Klimallco®
CLIMATE EXPERIENCE

Air Cooled Water Chillers

Cooling capacity : 142 - 1215 kW

R134a

LKAC

Twin Screw Compressors

Klimallco sa Air Treatment Experts

Outdoor Installation

2019

Contents

1. General Description

Air Cooled Water Chillers

The Klimallco LKAC large series are packaged air cooled water chillers for cooling applications and outdoor installation. They are available in 14 models with nominal capacities ranging from 142 to 1.215 kW.

These series are ideal in combination with Klimallco fan coil or air handling units for air conditioning office buildings, hotels, hospitals shopping centers, restaurants, etc., or for supplying chilled water for industrial applications.

Optimized design for R134a refrigerant.

Casing: Galvanized steel plate with polyesteric coating.

Assembly: Fully bolted/welding free.

Compressor: Twin Screw Semi Hermetic.

Air heat exchanger: Cross fin coil Internally grooved copper tubes and louvered aluminium fins. Direct drive propeler .

Fan: Low rpm, quiet operation.

Water heat exchanger: Shell and tube type.

Safety and functional devices:

- High/low pressure switch.
- Phase sequence - phase failure - reverse phase and voltage monitoring device.
- Evaporator low temperature protection.
- Electronic microprocessor control with digital display.
- Differential water pressure switch.
- High and low pressure transmitters.
- High pressure relieve valve on compressor discharge.
- Constant compressor current monitoring control.
- Liquid injection cooling system to ensure the appropriate gas discharge temperature.
- Electronic expansion valve, ensuring constant suction gas superheat, at all operating conditions.
- Stepless compressor control, continuously regulating output capacity from 25% to 100%, in acoordance with load demand.

2. Technical Description

General

The LKAC series air-cooled water chillers consists of 14 models covering capacities from 142 up to 1.215 kW. It is the end result of a thorough study, and accurate design by experienced Klimallco research and development teams, to develop a large size chiller series with compact shape, high performance, and reliability of the highest quality standards. This series meets the highest levels of aesthetic and technical requirements using the latest technological innovations, including environmentally friendly R134a refrigerant that is chlorine-free and has zero ozone depletion potential. LKAC units are therefore ideal for installation in commercial and industrial applications due to their dependability, selected materials and low operating sound levels.

Casing

All units use metal parts fabricated from heavy gauge galvanized steel sheets, formed to ensure maximum rigidity that guarantees and preserves the units operation during the years. After fabrication these are degreased, phosphatised, and electro statically powder coated with an epoxy-polyester RAL 7042 coating of a thickness 60-70 μ. This fully automatic process ensures superior corrosion resistance against the most aggressive ambient conditions. The treatment can successfully withstand a salt spray test of 500 hours, according to ASTM B-117. All components are assembled together using bolts thus avoiding the need for welding which may harm the galvanization of the steel, and ensures that the whole assembly can fully withstand adverse weather conditions.

The compact footprint of the unit arises from detailed study and design by our engineering teams and results in a machine, which fits easily in restricted areas and is simple and easy to install and maintain, and has been designed with special fittings for easy transport and lifting.

Removable side panels are used to permit access only to authorized personnel to internal components of the unit for inspection and maintenance. Electrical and electronic equipment and components for proper unit operation are located in a weather proof (IP 55) electrical panel with access only via a special key.

Compressor

The product is equipped with 2 semi-hermetic, accessible, screw type compressors and 2 independent refrigerant circuits. All screw compressors are designed for use with R134a refrigerant.The compression of the refrigerant is succeeded via twin screw shafts. The first one is directly driven by the motor and the second one is driven by the first. As a result the refrigerant gets through the screws and compressed.The compressors consist of twin screws moving in opposite directions, specially made out of steel and are installed in a separate compartment from the electric motor. The original seating design of the twin screws in 11-B type ball bearings, constantly varying performance through an axial shaft that ensures not only long life but also high performance. Movement to the screws is transmitted direct connection through the induction motor. The 3 phase 2 pole induction motor is suitable for a 400V-50Hz network and does not require any heat dissipation as it is cooled by the refrigerant medium itself. The windings design does not require any additional external cooling. A reduced starting current startup configuration ensures minimum startup current. The compressors are equipped with continuous (stepless) capacity control system. In continuous (stepless) capacity control system, a normally open solenoid valve and a normally closed solenoid valve are equipped to the inlet and outlet of the piston cylinder respectively. These two solenoid valves are controlled by the chiller micro controller, refrigeration capacity control can be modulated at anywhere within 25%-100%. The compressor is equipped with a special oil-separator ensuring the minimum possible lubricant circulation in the refrigerant circuit. Fitting lubrication is accomplished with effusion created by the pressure differential during normal operation, without the use of an additional mechanical pump. Compressors have been equipped with crankcase electrical heater for the oil, glass observation window for the oil level, an oil filter, with a designated cleaning/charging port, constant oil level control, and are internally protected by special thermistors against potential overheating or electrical spikes. Externally the compressor is equipped with a watertight IP-55 protected electrical panel, bearing all the necessary connections for operation and control. Inside the electrical panel an installed microprocessor controls all the safety and operation features of the compressor.

In order to ensure correct operation, the compressor also features:

- High temperature sensor for the refrigerant medium (PT-100).
- High temperature sensor for induction motor windings (PT-100).
- Low oil level safety switch.
- Refrigerant gas suction filter- accessible.
- Discharge valve.
- Check valve in discharge line.
- Pressure safety setup ensuring the highly pressurized refrigerant gas is within safety limits.
- Additional cooling through the suction chamber via a thermo expansion valve when necessary, through refrigerant liquid spray ensuring temperatures are kept within designated limits.
- Special rubber pads to absorb noise from the unit's operation.

Air heat exchanger

All unit air heat exchangers are manufactured from high quality inner grooved copper tubes according to ASTM B-280, having an outside diameter of 9,52 mm (3/8"). The fins are manufactured from aluminium and form the secondary extended heat transfer surface. The fins are continuous across the heat exchanger and are fabricated in high precision dedicated press lines. The fin surface is waffle formed, so as to increase the fin rigidity, and have special louvers that help increase heat transfer. The combination of internally grooved Copper-tubing and louvered fins has resulted in a heat transfer performance 30% superior to that of a conventional coil for this particular application. The assembly of the finned pack is achieved by mechanical expansion of the tubes in such a way as to form a perfect mechanical bond with the fins. For this purpose, the fin holes have a peripheral extrusion (collar) of adjustable height. This extrusion serves to define the distance between fins (and consequently the total heat transfer surface) and to ensure perfect contact of the fins to the tubes. Alternative fin materials are available upon request such as epoxy – coated aluminium or copper for applications in especially aggressive environments. The condensers are V-shaped paired in order to exploit all available space.Upon completion of the manufacturing procedure all coils are pressure tested at 30 bars for leaks.

Water heat exchanger

All units are equipped with a Shell and Tube water –direct expansion type evaporator that has two separate cooling circuits, one for each independent refrigerant circuit. The casing is of steel and the internal tubes are of copper. There is an air vent valve, drain valve, differential water pressure switch, probes for water temperature sensors, and the whole heat exchanger is wrapped in a heavy insulation material appropriate for external installation.

Air heat exchanger fans

Condenser fans are of the axial type directly transmitting motion to the blades, suitable for outdoor installation and pair mounted in-between the V-shaped condenser coils.The 3-phase motors are of closed type, low RPM, F insulation type and IP-55 protected. Axial seating is suitable for vertical operation, also included is internal thermal protection for the windings. Due to the special aerodynamic design of the blades and inlet cones as well as the perfect static and dynamic balancing, their operation is completely vibration-free. The fan-motor assembly has a protective grid against accidental contact with moving parts, which is designed according to ISO regulations. Fan motors are aerodynamically shaped so as not to interfere with the airflow, and have permanently lubricated bearings that do not require service. Upon request also available is an electrical set-up that controls the fan rpm through a microprocessor depending on the condensation temperature or pressure. Through this set-up the operational pressures of the device depend on the external condition thus increasing energy efficiency. Also this way of controlling the fans ensures machine performance under extreme cooling conditions, maximum performance, minimum absorbed current and noise confinement.

Microprocessor controller

All units are equipped with an electronic programmable control system. This allows complete management of all the functions of the unit and ensures protection of all vital parts. It also has a full self-diagnostics function as to prevent the stop of the machine by alarm. If it can't avert the cut off of the compressor, it has a diagnostics function, permitting easy and straightforward understanding of all the possible failures and malfunctions of the unit. All functions and indicators appear on the LCD screen. Over 150 programmable parameters offer complete unit management.

Critical parameters that require control are:

- Start-up/shut down time of compressor.
- Time delay.
- Protection against multiple start-up.
- Water pump time delay in reference to unit operation.
- Inlet/outlet water temperature.
- Evaporator and Condenser temperature.
- Discharge temperature.
- Suction temperature.
- Continuous sophisticated compressor capacity control using multiple parameters.
- High discharge pressure.
- Low suction pressure.
- Water temperature adjustment in the inlet side during summer operation.
- Superheat temperature.
- Controlled fault parameters:
- Low suction pressure per refrigerant circuit.
- High discharge pressure - temperature per refrigerant circuit.
- Oil low level.
- Compressor overload.
- Fan motor overload.
- Water pump overload.
- Differential water pressure switch.
- Error reading in water outlet low temperature.
- Compressor operating hour reading.
- In addition the control also shall include :
- Self diagnostic error of all electronic control sensors.
- Connection to building management system (BMS) by means of a Modbus or Metasys Protocol through RS485 serial gate.
- Remote on/ off switch.
- Remote alarm indication capability.
- History of operation points and fault codes.
- Password access code.

Refrigerant circuit

Each refrigerant circuit consists of the following:

- Electronic expansion valve with constant step control in order to maintain constantly the appropriate superheat of the refrigerant. The valve moves electromechanically controlled by the unit microprocessor. The valve is supplied with low voltage current that in addition is protected against sudden power shutdown. When the valve is in off position, it maintains a tight normally closed state not allowing refrigerant flow thus not needing supplimental electromagnetic valve at the liquid line.
- Filter drier.
- Shut off valves to allow easy replace of the filter core without loss of refrigerant.
- Liquid injection valve.
- Shut-off valves to allow servicing of the compressors.
- Solenoid valve in liquid injection line.
- Sight glass for checking the liquid lines.
- Pressure relief valve on compressor discharge.
- High and low pressure gauges for each refrigerant circuit, easily viewed.
- Service valves.

Optional accessories

- Microprocessor controller options:
- BMS module interface kit for Bacnet, Trend, LonWorks, connection.
- BMS interface kit for Modbus connection.
- Connection via internet using a device converting the Carel protocol to 10Mb/s TCP/IP ethernet protocol.
- Communication card through RS232 / RS485 serial ports.
- Possibility to send and receive messages using a GSM modem.
- Extention memory card for up to five thousand messages.
- Extention memory card 1& 2 MB.
- Microprocessor parameter reprogramming card.
- Other unit accessories/option:.
- Condenser fins made of copper or prepainted aluminum, and Blygold treatment for corrosion protection.
- Glycol application for chilled water temperature down to -15oC
- Continous linear fan speed regulation.
- A-meter, V-meter.
- Antifreeze heater at the evaporator.
- Electrical board ventilation fan.
- Heat recovery exchanger.
- Axial fans with EC motors.
- Other custom built options upon request.

3. Technical Specifications

LKAC 040-130

ì ŘŐŃ		LKAC - 040	LKAC - 055	LKAC - 075	LKAC - 090	LKAC - 105	LKAC - 120	LKAC - 130
Nominal Cooling capacity	kw	**142**	**190**	**261**	**318**	**368**	**412**	**451**
	RT	40	54	74	90	105	117	128
	Btu/h	484.091	647.727	889.773	1.084.091	1.254.545	1.404.545	1.537.500
Construction	Material/Color	Galvanised steel / Grey (RAL 7042)						
Compressor		Twin screw						
Quantity		2						
Capacity Steps		Stepless down to 12,5%-100%						
Absorbed power	kw	46,4	58,0	84,0	98,6	113,4	122,4	136,8
Nominal Operating Current	A	76,2	96,2	137,8	162,6	186,4	199,8	219,4
Maximum Operating Current	A	140,0	184,0	234,0	294,0	338,0	370,0	410,0
Condenser		High capacity cross finned coil with internally grooved tubes and louver fins						
Evaporator		Shell and tube						
Quantity		1						
Water Content	lit	94,0	88,0	133,0	125,0	222,0	206,0	206,0
ì MŔBÖŐŃØMPÒÒN ŐØŃŒĐP ØŃ	Water side bar	16						
	Refrigerant side bar	29						
Connections		DN 125	DN 125	DN 150	DN 150	DN 200	DN 200	DN 200
Nominal Water Supply	lit/h	24,424	32,680	44,892	54,696	63,296	70,864	77,572
Water Pressure Drop	kpa	22,0	38,0	40,0	41,0	23,0	34,0	41,0
Minimum System Water Content	lit	547	722	984	1263	1446	1572	1731
Fans								
Quantity		4	4	4	6	6	6	8
Speed	rpm	850						
Total Air Flow	m3/h	79.000	78.240	75.000	117.360	115.000	112.500	156.480
Absorbed power	kw	6,0	6,0	6,0	9,0	9,0	9,0	12,0
Nominal Operating Current	A	13,6	13,6	13,6	20,4	20,4	20,4	27,2
Maximum Operating Current	A	14,8	14,8	14,8	22,2	22,2	22,2	29,6
Electrical characteristics		400V/3Ph/50Hz						
Total Absorbed Power	kw	52,4	64,0	90,0	107,6	122,4	131,4	148,8
Nominal Operating Current	A	89,8	109,8	151,4	183,0	206,8	220,2	246,6
Maximum Operating Current	A	154,8	198,8	248,8	316,2	360,2	392,2	439,6
Compressor carter resistance power	W	2x300	2X300	2x300	2x300	2x300	2x300	2x300
Power cables cross section per phase	mm^2	120	150	185	240	240	2x120	2x185
Fuses	A	3x200	3x250	3x250	3x400	3x400	3x400	3x500
Voltage operating limits	V	360-440V						
Refrigerant circuit								
Number of circuits		2						
Expansion device		Electronic expansion valve						
Refrigerant type		R134a						
Sound level at 5m	dbA	66	67	68	69	69	69	70
Dimensions Width	mm	2.200	2.200	2.200	2.200	2.200	2.200	2.200
Length	mm	3.000	3.000	3.000	3.900	3.900	3.900	5.200
Height	mm	2.410	2.410	2.410	2.410	2.410	2.410	2.450
Shiping weight	kg	1.750	2.120	2.570	3.380	3.550	3.700	4.500

LKAC 155-345

ì ŘŐŇ		LKAC - 155	LKAC - 170	LKAC - 195	LKAC - 225	LKAC- 270	LKAC- 315	LKAC- 345
Nominal Cooling capacity	kw	**546**	**599**	**688**	**789**	**945**	**1105**	**1215**
	RT	155	170	195	224	268	314	345
	Btu/h	1.861.364	2.042.045	2.345.455	2.689.773	3.221.591	3.767.045	4.142.045
Construction	Material/Color	Galvanised steel / Grey RAL 7042						
Compressor		Twin srew						
Quantity		2						
Capacity Steps		Stepless down to 12,5%-100%						
Absorbed power	kw	166,8	180,0	200,8	230,0	273,0	311,2	358,0
Nominal Operating Current	A	267,8	289,0	322,8	366,8	435,6	495,2	588,6
Maximum Operating Current	A	516,0	554,0	602,0	694,0	802,0	930,0	970,0
Condenser		High capacity cross finned coil with internally grooved tubes and louver fins						
Evaporator		Shell and tubes						
Quantity		1						
Water Content	lit	185,0	225,0	310,0	378,0	348,0	337,0	435,0
Ì MŔBÖŐŇØMPÒŌŊ ŐØŇŒĐÐØŇ	Water side bar	16						
	Refrigerant side bar	29						
Connections		DN 200	DN 200	DN 200	DN 200	DN 200	DN 200	DN 200
Nominal Water Supply	lit/h	93,912	103,028	118,336	135,708	162,540	190,060	208,980
Water Pressure Drop	kpa	42,0	37,0	32,0	42,0	38,0	46,0	55,0
Minimum System Water Content	lit	1966	2156	2477	2840	3402	3978	4374
Fans								
Quantity		10	10	12	14	14	16	16
Speed	rpm	850						
Total Air Flow	m3/h	195.000	195.000	234.000	273.000	273.000	312.000	312.000
Absorbed power	kw	15,0	15,0	18,0	21,0	21,0	24,0	24,0
Nominal Operating Current	A	34,0	34,0	40,8	47,6	47,6	54,4	54,4
Maximum Operating Current	A	37,0	37,0	44,4	51,8	51,8	59,2	59,2
Electrical characteristics		400V/3Ph/50Hz						
Total Absorbed Power	kw	181,8	195,0	218,8	251,0	294,0	335,2	382,0
Nominal Operating Current	A	301,8	323,0	363,6	414,4	483,2	549,6	643,0
Maximum Operating Current	A	553,0	591,0	646,4	745,8	853,8	989,2	1029,2
Compressor carter resistance power	W	2X300	2X300	2X300	2X300	2X300	2X300	2X300
Power cables cross section per phase	mm^2	2x185	2x240	2x300	3x185	3x240	3x240	3x240
Fuses	A	3x500	3x600	3x700	3x800	3x900	3x900	3x900
Voltage operating limits	V	360-440V						
Refrigerant circuit								
Number of circuits		2						
Expansion device		Electronic expansion valve						
Refrigerant type		R134a						
Sound level at 5m	dbA	72	72	73	74	74	75	75
Dimensions Width	mm	2.200	2.200	2.200	2.200	2.200	2.200	2.200
Length	mm	6.500	6.500	7.800	9.100	9.100	10.400	10.400
Height	mm	2.450	2.450	2.470	2.490	2.490	2.490	2.490
Shiping weight	kg	5.350	5.680	6.700	7.700	8.100	9.050	9.150

Nominal conditions are as follows :

1. Entering/leaving chilled water temperature 12/7°C, ambient 35°CDB (cooling)
2. Electrical installation specifications are purely indicative and non-binding, all connections to the system andthe electrical installation must be in full accordance with all applicable national and local codes.

4. Capacity Tables

LKAC 040-345

Type	Ambient Temperature °C																			
		25			30			35			40			45			50		
	J MñØ outlet °C	Cooling capacity kW	Absorbed power kW	Current A	Cooling capacity kW	Absorbed power kW	Current A	Cooling capacity kW	Absorbed power kW	Current A	Cooling capacity kW	Absorbed power kW	Current A	Cooling capacity kW	Absorbed power kW	Current A	Cooling capacity kW	Absorbed power kW	Current A
[Y! / ھي	5	ĈDĆÆ	37,4	62,1	140,7	41,4	68,2	130,4	46,0	75,6	119,4	51,7	83,8	107,0	59,7	97,9	93,6	69,7	114,3
	ي	ĈĎĆÆ	37,7	62,5	152,8	41,7	68,8	**142**	**46,4**	**76,2**	130,3	51,7	84,7	117,9	59,4	97,3	103,4	69,2	113,6
	ھ	ĈĐĆÆĐ	38,1	63,2	172,5	42,2	69,5	160,6	47,0	77,1	148,0	52,3	85,7	134,4	59,5	97,5	119,3	69,0	113,4
[Y! / يي	5	ĈĆĈÆ	46,7	78,4	188,2	51,7	86,1	174,4	57,5	95,4	159,8	64,6	105,8	143,2	74,6	123,6	125,2	87,1	144,3
	ي	ĈĈĐÆÊ	47,1	79,0	204,5	52,2	86,9	**190**	**58,0**	**96,2**	174,3	64,7	107,0	157,8	74,2	122,8	138,4	86,5	143,5
	ھ	ĈÇDÆĐ	47,6	79,8	230,9	52,8	87,8	214,9	58,7	97,3	198,0	65,4	108,2	179,9	74,4	123,1	159,6	86,3	143,2
[Y! / ي ھ	5	ĈĐĎÆÊ	67,7	112,3	258,6	74,9	123,4	239,6	83,3	136,7	219,5	93,6	151,5	196,6	108,1	177,0	172,0	126,2	206,7
	ي	ĈEEÆĐ	68,3	113,1	280,9	75,5	124,4	**261**	**84,0**	**137,8**	239,5	93,7	153,2	216,7	107,5	176,0	190,1	125,3	205,5
	ھ	ĈĈĐÆĐ	69,0	114,3	317,1	76,4	125,8	295,2	85,0	139,3	272,0	94,7	155,0	247,1	107,8	176,4	219,2	125,0	205,1
[Y! / ﻻھ	5	ĈĈĎÆÇ	79,4	132,5	315,0	88,0	145,6	291,9	97,8	161,3	267,5	109,8	178,8	239,6	126,9	208,8	209,6	148,1	243,9
	ي	ĈĎĐĆÆ	80,2	133,4	342,2	88,7	146,8	**318**	**98,6**	**162,6**	291,8	109,9	180,8	264,1	126,1	207,6	231,6	147,1	242,5
	ھ	ÇĈĈÆÇ	81,0	134,9	386,4	89,7	148,4	359,7	99,8	164,4	331,4	111,1	182,9	301,1	126,5	208,1	267,1	146,7	242,0
[Y! / ھي	5	ĈDEÆÊ	91,4	151,9	364,6	101,2	166,9	337,8	112,4	184,9	309,5	126,3	205,0	277,3	145,9	239,4	242,5	170,4	279,6
	ي	ÇĈĈÆÇ	92,2	153,0	396,0	102,0	168,3	**368**	**113,4**	**186,4**	337,6	126,5	207,3	305,6	145,1	238,0	268,0	169,1	278,0
	ھ	ÇĐĎÆÊ	93,1	154,6	447,2	103,2	170,1	416,2	114,8	188,5	383,5	127,8	209,6	348,4	145,5	238,6	309,1	168,7	277,4
[Y! / ھو	5	ÇĊDÆ	98,6	162,8	408,2	109,2	178,9	378,2	121,4	198,1	346,5	136,3	219,7	310,4	157,5	256,6	271,5	183,9	299,7
	ي	ÇĐĆÆ	99,5	164,0	443,4	110,1	180,4	**412**	**122,4**	**199,8**	378,0	136,5	222,2	342,1	156,6	255,1	300,1	182,6	298,0
	ھ	DĊĆÆ	100,5	165,8	500,6	111,4	182,3	466,0	123,9	202,0	429,4	137,9	224,7	390,1	157,0	255,7	346,0	182,1	297,4
[Y! / ھي	5	ÇĐDÆÊ	110,2	178,7	446,8	122,0	196,5	414,0	135,7	217,6	379,3	152,4	241,3	339,8	176,1	281,8	297,2	205,5	329,1
	ي	DĈĐÆĐ	111,2	180,1	485,3	123,0	198,1	**451**	**136,8**	**219,4**	413,8	152,5	244,0	374,5	175,0	280,2	328,5	204,1	327,2
	ھ	DĐĆÆĐ	112,4	182,0	548,0	124,5	200,2	510,1	138,4	221,9	470,0	154,2	246,8	427,0	175,5	280,8	378,8	203,5	326,5
[Y! / يي	5	DĐĐÆĐ	134,4	218,2	540,9	148,8	239,8	501,2	165,4	265,6	459,2	185,8	294,5	411,4	214,7	344,0	359,8	250,6	401,7
	ي	ĐĈĐÆĐ	135,6	219,8	587,6	150,0	241,8	**546**	**166,8**	**267,8**	501,0	186,0	297,8	453,4	213,4	342,0	397,7	248,8	399,4
	ھ	ĐĈĐÆÇ	137,0	222,2	663,5	151,8	244,4	617,5	168,8	270,8	569,0	188,0	301,2	516,9	214,0	342,8	458,6	248,2	398,6
[Y! / ھو	5	ĐĊĆÆĐ	145,0	235,5	593,4	160,6	258,8	549,9	178,5	286,6	503,8	200,5	317,8	451,3	231,7	371,2	394,7	270,4	433,5
	ي	ĐĐĐÆĐ	146,3	237,2	644,6	161,9	260,9	**599**	**180,0**	**289,0**	549,6	200,7	321,4	497,4	230,3	369,1	436,3	268,5	431,0
	ھ	ĐĐÇÆ	147,8	239,8	727,9	163,8	263,7	677,5	182,2	292,2	624,3	202,9	325,0	567,1	230,9	369,9	503,1	267,8	430,1
[Y! / ﻻي	5	ĐĈĐÆ	161,8	263,0	681,6	179,1	289,0	631,6	199,1	320,1	578,7	223,7	355,0	518,4	258,4	414,6	453,4	301,7	484,2
	ي	ĐĐEÆĐ	163,2	264,9	740,4	180,6	291,5	**688**	**200,8**	**322,8**	631,2	223,9	359,0	571,3	256,9	412,2	501,1	299,5	481,4
	ھ	ĐEĆÆĈ	164,9	267,8	836,0	182,7	294,6	778,1	203,2	326,4	717,0	226,3	363,0	651,4	257,6	413,2	577,8	298,8	480,4
[Y! / يو	5	ĐĈÇÆĐ	185,3	298,8	781,6	205,2	328,4	724,3	228,1	363,8	663,6	256,2	403,4	594,4	296,0	471,1	519,9	345,5	550,2
	ي	EĆDÆĐ	187,0	301,0	849,0	206,8	331,2	**789**	**230,0**	**366,8**	723,9	256,5	407,9	655,2	294,2	468,4	574,6	343,1	547,0
	ھ	ĈĆĈĆÆĐ	188,9	304,3	958,7	209,3	334,7	892,4	232,8	370,9	822,3	259,2	412,5	747,0	295,1	469,5	662,7	342,2	545,9
[Y! / ھو	5	EEEÆĐ	219,9	354,9	936,2	243,5	390,0	867,5	270,7	432,0	794,8	304,1	479,0	712,0	351,3	559,5	622,7	410,1	653,4
	ي	ĈĆĐÇÆĐ	221,9	357,5	1016,9	245,5	393,3	**945**	**273,0**	**435,6**	867,0	304,4	484,4	784,7	349,2	556,3	688,2	407,2	649,7
	ھ	ĈĈĈĈÆĐ	224,2	361,4	1148,3	248,4	397,5	1068,8	276,3	440,5	984,9	307,7	489,9	894,7	350,2	557,5	793,7	406,2	648,3
[Y! / يق	5	ĈĈĐEÆ	250,7	403,4	1094,7	277,6	443,4	1014,4	308,6	491,1	929,4	346,6	544,6	832,5	400,5	636,0	728,2	467,5	742,8
	ي	ĈĈĐĐÆ	253,0	406,4	1189,1	279,8	447,1	**1105**	**311,2**	**495,2**	1013,8	347,0	550,7	917,6	398,1	632,4	804,8	464,2	738,5
	ھ	ĈÇĈEÆĐ	255,6	410,8	1342,7	283,2	451,9	1249,8	314,9	500,7	1151,6	350,7	556,9	1046,1	399,2	633,8	928,1	463,0	737,0
[Y! / يق	5	ĈĈĐDÆÇ	288,4	479,5	1203,6	319,3	527,0	1115,4	355,0	583,7	1021,9	398,8	647,3	915,4	460,7	756,0	800,6	537,8	882,9
	ي	ĈĈEÇÆĐ	291,0	483,1	1307,5	321,9	531,4	**1215**	**358,0**	**588,6**	1114,8	399,2	654,5	1008,9	458,0	751,6	884,9	534,0	877,8
	ھ	ĈDĐĈÆĐ	294,0	488,3	1476,4	325,8	537,1	1374,2	362,3	595,2	1266,3	403,5	662,0	1150,3	459,3	753,4	1020,4	532,7	876,0

Notes

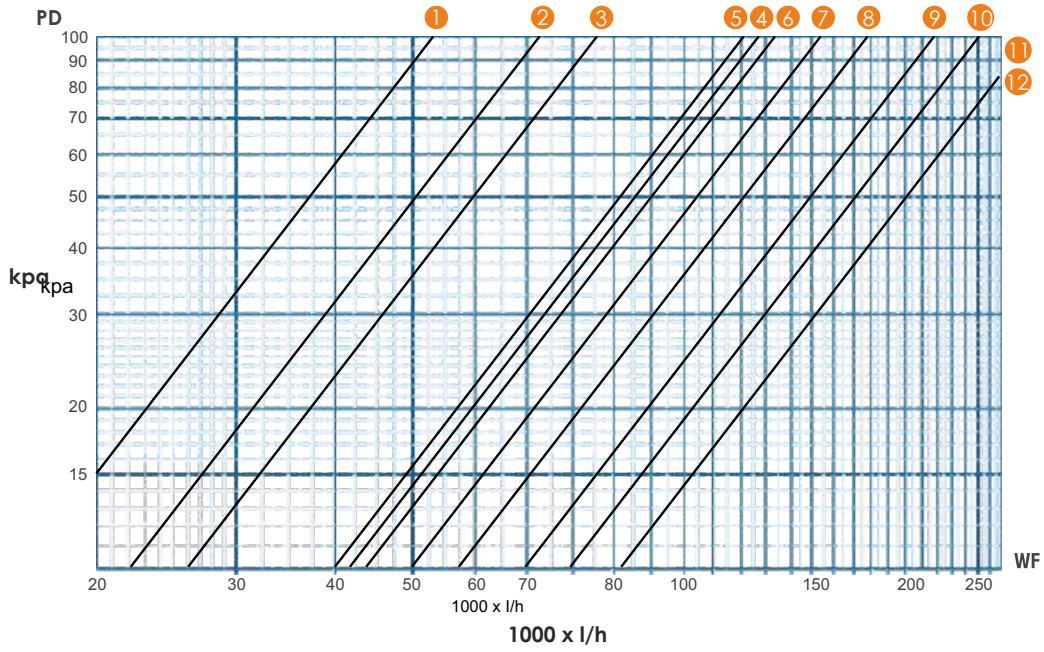
Bold values show nominal cooling capacities.

Absorbed power and current refers to the compressor.

Above figures are valid for water Δt = 5°C.

5. Water Pressure Drop

LKAC 040-345

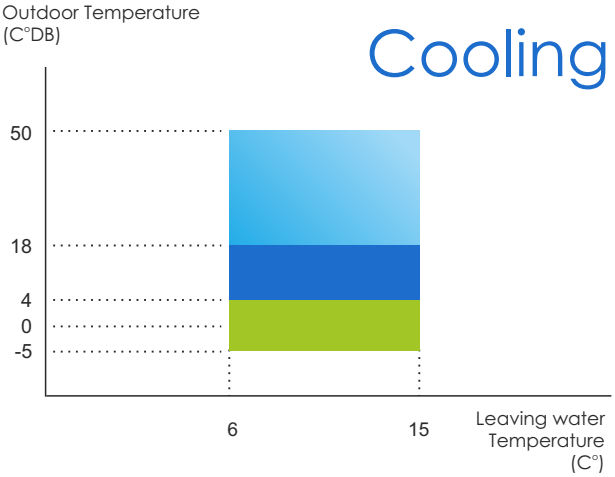


Notes

PD: Pressure Drop
WF: Water Flow
1. LKAC 040, 055
2. LKAC 075
3. LKAC 090
4. LKAC 105
5. LKAC 120
6. LKAC 130
7. LKAC 155
8. LKAC 170
9. LKAC 195
10. LKAC 225
11. LKAC 270, 315
12. LKAC 345

% Dsgxkdmd F kxbnkax unkt l d	Unit	10	20	30	40
Freezing point	°C	-4	-9	-15	-23
Output duty	KW	0,99	0,98	0,97	0,96
Input power	KW	0,99	0,98	0,98	0,97
Equivelant Flow rate	L/H	1,02	1,04	1,08	1,13
Equivelant pressure drop	kPa	1,06	1,12	1,18	1,25

6. Operation Range



Notes

Protect the water circuit against freezing

After Request

Required continuous linear fan speed regulation control.

The accompanying operating limits are for general guidance only. It may be possible for certain units to operate outside the confines of the graph.Please contact Klimallco if further clarification is required.

For operation with leaving water temperature below 6°C it is required to confirm with Klimallco at the time of order and the addition of glycol into the system.

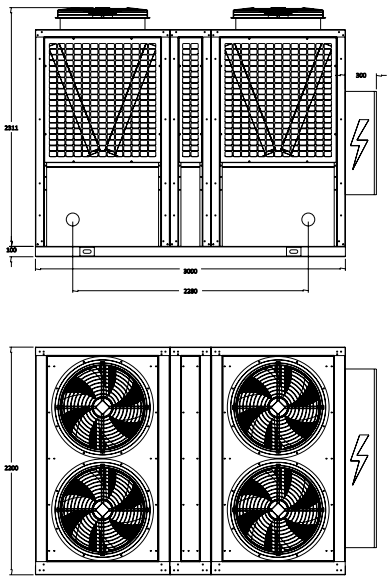
7. Sound Data

i ŘŐÑ		dB(A)	63	125	250	500	1000	2000	4000	8000
LKAC - 040	Power dB	88	82	81	81	83	82	80	75	70
	Pressure @1 m	77	71	70	70	72	71	69	64	59
	Pressure @10 m	57	51	50	50	52	51	49	44	39
LKAC - 055	Power dB	89	83	81	81	84	82	80	76	70
	Pressure @1 m	78	72	70	70	73	71	69	65	59
	Pressure @10 m	58	52	50	50	53	51	49	45	39
LKAC - 070	Power dB	90	83	81	81	84	83	82	78	70
	Pressure @1 m	79	72	70	70	73	72	71	67	59
	Pressure @10 m	59	52	50	50	53	52	51	47	39
LKAC - 090	Power dB	91	85	83	83	86	84	83	79	72
	Pressure @1 m	80	74	72	72	75	73	72	68	61
	Pressure @10 m	60	54	52	52	55	53	52	48	41
LKAC - 105	Power dB	91	85	83	83	86	84	83	79	72
	Pressure @1 m	80	74	72	72	75	73	72	68	61
	Pressure @10 m	60	54	52	52	55	53	52	48	41
LKAC - 120	Power dB	91	85	83	83	86	84	83	79	72
	Pressure @1 m	80	74	72	72	75	73	72	68	61
	Pressure @10 m	60	54	52	52	55	53	52	48	41
LKAC - 130	Power dB	92	86	84	84	87	86	84	80	73
	Pressure @1 m	81	75	73	73	76	75	73	69	62
	Pressure @10 m	61	55	53	53	56	55	53	49	42

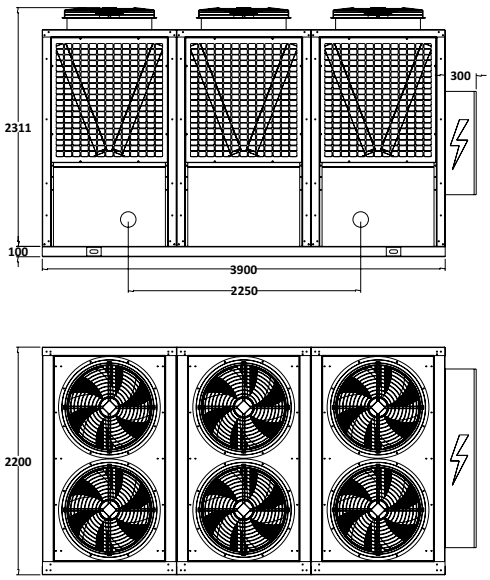
Type		dB(A)	63	125	250	500	1000	2000	4000	8000
LKAC - 155	Power dB	92	86	84	84	87	86	84	80	73
	Pressure @1 m	81	75	73	73	76	75	73	69	62
	Pressure @10 m	61	55	53	53	56	55	53	49	42
LKAC - 170	Power dB	94	87	85	85	88	87	86	82	74
	Pressure @1 m	83	76	74	74	77	76	75	71	63
	Pressure @10 m	63	56	54	54	57	56	55	51	43
LKAC - 195	Power dB	94	88	86	86	89	88	86	82	75
	Pressure @1 m	83	77	75	75	78	77	75	71	64
	Pressure @10 m	63	57	55	55	58	57	55	51	44
LKAC - 225	Power dB	95	88	86	87	89	88	87	83	75
	Pressure @1 m	84	77	75	76	78	77	76	72	64
	Pressure @10 m	64	57	55	56	58	57	56	52	44
LKAC- 270	Power dB	95	89	87	87	90	89	88	83	76
	Pressure @1 m	84	78	76	76	79	78	77	72	65
	Pressure @10 m	64	58	56	56	59	58	57	52	45
LKAC- 315	Power dB	95	89	87	87	90	89	88	83	76
	Pressure @1 m	84	78	76	76	79	78	77	72	65
	Pressure @10 m	64	58	56	56	59	58	57	52	45
LKAC- 345	Power dB	96	89	88	88	90	90	88	83	77
	Pressure @1 m	85	78	77	77	79	79	77	72	66
	Pressure @10 m	65	58	57	57	59	59	57	52	46

8. Outlook Drawings

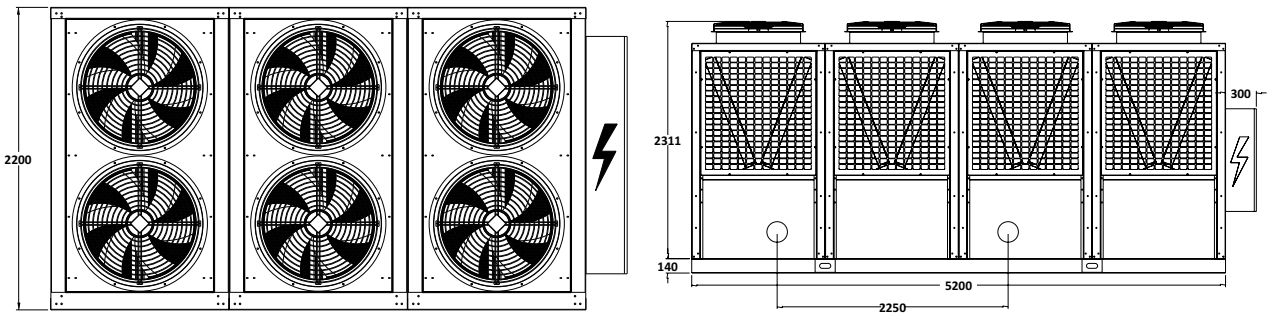
LKAC 040-075



LKAC 090-120

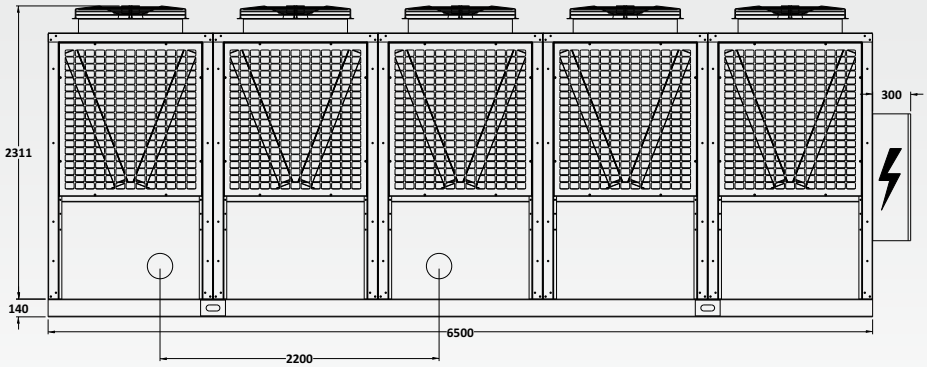


LKAC 130



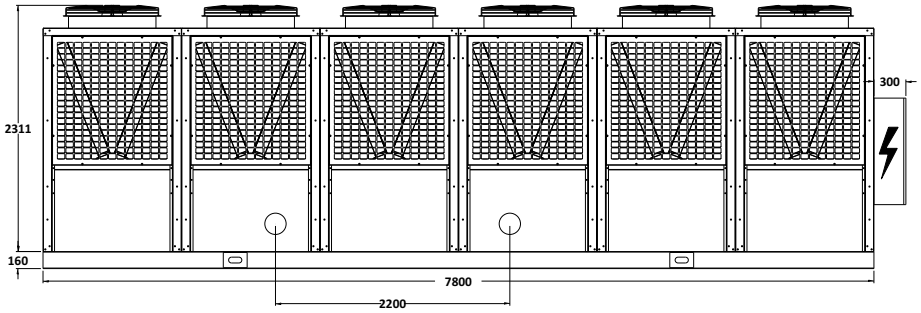
LKAC 155 - 170

W = 2200



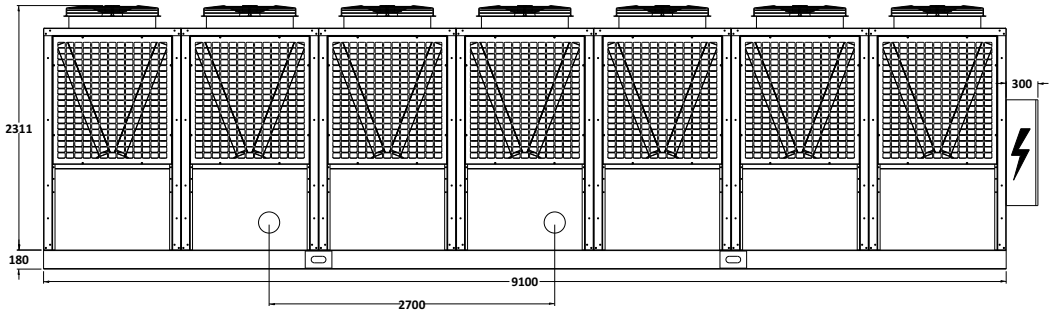
LKAC 195

W = 2200



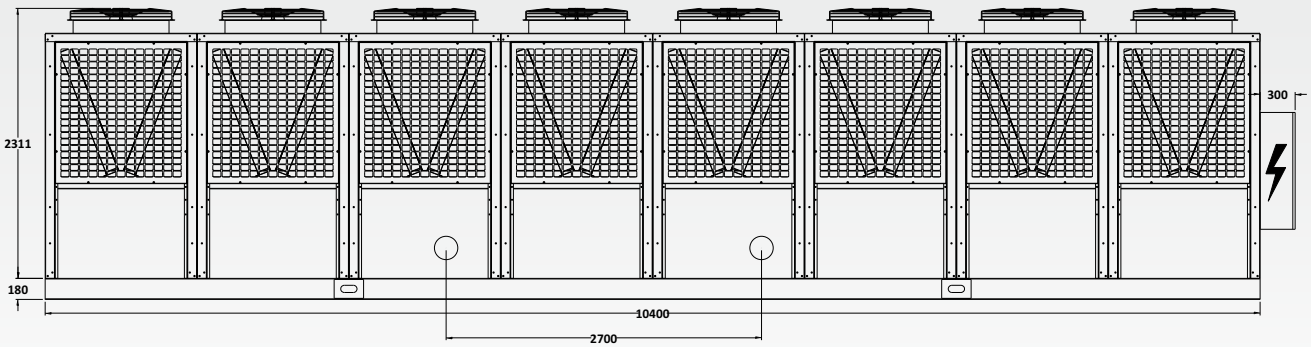
LKAC 225-270

W = 2200



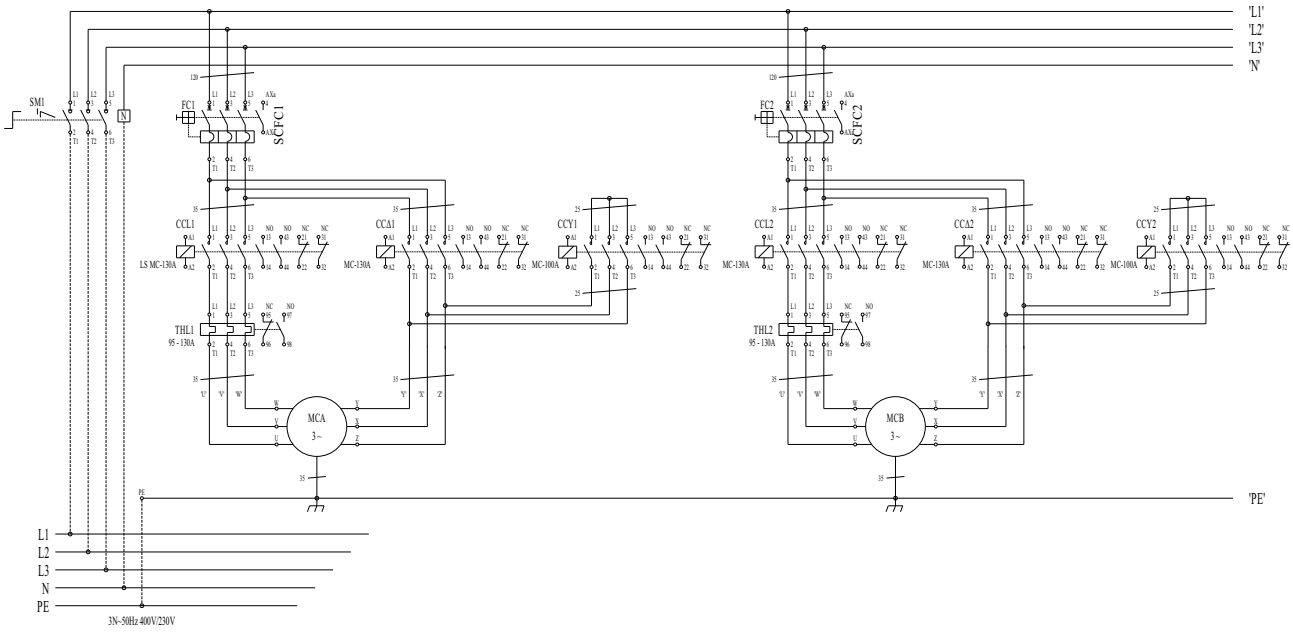
LKAC 315-345

W = 2200

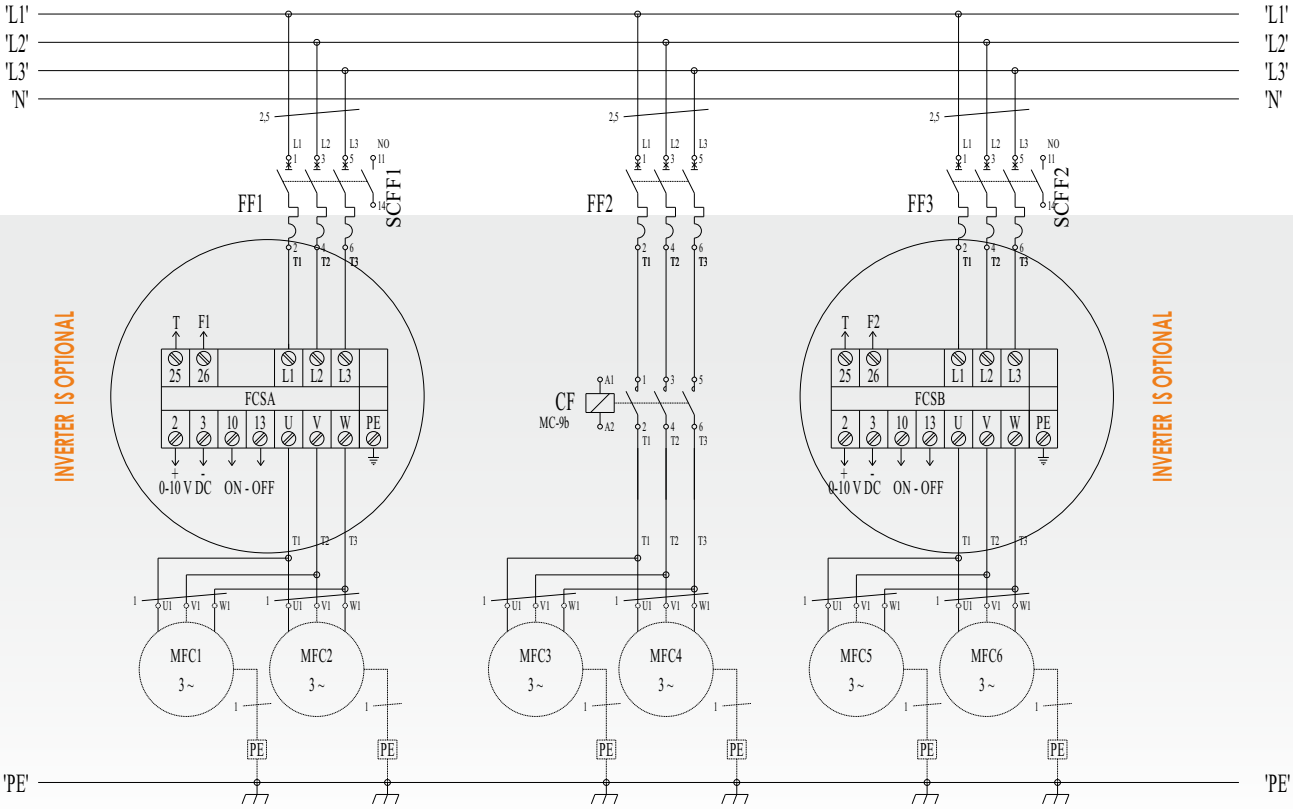


9. Wiring Diagramms

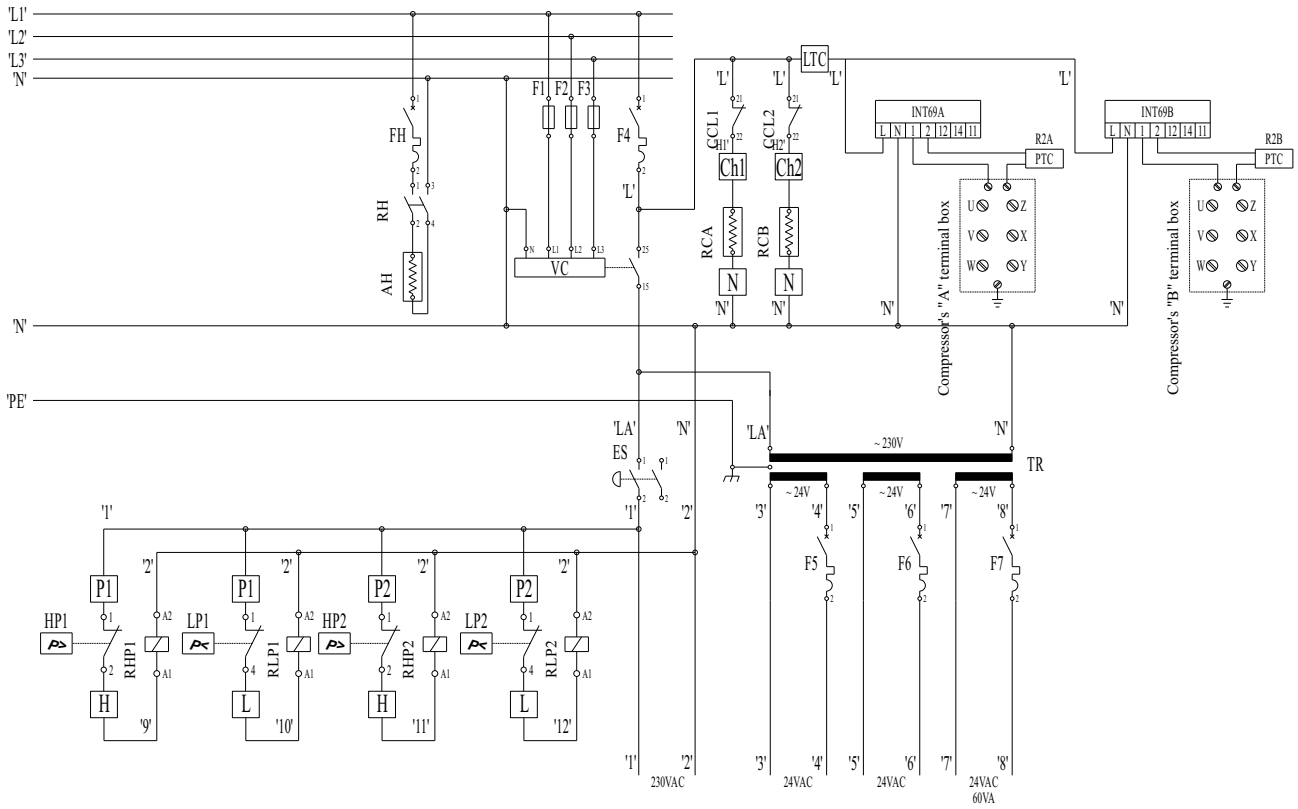
8.1 Compressor connection diagram



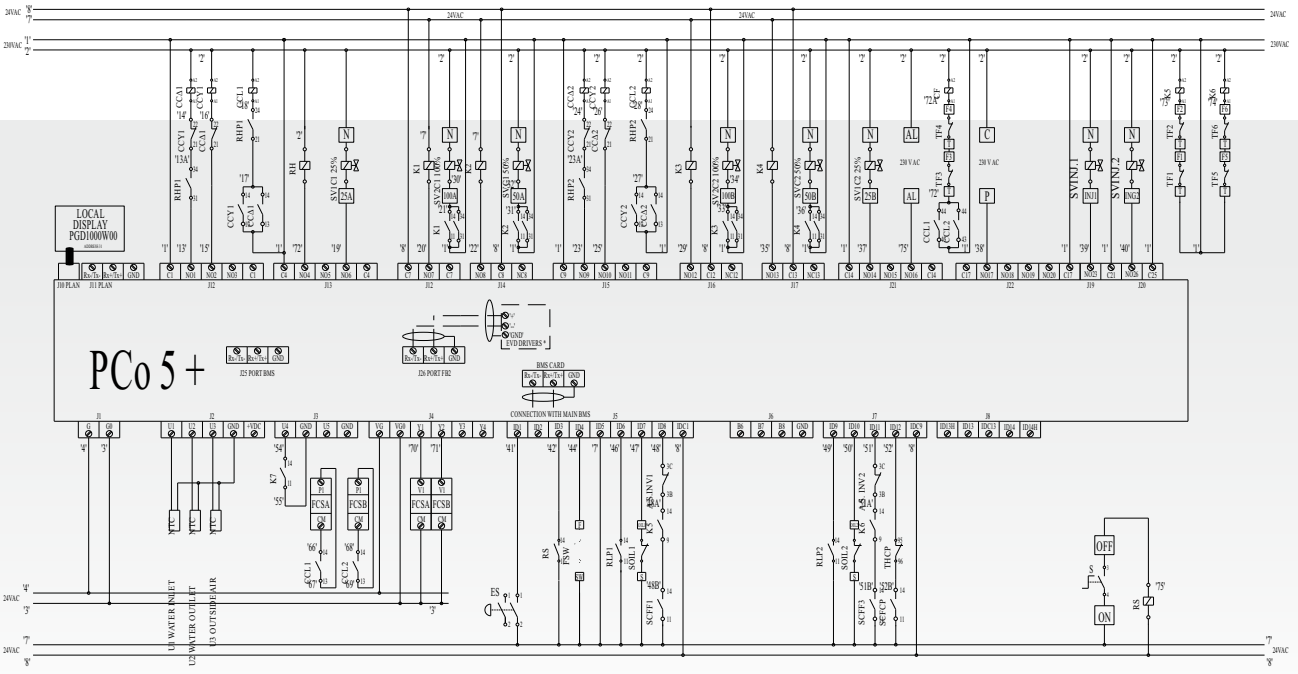
8.2 Fan connection diagram



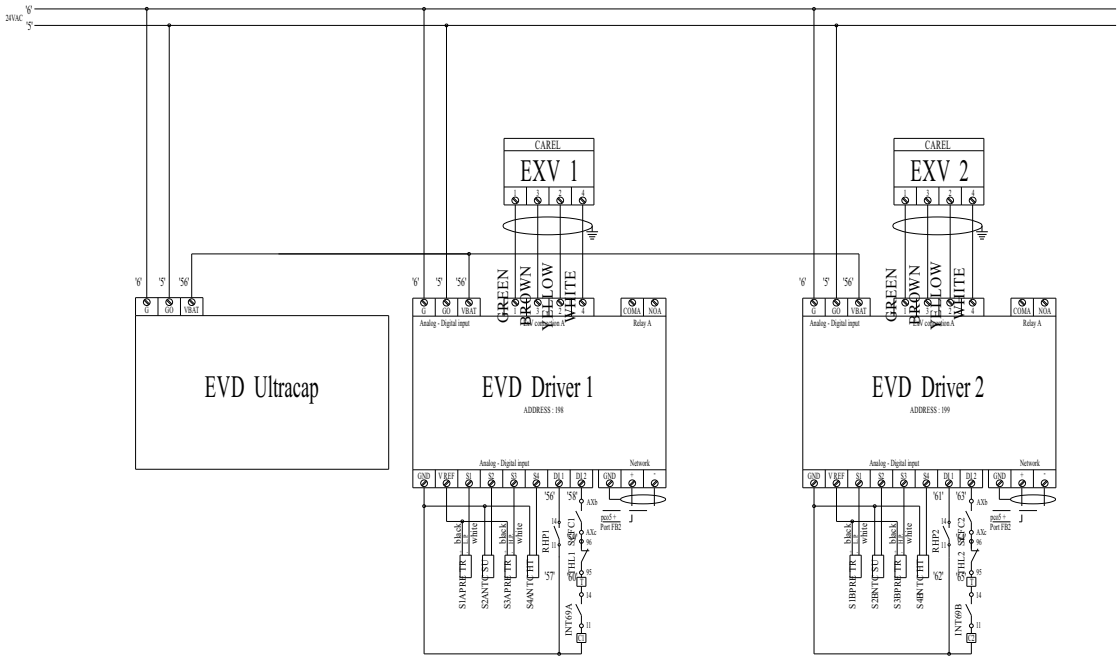
8.3 Electrical diagram of axiliary circuit



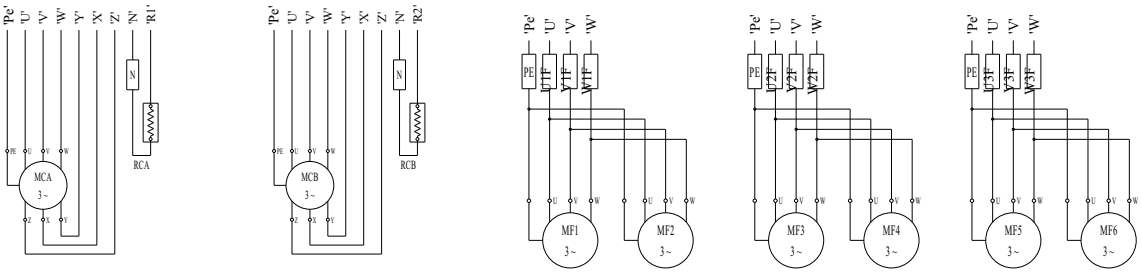
8.4 Control circuit diagram



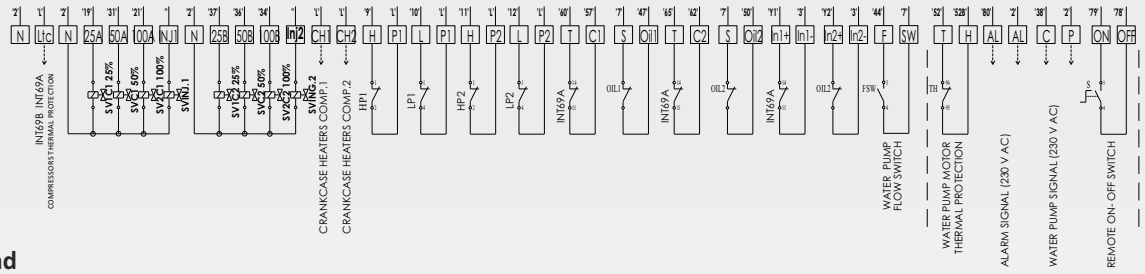
8.5 Electronic expansion valve connection diagram.



8.6 Electrical Panel



Cable Terminals



Legend

EXV_	Electronic refrigerant expansion valve
MFC_	Condenser fan's motor
Tr1	Transformer 230VAC / 24VAC /24VAC /24VAC /200VA
INT69_	Compressor's motor protection device
F_	Fuse
VC	3 phase control
LPT_	Low pressure transducer
HPT_	High pressure transducer
FC_	Compressor's circuit breaker
FCS_	Compressor's thermal overload relay (Y-Δ)
TF_	Contencer fans' speed controler (INVERTER)
FF_	Condenser fan speed controler alarm contact
MC_	Condenser fans' circuit breaker
THL_	Compressor's motor
CC_Δ	Compressor's "delta" contactor (Y-Δ)
CC_Y	Compressor's "star" contactor (Y-Δ)
Sm1	Main switch-disconnector
CC_L	Compressor's "line" contactor (Y-Δ)
EVD_	Electronic driver for exv expansion valve
S1_	Evaporating pressure transducer (0-10 Bar)
S2_	Compressor suction temperature
S3_	Compressor discharge temperature
S4_	Compressor condensating pressure (0-30 Bar)
THCP_	Water pump motor thermal protection (N.C. dry contact)
CP_	Water pump contactor
MCP_	Water pump motor
LP_	Low pressure switch
S	ON - OFF switch
FSW_	Flow switch
SOIL_	Oil level switch
SVINJ_	Liquid injection valve
U2	Water outlet temperature NTC probe (Slave unit)
U1	Water inlet temperature NTC probe (Slave unit)
SV1C1	Compressor's 1 solenoid valve "A" (25%)
RLP_	Low pressure switch miniature relay
RHP_	High pressure switch miniature relay
HP_	High pressure switch
SVC1	Compressor's 1 solenoid valve "B" (50%)
SV2C1	Compressor's 1 solenoid valve "C" (100%)
SV1C2	Compressor's 2 solenoid valve "A" (25%)
SVC2	Compressor's 2 solenoid valve "B" (50%)
SV2C2	Compressor's 2 solenoid valve "C" (100%)
SC_	Circuit breaker auxiliary contact
U3	Outside air temperature NTC probe (Slave unit)
ES	Emergency stop button
RH	Antifreeze heater contactor
AH	Antifreeze heater element
FH	Antifreeze heater circuit breaker

Field Connections

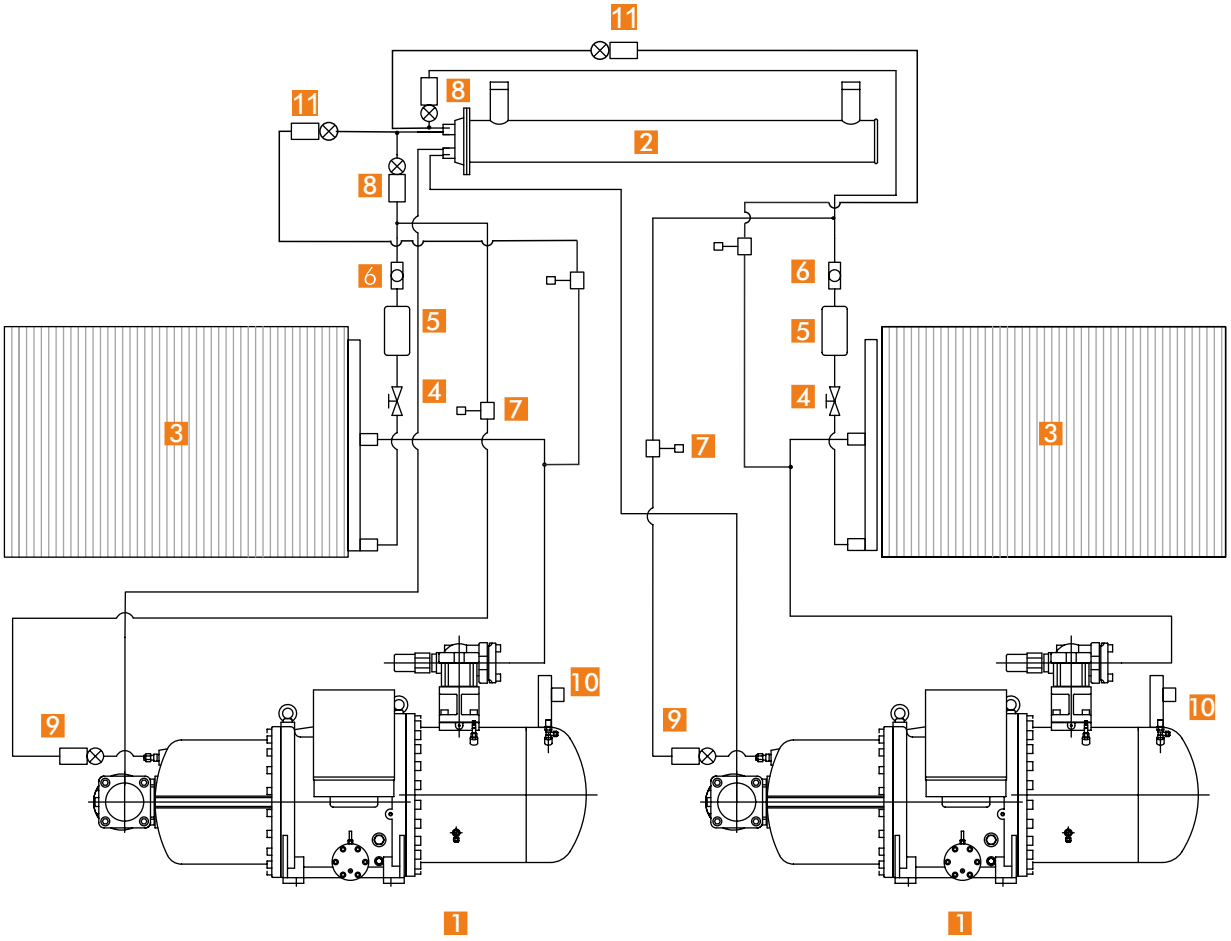
On - Off Remote On Off Switch (dry Contact)
Al-al Alarm Signal (220 V Ac)
C-p Pump Motor Command (220 V Ac)
T - H WATER PUMP THERMAL PROTECTION

VC MAIN ALARM

Overvoltage : F1 ON
Undervoltage : F2 ON
Phase failure : F1 on, F2 flashing
Phase unbalance : F1 and F2 on
Phase sequence: F1 and F2 alternately flashing
Overlapping of the threshold values : R/T,F1 and F2 flashing

10. Refrigerant Circuit

LKAC 040-345



NOTES

1. Compressors.
2. Shell and tube heat exchanger.
3. Condenser coil.
4. Shut of valve.
5. Filter dryer.
6. Sight glass.
7. Electromagnetic spray valve.
8. Electronic expansion valve.
9. Thermal expansion spray valve.
10. Safety valve.
11. Hot Gas by-pass regulator (Optional)

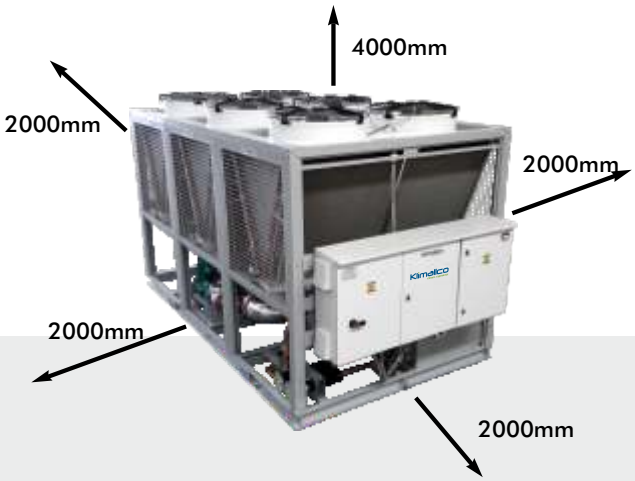
11. Installation

11.1 Selection of Location Installation and Service space

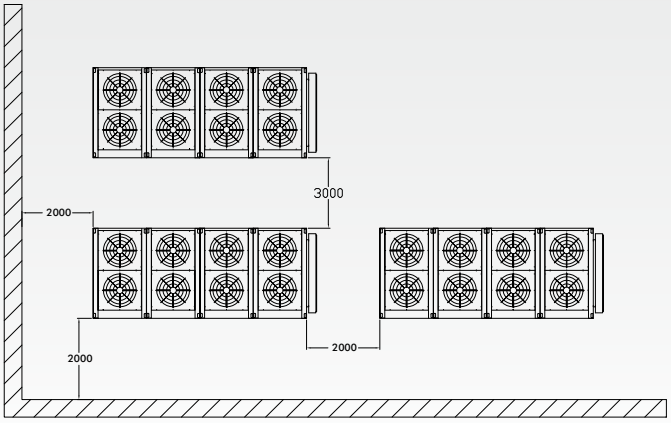
The LKAC unit should be installed in a location that meets the following requirements:

1. The foundation is strong enough to support the weight of the unit, and the floor is flat to prevent vibration and noise generation.
2. The space around the unit is adequate for servicing and the minimum space air inlet and air outlet is available. If several units are being installed side by side in parallel, the minimum service space between them must be taken into account.
3. There is no danger of fire due to leakage of inflammable gas.
4. Ensure that water cannot cause any damage to the surroundings in case it drips out of the unit.
5. Make sure that the air inlet and outlet of the unit are not positioned towards the main wind direction. Frontal wind shall disturb the operation of the unit. If necessary, use a windscreen to block the wind.
6. In heavy snowfall areas, select an installation site where snow shall not affect operation of the unit.
7. Make sure that the unit can be fixed directly on concrete. In order to avoid the transmission of vibration from the operating unit to its carrying structure, the use of antivibration material to install under the supports of the unit is recommended. It is suggested to install a rubber pad between the points of support and the base of the unit, or spring antivibration mounts under each point of support of the unit.

a. Installation and service space required for single chiller.

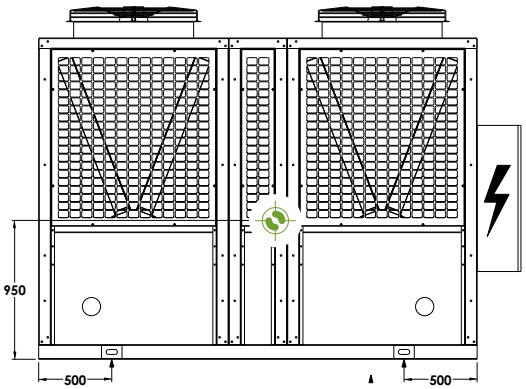


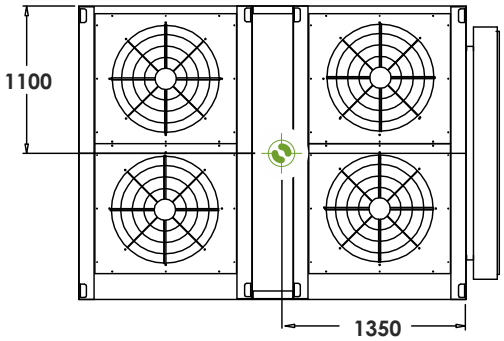
b. Installation and service space required for more than one chiller.



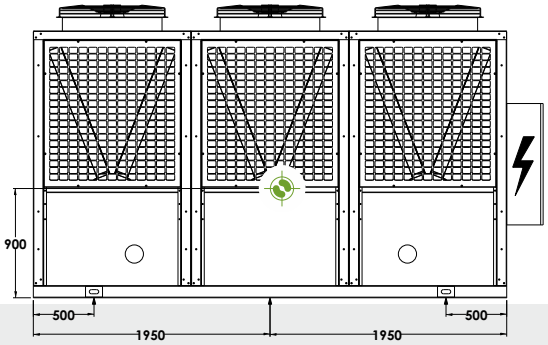
10.2 Center gravity and installation seating points

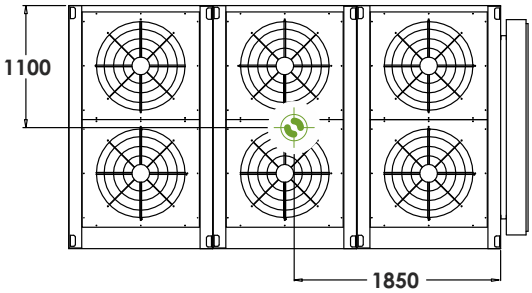
LKAC 040-075



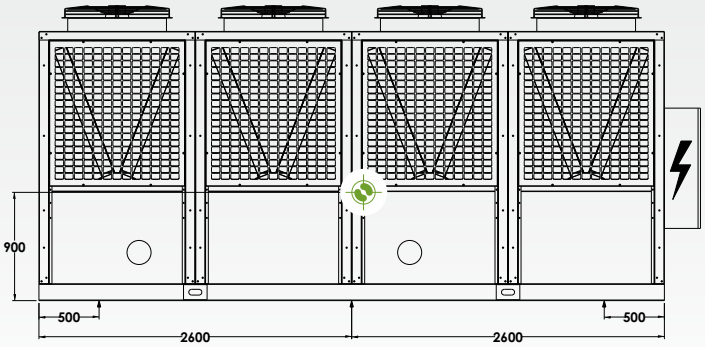


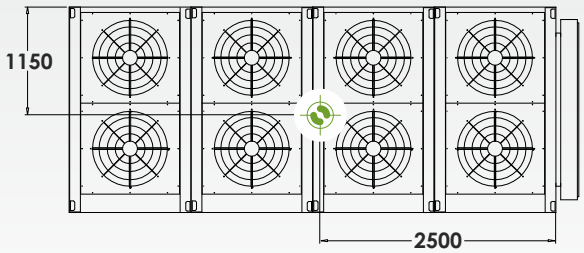
LKAC 090-120



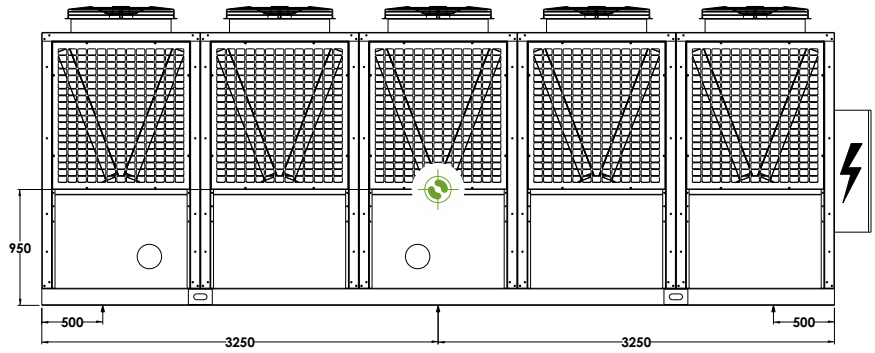


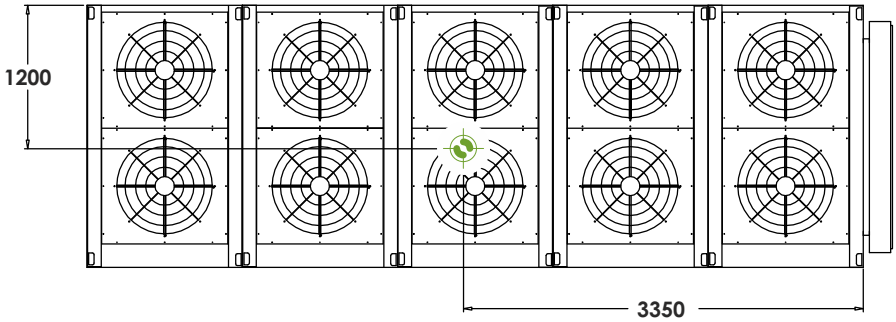
LKAC 130



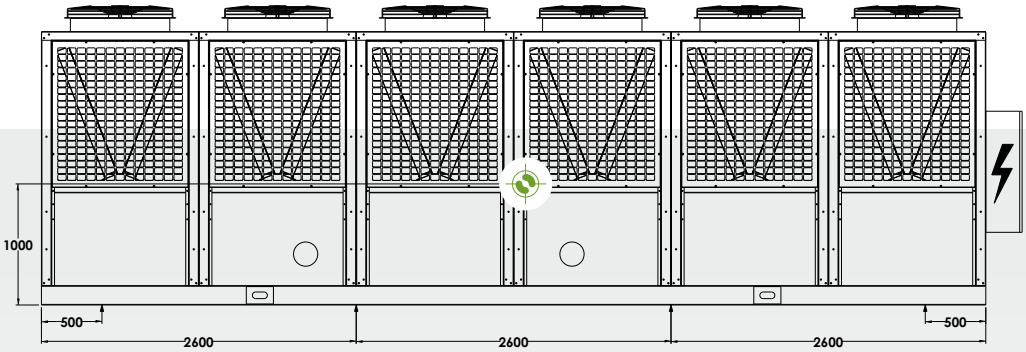


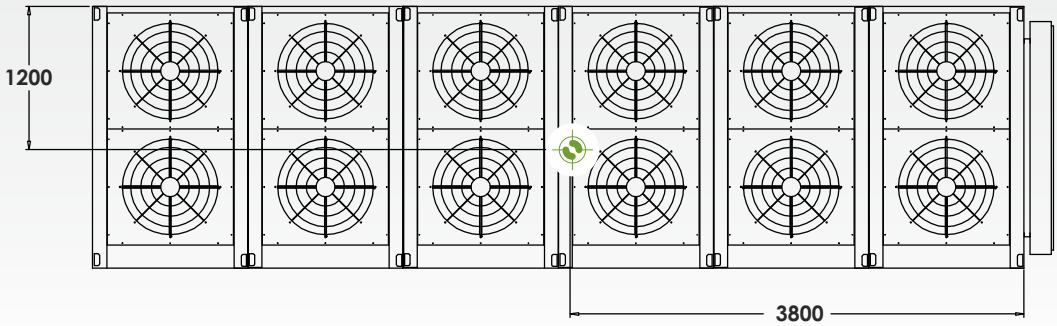
LKAC 155-170



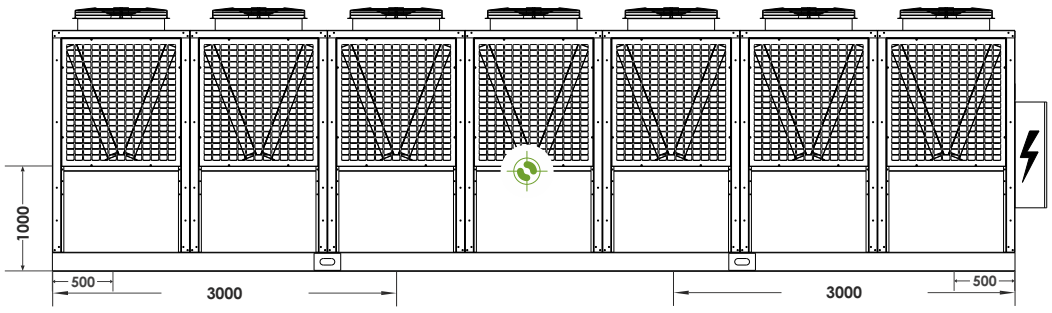


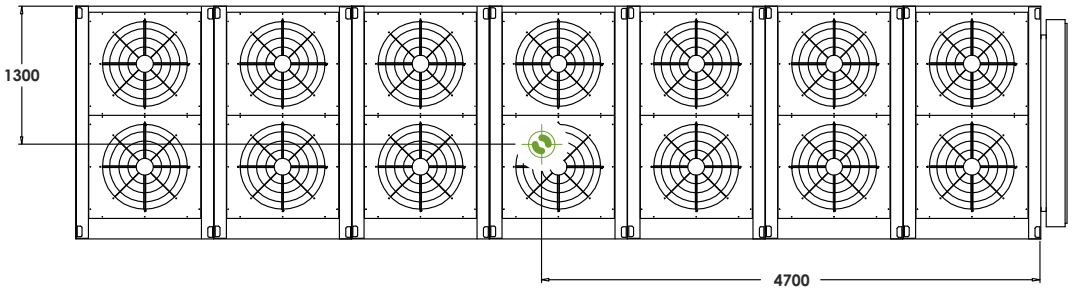
LKAC 195



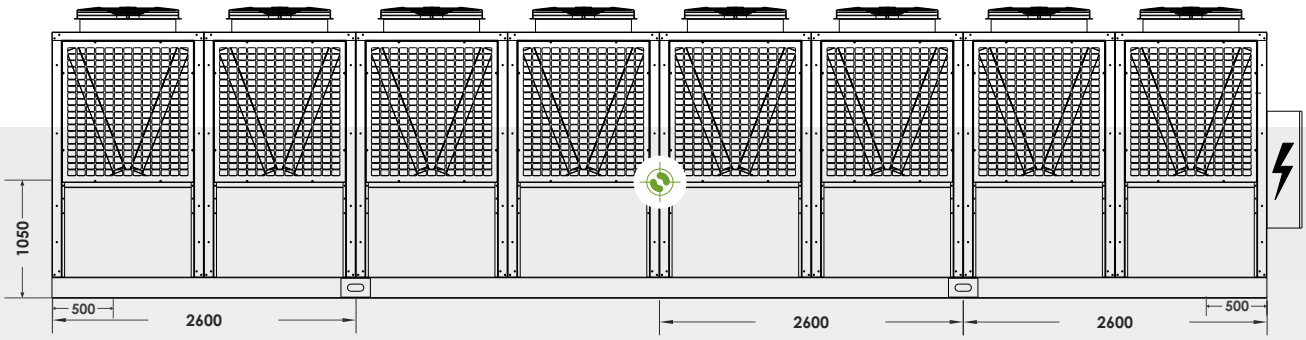


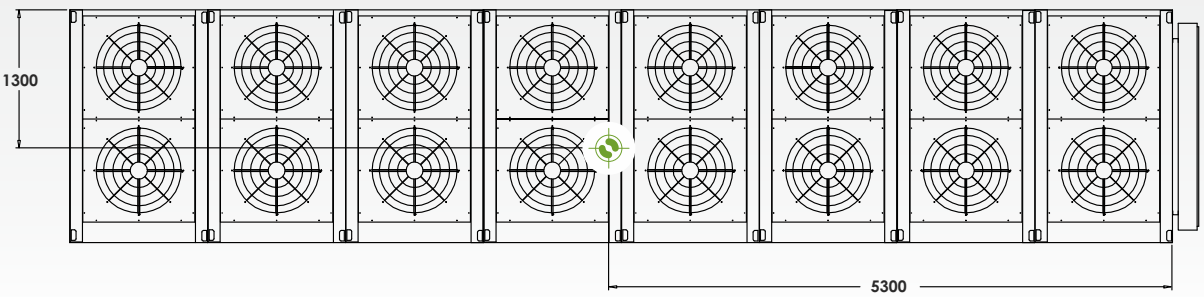
LKAC 225-270





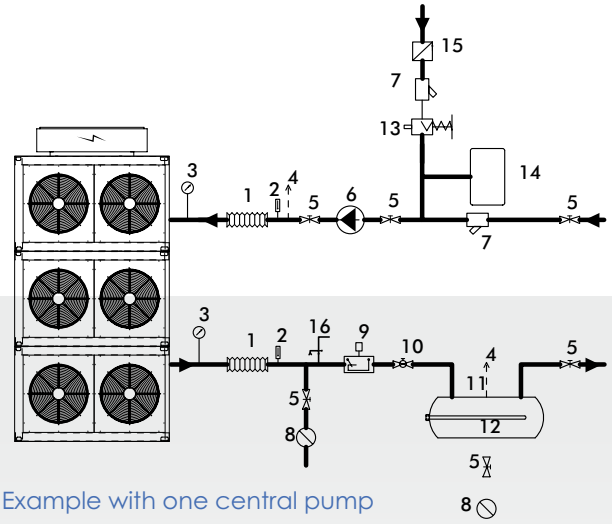
LKAC 315-345



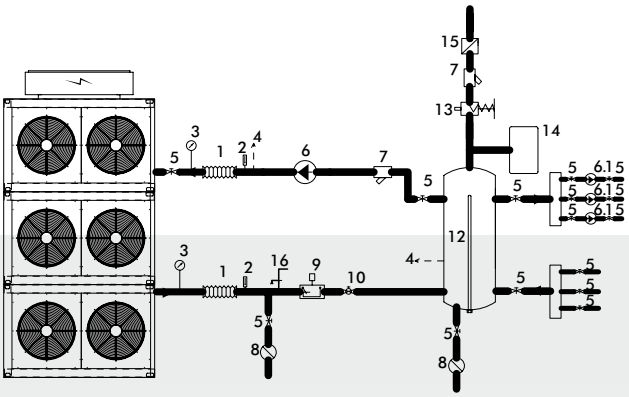


11.3 Recommendations concerning the hydraulic circuit

- All field connections must be carried out by a licensed technician and must comply with the applicable local and national codes.
- Evaporator water connections should be made in accordance with the unit outlook respecting the water inlet – and outlets.
- Install a flow switch or water differential pressostat (standard component) in the water outlet piping to prevent the unit from operating at a water flow, which is too low. A terminal is provided in the switch box for the electrical connection of the flow switch in the control circuit.
- To avoid errosion, it is recommended to install a filter in the water inlet pipe.
- It is essential to install a thermometer in the water inlet/ outlet pipe to check temperatures.
- Provide heat insulation with suitable vapour barrier around the chilled water piping to prevent condensation and capacity loss.Provide drain connections at all low points of the system to permit complete drainage for maintenance and/ or shutdown.
- Air vents should be provided at all high points in the system located where they are easily accessible for servicing. The water inlet pipe is specially designed to obtain a complete air purge of the evaporator.
- Provide flexible connection pipes at the inlet and outlet of the evaporator, to prevent tubes vibration.
- Install an expansion tank on the suction side of the water pump so that the water pressure on the pump suction shall be positive.
- The frequent evacuation of the water system should be avoided.
- To avoid frequent on/off operation of the compressor, a minimum water volume is required in the system. To assure proper operation of the unit, the water flow through the evaporator must be within the specified limits in (table 11.4). The water quality should be in accordance with the specifications in the table 11.4, to ensure the longest life span and optimum operation.



Example with one central pump



Example with internal loop pump and external zone pumps

NOTES

1. Flexible.
2. Thermometer.
3. Manometer.
4. Air vent.
5. Shut off valve.
6. Pump (primary circuit).
6. 1 Pump (secondary circuit).
7. Water filter.
8. Drainage.
9. Flow switch (optional).
10. Balancing valve.
11. Buffer tank.
12. Electric resistance.
13. Automatic make up water valve.
14. Expansion membrane.
15. Check valve.
16. Safety valve.

11.4 Watercharge, flow and quality

To ensure proper operation of the unit, a minimum water volume is required in the system and the water flow must be within the operation range as specified in the tables.

R134a	Minimum Water Volume (l)	Minimum Water Flow (l/h)	Nominal Water Flow (l/h)	Maximum Water Flow (l/h)
LKAC 040RTC	547	17,097	24,424	29,797
LKAC 055RTC	722	22,876	32,680	39,870
LKAC 075RTC	984	31,424	44,892	54,768
LKAC 090RTC	1263	38,287	54,696	66,729
LKAC 105RTC	1446	44,307	63,296	77,221
LKAC 120RTC	1572	49,605	70,864	86,454
LKAC 130RTC	1731	54,300	77,572	94,638
LKAC 155RTC	2079	65,738	93,912	114,573
LKAC 170RTC	2350	72,120	103,028	125,694
LKAC 195RTC	2665	82,835	118,336	144,370
LKAC 225RTC	3089	94,996	135,708	165,564
LKAC 270RTC	3572	113,778	162,540	198,299
LKAC 315RTC	4016	133,042	190,060	231,873
LKAC 345RTC	4313	146,286	208,980	254,956

Be sure the water quality is in accordance with the specifications below.

Items	Evaporator Water		Heated Water		Tendency if out of critiria
	Circulating Water 20°C	Supply Water	Circulating Water 20-60°C	Supply Water	
Items to be controlled					
PH at 20°C	6.8 - 8.0	6.8 - 8.0	7.0 - 8.0	7.0 - 8.0	corrosion + scale
Electrical Conduct (mS/m) at 25°C	bellow 30	bellow 30	bellow 30	bellow 30	corrosion + scale
Chloride Ion (mg Cl/l)	bellow 50	bellow 200	bellow 30	bellow 30	corrosion
Sulfate Ion (mg So 2/4/l)	bellow 50	bellow 50	bellow 30	bellow 30	corrosion
M-alkalinity (ph 4.8) (mgSO3/l)	bellow 50	bellow 50	bellow 50	bellow 50	corrosion
Total Hardness (CaCo3/l)	bellow 70	bellow 70	bellow 70	bellow 70	corrosion
Total Hardness (mg CaCO3/l)	bellow 50	bellow 50	bellow 50	bellow 50	corrosion
Silica Ion (mg Sio2/l)	bellow 30	bellow 30	bellow 30	bellow 30	corrosion
Items to be refered to :					
Iron (mg Fe/l)	bellow 1.0	bellow 0.3	bellow 1.0	bellow 0.3	corrosion + scale
Copper (mg Cu/l)	bellow 1.0	bellow 0.1	bellow 1.0	bellow 0.1	corrosion
Sulfide Ion (mg S2/l)	Not detectable	Not detectable	Not detectable	Not detectable	corrosion
Amonium Ion (mg NH4/l)	bellow 0.3	bellow 0.1	bellow 0.1	bellow 0.1	corrosion
Remaining Chloride (mg Cl/l)	bellow 0.25	bellow 0.3	bellow 0.1	bellow 0.3	corrosion
Free Carbide(mg SO2/l)	bellow 0.4	bellow 4.0	bellow 0.4	bellow 4.0	corrosion
Stability Index	-	-	-	-	corrosion + scale

Notes

The above tables are purely indicative and non-binding

Operating pressure of the refrigerant circuit

It is important to check the high and low pressure of the refrigerant circuit to ensure the proper operation of the unit and to guarantee that the rated output shall be obtained.

Attention:

The pressures measured shall vary between a maximum and minimum value, depending on the water and ambient temperatures at the moment of measurement.

R 134a	F ÖÖÖÖDNJÖ ÖÑÑ (Region)	Minimum (outdoor temp. 15°CDB) (leaving water temp 6°C)	Nominal (outdoor temp. 35°CDB) (leaving water temp, 7°C)	Maximum (outdoor temp. 38°CDB) (leaving water temp, 25°C)
	Low pressure	1,7-2,0 bar	2,0-2,3 bar	2,5-3,0 bar
	High pressure	8,0-10 bar	11-13 bar	14-16 bar

Klimallco®
climate experience

KLIMALLCO's units comply with the European regulations, that guarantee the safety of the product.

LKAC

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CERTIFIED LR ISO 9001 · ISO 14001

KLIMALLCO's quality management system is certified according to **ISO 9001:2015** and **ISO 14001:2015** for:
Design, manufacturing and trading of air conditioning equipment.

Technical Data
2019

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