

RAS F Kp

AIR COOLED CHILLERS FOR OUTDOOR INSTALLATION WITH INTEGRATED FREE COOLING SYSTEM, SEMIHERMETIC RECIPROCATED COMPRESSORS AND AXIAL FANS

Cooling capacity from 54 kW to 350 kW



R290



AIR



AC

EC

FC



ERP 2021

VERSIONS

RAS F Kp - Free-cooling version

The packaged air cooled chillers of RAS F Kp series are suitable for outdoor installation and are particularly indicated to cool fluid solutions for industrial applications or air conditioning systems of the service industry, where it is necessary to grant excellent performances at very low environmental impact.

The refrigerant used is propane, a non-toxic hydrocarbon, even at high concentrations, with an almost null ozone depletion potential, negligible global warming potential and thermodynamic properties which allow to reach high efficiency values.

For this reason the units are designed as group for external installation, in compliance with the European standard EN378 and updates.

The **integrated Free-cooling section** allows to partially or totally recovering of cooling capacity from external air without big consumption of energy. Units are equipped with an additional coil crossed by the liquid to be chilled and invested by the complete air flow generated by the condenser fans.

As soon as the inlet Free-cooling air temperature is lower than inlet water returning from the plant, Free-cooling operation starts .

The benefit obtained by the Free-cooling system is much bigger as much lower is the external air temperature than the temperature value of fluid to be chilled. That's why such kind of units are suitable to be installed on air conditioning and refrigeration plants located where the weather annual profile is characterized by medium-low external temperatures and where the cooling demand is significant and for long periods of time.

Depending on the capacity required the units are available with 1 or 2 independents cooling circuits equipped with 1 or 2 compressors for every circuit ("tandem" configuration).

Thanks to the many available options, these chillers are particularly versatile and are easily adaptable to the different types of plants, where production of chilled water is required.

All the units are completely factory assembled, tested and supplied with refrigerant and non-freezing oil charge; so, once on installation site, they only need to be positioned and connected to the hydraulic and power supply lines.

Units CE certified in compliance with the European regulation 2016/2281 ERP 2021.

MAIN COMPONENTS

FRAME

Strong and compact structure, made of base and frame with high-thickness galvanized steel elements assembled with stainless steel rivets. All galvanized steel surfaces externally positioned are superficially coated by an oven powder-painting with colour RAL7035. The technical section which contains compressors and the other cooling circuit elements, except the condensing part, is closed in a cabinet; if a refrigerant leak occurs the technical vane is automatically airy using an external axial fan which is able to clean all the air inside the cabinet 4 time/minute.

To reduce the sound level it is possible to insulate the technical section with a sound and fire proof standard thickness material or higher thickness material (CFU option).

COMPRESSORS

Semi hermetic alternative type optimized to operate with the hydrocarbons and realized in compliance with the safety regulation in force. The electrical motor, arranged for starts with low inrush current (PW option), is equipped with thermal protection module (installed in the electrical cabinet); the lubricating system, of forced type, is equipped with oil filters and check valves to survey the lubricating pressure and is made through a high pressure pump. Each compressor is installed on rubber type vibration dampers and is provided with switch-off valve on suction and discharge side, electronic differential pressure switch for the oil level control, crankcase heater and temperature probe on discharge side to control the compressor's discharge temperature. If the compressors are installed in "tandem" version each one is equipped with oil level sensor and oil recuperator; this device activates automatically when in one compressor the lubricant level goes down then minimum value.

EVAPORATOR

Stainless steel plates type mono or bi circuits, thermally insulated using a flexible closed cells mattress of high thickness. Is also provided with a safety differential pressure switch which does not allows the unit operation in case of water flow lack or reduction.

COILS

The external exchanger coils are made of micro-finned copper pipes arranged in staggered ranks mechanically expanded inside of an aluminium finned pack. The fin is designed to maximize the thermal exchange efficiency.

Free-cooling external coil made of optimized section copper pipes able to reduce the glycol side pressure drops with aluminium finned pack. The fluid side Free-cooling coils maximum pressure corresponds to 10 relative bar. The coil frontal section can be provide with a protection grid (GP option).

FANS

6 poles axial fans with electrical motor and external rotor directly coupled to the impeller; aluminium blades with wings profile are suitably designed to avoid any turbulence in the iar detachment zone, granting in this way the maximum efficiency with the minimum noise level. The fan is equipped with a galvanized steel protection grid painted after the construction; the fan motors are of totally closed type and have got a protection factor IP54 and winding-flooded protection thermostat.

REGENERATIVE EXCHANGER

Heat regenerative exchanger gas/fluid of plates type, installed on each circuit to grant a suitable overheating value to

the compressor sucked gas and at the same time to increase the cooling circuit efficiency thanks to higher sub-cooling of condensing coil leaving fluid.

Insulated thermally using a close cells mattress of great thickness.

COOLING CIRCUIT

Independent cooling circuits, each provided with a shut-off valve for refrigerant charge, antifreeze probe, sight glass, dehydrating filter for R290 with wide filtering surface, high pressure side safety valve equipped with connector to the discharge refrigerant conveying piping, electronic thermostatic valve (for 1001,2402 and following bigger frames), pressure switches and high/low pressure gauges for R290 specifically. All the units are equipped with a leak sensor which is able to turn off the compressors and turn on the extraction fan in case of a refrigerant leak occurs.

ELECTRICAL BOARD

Built in compliance with 61439-1 standards, inside of which all the control system elements and the ones required for electrical motors starting and protection are located, all the components are factory connected and testes.

The electrical cabinet has got a watertight structure, equipped with cable glands with protection factor of IP65/66.

Besides the electrical cabinet contains all the power and control devices, microprocessor electronic board complete with keyboard and display for visualizing several function available, main switch of lock-door type, isolation transformer for auxiliary circuits, automatic switches, fuses and protection switches for compressors and fans motors, terminals for general alarm and unit remote ON/OFF, spring type terminal board and the possibility to interface to BMS system.

ACCESSORIES

RAS F Kp

RAS F Kp		521	591	721	871	1001	1402
Amperometer + Voltmeter	A+V	o	o	o	o	o	o
Electrical power supply different than standard	AE	□	□	□	□	□	□
Axial fan diffuser	AXT	o	o	o	o	o	o
Operation in cooling mode down to -20°C	BF	●	●	●	●	●	●
Soundproofed compressors cabinet with higher thickness material	CFU	o	o	o	o	o	o
Compressors inrush counter	CS	o	o	o	o	o	o
Refrigerant leakage detector	DR	●	●	●	●	●	●
Axial fans with electronic commutated motor	EC	o	o	o	o	o	o
Compressor disabled below established OAT for Free-cooling units	FCN	o	o	o	o	o	o
Condensing coil protection grid	GP	o	o	o	o	o	o
High pressure double safety valve	HRV2	o	o	o	o	o	o
Victaulic insulation on pump side	I1	o	o	o	o	o	o
Victaulic insulation buffer tank side	I2	o	o	o	o	o	o
Victaulic insulation free-cooling side	I3	o	o	o	o	o	o
RS 485 Serial interface	IH	o	o	o	o	o	o
BACNET Protocol serial interface	IH-BAC	o	o	o	o	o	o
TCP/IP Protocol serial interface	IWG	o	o	o	o	o	o
Phase monitor	MF	o	o	o	o	o	o
MP advanced control for MSC - up to n.2 units	MP ADV	o	o	o	o	o	o
Up to two units	MS	o	o	o	o	o	o
Advanced Cascade system - up to n.6 units	MSC	o	o	o	o	o	o
Remote monitoring for units in cascade	MSHWEV	o	o	o	o	o	o
Pressure gauges	MT	●	●	●	●	●	●
Buffer tank module	MV	o	o	o	o	o	o
Pump group	P1	o	o	o	o	o	o
Higher available pressure pump group	P1H	o	o	o	o	o	o
Double pump group	P2	o	o	o	o	o	o
Higher available pressure double pump group	P2H	o	o	o	o	o	o
Rubber-type vibration dampers	PA	◇	◇	◇	◇	◇	◇
Spring-type vibration dampers	PM	◇	◇	◇	◇	◇	◇
Remote display	PQ	◇	◇	◇	◇	◇	◇
Part-Winding	PW	o	o	o	o	o	o
Anti-freeze heater on evaporator	RA	o	o	o	o	o	o
Shut-off valve on compressors discharge side	RD	●	●	●	●	●	●
Power factor correction system cosfi ≥0,9	RF	o	o	o	o	o	o
Shut-off valve on compressors suction side	RH	●	●	●	●	●	●
Compressor overload relays	RL	o	o	o	o	o	o
Partial heat recovery	RP	o	o	o	o	o	o
Copper/Copper coil	RR	o	o	o	o	o	o
Personalized frame painting	RV	□	□	□	□	□	□
Double layer treatment of the coil	TDS	o	o	o	o	o	o
Electronic thermostatic valve	TE	o	o	o	o	●	o
Brine Version	VB	o	o	o	o	o	o
Inverter on compressor	VSC	o	o	o	o	o	o
Inverter for pump	VSP1	o	o	o	o	o	o
High pressure inverter for pump	VSP1H	o	o	o	o	o	o
Inverter for parallel pumps (only one running)	VSP2	o	o	o	o	o	o
High pressure inverter for parallel pumps (only one running)	VSP2H	o	o	o	o	o	o

● Standard, o Optional, ◇ Optional (external kit)-- Not available, □ Contact sales department

RAS F Kp		1702	2102	2402	2902	3402
Amperometer + Voltmeter	A+V	o	o	o	o	o
Electrical power supply different than standard	AE	□	□	□	□	□
Axial fan diffuser	AXT	o	o	o	o	o
Operation in cooling mode down to -20°C	BF	●	●	●	●	●
Soundproofed compressors cabinet with higher thickness material	CFU	o	o	o	o	o
Compressors inrush counter	CS	o	o	o	o	o
Refrigerant leakage detector	DR	●	●	●	●	●
Axial fans with electronic commutated motor	EC	o	o	o	o	o
Compressor disabled below established OAT for Free-cooling units	FCN	o	o	o	o	o
Condensing coil protection grid	GP	o	o	o	o	o
High pressure double safety valve	HRV2	o	o	o	o	o
Victaulic insulation on pump side	I1	o	o	o	o	o
Victaulic insulation buffer tank side	I2	o	o	o	o	o
Victaulic insulation free-cooling side	I3	o	o	o	o	o
RS 485 Serial interface	IH	o	o	o	o	o
BACNET Protocol serial interface	IH-BAC	o	o	o	o	o
TCP/IP Protocol serial interface	IWG	o	o	o	o	o
Phase monitor	MF	o	o	o	o	o
MP advanced control for MSC - up to n.2 units	MP ADV	o	o	o	o	o
Up to two units	MS	o	o	o	o	o
Advanced Cascade system - up to n.6 units	MSC	o	o	o	o	o
Remote monitoring for units in cascade	MSHWEV	o	o	o	o	o
Pressure gauges	MT	●	●	●	●	●
Buffer tank module	MV	o	o	o	o	o
Pump group	P1	o	o	o	o	o
Higher available pressure pump group	P1H	o	o	o	o	o
Double pump group	P2	o	o	o	o	o
Higher available pressure double pump group	P2H	o	o	o	o	o
Rubber-type vibration dampers	PA	◇	◇	◇	◇	◇
Spring-type vibration dampers	PM	◇	◇	◇	◇	◇
Remote display	PQ	◇	◇	◇	◇	◇
Part-Winding	PW	o	o	o	o	o
Anti-freeze heater on evaporator	RA	o	o	o	o	o
Shut-off valve on compressors discharge side	RD	●	●	●	●	●
Power factor correction system cosfi ≥0,9	RF	o	o	o	o	o
Shut-off valve on compressors suction side	RH	●	●	●	●	●
Compressor overload relays	RL	o	o	o	o	o
Partial heat recovery	RP	o	o	o	o	o
Copper/Copper coil	RR	o	o	o	o	o
Personalized frame painting	RV	□	□	□	□	□
Double layer treatment of the coil	TDS	o	o	o	o	o
Electronic thermostatic valve	TE	o	o	●	●	●
Brine Version	VB	o	o	o	o	o
Inverter on compressor	VSC	o	o	o	o	o
Inverter for pump	VSP1	o	o	o	o	o
High pressure inverter for pump	VSP1H	o	o	o	o	o
Inverter for parallel pumps (only one running)	VSP2	o	o	o	o	o
High pressure inverter for parallel pumps (only one running)	VSP2H	o	o	o	o	o

● Standard, o Optional, ◇ Optional (external kit)-- Not available, □ Contact sales department

TECHNICAL DATA

RAS F Kp		521	591	721	871	1001	1402
Cooling capacity	kW	50,9	60,1	73,8	89,1	103,8	146,6
Total input power	kW	18,2	20,2	23,9	30,8	35,3	47,5
Nominal input current	A	35,1	37,2	41,8	55,2	65,0	83,4
EER	W/W	2,80	2,98	3,08	2,89	2,94	3,08
SEPR ⁽⁶⁾	W/W	5,32	5,33	5,34	5,49	5,47	5,41
Circuits	n°	1	1	1	1	1	2
Compressors	n°	1	1	1	1	1	2
Refrigerant R290							
Refrigerant charge	kg	4	6	7	7	11	13
Global warming potential (GWP)	-	3	3	3	3	3	3
Equivalent CO ₂ charge	kg	12	18	21	21	33	39
Axial fans ⁽¹⁾							
Quantity	n°	1	1	1	2	2	2
Total air flow	m ³ /h	24120	22870	22910	46960	43780	45350
Total power input	kW	2,5	2,5	2,5	5,0	5,0	5,0
Total input current	A	5,2	5,2	5,2	10,3	10,3	10,3
Evaporator ⁽²⁾							
Quantity	n°	1	1	1	1	1	1
Water flow	m ³ /h	9,7	11,4	14,0	16,9	19,7	27,8
Pressure drop	kPa	35	47	22	31	41	26
Free cooling ⁽⁵⁾							
Free Cooling capacity	kW	31,5	32,8	26,3	63,6	66,2	52,1
Water flow	m ³ /h	9,7	11,4	14,0	16,9	19,7	27,8
Pressure drop	kPa	20	27	25	42	54	23
Weight							
Transport weight	kg	1066	1102	1131	1451	1517	1739
Operating weight	kg	1088	1124	1150	1492	1558	1776
Dimensions							
Length	mm	1730	1730	1730	2770	2770	2770
Width	mm	1370	1370	1370	1370	1370	1370
Height	mm	2420	2420	2420	2420	2420	2420
Sound data							
Total LWA ⁽³⁾	dB(A)	88,9	90,1	91,8	94,5	94,5	94,7
Total SPL 10m ⁽⁴⁾	dB(A)	57,0	58,2	60,0	62,5	62,5	62,7
Power supply							
Voltage/phase/frequency	V/ph/Hz	400/3/50+N+PE	400/3/50+N+PE	400/3/50+N+PE	400/3/50+N+PE	400/3/50+N+PE	400/3/50+N+PE
General electrical data							
Maximum input power	[kW]	22,5	26,3	28,4	39,0	47,0	56,8
Maximum input current	[A]	42,0	49,2	52,2	71,3	84,9	104
Inrush current	[A]	208	230	244	283	332	296

(1) Air temperature 35°C

(2) Fluid: Water + 30% Ethylene Glycol - in/out Temperature: 12/7°C

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

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

(5) Free-Cooling: Air 3°C - Liquid 12°C (Water +30% Ethylene Glycol) at nominal flow rate

(6) SEPR: High temperature process chiller

RAS F Kp		1702	2102	2402	2902	3402
Cooling capacity	kW	174,9	208,5	222,0	283,3	332,6
Total input power	kW	59,5	70,2	83,6	96,5	118,5
Nominal input current	A	105,7	127,1	153,5	168,6	206,5
EER	W/W	2,94	2,97	2,65	2,94	2,81
SEPR ⁽⁶⁾	W/W	5,41	5,34	5,23	5,28	5,24
Circuits	n°	2	2	2	2	2
Compressors	n°	2	2	4	4	4
Refrigerant R290						
Refrigerant charge	kg	15	19	14	19	24
Global warming potential (GWP)	-	3	3	3	3	3
Equivalent CO ₂ charge	kg	45	57	42	57	72
Axial fans ⁽¹⁾						
Quantity	n°	3	3	4	4	4
Total air flow	m ³ /h	67380	67670	100610	95900	89990
Total power input	kW	7,4	7,4	9,9	9,9	9,9
Total input current	A	15,5	15,5	20,6	20,6	20,6
Evaporator ⁽²⁾						
Quantity	n°	1	1	1	1	1
Water flow	m ³ /h	33,2	39,5	42,1	53,7	63,1
Pressure drop	kPa	35	33	41	34	45
Free cooling ⁽⁵⁾						
Free Cooling capacity	kW	103,2	82,6	103,1	112,4	119,2
Water flow	m ³ /h	33,2	39,5	42,1	53,7	63,1
Pressure drop	kPa	69	61	46	64	58
Weight						
Transport weight	kg	2180	2220	2703	2874	3100
Operating weight	kg	2246	2280	2794	2974	3178
Dimensions						
Length	mm	3810	3810	4850	4850	4850
Width	mm	1370	1370	1370	1370	1370
Height	mm	2420	2420	2420	2420	2420
Sound data						
Total LWA ⁽³⁾	dB(A)	94,7	96,7	96,5	97,1	99,2
Total SPL 10m ⁽⁴⁾	dB(A)	62,6	64,6	64,3	64,8	66,9
Power supply						
Voltage/phase/frequency	V/ph/Hz	400/3/50+N+PE	400/3/50+N+PE	400/3/50+N+PE	400/3/50+N+PE	400/3/50+N+PE
General electrical data						
Maximum input power	[kW]	75,4	91,4	106	114	146
Maximum input current	[A]	137	165	197	209	265
Inrush current	[A]	349	411	377	401	477

(1) Air temperature 35°C

(2) Fluid: Water + 30% Ethylene Glycol - in/out Temperature: 12/7°C

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

(4) Sound pressure level at 10 mt from the unit in free field conditions in accordance with ISO 3744.

(5) Free-Cooling: Air 3°C - Liquid 12°C (Water +30% Ethylene Glycol) at nominal flow rate

(6) SEPR: High temperature process chiller