ERAC Ka

AIR COOLED CHILLERS
WITH BRUSHLESS OIL-FREE TURBOCOR COMPRESSORS

COOLING CAPACITY FROM 443 to 1400 kW

AIR COOLED CHILLERS FOR EXTERNAL INSTALLATION EQUIPPED WITH BRUSHLESS OIL-FREE TURBOCOR COMPRESSORS

The monoblock air-cooled chillers of ERAC...Ka series are suitable for external installation and are particularly indicated for liquid cooling in air conditioning and industrial process plants, where high efficiency with partial loads, quietness and long lifetime must be granted. This series meet the requirements for seasonal efficiency foreseen by the (EU) Regulation 2016/2281.

The extreme compactness of both compressor and condensing section has allowed to produce chillers with a compact design and resulting reduced weight if compared to traditional chillers with same cooling capacity. This aspect connected to the lack of lubricating oil in the cooling circuit, allows to significantly reduce the maintenance costs and to make the most of the heat exchangers in their global thermal exchange surface.

All the units are totally factory assembled and tested following specific quality procedures. They are also totally hydraulically and electrically connected so, once on site, they can be quickly installed. Before final test, cooling circuits are pressure tightness tested and charged with refrigerant R134a. Therefore, once on site, the units must only be positioned and hydraulically and electrically connected.

Operation limits:

Air: from -8°C to +42°C ; **water** (outlet from the evaporator): from 5°C to 15°C.

Structures
Made up of high-thickness galvanized carbon steel, epoxy-powder RAL 7035 painted elements. The structure is strongly fixed through galvanized self-locking bolts and nuts able to absorb any mechanical stress due to handling and transport. Evaporating section, compressors and regulation valve can be easily accessed and inspected in order to make check and maintenance operation easier and safer.

Compressors
Double-stage, magnetic-levitation centrifugal hermetic Compressors (without mechanical bearings). They are oil-free and provided with in-built electronic management system, pressure and temperature probes, direct-cooling system and inverter for speed regulation. Each compressor is equipped with rubber type anti-vibration dampers, suction side shut-off valve, discharge side shut-off valve with in-built check valve, suction filter, double stage hot gas by-pass system for start phases, liquid refrigerant line with sigh-glass and valve for compressor direct and controlled cooling. Compressors are suitably weather protected, being installed inside a sealed and sound-proof cabinet, easy to be inspected thanks side panels provided with ¼ turn locks which can be opened through special keys. The electrical cabinet with interlocked double panels can be opened by an external main switch positioned on the unit front side.

Evaporator
Shell & tube flooded Evaporator. Refrigerant is outside the tubes and inside a carbon steel shell; the flooding level is controlled by an electronic sensor which grants the max efficiency at any load condition. Refrigerant side design pressure is 16,5 bar. Water side one is 10 bar. The exchange tube, the chilled solutions (water or glycol solutions) flows in, is made up of pure corrugated copper to optimize thermal exchange. The exchange shell is covered by 10 mm thickness, fire retardant, closed cell material and protected by scratch-resistant coating. Hydraulic connections are of Victaulic type.

Condensing coils
External Condensing Coils made up of finned pack heat-exchangers with cross-fin pure electrolytic copper pipes and louvered aluminium fins. On demand, if the units are installed in particularly aggressive environments, it is possible to realize coils with a double-layer epoxy paint or to realized a totally pure copper coil (option RM and RR).

Fans
6-poles Axial Fans with electrical motor with external rotor directly coupled to the impeller and driven by a V/F inverter system which controls the condensation temperature. Aluminum blades with wings profile are suitably designed to avoid any turbulence in the air detachment zone, granting in this way the max efficiency with the minimum noise level. The fan is equipped with galvanized steel protection grid painted after the construction. The fan motors are of totally closed type and have got a protection factor IP54 and protection winding-flooded thermostat. On demand, for operation till -20°C external air temperature is possible to provide it with EC Brushless fans (Option EC).

Refrigerant circuit
Cooling Circuits mainly consisting of: electronic thermostatic valve with in-built microprocessor to regulate the refrigerant flow even with compressor partial load operation, also working as complete closure solenoid valve, shut-off valves on each compressor discharge line and shut-off valve on suction side, discharge side non-return valve, liquid line shut-off valve, dehydrating filter with interchangeable artridges, sight-glass, hot gas by-pass line with tandem or trio-compressors, liquid tapping line for compressors internal cooling, high and low pressure safety valve, gauges, high and low pressure transducers, high and low pressure switches.

Electrical Board
Contained inside a housing suitable for external installation (IP 54) and consisting of: lockable main switch, contactors, amperometric and thermal protections insulation switches for low tension auxiliaries derivation, conductors numbered as relevant terminals, passive filters for harmonics and electromagnetic interferences removal, user interface consisting of alphanumeric backlit display, special microprocessor electronic board, thermostat on electrical board for internal temperature control in case of operation or parking where external temperatures are below 0°C, forced electrical cabinet ventilation to grant the right operation of those components subject to relevant sunlight.

Microprocessor
Electronic Microprocessor consisting of IN/OUT electronic board, LCD Graphic Display, LED signals and keyboard. This microprocessor allows the PID regulation of evaporator outlet water temperature and the working parameters setting, as well as the alarms management, the measured values (temperature, working hours etc...) reading and the possibility to control them through a supervision system. It also allows the reading and setting of: all the INPUTS and OUTPUTS, all the system working parameters as well to display all the existing alarms.

Versions

High efficiency version (HE)
Units with full load efficiency Eurovent class A EER ≥ 3.1.

Technical data - ERAC Ka serie

ERAC KA		451	562	682	812	983	1404
Performance data							
Cooling capacity (EN14511)	kW	443,0	557,6	676,0	807,7	979,2	1395,9
Total input power (EN14511)	kW	142,0	189,0	200,0	254,0	283,0	423,0
EER	W/W	3,1	2,95	3,38	3,18	3,46	3,30
SEER (1)		5,20	5,13	5,01	5,18	4,99	4,91
ηs,c (1)		205,0	202,0	197,9	204,4	196,6	193,5
Refrigerant data R134a							
Global warming potential	GWP	1430	1430	1430	1430	1430	1430
Equivalent CO_2 charge	t	403,3	396,1	563,4	586,3	836,6	1029,6
Refrigerant charge	Kg	282	277	394	410	585	720
Centrifugal compressors							
Quantity/Circuits	n°/n°	1 / 1	2 / 1	2 / 1	2 / 1	3 / 1	4 / 2
Nominal consumption of the unit	A	202,7	271	288,7	368,9	409	614,2
Max. current consumption of the unit	A	244	313	463	472	690	926
Max. starting current of the unit	A	101	301	418	451	618	870
Axial fans							
Quantity	n°	8	10	10	12	14	20
Motors power input	kW	15,6	20,0	20,0	24,0	28,0	40,0
Total condensing air flow	m^3/h	155200	210400	186000	223200	260400	372000
Electrical current consumption	A	31,2	39,0	39,0	47,4	55,3	79,0
Shell & tube flooded Evaporator							
Quantity	n°	1	1	1	1	1	2
Water flow	m^3/h	76,4	96,1	116,6	139,3	168,8	240,7
Pressure drop	kPa	24,0	92,5	65,0	74,0	70,0	78,0
Sound power level (2)	dB(A)	90,0	93,0	93,0	94,0	94,0	96,0
Power supply	V/Hz/Ph	400/50/3	400/50/3	400/50/3	400/50/3	400/50/3	400/50/3

Performances are referred to the following conditions: ambient air temperature 35°C - water 12/7°C

(1) In accordance with (EU) 2016/2281 and relative norms part of this.

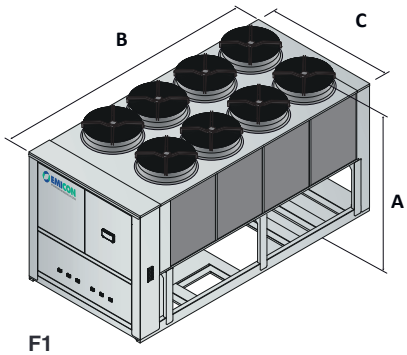
(2) Sound power level in accordance with ISO 3744.

Accessories - ERAC Ka serie

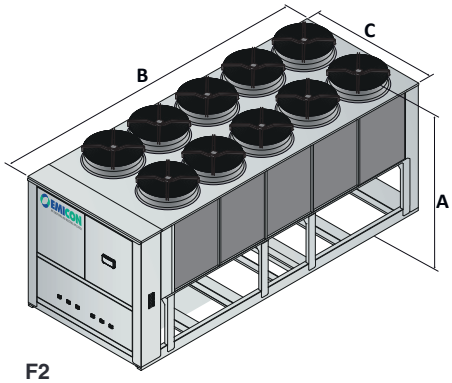
ERAC Ka		451	562	682	812	983	1404
Amperometer	A	o	o	o	o	o	o
Low ambient temperature operation (down to -20°C)	BF	●	●	●	●	●	●
Refrigerant leakage detector	DR	o	o	o	o	o	o
EC Brushless fans	EC	o	o	o	o	o	o
Anti-pollen filters on condensing coils	FA	o	o	o	o	o	o
Mechanical flow switch	FL	o	o	o	o	o	o
Condensing coil protection grid	GP	o	o	o	o	o	o
Protection grid for compressors section	GP1	o	o	o	o	o	o
RS 485 serial interface	IH	o	o	o	o	o	o
Seawood packing	IM	o	o	o	o	o	o
SNMP or TCP/IP Protocol serial interface	IWG	o	o	o	o	o	o
Rubber-type vibration dampers	PA	o	o	o	o	o	o
Spring-type vibration dampers	PM	o	o	o	o	o	o
Remote display	PQ	o	o	o	o	o	o
Anti-freeze heater on evaporator	RA	o	o	o	o	o	o
Voltmeter	V	o	o	o	o	o	o
Compressors overload relays	RL	o	o	o	o	o	o
Condensing coil with pre-painted fins	RM	o	o	o	o	o	o
Copper/copper condensing coils	RR	o	o	o	o	o	o

● Standard o Optional - Not available

Dimensions - ERAH MC VS HE Ka serie



F1



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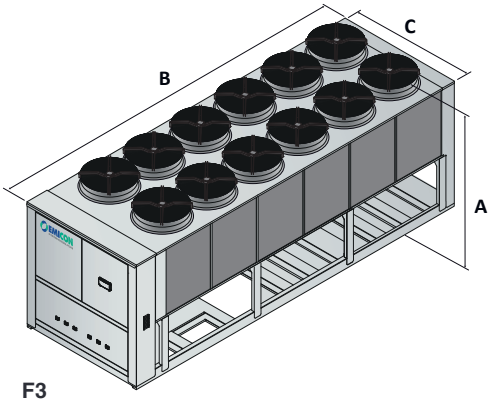

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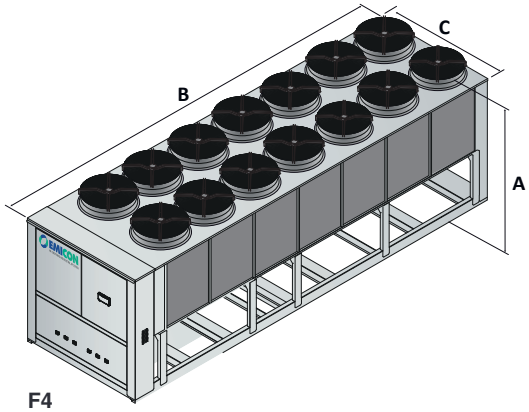

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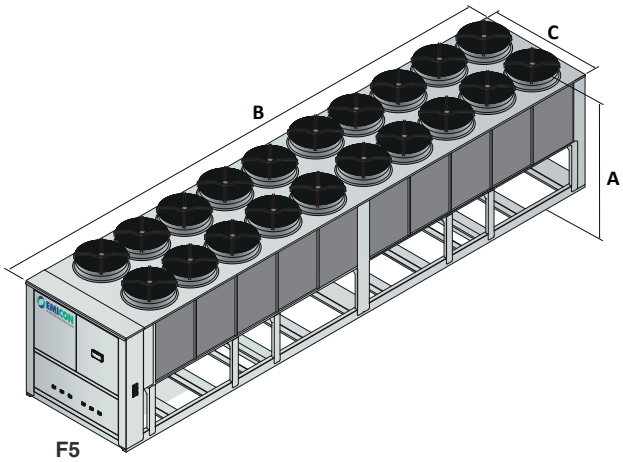

F5

Mod.		A (mm)	B (mm)	C (mm)	Kg
482	F1	2560	4570	2300	4338
562	F2	2560	5720	2300	4736
682	F2	2560	5720	2300	4900
812	F3	2560	6690	2300	4918
983	F4	2560	7670	2300	5918
1404	F5	2560	10570	2300	5946

ACCESSORIES

A Amperometer: Electrical device to measure the electrical current absorbed by the unit.

ACP Anti-corrosive protection of the condensing coils (AIAX coating): flooding painting of the exchanger surface by application of resin suitable to ensure a protection against atmospheric agents, for installations in highly corrosive environments in industrial areas with high concentration of pollutant (>100 ppm) and urban areas with high levels of atmospheric pollution (> 125 ug/m3). This is a valid alternative to the well-known Blygold or Thermo guard protections. (Alternative to PCP).

AE Electrical power supply different than standard: Particularly 230 V three-phase, 460 V three-phase. Frequency 50/60 Hz.

BT Low ambient temperature operation (down to -20°C): Electronic device for the continuous modulating voltage control of the condensing pressure through the variation of the fan rotation speed, allowing the unit operation down to -20°C ambient temperature. (Alternative to BF and EC).

BF Low ambient temperature operation (down to -20°C): Electronic device, frequency converter type, for the continuous modulating control of the condensing pressure through the variation of the fan rotation speed. (Alternative to BT and EC).

CF Soundproofed compressors cabinet with standard material: Insulation of compressors by a cabinet with profile and panels made of hot dip galvanized and powder painted sheet, coated with soundproofing material specifically designed for reduction of the sound with frequencies typical of the used compressors. Access panels are easy to be opened thanks to a triangular wrench.

CFU Soundproofed compressors cabinet with polyester material: Insulation of compressors by a cabinet with profile and panels made of hot dip galvanized and powder painted sheet, coated with high thickness soundproofing polyester material. Access panels are easy to be opened thanks to a triangular wrench.

CFT Overall compressor and technical compartment cabinet: Insulation with sound and fireproofing materials 25 mm thickness for compressor and technical compartment. (Not available for 8-10 fans version).

CS Compressors inrush counter: Electromechanical device positioned inside the electrical board, recording the total inrush starts of compressors.

DS Star/Delta: Electric device of close transition type to reduce inrush current, complete with short circuit safety by mechanical interlock (Available from unit 7020 AM MC Ka to 11520 AM MC Ka).

EC Axial fans with electronic commutated motor: with external rotor directly coupled to a three-phase electronically commutated motor (EC) they have the possibility of a continuous regulation of the speed by means of a 0-10V signal completely managed by the microprocessor. Aluminum blades with wings profile are suitably designed to avoid any turbulence in the air detachment zone, granting in this way the max efficiency with the minimum noise level. The fan is equipped with galvanized steel protection grid painted after the construction. Thanks to a more accurate adjustment of air flow, they allow operation of the unit with external temperature down to -20 °C. (Alternative to BT and BF).

GP Condensing coil protection grid: Metal grid to protect against accidental impacts. (Alternative to GP1).

GP2 Anti-intrusion grid: Metal protection grid to protect compressors and exchangers (Not available with CF, CFU e CFT).

GP3 Anti-intrusion grid with compressors cabinet: Anti-intrusion metal protection grid coupled with soundproofed compressor cabinet. (Only available with CF and for ultra-silenced version).

I1 Isolamento Victaulic lato pompa: Coibentazione dei giunti con poliuretano a cellule chiuse per evitare la formazione di condensa, lato pompa.

I2 Isolamento Victaulic lato serbatoio: Coibentazione dei giunti con poliuretano a cellule chiuse per evitare la formazione di condensa, lato serbatoio.

IH RS 485 Serial interface: Electronic card to be connected to the microprocessor to allow connection of the units to supervision systems, for a remote control and monitoring of the unit. (Alternative to IH LON or IWG).

IH LON LON Protocol serial interface: Electronic card to be connected to the microprocessor to allow connection of the units to supervision systems with LON protocol, for a remote control and monitoring of the unit. (Alternative to IH or IWG).

IM Seawood packing: Fumigated seawood case and film envelope together added with slowly vaporizing corrosion inhibitors completely nitrates and heavy metals (VCI) free suitable for long sea transports.

IWG SNMP or TCP/IP Protocol serial interface: Electronic card to be connected to the microprocessor to allow connection of the units to supervision systems with SNMP or TCP/IP protocol, for a remote control and monitoring of the unit. (Alternative to IH or IH LON).

MF Phase monitor: Electronic device that checks the correct sequence and/or the lack of one of the 3 phases, switching off the unit if necessary.

MV Buffer tank module: Of suitable capacity complete with expansion vessel, safety valve, water gauge, water charge and discharge valves, air purging valves, check valves for filter service operations.

OS Oil flow safety switch: In-built in the compressor to control the compressor internal oil flow, it signals the eventual decrease of the oil level. It is a flow-static optoelectronic device.

P1 Pump group: Chilled water pump group made of a single pump, expansion vessel, safety valve water gauge, water charge and discharge valves, air purging valves, electric control of the pump.

The pump is of enbloc 2-pole type.

P1H Higher available pressure pump group: Chilled water pump group made of a single pump, expansion vessel, safety valve water gauge, water charge and discharge valves, air purging valves, electric control of the pump. The pump is of enbloc 2-pole type.

P2 Double pump group (only one working): Chilled water pump group made by two pumps in parallel, expansion vessel, safety valve, water gauge, water charge and discharge valves, air purging valves, water shut-off valve on suction and check valve on discharge for each single pump, electric control of the pump. The pump is of enbloc 2-pole type.

P2H Higher available pressure double pump group (only one working): Chilled water pump group made by two higher available pressure pumps in parallel, expansion vessel, safety valve, water gauge, water charge and discharge valves, air purging valves, water shut-off valve on suction and check valve on discharge for each single pump, electric control of the pump. The pump is of enbloc 2-pole type.

PT In-line twin pump group (only one working): Chilled water pump group made by a twin pump group with a single impeller body and two separate electric motors. The hydronic kit is made by an expansion vessel, safety valve, water gauge, water charge and discharge valves, air purging valves, electric control of the pump. The pump is of enbloc 2-pole type.

PA Rubber-type vibration dampers: Bell-shaped vibration dampers supports for isolating the unit (supplied in kit), made of base and bell in galvanized iron and natural rubber mixture.

PCP Anti-corrosive protection of the condensing coils (Powder coating): painting of the exchanger surface by application of a black colored epoxy resin suitable to ensure a protection against atmospheric agents, for coastal installations, industrial environments with an average concentration of pollutant (< 100 ppm) and urban areas with lower middle levels of atmospheric pollution (< 125 ug/m3). (Alternative to ACP).

PM Spring-type vibration dampers: Spring-type vibration dampers support, for insulating the unit (supplied in kit), mainly indicated for installation in difficult and aggressive environments. Made of two steel plates containing a suitable quantity of harmonic steel springs. (Alternative to PA).

PQ Remote display: Remote terminal displaying temperature values detected by probes, alarm digital inputs, outputs, remote ON/OFF of the unit. It also gives the possibility to change and program parameters and report/display alarms.

PW Part-Winding: Equipment for step compressors starting, reducing of about 35% the inrush current of each compressor.

RA Anti-freeze heater on evaporator: Electrical heater installed on the evaporator, in order to prevent freezing and provided with thermostat.

RD Shut-off valve on compressors discharge side: They are used to isolate compressors during service operation.

RF Power factor correction system cosfi ≥0,9: Electrical device made by suitable condensers for compressor rephasing that ensure a cosfi value ≥0,9, so to reduce absorption from electrical network.

RH Shut-off valve on compressors suction side: They are used to isolate compressors during service operation.

RL Compressor overload relays: Electromechanical protection devices against compressors overload.

RM Condensing coil with pre-painted fins: Double-layer treatment of condensing coils with epoxy coating.

RP Partial heat recovery: (about 20%) of condensing heat through a refrigerant/water plate exchanger (desuperheater) always in series to the compressors. It is used when you want to partially recover condensing heat capacity for production of sanitary water.

RR Copper/Copper coil: Special condensing coils with copper pipes and fins.

RT Total heat recovery: (100%) of condensing heat by refrigerant/water heat exchanger in alternative and in parallel to the condensing air section. It is used when you want to completely recover condensing heat capacity for production of sanitary water or for heating applications.

RV Personalized frame painting in alternative RAL colour.

TE Electronic thermostatic valve: Electronic thermostatic valve that reduces the response times of the unit. Useful in case of frequent changes on cooling demand, so as to improve efficiency.

V Voltmeter: Electrical device measuring the electrical voltage of the unit power supply.

VB Brine Version: Unit suitable for working with evaporator outlet water temperatures lower than 0°C. A 20 mm evaporator insulation will be provided.

VS Solenoid valve: Electromagnetic solenoid valve on each cooling circuit to cut off the liquid line at compressors switch-off.