



Microchannel Solutions
by ThermoKey

Core
Remote Condenser
Liquid Cooler

ThermoKey®
Heat Exchange Solutions

TKMicro is the best solution for HVAC/R.

Why?

- Thanks to a thorough know-how of air-cooled units ThermoKey is able to develop new products and customized solutions in synergy with its customers.
- ThermoKey has invested in a state-of-the-art production process both for small batches and large series production.

ThermoKey values

Know how

ThermoKey's customers must compete to meet the always more and more sophisticated needs of the market. The challenge is on knowledge: metallurgic, thermodynamic, mechanic, acoustic and electronic. Our customers have to be able to count on a partner capable of answering with knowledge to the new challenges, thanks to its 6 years of lab and field testing with different refrigerants, different surface treatments and at different working conditions.

Innovation

Innovation is the central issue in economic prosperity (Porter). ThermoKey has invested to offer a solution studied especially for the HVAC/R market. The result is an heat exchanger which, with its innovative characteristics of lightness and thickness, can deeply change the actual offer available to customers.

Reliability

TKMicro is installed on thousands of units which work efficiently. Materials, thicknesses and the manufacturing process have been especially defined to be the best solution in the market. The durability and the constant performance in time contribute to the quick come back of the initial investment.

Eco-sustainability and efficiency

TKMicro is composed of 100% recyclable materials: low carbon footprint. Compared to tube and fin technology TKMicro weighs almost 60% less (compact footprint and weight) and needs much less refrigerant. In its various versions TKMicro is compatible also with water, propane and ammonia. Its geometry drastically reduces pressure drops leading to energy saving and reduction of the acoustic impact.

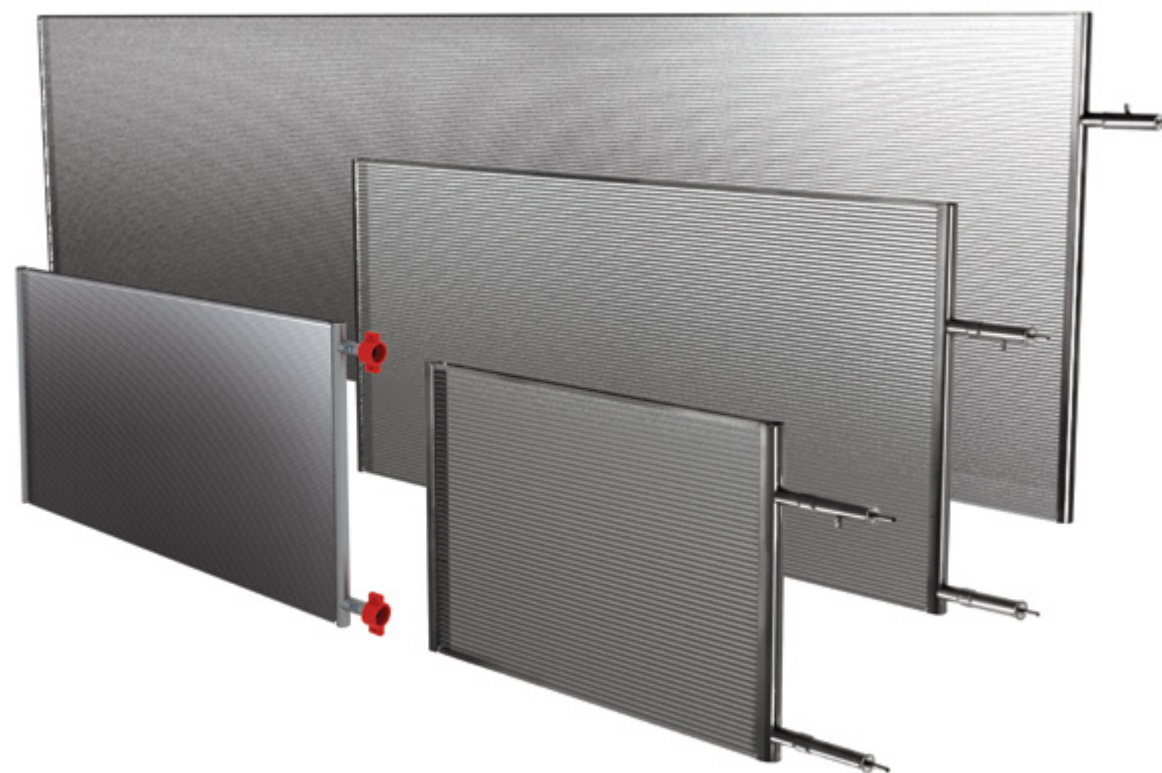
Microchannel Core

PRODUCTION

ThermoKey is a leading company in the production of Microchannel cores in Europe. Cores are used by the main European chiller manufacturers/OEM as well as by ThermoKey inside its air-cooled units.

USE

Microchannel cores are used in the remote condensers and also in the chillers as condensing units or liquid coolers (free-cooling). Specifically in systems as HVAC Chillers, Process Chillers, Data Centre systems, Rooftop systems, Airside Equipements, Food and Beverage and Industrial Process Equipments.



COMPATIBILITY

ThermoKey cores, in the various configurations, are compatible with all standard refrigerants (R410A, R134a, R22, R407C, R404, R507A, R245fa), ammonia (R717), propane (R290) and water (R718) up to a maximum working pressure of 45 bar and test pressure of 50 bar.

MEASURES

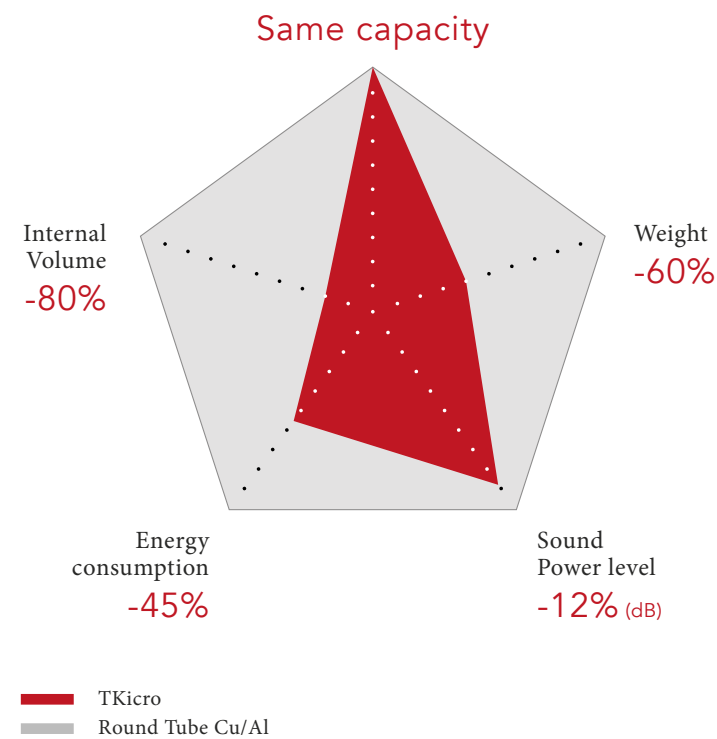
ThermoKey can manufacture cores to fit a wide range of dimensions: length from 500mm to 5400mm and height from 450mm to 1300mm.



TKMicro

comparison with round-tube technology

TKMicro offers great advantage in terms of performances. Compared to a traditional tube and fin coil with the same capacity TKMicro offers great advantages in terms of performance:



LESS WEIGHT AND REDUCED THICKNESS

60% less weight with the same capacity.

LESS REFRIGERANT CHARGE

80% less internal volume.

ENERGY CONSUMPTION

45% less energy consumptions thanks to lower pressure drops on the air side.

SOUND POWER LEVEL

12% less sound power level thanks to a reduced thickness of the core compared to a 3/4 row tube and fin coil.

Easy cleaning and maintenance

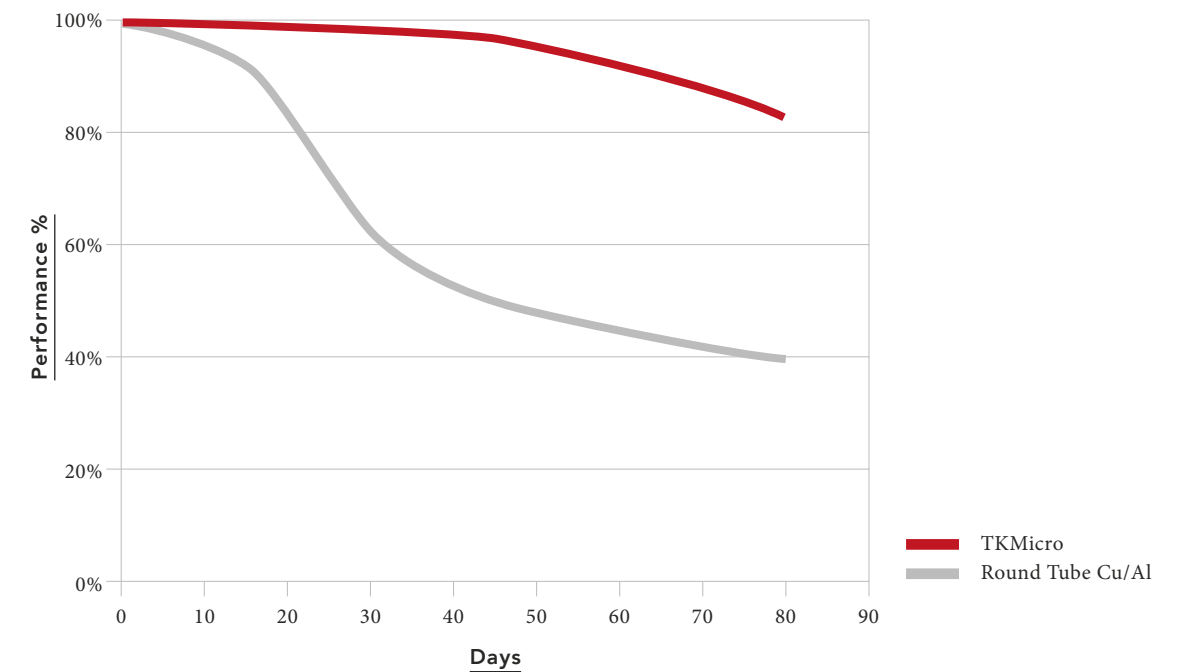
More reliability

CONSTANT PERFORMANCE OVER TIME EVEN IN THE MOST AGGRESSIVE ENVIRONMENTS.

COMPARISON BETWEEN ROUND TUBE TECHNOLOGY AND TKMICRO.

The accurate choice of the materials supplied by the best manufacturers, the control over the manufacturing process and the attention given to every single detail make TKMicro the most reliable core in the market.

TKMicro has brilliantly performed in the SWAAT Test (ASTM G85-02 norm) resisting over 80 days.

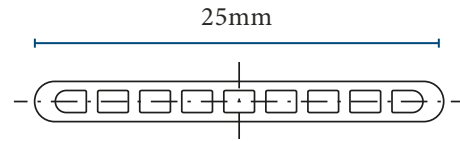


TKMicro Condenser



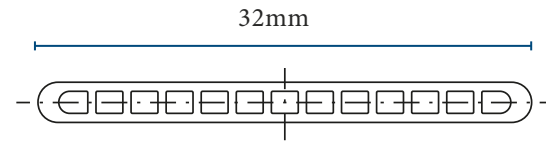
HEADER D-shape header

- For its most demanding customers ThermoKey also provides the D-shape header with 3mm wall thickness. The D-shape has lower pressure drops and is specifically designed for chiller manufacturers.
- Best distribution of refrigerant inside the core.
- Lower pressure drops.
- Best performance of the core.



CONDENSER MULTI PORT EXTRUDED (MPE) TKMicro25 condensers: 25mm width*

The best compromise between performance and lightness. Microchannel cores with a 25mm tube have a slightly higher capacity than a traditional tube and fin 3 Row 3/8" tube coil.



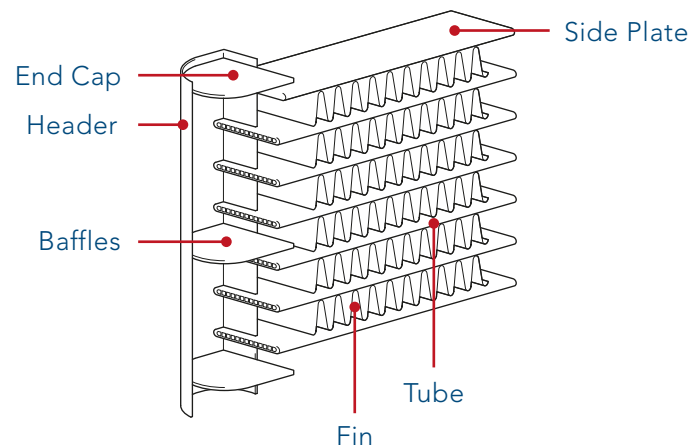
CONDENSER MULTI PORT EXTRUDED (MPE) TKMicro32 condensers: 32mm width* (UI/CSA certificated)

Ideal for the low pressure drops and maximum heat transfer. Particularly suitable for application with high air flow rate. Microchannel cores with a 32mm tube have clearly a higher performance than a traditional tube and fin 4 Row 3/8" tube coil.

(* Up to 45 Bar Ps



TKMicro technology



THERMOKEY MICROCHANNEL TECHNOLOGY

ThermoKey has chosen the top class materials available to ensure the maximum quality for its TKMicro technology.

All core details are developed together with the best suppliers in the market in order to answer to the specific requirements of the HVAC/R market.

TKMicro Liquid Cooler



HEADER Round header

ThermoKey has developed an MPE and a header dedicated to the liquid cooler with the aim of achieving very low pressure drops (liquid side). Cores are equipped with victaulic plugs that are user-friendly. TKMicro H2O with high water flow is comparable to a 4 row round tube coil.

The new TKMicroH₂O, the water microchannel core, is lighter, smaller and more robust than the equivalent traditional tube&fin core. It has also low pressure drops on the air side (consequent suction energy saving).

TKMicroH₂O is equipped with flanges and diameter headers and is ready to be installed in ThermoKey Dry Coolers, whereas the Freecooling version (microchannel condenser plus TKMicroH₂O) is the ideal solution for Chiller manufacturers.



MULTI PORT EXTRUDED (MPE)

MPE tubes allow the best heat transfer with the minimum dimensions. We provide three different types of MPE tubes to better meet the needs of our customers.

FIN

Using Finite Element Analysis (FEA) technique and our Wind Tunnel facility, we have optimized louvered angles, fin pitch and the number of louvers in order to achieve minimum air side pressure drops and, at the same time, maximize the air heat transfer.

We produce fins that fit both the 32mm tube and the 25mm tube.

The brazing process ensures a perfect and permanent contact between tubes and fins.

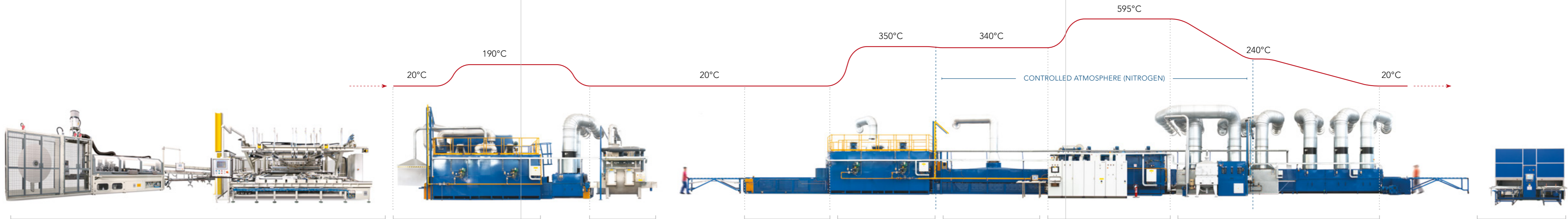
For particularly aggressive environments various types of surface/treatments are available.

Efficiency in the production line

Our semi-continuous line is manufactured to fit a wide range of dimensions: we can manufacture cores with length from 500mm to 5400mm and height from 350mm to 1300mm.

ThermoKey has chosen the latest generation of Controlled Atmosphere Brazing (CAB) Furnace for the manufacturing of its aluminium heat exchanger.

The fully automated furnace is provided with an array of sensors distributed all over the line to guarantee control and stability of the brazing process.



CORE BUILDER

The microchannel core is built assembling tubes and fins coming from rolled coils. Capability to produce 32mm and 25mm MPE cores in the same line.

THERMODEGREASER

Removal of all residues of oil and other impurities from the cores. Before being released into the atmosphere, the oil fumes are further heated up to 550° C in the maximum respect of environmental laws.

FLUXER

(only for non pre-fluxed tubes). To ensure a uniform distribution of the flux on the core, an air knife removes the excess of flux.

PRE-BRAZING

The operators perform quality checks and apply the AL/Si brazing paste in the junction between header and tubes to ensure a perfect brazing. Application of the connections in respect to customer's requirements.

DRYER

Evaporate the residual moisture and the binder in order to activate the flux on the tubes. Two zones of sensors for better process control.

PRE-HEATING

First heating stage with nitrogen controlled atmosphere. Divide the brazing section from the outside for process stability. To improve efficiency, recover heat and nitrogen from the main brazing chamber.

BRAZING

Here is where the brazing process takes place. The metal melts to create uniform and stable junctions. Equipped with 3 control zones with 9 thermocouples + 1 for safety. 6 meters length brazing chamber. Temperature uniformity: +/- 2°C. Continuous check of oxygen level inside the chamber.

COOLING

First stage of cooling in a controlled atmosphere. It prevents the formation of the oxide on the cores for a longer life time. Uniform and controlled cooling. Final Cooling: forced air cooling down to ambient temperature.

LEAKAGE TEST

The cores less than 2,5 meter long are tested with helium leak-test machine, while cores up to 2,5 meter long are tested in water tanks. pressure test of 50 bars. 100% of cores are controlled.



In the next 5 years aluminium microchannel cores will replace 50% of the copper coils for HVAC/R application. We are ready to take on the role of key player.

Giuseppe Visentini — Executive Board Member — COO, ThermoKey Spa



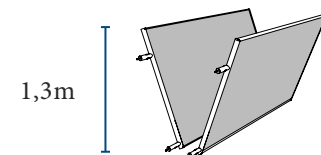
European Leader

ThermoKey has been producing heat exchangers since 1991. Since then it has gained a key player role, becoming partner to the major chiller manufacturers in the European Market and manufacturing its own ventilation units.

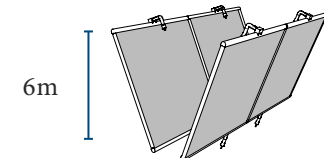
How to use TKMicro for HVAC/R



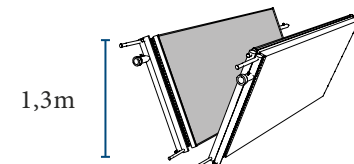
HORIZONTAL MODE
Standard series for condensing e liquid cooling.



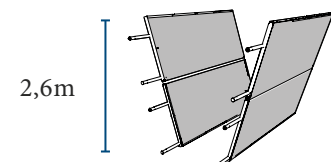
VERTICAL MODE
Super low pressure drop designed for condenser.



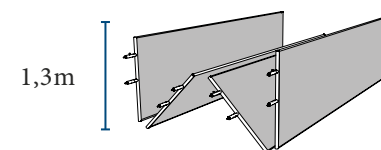
FREE COOLING APPLICATION
Condensing and free cooling available both tube & fin and TKMicro.



MULTIPLE HORIZONTAL MODE
Maximum performance with the minimum footprint.

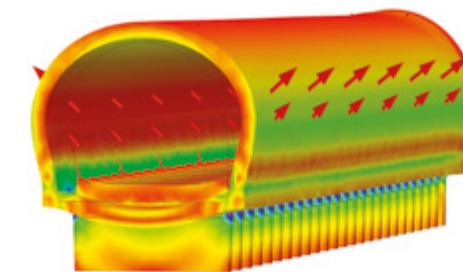


UPSIDEDOWN "M" SHAPE
Specific for chiller manufacturers to maximize the subcooling unit on the four cores.

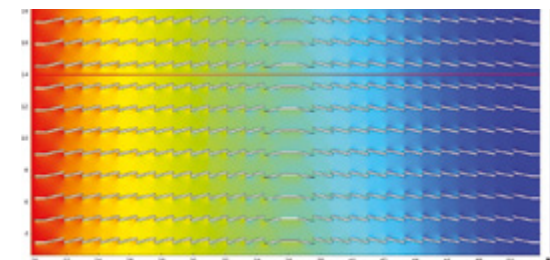


TKMicro Research and development

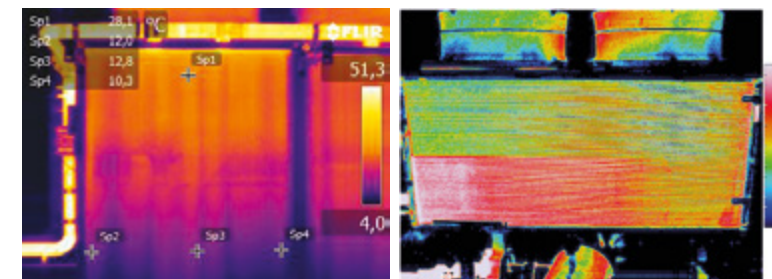
ThermoKey is constantly involved in an ongoing activity to develop new products and solutions. Every detail is studied to optimize performances. To guarantee always the best quality our engineers are working on several aspects:



STRUCTURAL CALCULATION
Through FEM analysis we are able to foresee material deformations and work on possible problems before they occur.



AIR-FLOW SIMULATIONS
The air-flow performance of the TKMicro cores is tested through an especially built Wind Tunnel which is able to reach 22,000m³/h.



THERMO-FLUID-DYNAMIC ANALYSES
The thermodynamic performance is maybe the most important information for our customers. To obtain always more reliable data we carry out CFD simulations of the fluid distribution inside the heat exchanger and we constantly verify the accuracy.

TKMicro Equipped Units

Thanks to a consolidated know-how in the heat exchanger production, ThermoKey is able to maximize the competitive advantages of microchannel technology, offering a series of remote condensers and liquid coolers.



TABLE REMOTE CONDENSER

Performance range

- Capacity from 10 kW to 480 kW(*)
- +30% capacity vs traditional condensers with the same footprint
- Modular design, 1-8 fans
- Reduced dimensions and weight

Fans

diameter Ø 300, 400, 450, 500, 630, 800, 900 mm, AC or EC motor

Units can be customized with a wide range of accessories



V-TYPE REMOTE CONDENSER

Performance range

capacity from 90 kW to 870 kW (*)

Fans

diameter Ø 800, 900 mm, AC or EC motor

Units can be customized with a wide range of accessories

(*) **Standard conditions** - R404A, condensing temp: 40°C, subcooling: 3°K, desuperheat: 25°K, air temp: 25°C



TKSMART (LIGHT REMOTE CONDENSER)

Performance range

capacity from 13 kW to 98 kW(*)

1-4 Fans

diameter Ø 400, 500, 630 mm, AC or EC fans



TKMICRO V-TYPE MODULAR REMOTE CONDENSER

Performance range

capacity for each module:

TKMicro 25: 148 kW

TKMicro 32: 160 kW

Fans

diameter Ø 800 mm, AC or EC motor

Modules

from 1 to n



TKMICRO H₂O MODULAR LIQUID COOLER

Performance range

capacity for each module up to 120 kW**

Fans

Diameter Ø 800 AC and EC motor

Modules

from 1 to n

(**) **Standard conditions** - ΔT = 15k ethylene glycol 35%, Tw1=40°C, Tw2=35°C, T1=25°C

TK Archimede selection software

CALCULATION FUNCTION

Entry working conditions (requested capacity, temperature and type of the fluid, noise level and eventual other plant restrictions).

TKARCHIMEDE SELECTS THE UNITS ACCORDING TO PARAMETERS:

- main **fluids** present on the market
- **altitude, humidity, inlet air temperature**
- **fans** thickness (automatic adjustment of capacity)
- different range of **accessories** available.

VERIFY FUNCTION

It is possible to verify the performances of each unit in one or more specific working conditions.



TK Cardano selection software

It finds the best remote condenser solution with microchannel cores (range from 10kW to 870kW). The software is constantly internally developed and is the result of ThermoKey's experience in the thermodynamic calculation of microchannel remote condensers.

TKCARDANO SELECTS THE UNITS ACCORDING TO PARAMETERS:

- the main refrigerants on the market
- the possibility to calculate the thermic performances changing the condensing, subcooling and desuperheat temperatures
- the possibility to modify altitude, humidity and the inlet temperature
- the wide range of accessories

TK ThermalKey

CALCULATION FUNCTION

TKThermalKey is a thermodynamic calculation software developed internally by ThermoKey.

It is used for the selection of microchannels units (remote condensers and liquid coolers).

VERIFY FUNCTION

In the condenser section the user can select the units choosing among 15 different refrigerants.



Meat freezing and storage

Refrigeration for MRÓZ at Borek Wielkopolski (Poland).

NEED

Meat Meal freezing and storing . 31 cold rooms with total surface 3500 m². Total cooling capacity of the chiller c.a. 910 kW cooling solution necessary for whole meat production process.

SOLUTION

23 unit coolers: Cubic, commercial and double flow unit cooler for the freezing area; Double Flow and Cubic Unit Cooler for low temperature storage. 4 Microchannel V-Type remote condensers.



Vegetables storage

The company is one of the biggest Polish producers of broccoli, cauliflower, onions, root vegetables and cruciferous vegetables. Storage capacity includes cooling chambers allowing to store up to 13 thousand tons of vegetables.

NEED

The Polish company production of root vegetables reaches level 5.600.000 kg, brassica vegetables at 770.000 kg, onions 3.000.000 kg (data from 2013).

SOLUTION

Thermokey has supplied to a Polish company 8 **microchannel condensers** model MKH1480.BDH and 40 Unit Cooler model IMT450.76DA

Direction

Acrobatik

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TKM0717EN

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