



# AIR COOLED CONDENSERS

**REFRION**  
a better innovation

## AIR COOLED CONDENSERS

Condensers can adapt to various uses, such as conditioning, commercial and industrial refrigeration. Fairing consists of modular components in hot-dip galv anised steel, powder coated (standard colour: RAL 9002) and corrosion-resistant up to corrosion class C5. The fastening elements (screws, threaded inserts, rivets, washers and nuts) are all in stainless steel.

### HEAT EXCHANGERS

- With ROUND SECTION tubes: 7,2 mm, 3/8", 12 mm or with 5/8" nominal diameter, staggered pitch pattern and high-efficiency fins.

Standard fin pitch: 2.1 mm.

The pressure vessel is designed for a PS = 30 bar (PS = 45 bar with R410A fluid) and a TS = 110 °C in accordance with EC Pressure Equipment Directive 2014/68/EU. Testing performed with dry air.



### TUBE MATERIAL

- Standard material: copper Cu-DHP. Suitable for environments classified as ISO 12944 C3 (e.g.: urban and industrial atmospheres, moderate sulphur dioxide levels, production areas with high humidity).

On request:

- Copper-iron Cu-Fe2P. Suitable for any application with refrigerants operating at elevate design pressures (P.S.= 130 bar) like R410A or R744 (CO2)
- Stainless steels. Suitable for corrosive environments or in case of fluids incompatible with copper (e.g. R717). AISI 304 is suitable for installations in industrial atmosphere or in coastal region. AISI 316L is recommended in naval/offshore application and polluted environments.



### FIN MATERIAL

- Standard materials: aluminum alloys A8006 or A8079 (pre-painted). Suitable for environments classified as ISO 12944 C3.

On request:

- Aluminum-Magnesium alloys. They provide good resistance to corrosion in marine atmospheres. AlMg fins are available in AlMg2,5 (A5052) and AlMg3 (A5754).
- Stainless steels: When the concentration of aggressive agents and particles in the ambient air is significant, stainless steel fins is an alternative option to a corrosion protection painting. Stainless steel fins are available in AISI 304 or AISI 316L.

### AXIAL FANS

Maintenance-free, external rotor axial fans. Protective grid compliant with EN ISO 13857.

- Standard AC three-phase or single-phase: with thermal protection, lubricated for life, statically and dynamically balanced.
- Brushless energy-saving EC three-phase or single-phase: combines excellent performance with extremely low consumption and noise levels.



### PROBLEM SOLVING ORIENTED

Tackling a wide range of problems and the most extreme conditions is our daily challenge: thanks to operational flexibility and our technical know-how, we offer solutions that maximise efficiency and energy savings.



### TECHNICAL KNOW-HOW AND FLEXIBILITY

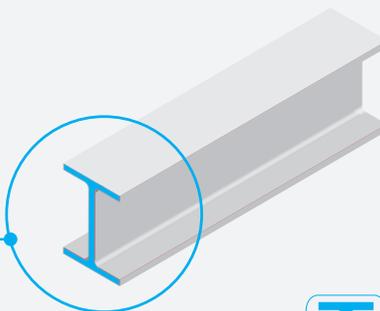
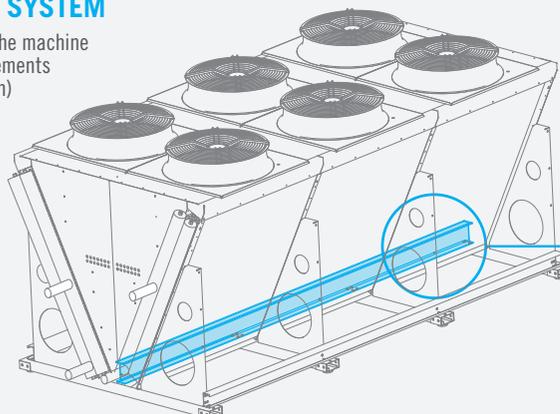
Refrion products have been researched to meet the specific size and supply requirements of the system in which they will be installed.

Each device is unique and tailor made.



### S.R.S. - STRAIN RELIEF SYSTEM

Our exclusive system to stabilise the machine and avoid bending during all movements (lifting, transportation, installation) and over its entire life cycle.



### REFERENCE STANDARDS AND EU DIRECTIVES

- EN 327 (Air Cooled refrigerant Condensers Performances)
- EN 378 (Safety and Environmental requirements)
- EN 60204-1 (Safety - Electrical equipment)
- EN13487 (Sound Measurements)
- EN ISO 13857 (Fan Guards)
- ISO 12944 (Corrosion protection paint systems)
- CSA C22.2 No. 236-11- UL 1995
- MD Directive 2006/42/EC (Machinery Directive).
- PED Directive 2014/68/EU (Pressure Equipments Directive).
- RoHS Directive 2002/95/EC (Restriction of Hazardous Substances Directive).
- EMC Directive 2014/30/EU (Electromagnetic Compatibility Directive).
- LVD Directive 2014/35/EU (Low voltage Directive).
- ErP Directive 2009/125/EC (Eco-Design Directive).

## COMBO

-  **COOLING CAPACITY**  
**133-2340 kW\***
-  **NUMBER OF FANS**  
**4-20**
-  **FAN DIAMETER**  
**800-910 mm**
-  **MODULE**  
Short (R)  
Standard (K)
-  **S.R.S.**



### EFFICIENCY AND TRANSPORTABILITY

The Combo series has a special feature to generate the greatest amount of power that can be transported via container. Combo, in fact, achieves excellent results bringing together power and transportability.



Refrion participates in the ECP programme for Dry Coolers. Check ongoing validity of certificate: [www.eurovent-certification.com](http://www.eurovent-certification.com)

## TOWER

-  **COOLING CAPACITY**  
**41-1355 kW\***
-  **NUMBER OF FANS**  
**1-10**
-  **FAN DIAMETER**  
**800-910-1000 mm**
-  **MODULE**  
Short (L)  
Standard (T)
-  **S.R.S.**



### SPECIAL ARCHITECTURAL REQUIREMENTS

Refrion has designed the Tower series which maintains the same level of performance, while limiting the overall height dimensions, thus achieving an installation with a low visual impact.



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## WALL

-  **COOLING CAPACITY**  
**66-1170 kW\***
-  **NUMBER OF FANS**  
**1-10**
-  **FAN DIAMETER**  
**800-910 mm**
-  **MODULE**  
Short (R)  
Standard (K)



### INNOVATION

The new Wall model meets the increasingly challenging market demands. A wall installation represents the best ergonomic design, even in small spaces.



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## HORIZONTAL / VERTICAL AIR FLOW

**kw** COOLING CAPACITY  
**8-1605 kW\***

**NUMBER OF FANS**  
**1-20**

**FAN DIAMETER**  
**500-630-800-  
910-1000-1250 mm**

**MODULE**  
Short (C)  
Standard (A)  
Long (B)



### VERSATILITY AND FLEXIBILITY

The entire series has been redesigned with the intent of providing greater selection, reducing delivery time, lowering transport costs and offering maximum flexibility during installation.



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## RADIAL

**kw** COOLING CAPACITY  
**40-245 kW\***

**NUMBER OF FANS**  
**1-4**

**FAN DIAMETER**  
**500-710 mm**



### STURDY, COMPACT AND STACKABLE

Designed and made to be modular. It is built with double-wall panels in galvanised steel and mineral wool in the hollow space for soundproofing and heat insulation. Powder coated (standard colour: RAL 7035).

### RADIAL FANS

Residual static pressure 200 Pa.

- Standard AC three-phase, diameter 500mm.
- Brushless energy-saving EC, diameter 710mm.

## CUSTOMIZED SOLUTIONS

Thanks to the wide range of materials used and to customized solutions, the Refrion ventilated equipment for industrial applications are suitable for conditions and needs that range from being compatible in aggressive environments to minimizing noise or vibrations. The heat exchangers are designed for very high air flow and, therefore, are ideal for the application in the most demanding fields such as naval, military, oil & gas, offshore, nuclear, etc. Refrion specializes in building machines for the industrial process cooling in various sectors:

- power generation
- cogeneration and trigeneration
- production of vegetable oils
- power generation data centers
- industrial processes, in general

### REMOTE CONDENSER FOR NUCLEAR PLANT

**HT** 2 x 107 kW

**F** 4

**Q** 63.600 m<sup>3</sup>/h

**F** 910 mm



- 2 circuits with independent control
- Heat exchangers with stainless steel tubes
- EC fans.



### AMMONIA CONDENSER FOR INDUSTRIAL APPLICATION

**HT** 1152 kW

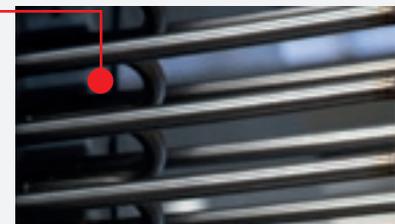
**F** 14

**Q** 357.445 m<sup>3</sup>/h

**F** 910 mm



- Stainless steel heat exchangers
- Industrial Adiabatic System
- Frame Coating: C4-M (ISO 12944)



## WE ARE ALL OVER THE WORLD



# TABLE OF CODES

## COIL TYPE

Round Shape 12 mm diam. Copper Tube	A
Round Shape 10 mm diam. Copper Tube	K
Round Shape 7mm diam. Copper Tube	N
4816 (48x41,57 pipe Ø=3/8" AISI 304)	X
4816 (48x41,57 pipe Ø=3/8" AISI 316L)	4

## FAN TYPE PERFORMANCE CONFIGURATION

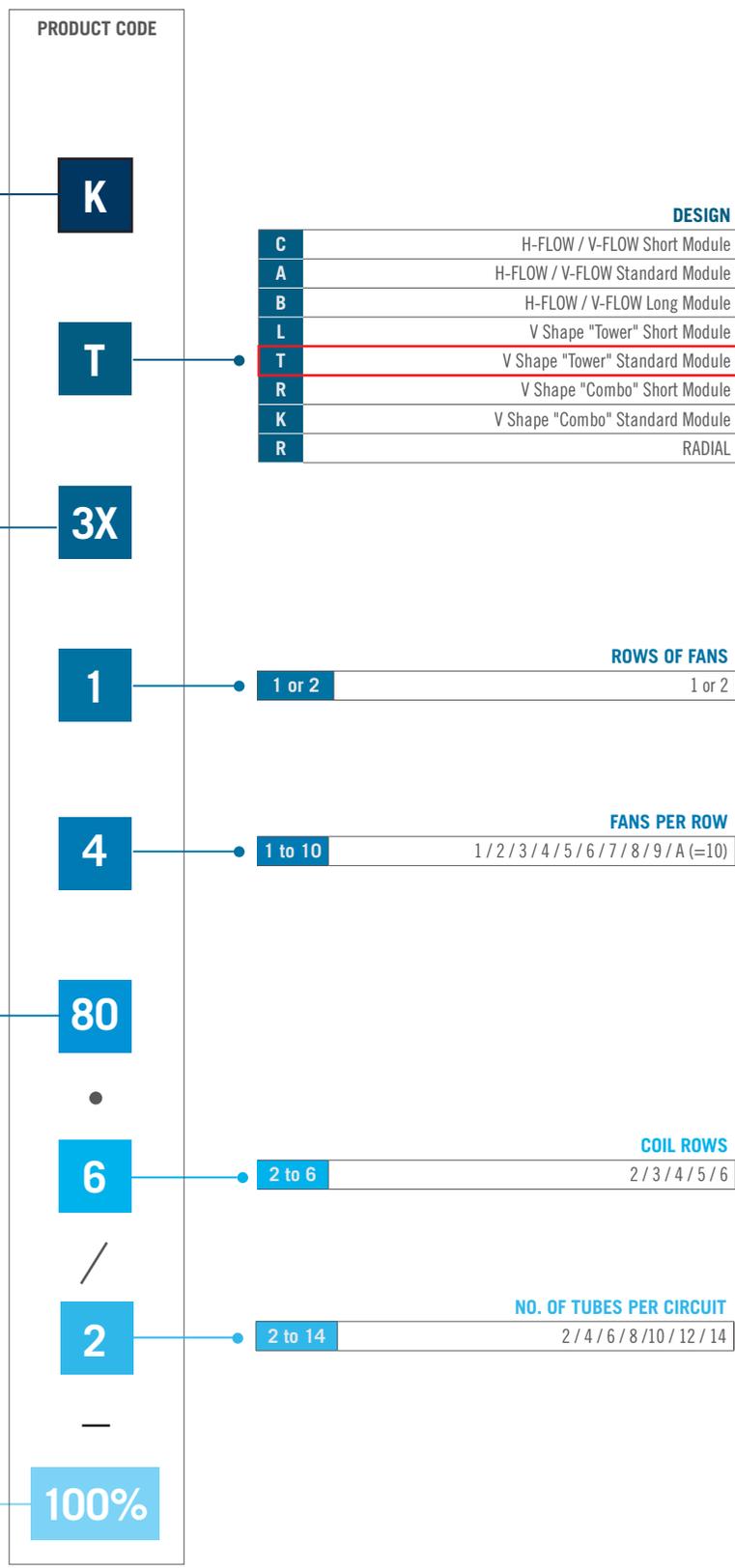
Axial 3- phase EC / High Power	5C
Axial 1- phase EC / High Power	5X
Axial 3- phase EC / High Power + High Efficiency Diffuser	UC
Axial 3- phase EC / Standard	4C
Axial 1- phase EC / Standard	4X
Axial 3- phase EC / Standard + High Efficiency Diffuser	PC
Axial 3- phase EC / Low Noise	3C
Axial 1- phase EC / Low Noise	3X
Axial 3- phase EC / Low Noise + High Efficiency Diffuser	VC
Axial 3- phase AC / Standard / Delta	4D
Axial 3- phase AC / Standard / Star	4Y
Axial 3- phase AC / Low Noise / Delta	3D
Axial 3- phase AC / Low Noise / Star	3Y
Axial 3- phase AC / Quiet / Delta	2D
Axial 3- phase AC / Quiet / Star	2Y
Radial 3- phase EC	6C
Radial 3- phase AC / Delta	RD
Radial 3- phase AC / Star	RY
Axial 1- phase AC Standard / Standard	4M
Axial 1- phase AC Standard / Low Noise	3M
Axial 1- phase AC Standard / Quiet	2M

## DIAMETER OF THE FANS

350mm	35
450mm	45
500mm	50
630mm	63
710mm	71
800mm	80
910mm	90
1000mm	10

## SPEED RATE (EC FANS ONLY)

30% / 40% / 50% / 60% / 70% / 80% / 90% / 100%	30% to 100%
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## DESIGN

C	H-FLOW / V-FLOW Short Module
A	H-FLOW / V-FLOW Standard Module
B	H-FLOW / V-FLOW Long Module
L	V Shape "Tower" Short Module
T	V Shape "Tower" Standard Module
R	V Shape "Combo" Short Module
K	V Shape "Combo" Standard Module
R	RADIAL

## ROWS OF FANS

1 or 2	1 or 2
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## FANS PER ROW

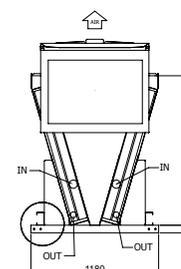
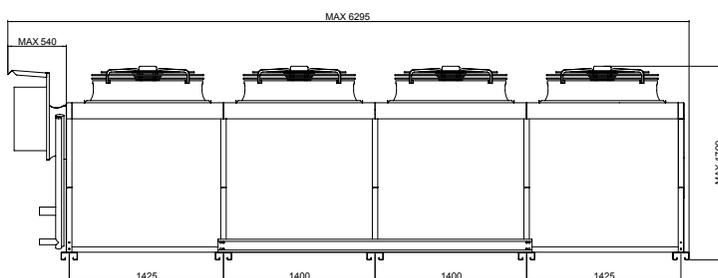
1 to 10	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / A (=10)
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## COIL ROWS

2 to 6	2 / 3 / 4 / 5 / 6
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## NO. OF TUBES PER CIRCUIT

2 to 14	2 / 4 / 6 / 8 / 10 / 12 / 14
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## HIGHLIGHTS

### HIGH EFFICIENCY EC FANS

Compared to units equipped with standard EC fans, the high efficiency diffusers allow to:

- reduce the speed of the fans;
  - reduce the sound level down to 3dB(A);
  - reduce the energy consumption down to 15%;
- or
- increase the air flow up to 9%;
  - increase the thermal exchange up to 8%.

The series of coolers that use the high efficiency diffusers are distinguished by the fan type performance configuration codes UC, VC e PC.



### NATURAL REFRIGERANTS

Understanding of the high global warming potential (GWP) and environmental impact of HFC (hydrofluorocarbon) atmospheric emissions means that there is increasing pressure on industry to seek viable and efficient alternatives.

## NH<sub>3</sub> Ammonia

Favourable thermodynamic properties, high energy efficiency and low cost make Ammonia a useful refrigerant widely used in modern vapor-compression refrigeration; in a mixture along with hydrogen and water, it is also used in absorption refrigerators. NH<sub>3</sub> is incompatible with copper, therefore stainless-steel tubes heat exchangers prove to be the optimal technical solution for this application.

## CO<sub>2</sub> Carbon dioxide

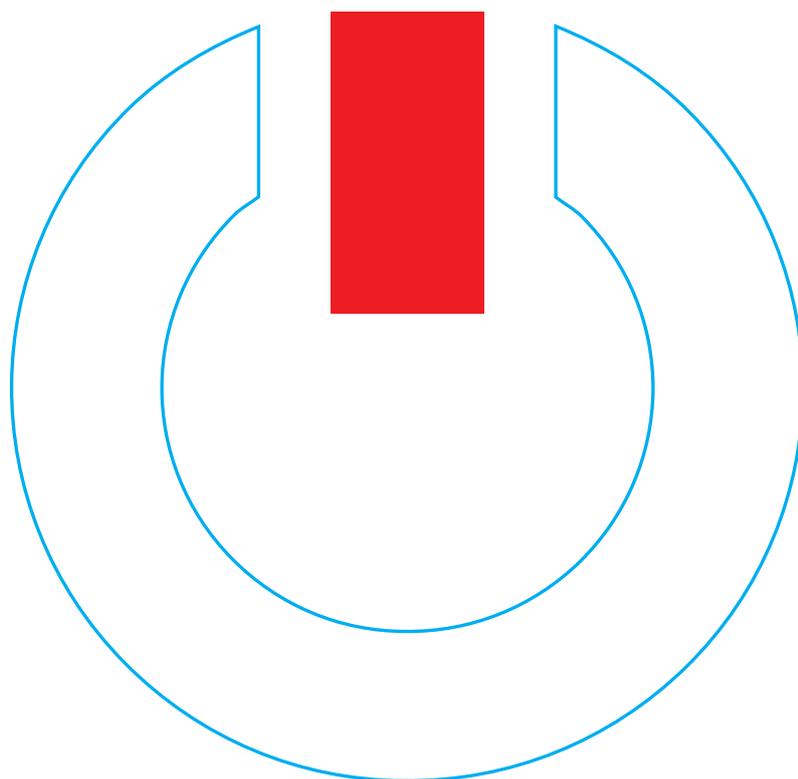
CO<sub>2</sub>, which is non-flammable and non-toxic, has proved to be a sustainable option of low environmental impact. The gas cooler replaces the traditional remote condenser in equipment developed to use CO<sub>2</sub> as the sole refrigerant. In contrast to the traditional remote condenser, in the gas cooler carbon dioxide flows through pipes at high temperature and pressure, and it is cooled by atmospheric air forced through a finned exchanger without changing state, i.e. without liquefying. To enable functioning of this kind, maximum operating temperatures and pressures are considerably higher, reaching **130 barg** and **150 °C**.



Nominal diameter 12mm and 5/8" are available.  
Steel grades: AISI 304 and AISI 316L.



Compared to standard copper Cu-DHP, copper-iron Cu-Fe2P provide much higher strength, therefore thinner tube wall thicknesses can be used, resulting in significant material and cost saving. Refrion has therefore developed a heat exchanger with a finned core that uses materials capable of withstanding the high stresses encountered, and special construction techniques to offset the effects of thermal expansion.



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