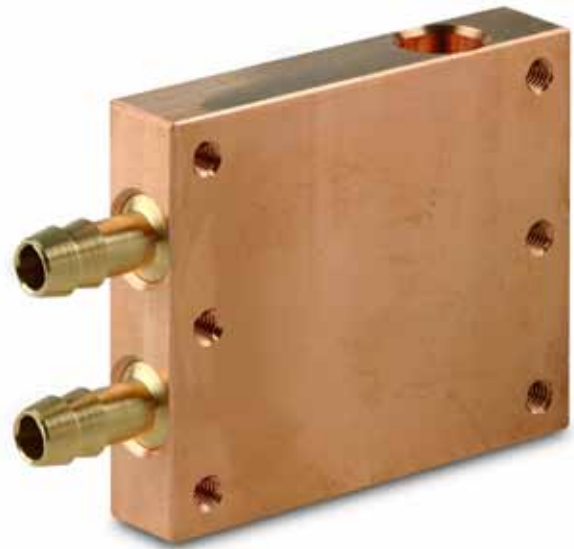
COOLPLATE | Brazed cold plates for medium-powered applications

COOLPLATE is a family of brazed cold plates manufactured in aluminium or copper and are used in medium-powered applications. These exchangers are CNC-machined profiles made of aluminium or copper with intersecting holes that are closed by joints of various type. Such joints are brazed to warrant the maximum seal. To increase the thermal performances, each hole can be equipped with a helical profile, thus increasing the total surface in touch with the liquid and the turbulent flow.

COOLPLATES can be CNC-machined on both sides, according to their final application and can be customized according to the customer's demands.

Applications:

- Cooling of thermoelectric modules
- Medical systems
- Optoelectronic systems
- Lithography machines
- Computers
- Transformers



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COOLTUBE | Cold plates with pressed tubes for low-and-medium powered applications

COOLTUBE is a cold plate series for low and medium powered applications. Such cold plates are made up of copper or stainless steel tubes that are pressed inside locations obtained from aluminium profiles. Thanks to particularly accurate processes obtained with machine tools, the tubes are located inside the corresponding locations with a thin layer of thermal conductive epoxy resin that warrants high contact and dissipation performances. COOLTUBE cold plates can be customized according to the customer's demands.

Applications :

- Cooling of low-powered IGBTs
- Power Drivers
- Frequency converters
- Electronic amplifiers
- Power suppliers



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LIQUID COOLING SYSTEMS AND CHILLERS

CCS | ACS - COMPACT | ACS

CCS | Refrigeration-based cooling systems

The CCS series includes all refrigerant-based cooling systems. Our range of cooling powers includes units ranging from 300W up to 4 kW that use R404A, R407c and R134a as a cooling refrigerating gas, according to the customer's specific demands. Based on alternative, rotating or Scroll compressors, CCS units can be customized for OEM applications.

CCS-MINI : compact refrigeration systems

The growing necessity of compact refrigeration systems finds an answer in CCS-MINIs.

Up to 10 times more efficient than a Peltier effect system, our small refrigeration units originate around small rotating compressors, which are extremely compact, light and reliable. These systems use R134a refrigerating gas and run with a DC24V, with variable speed control. The possible applications are numerous, ranging from the small isolated container to compact cooling units for liquid.

CCS - applications:

- Cooling in industrial processes
- Cooling of high powered Leds
- Printing machines cooling
- CNC-machines cooling

CCS-MINI - applicazioni:

- portable cooling systems
- cooling systems for electronic equipment
- visualization systems in medical field
- Machines for beauty & wellness
- Miniconditioners



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ACS-COMPACT | Pressurized liquid cooling systems for OEM applications

ACS-COMPACT is a compact liquid system for cooling electronic components. Thanks to our EXV pressurized compensator and the construction of the pump, this unit can work in any position. Maintenance intervals are reduced thanks to the low permeability of the used materials.

ACS-COMPACT can be connected to various types of cold plates and can easily be customized for OEM customers. The possibility to helium test the sealed loop permits to carefully evaluate the necessary maintenance interval.

Applications :

- Recirculation systems

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ACS | Water cooling systems for over-environmental temperature applications

ACS liquid cooling systems are complete with recirculation and cooling of the liquid in a closed loop. Thanks to the all-in-one structure, ACS is a ready-to-use non-pressurized unit and can directly be connected to any compatible cold plate. The system is extremely easy to use and can be serviced on field without any tools. ACS systems can easily be customized for OEM customers.

Applications :

- Machine tools
- Cooling of high-powered LEDs
- Printing machines
- Medical machines

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PHASE-CHANGE SYSTEMS

POWERBOIL | Phase-change systems

POWERBOIL is a cooling system that uses an electrically insulating liquid that moves heat thanks to an intense boiling process. The generated steam moves from evaporation zone to condensation zone where it condenses by becoming liquid again and releasing the accumulated heat. The condenser may be manufactured with various technologies, according to the application requirements. System efficiency is guaranteed by the microstructure of the evaporation surface that ensures an extremely high boiling level that turns into a very high transport of heat. This way the temperature of the electronic component may be stabilized up to some kW in power.

The system typology, which is based on a natural circulation of the refrigerating liquid that moves up in a state of steam and gets back to evaporation point in a liquid state, guarantees reliability at the highest levels. The two main components, the evaporator where the boiling process of the liquid takes place, and the condenser where steam condenses, are easy to adapt to the customer's requirements.

Applications with recirculation pump

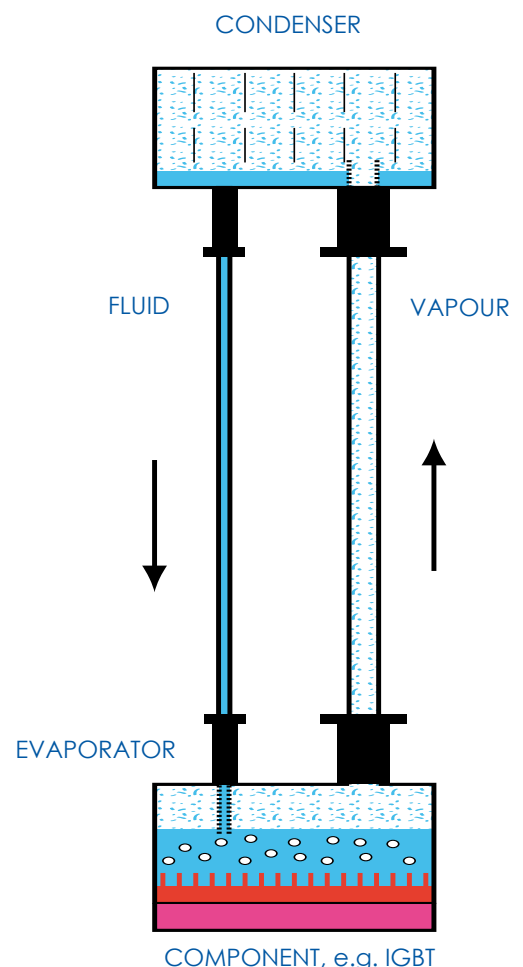
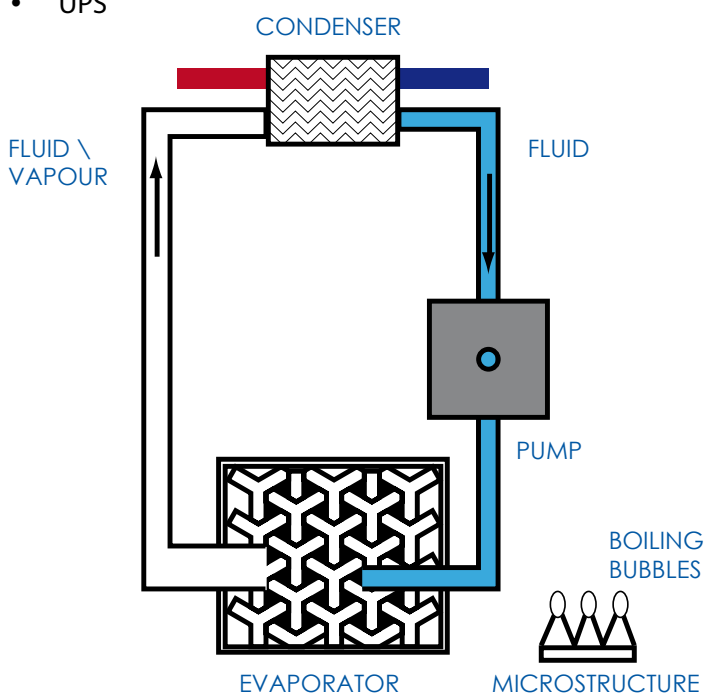
For high power applications POWERBOIL can be configured with a recirculation pump. The refrigerating liquid is pumped into the evaporator, thus increasing the thermal exchange. With this configuration heat fluxes up to 5000W may be managed on a 10x10 cm surface.

Main advantages

- Innovative cooling system by boiling a low boiling dielectric fluid.
- Very high boiling relation on the microstructured surface.
- Heat transfer coefficient up to $4000\text{Wm}^2\text{K}$
- It can manage heat fluxes up to 5000W on a $10 \times 10\text{ cm}^2$ surface
- Possibility to have multiple evaporators
- Evolution of water cooling system.

Applications:

- IGBT cooling
- Power suppliers
- UPS

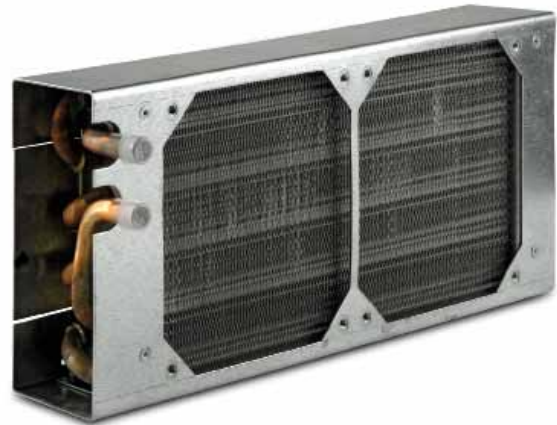


HEAT EXCHANGERS

TFR | CFT

TFR TUBE FIN RADIATOR | Air to Water exchangers with finned tube

Heat exchangers with finned tubes are designed for systems with high air flow. Thanks to the way they are manufactured, they are reliable and effective compared to their cost. TFR heat exchangers are available in different configurations and are easy to adapt to OEM applications. The radiators consist of copper or stainless steel tubes expanded into copper or aluminium fins. TFR heat exchangers can be customized according to demands.



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CFT COPPER FLAT TUBE | Air-to-Water weld brazed exchangers made of copper

CFT heat exchangers are high performance radiators, even in applications with low air flow. They are manufactured by soldering together copper flat tubes with fins made of the same material inside a brass structure. High density fins make these radiators suitable for moderate air flows where little space occupied but high dissipative capacity are both required. Small sizes make them right to be used in small spaces or on mobile applications.



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THERMOELECTRIC ASSEMBLIES

TCU-AA | TCU-AP | TCU-AL

Our experience at your service to offer custom-made solutions

A lot of thermoelectric applications are developed and produced for OEM customers. Applications ranging between the medical field and the industrial one, we are able to design, test and produce a wide range of assemblies including air-to-air, air-to-plate, air-to-liquid devices. By embracing a multitechnology approach, which is based on the knowledge of different cooling techniques, we are able to develop complete solutions such as liquid chillers, liquid/thermoelectric hybrid conditioners, temperature control systems for applications in the medical field, beauty, low power electronics, sensors, process controls.

TCU-AA | TCU-AP | TCU-AL

Our TCU series of assemblies includes a wide range of solutions for demanding applications. Based on thermoelectric modules, our systems are designed to work under any conditions, from extremely high or low environmental temperatures to mobile applications. The main advantages of our thermoelectric refrigerators are listed below:

- Extremely high MTBF, over 300 000 hours.
- Resistance to vibrations
- DC operation
- Precision in temperature control and fast response
- Easy to customize according to the customer's requirements
- Possibility of working in any position
- Wide range of environmental temperature
- Heat & Cool applications
- Contained sizes and weight

TCU-AA | Air-to-air assemblies

Our range of TCU-AA assemblies are mainly used for air conditioners in small spaces. The hot side is air-cooled by means of an aluminium heat exchanger usually placed on the external wall of the enclosure, whilst the cold side stays inside the compartment where a fan blows air onto the aluminium exchanger, thus generating cold air. Our air-to-air systems have a range between 30 and 200 W in refrigerating power.

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TCU-AP | Air-to-plate assemblies

Our family of TCU-AP assemblies is generally used in LED cooling systems. These systems consist of an aluminium plate on the cold side and of an air heat exchanger on the hot one. Our air-to-plate systems have a range between 30 and 200 W in refrigerating power.



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Product

TCU-AL | Air-to-liquid assemblies

The series of TCU-AL assemblies are used in the medical field and the industrial field to control the temperature of liquids. As they are reversible devices, our units are also used in conditioning systems for small spaces, such as air-to-air ones, even though here heat is removed by means of liquid heat exchangers, usually connected to a source of cold water. Our air-to-liquid systems have a range between 30 and 200 W in refrigerating power.

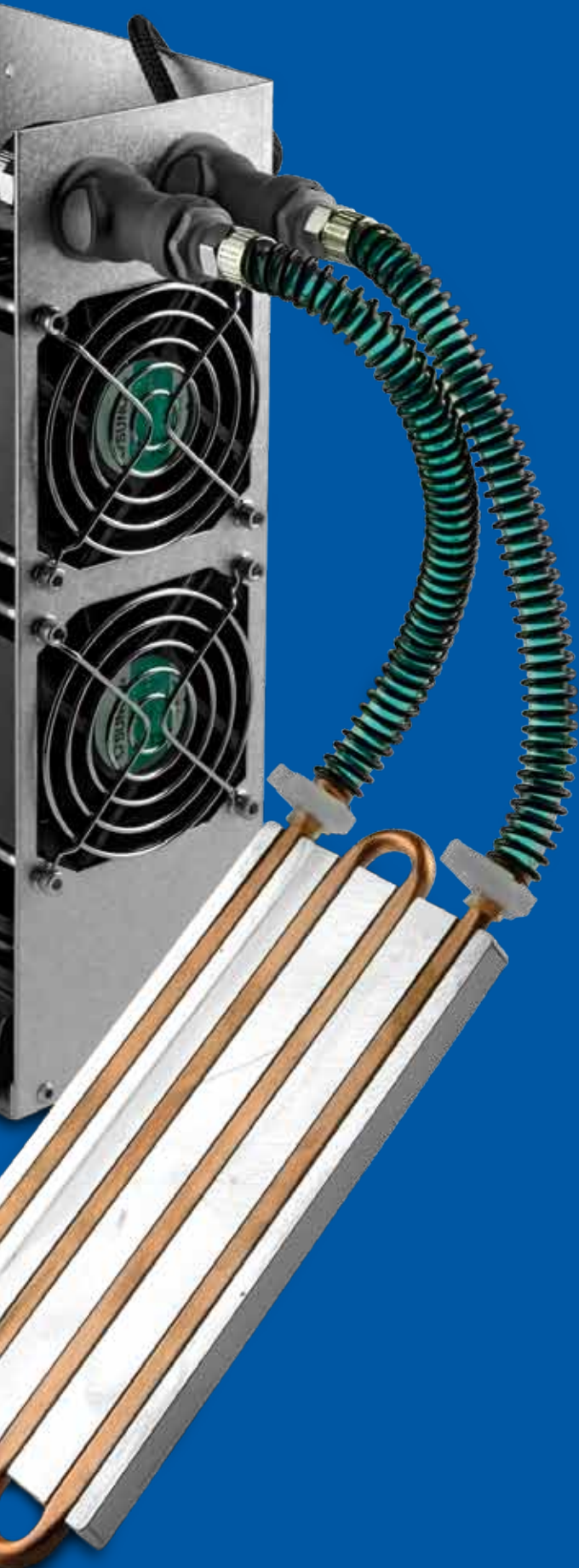


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