

RAC MC HE Ke/Kh

HIGH EFFICIENCY AIR COOLED CHILLERS FOR OUTDOOR INSTALLATION
EQUIPPED WITH BRUSHLESS OIL-FREE TURBOCOR COMPRESSORS, AXIAL FANS
AND MICROCHANNEL CONDENSING COILS

Cooling capacity from 443 kW to 1396 kW



R513A

R1234
ze



AIR



EC

alu



ERP
2021

VERSIONS

- RAC MC HE Kh** - High efficiency version
- RAC MC HE S Kh** - High-efficiency silenced version
- RAC MC HE U Kh** - High-efficiency ultra-silenced version

The monoblock air-cooled chillers of RAC MC 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.

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 the refrigerant. Therefore, once on site, the units must only be positioned and hydraulically and electrically connected.

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

MAIN COMPONENTS

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 sight-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 (Falling film). 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

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. These fans, thanks to a more accurate regulation of the airflow, allow the unit to operate with an external air temperature up to - 20 °C.

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 work-

ing 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.

ACCESSORIES

RAC MC Ke/Kh

RAC MC Ke/Kh		451	562	682	812	983	1404
Amperometer	A	o	o	o	o	o	o
Operation in cooling mode down to -20°C	BF	•	•	•	•	•	•
Axial fans with electronic commutated motor	EC	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
Anti-intrusion grid	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
BACNET Protocol serial interface	IH-BAC	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
Voltmeter	V	o	o	o	o	o	o
Compressors overload relays	RL	o	o	o	o	o	o
Condensing coil with pre-painted fins	RP	o	o	o	o	o	o
Copper/copper condensing coils	RT	o	o	o	o	o	o

RAC MC Ke/Kh		451	562	682	812	983	1404
Amperometer	A	o	o	o	o	o	o
Operation in cooling mode down to -20°C	BF	•	•	•	•	•	•
Axial fans with electronic commutated motor	EC	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
Anti-intrusion grid	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
BACNET Protocol serial interface	IH-BAC	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
Voltmeter	V	o	o	o	o	o	o
Compressors overload relays	RL	o	o	o	o	o	o
Condensing coil with pre-painted fins	RP	o	o	o	o	o	o
Copper/copper condensing coils	RT	o	o	o	o	o	o

• Standard, o Optional, -- Not available

TECHNICAL DATA

RAC MC HE S Ke		251	351	401	502	552	652
Cooling capacity ⁽¹⁾	kW	281,0	380,0	430,0	504,0	560,0	672,0
Total input power ⁽¹⁾	kW	82,9	112,3	133,7	145,2	166,8	205,7
Nominal input current ⁽¹⁾	A	139,6	189,0	225,1	244,4	280,7	346,3
EER ⁽¹⁾	W/W	4,33	4,23	3,92	4,30	4,09	3,96
SEER (EN14825) ⁽¹⁾	W/W	3,39	3,38	3,22	3,47	3,36	3,27
Circuits	n°	1	1	1	1	1	1
Compressors	n°	1	1	1	2	2	2
Compressor power input	kW	64,9	89,9	109,7	117,2	136,8	169,7
Refrigerant data R513A							
Global warming potential (GWP)	-	573	573	573	573	573	573
Fans							
Quantity	n°	6	8	8	10	10	12
Total air flow	m ³ /h	145656	191880	194208	238200	242760	291312
Total power input	kW	18,0	22,4	24,0	28,0	30,0	36,0
Evaporator							
Quantity	n°	1	1	1	1	1	1
Water flow	m ³ /h	48,4	65,4	74,0	86,8	96,4	115,7
Pressure drop	kPa	30,0	34,0	34,5	33,7	35,0	32,9
Weight							
Transport weight	kg	3459	3758	3833	4140	4223	4537
Operating weight	kg	3552	3861	3948	4267	4364	4694
Dimensions							
Length	mm	3920	5060	5060	6200	6200	7340
Width	mm	2260	2260	2260	2260	2260	2260
Height	mm	2650	2650	2650	2650	2650	2650
Sound data							
Total LWA ⁽²⁾	dB(A)	90,2	90,8	91,3	91,9	92,5	93,0
Total SPL 10m ⁽³⁾	dB(A)	69,6	70,2	70,7	71,3	71,9	72,4
Power supply							
Voltage/phase/frequency	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
General electrical data							
Maximum input power	[kW]	206,7	295,3	296,4	215,7	217,5	307,7
Maximum input current	[A]	348	497	499	363	366	518
Inrush current	[A]	**	**	**	**	**	**

RAC MC HE S Ke		752	852	953	1054	1154	1254
Cooling capacity ⁽¹⁾	kW	762,0	861,0	963,0	1060,0	1176,0	1280,0
Total input power ⁽¹⁾	kW	229,9	260,1	289,8	320,6	359,0	417,5
Nominal input current ⁽¹⁾	A	387,0	437,9	487,8	539,8	604,3	702,8
EER ⁽¹⁾	W/W	4,06	4,06	4,02	3,98	3,93	3,64
SEER (EN14825) ⁽¹⁾	W/W	3,32	3,31	3,32	3,31	3,28	3,07
Circuits	n°	1	1	1	2	2	2
Compressors	n°	2	3	3	4	4	4
Compressor power input	kW	187,9	212,1	239,4	266,6	299,0	351,5
Refrigerant data R513A							
Global warming potential (GWP)	-	573	573	573	573	573	573
Fans							
Quantity	n°	14	16	18	18	20	22
Total air flow	m ³ /h	339864	388416	428760	436968	485520	534072
Total power input	kW	42,0	48,0	50,4	54,0	60,0	66,0
Evaporator							
Quantity	n°	1	1	1	1	1	1
Water flow	m ³ /h	131,2	148,3	165,8	182,5	202,5	220,4
Pressure drop	kPa	34,8	36,9	37,1	32,5	37,6	43,0
Weight							
Transport weight	kg	4858	5185	5519	5629	5972	6321
Operating weight	kg	5032	5378	5733	5867	6236	6614
Dimensions							
Length	mm	8480	9620	10760	10760	11900	13040
Width	mm	2260	2260	2260	2260	2260	2260
Height	mm	2650	2650	2650	2650	2650	2650
Sound data							
Total LWA ⁽²⁾	dB(A)	93,6	94,2	94,8	95,4	96,0	96,6
Total SPL 10m ⁽³⁾	dB(A)	73,0	73,6	74,2	74,8	75,4	76,0
Power supply							
Voltage/phase/frequency	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
General electrical data							
Maximum input power	[kW]	313,1	234,0	458,0	429,4	435,5	609,5
Maximum input current	[A]	527	394	771	723	733	1026
Inrush current	[A]	**	**	**	**	**	**

(1) Water: In/out Temperature: 12/7°C; Ambient air temperature 35°C

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

(3) Sound pressure level at 10m from the unit in free field conditions, in accordance with ISO 3744

RAC MC HE U Ke		251	351	401	502	552	652
Cooling capacity ⁽¹⁾	kW	252,0	355,0	410,0	488,0	540,0	642,0
Total input power ⁽¹⁾	kW	72,7	103,0	117,0	140,0	163,7	194,1
Nominal input current ⁽¹⁾	A	122,4	173,4	197,0	235,6	275,7	326,8
EER ⁽¹⁾	W/W	4,21	4,01	4,06	4,00	3,80	3,80
SEER (EN14825) ⁽¹⁾	W/W	3,47	3,45	3,50	3,49	3,30	3,31
Circuits	n°	1	1	1	1	1	1
Compressors	n°	1	1	1	2	2	2
Compressor power input	kW	59,9	88,6	101,0	122,0	142,1	168,9
Refrigerant data R513A							
Global warming potential (GWP)	-	573	573	573	573	573	573
Fans							
Quantity	n°	8	8	10	10	12	14
Total air flow	m³/h	151600	159600	189500	199500	238800	279300
Total power input	kW	12,8	14,4	16,0	18,0	21,6	25,2
Evaporator							
Quantity	n°	1	1	1	1	1	1
Water flow	m³/h	43,4	61,1	70,6	84,0	93,0	110,6
Pressure drop	kPa	32,0	36,6	37,1	36,3	34,8	35,6
Weight							
Transport weight	kg	3702	3776	4079	4160	4470	4786
Operating weight	kg	3807	3892	4207	4303	4628	4962
Dimensions							
Length	mm	5060	5060	6200	6200	7340	8480
Width	mm	2260	2260	2260	2260	2260	2260
Height	mm	2650	2650	2650	2650	2650	2650
Sound data							
Total LWA ⁽²⁾	dB(A)	86,7	87,2	87,8	88,3	88,9	89,4
Total SPL 10m ⁽³⁾	dB(A)	66,1	66,6	67,2	67,7	68,3	68,8
Power supply							
Voltage/phase/frequency	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
General electrical data							
Maximum input power	[kW]	201,9	287,5	289,2	206,8	209,6	297,6
Maximum input current	[A]	340	484	487	348	353	501
Inrush current	[A]	**	**	**	**	**	**

RAC MC HE U Ke		752	852	953	1054	1154	1254
Cooling capacity ⁽¹⁾	kW	742,0	843,0	936,0	1028,0	1144,0	1244,0
Total input power ⁽¹⁾	kW	222,4	248,2	279,6	304,6	348,3	385,7
Nominal input current ⁽¹⁾	A	374,5	417,8	470,7	512,8	586,4	649,3
EER ⁽¹⁾	W/W	3,83	3,84	3,79	3,83	3,65	3,59
SEER (EN14825) ⁽¹⁾	W/W	3,34	3,40	3,35	3,37	3,28	3,23
Circuits	n°	1	1	1	2	2	2
Compressors	n°	2	3	3	4	4	4
Compressor power input	kW	193,6	219,4	247,2	268,6	313,1	346,1
Refrigerant data R513A							
Global warming potential (GWP)	-	573	573	573	573	573	573
Fans							
Quantity	n°	16	18	18	20	22	22
Total air flow	m³/h	319200	341100	359100	399000	416900	438900
Total power input	kW	28,8	28,8	32,4	36,0	35,2	39,6
Evaporator							
Quantity	n°	1	1	1	1	1	1
Water flow	m³/h	127,8	145,2	161,2	177,0	197,0	214,2
Pressure drop	kPa	37,4	39,5	39,7	35,1	40,2	44,0
Weight							
Transport weight	kg	5108	5437	5546	5926	6227	6318
Operating weight	kg	5304	5654	5786	6193	6524	6649
Dimensions							
Length	mm	9620	10760	10760	11900	13040	13040
Width	mm	2260	2260	2260	2260	2260	2260
Height	mm	2650	2650	2650	2650	2650	2650
Sound data							
Total LWA ⁽²⁾	dB(A)	90,0	90,5	91,1	91,6	92,2	92,8
Total SPL 10m ⁽³⁾	dB(A)	69,4	69,9	70,5	71,0	71,6	72,2
Power supply							
Voltage/phase/frequency	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
General electrical data							
Maximum input power	[kW]	301,1	216,8	441,3	413,4	412,2	585,1
Maximum input current	[A]	507	365	743	696	694	985
Inrush current	[A]	**	**	**	**	**	**

(1) Water: In/out Temperature: 12/7°C; Ambient air temperature 35°C

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

(3) Sound pressure level at 10m from the unit in free field conditions, in accordance with ISO 3744

RAC MC HE S Kh		251	502	753	1004
Cooling capacity ⁽¹⁾	kW	261,0	522,0	783,0	1044,0
Total input power ⁽¹⁾	kW	75,6	152,8	226,5	303,6
Nominal input current ⁽¹⁾	A	127,2	257,3	381,3	511,1
EER Gross ⁽¹⁾	W/W	4,53	4,25	4,39	4,29
EER Net ⁽¹⁾	W/W	3,45	3,42	3,46	3,44
Circuits	n°	1	1	1	2
Compressors	n°	1	2	3	4
Compressor power input	kW	57,6	122,8	178,5	243,6
Refrigerant data R1234Ze					
Global warming potential (GWP)	-	6	6	6	6
Fans					
Quantity	n°	6	10	16	20
Total air flow	m ³ /h	145656	242760	388416	485520
Total power input	kW	18,0	30,0	48,0	60,0
Evaporator					
Quantity	n°	1	1	1	1
Water flow	m ³ /h	44,9	89,9	134,8	179,8
Pressure drop	kPa	30,0	33,7	36,9	37,1
Weight					
Transport weight	kg	3473	4157	5208	5998
Operating weight	kg	3568	4285	5403	6267
Dimensions					
Length	mm	3920	6200	9620	11900
Width	mm	2260	2260	2260	2260
Height	mm	2650	2650	2650	2650
Sound data					
Total LWA ⁽²⁾	dB(A)	90,3	92,0	94,9	97,6
Total SPL 10m ⁽³⁾	dB(A)	69,7	71,4	73,5	75,7
Power supply					
Voltage/phase/frequency	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50
General electrical data					
Maximum input power	[kW]	114,7	223,3	338,0	447,3
Maximum input current	[A]	193	376	569	753
Inrush current	[A]	**	**	**	**

RAC MC HE U Kh		251	502	753	1004
Cooling capacity ⁽¹⁾	kW	261,0	502,0	783,0	1004,0
Total input power ⁽¹⁾	kW	75,9	143,4	222,1	280,8
Nominal input current ⁽¹⁾	A	127,8	241,4	373,9	472,7
EER Gross ⁽¹⁾	W/W	4,24	4,12	4,13	4,16
EER Net ⁽¹⁾	W/W	3,44	3,50	3,53	3,58
Circuits	n°	1	1	1	2
Compressors	n°	1	2	3	4
Compressor power input	kW	61,5	121,8	189,7	241,2
Refrigerant data R1234Ze					
Global warming potential (GWP)	-	6	6	6	6
Fans					
Quantity	n°	8	12	18	22
Total air flow	m ³ /h	159600	239400	359100	438900
Total power input	kW	14,4	21,6	32,4	39,6
Evaporator					
Quantity	n°	1	1	1	1
Water flow	m ³ /h	44,9	86,4	134,8	172,9
Pressure drop	kPa	30,0	33,7	36,9	37,1
Weight					
Transport weight	kg	3765	4546	5532	6345
Operating weight	kg	3869	4705	5752	6642
Dimensions					
Length	mm	5060	7340	10760	13040
Width	mm	2260	2260	2260	2260
Height	mm	2650	2650	2650	2650
Sound data					
Total LWA ⁽²⁾	dB(A)	86,8	88,4	91,2	93,8
Total SPL 10m ⁽³⁾	dB(A)	66,2	67,8	69,8	71,9
Power supply					
Voltage/phase/frequency	V/ph/Hz	400/3/50	400/3/50	400/3/50	400/3/50
General electrical data					
Maximum input power	[kW]	111,1	215,6	323,7	428,3
Maximum input current	[A]	187	363	545	721
Inrush current	[A]	**	**	**	**

(1) Water: In/out Temperature: 12/7°C; Ambient air temperature 35°C

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

(3) Sound pressure level at 10m from the unit in free field conditions, in accordance with ISO 3744