

Packaged Air to Water Chillers and Heat Pumps

Cooling capacity : 5.9 - 31.8 kW
Heating capacity : 6.9 - 37.3 kW

SKAC
SKAH

SKAC/SKAH-B R407c
SKAC/SKAH-D R410a



Outdoor Installation



Contents

pg	
2	1. General Description
3	2. Technical Description
5	3. Technical Specifications
7	4. Capacity Tables
8	5. Water Pressure Drop
8	6. Operation Range
9	7. Outlook Drawings
11	8. Refrigerant Diagrams
12	9. Wiring Diagrams
14	10. Installation

1. General Description

Packaged Air to Water Chillers and Heat Pumps

The Klimallco SKAC / SKAH large series are packaged air cooled water chillers for cooling applications and outdoor installation. They are available in 9 models with nominal cooling capacities ranging from 5,8 to 31,8 kW and 6,9 to 37,3 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.

Chiller - SKAC
Heat Pump - SKAH

- **Optimized design for R407c/R410a refrigerant.**
- **Casing:** Galvanized steel plate with polyester coating.
- **Assembly:** Fully bolted/welding free. Built in complete hydraulic module.
- **Compressor:** Hermetically sealed scroll type.
- **Air heat exchanger:** Cross fin coil.
- **Direct drive propeller fan :** Low rpm, quiet operation.
- **Water heat exchanger:** Plate heat exchanger.
- **Safety and functional devices :**
 - High/low pressure switches / transmitters.
 - Differential water pressostat.
 - Plate heat exchanger low temperature protection.
 - Electronic microprocessor control with digital display.

2. Technical Description

General

The SKAC/SKAH series air-cooled water heat pump consists of 9 models covering cooling capacities from 5,8 up to 31,8kW and heating capacities from 6,9kW up to 37,3kW. It is the end result of a thorough study, and accurate design by experienced Klimallco research and development teams, to develop a small size heat pump 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 R407c refrigerant that is Chlorine-free and has zero ozone depletion potential. SKAC-HSB units are therefore ideal for installation in urban environments due to their elegant design, 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 metal parts are degreased, phosphatised, and electrostatically powder coated with an epoxy-polyester RAL 7042 coating of a thickness of 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 panels with special locks are used to permit access only to authorized personnel to internal components of the unit for inspection and maintenance.

Compressor

All units use low-noise, maintenance free, Hermetic Scroll compressor with low vibration levels, specially optimized for use with R407c or R410a refrigerant, selected from world class suppliers. They are equipped with a crankcase electrical heater for the oil, and are internally protected against potential overloading or electrical spikes. The compressors are mounted on special antivibration rubber mounts to eliminate vibration from the unit's operation.

Hydraulic kit

All units are equipped, as standard, with a complete

hydraulic kit comprising of a circulating pump, buffer and expansion tank, automatic fill and make up water valve with manometer, safety valve, airvent, water filter, differential water pressure switch, and evacuation valve.

Air heat exchanger

All unit air heat exchangers are manufactured from high quality inner grooved seamless 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.

Water heat exchanger

All units are equipped with a water - refrigerant Plate Heat Exchanger, selected from world class manufacturers.

It is made of stainless steel plates (AISI 316L.4401) specially formed to achieve a large heat transfer surface and assembled by means of an automatic brazing process, under vacuum.

Air heat exchanger fans

All unit fans are of the axial type, single phase, 6 poles, internally protected against potential overheating silent and suitable for outdoor installation. Due to the sophisticated 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 of the external rotor type, aerodynamically shaped so as not to interfere with the airflow, and have permanently lubricated bearings that do not require servicing. Continuous linear fan speed regulation control is achieved according to coil temperatures including fan silent mode operation. This standard feature for Klimallco SKAC units saves energy and reduces sound levels dramatically, optimizing capacity. Microprocessor controller All units are equipped with a sophisticated controller easily accessible from outside through a transparent plastic cover that combines intelligence with operating simplicity. The controller constantly monitors all machine parameters and precisely manages among others

- Automatic compressor control function through return water temperature.
- Continuous fan speed control based on coil heat exchanger temperature.
- Defrost control.
- Hydraulic circuit pump control.
- Compressor start up time delay function.
- Over 150 programmable parameters.
- Fan motor overload protection.
- Auto diagnostic stop function due to low water circulation, high/low operating pressures, and compressor thermal overload.
- Auto diagnostic function and digital display of approximately 30 possible error codes including thermistor faults.
- Digital displays of water inlet / outlet as well as coil temperatures.
- Remote Cool / Heat selector switch.
- Remote on / off switch.

- Remote alarm indication capability.
- Many optional control capabilities (listed in optional accessories).

Refrigerant circuit

All units have a single refrigerant circuit with one compressor. The circuit consists of thermal expansion valve, solenoid valve, large capacity filter dryer and liquid glass.

For heat pump units circuit includes also 4-way reversing valve, suction accumulator, liquid receiver, check valves. Unit protection is provided by either a high-pressure switch with manual reset and low-pressure switch - auto reset (R407c) or by pressure transmitters (R410a).

Optional accessories

Microprocessor controller options

- Remote keyboard.
- Dynamic set point program via a 4-20ma proportional signal
- BMS module interface kit for Modbus connection.
- Parallel chiller operation with more than 2 units with optional controller.
- Microprocessor parameter reprogramming card.

Other unit accessories/option

- R407c or R410a refrigerant.
- Antifreeze protection.
- Pressure manometers (R407c).
- Condenser fins made of copper or prepainted aluminum, and Blygold treatment for corrosion protection.
- Glycol application for chilled water temperature down to -5°C
- Pressure relief valve on compressor discharge.
- High / Low pressure manometers.
- Phase sequence - phase failure - reverse phase and voltage monitoring device.
- Compressor noise reduction jacket.
- Compressor chamber noise reduction kit.
- Other custom built options upon request.

3. Technical Specifications

SKAC 001-010 Cooling Only

Type		001-1	002-1	002	003	004	005	006	007	010
Nominal cooling capacity	kW	5,8	6,9	6,9	8,1	12,2	14,6	18,5	22,4	31,8
	RT	1,6	2	2	2,3	3,5	4,14	5,36	6,47	9,01
	Btu/h	19.773	23.523	23.523	27.614	41.591	49.773	63.068	76.364	108.409
Construction	Material/Color	Galv anized steel/Light grey-beige (RAL7042)								
Compressor		SCROLL								
Quantity		1								
Absorbed power	kW	2	2,4	2,32	2,7	4,02	4,7	6	7,2	10,3
Nominal operating current	A	9,4	11,1	4,4	5	7,8	8,3	12,2	14,5	17,8
Maximum operating current	A	14,8	17,3	5,6	7	11	13	17	20	27
Air heat exchanger		High capacity cross finned coil with internallygrooved tubes and louv erfins								
Water heat exchanger		Braze plate								
Quantity		1								
Water content	l	0,57	0,66	0,66	0,76	1,14	1,35	1,4	1,7	2,5
Max. Operating pressure	Waterside bar	30	30	30	30	30	30	30	30	30
	Refrigerant side bar	30	30	30	30	30	30	30	30	30
Connections		3/4"	3/4"	3/4"	1"	1"	1"	1 1/4"	1 1/4"	1 1/4"
Nominal water flow	l/h	998	1.187	1.187	1.393	2.098	2.511	3.182	3.853	5.470
Water pressure drop	kpa	26,5	27,6	27,6	29,2	29,9	34,1	34,6	45,4	24,4
Minimum system water content	l	29	35	35	41	61	73	93	112	159
Maximum unit operating water pressure	bar	3,0								
Fan		Axial type								
Quantity		1			2			1		
Speed	rpm	920	920	920	920	920	920	920	920	920
Total air flow	m³/h	2.500	2.350	2.350	4.000	4.600	6.200	6.400	10.500	11.000
Absorbed power	kW	0,12	0,12	0,12	0,17	0,24	0,34	0,34	0,6	0,6
Nominal operating current	A	0,57	0,57	0,57	0,8	1,14	1,6	1,6	2,4	2,4
Maximum operating current	A	0,63	0,63	0,63	0,9	1,26	1,8	1,8	3,8	3,8
Pump										
Absorbed power	kW	0,13	0,13	0,13	0,13	0,25	0,3	0,45	0,45	0,55
Maximum operating current	A	0,58	0,58	0,58	0,58	1,1	2	2,7	2,7	3,5
Av ailable external water head	Kpa	35	32	32	30	42	130	150	120	165
Electrical characteristics		230 V/1 ph/50 Hz			400 V/3 ph/50 Hz					
Total absorbed power	kW	2,3	2,7	2,6	3	4,5	5,3	6,8	2,3	11,5
Nominal operating current	A	10,6	12,3	5,6	6,4	10	11,9	16,5	19,6	23,7
Maximum operating current	A	16	18,5	6,8	8,5	13,4	16,8	21,5	25,3	33,1
Compressor carter resistance power	W	70	70	70	70	70	70	70	70	70
Power cables cross section	mm²	4	4	2,5	2,5	2,5	4	6	6	10
Fuses	A	25	25	3x16	3x16	3x16	3x25	3x25	3x32	3x40
Voltage operating limits	V	220-240 V			360-440 V					
Refrigerant circuit										
Number of circuits		1								
Expansion device		Expansion valve								
Refrigerant type		R407c/ R410a								
Noise level at 5m	dB(A)	45	45	46	48	48	51	52	53	55
Dimensions	Width mm	474	474	474	474	522	522	605	800	800
	Length mm	1022	1022	1022	1222	1462	1612	1732	2020	2020
	Heigh mm	932	932	932	982	1002	1002	1202	1202	1202
Shipping weight	kg	100	108	108	140	180	200	270	320	350

Notes

Nominal conditions are as follows entering/leaving chilled water temperature 12/7°C; ambient 35°C DB electrical installation specifications are purely indicative and non-binding, all connections to the system and the electrical installation must be in full accordance with all applicable national and local codes.

SKAH 001-010 Heat Pump

Σύμ		001-1	002-1	002	003	004	005	006	007	010
Nominal cooling capacity	kW	5.8	6.9	6.9	8.1	12.2	14.6	18.5	22.4	31.8
	RT	1.6	2.0	2.0	2.3	3.5	4.1	5.3	6.4	9.0
	Btu/h	19.773	23.523	23.523	27.614	41.591	49.773	63.068	76.364	108.409
Nominal heating capacity	kW	6.9	8.2	8.2	9.6	14.3	17	21.7	26.2	37.3
	kcal	5.934	7.052	7.052	8.256	12.298	14.620	18.662	22.532	32.078
Construction	Material/Color	Galvanized steel/Light grey-beige (RAL9002)								
Compressor		SCROLL								
Quantity		1								
Absorbed power	kW	2.0/2.3	2.4/2.7	2.3/2.7	2.7/3.1	4.0/4.5	4.6/5.2	6.0/6.8	7.2/8.0	10.3/11.5
Nominal operating current	A	9.4/10.6	11.1/12.6	4.4/4.8	5.0/5.5	7.8/8.3	8.3/9.2	12.2/13.1	14.5/15.5	17.8/19.4
Maximum operating current	A	14.80	17.30	5.60	7.00	11.00	13.00	17.00	20.00	27.00
Air heat exchanger		High capacity cross finned coil with internally grooved tubes and louver fins								
Water heat exchanger		Braze plate								
Quantity		1								
Water content	l	0.57	0.66	0.66	0.76	1.14	1.35	1.40	1.70	2.50
Max. Operating pressure	Waterside bar	30	30	30	30	30	30	30	30	30
	Refrigerant side bar	30	30	30	30	30	30	30	30	30
Connections		3/4"	3/4"	3/4"	1"	1"	1"	1 1/4"	1 1/4"	1 1/4"
Nominal water flow	l/h	998	1.187	1.187	1.393	2.098	2.511	3.182	3.853	5.470
Water pressure drop	kpa	26.5	27.6	27.6	29.2	29.9	34.1	34.6	45.4	24.4
Minimum system water content	l	29	35	35	41	61	73	93	112	159
Maximum unit operating water pressure	bar	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Fan		Axial type								
Quantity		1			2			1		
Speed	rpm	920	920	920	920	920	920	920	860	860
Total airflow	ℓ ³ /h	2.500	2.350	2.350	4.000	4.600	6.200	6.400	10.500	11.000
Absorbed power	kW	0.12	0.12	0.12	0.17	0.24	0.34	0.34	0.6	0.6
Nominal operating current	A	0.57	0.57	0.57	0.80	1.14	1.60	1.60	2.6	2.6
Maximum operating current	A	0.63	0.63	0.63	0.90	1.26	1.80	1.80	2.4	2.4
Pump										
Absorbed power	kW	0.13	0.13	0.13	0.13	0.25	0.30	0.45	0.45	0.55
Maximum operating current	A	0.58	0.58	0.58	0.58	1.1	2.00	2.70	2.70	3.50
Available external water head	Kpa	35.0	32.0	32.0	30.0	42.0	130.0	150.0	120.0	165.0
Electrical characteristics		230 V/1 ph/50 Hz			400 V/3 ph/50 Hz					
Total absorbed power	kW	2.3/2.6	2.7/3.0	2.6/3.0	3.0/3.4	4.5/5.0	5.3/5.8	6.8/7.6	8.3/9.1	11.2/12.7
Nominal operating current	A	10.6/11.8	12.2/13.8	5.6/6.0	6.4/6.9	10.0/10.5	11.9/12.8	16.3/17.4	19/20.6	22.9/25.3
Maximum operating current	A	16.0	18.5	6.8	8.5	13.4	16.8	21.5	25.3	33.1
Compressor carter resistance power W		70	70	70	70	70	70	70	70	70
Power cables cross section	mm ²	4	4	2.5	2.5	2.5	4	6	6	10
Fuses	A	25	25	3x16	3x16	3x16	3x25	3x25	3x32	3x40
Voltage operating limits	V	220-240 V			360-440 V					
Refrigerant circuit										
Number of circuits		1								
Expansion device		Expansion valve								
Refrigerant type		R407c/ R410a								
Noise level at 5m	dB(A)	45	45	46	48	48	51	52	53	55
Dimensions	Width mm	474	474	474	474	522	522	605	800	800
	Length mm	1022	1022	1022	1222	1462	1612	1732	2020	2020
	Heigh mm	932	932	932	982	1002	1002	1202	1202	1202
Shipping weight	kg	110	115	115	155	190	230	300	350	380

Notes

Nominal conditions are as follows entering/leaving chilled water temperature 12/7 °C; ambient 35°CDB (cooling) entering/leaving heated water temperature 40/45 °C; ambient 7°CDB/6°CWB (heating) electrical installation specifications are purely indicative and non-binding, all connections to the system and the electrical installation must be in full accordance with all applicable national and local codes.

4. Capacity Tables

Cooling capacity table for SKAC / SKAH

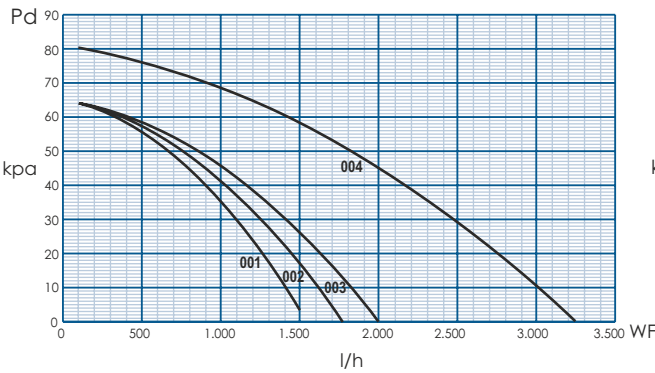
Type	Ambient Temperature °C																
	Water inlet °C		25			30			35			40			45		
			Cooling	Absorbed power kW	Current A	Cooling	Absorbed power kW	Current A	Cooling	Absorbed power kW	Current A	Cooling	Absorbed power kW	Current A	Cooling	Absorbed power kW	Current A
001-1	5		6.1	1.6	7.5	5.8	1.8	8.4	5.4	2.0	9.4	4.9	2.3	10.6	4.5	2.6	12.1
	7		6.7	1.6	7.5	6.2	1.8	8.3	5.8	2.0	9.4	5.4	2.3	10.6	4.9	2.6	12.0
	10		7.5	1.6	7.4	7.0	1.8	8.2	6.6	2.0	9.2	6.1	2.3	10.4	5.5	2.6	11.9
002-1	5		7.3	1.9	8.9	6.9	2.1	9.9	6.4	2.4	11.1	5.9	2.7	12.6	5.3	3.1	14.3
	7		8.0	1.9	8.8	7.5	2.1	9.9	6.9	2.4	11.1	6.4	2.7	12.5	5.8	3.1	14.2
	10		8.9	1.8	8.7	8.4	2.1	9.8	7.8	2.3	10.9	7.2	2.7	12.4	6.6	3.0	14.1
002	5		7.2	1.8	3.8	6.8	2.1	4.1	6.3	2.3	4.4	5.8	2.7	4.8	5.3	3.0	5.3
	7		7.9	1.8	3.7	7.4	2.0	4.0	6.9	2.3	4.4	6.4	2.6	4.8	5.8	3.0	5.3
	10		8.8	1.8	3.7	8.3	2.0	4.0	7.8	2.3	4.4	7.2	2.6	4.8	6.6	3.0	5.3
003	5		8.5	2.1	4.3	8.0	2.4	4.7	7.4	2.7	5.1	6.9	3.1	5.5	6.3	3.5	6.1
	7		9.2	2.1	4.3	8.7	2.4	4.6	8.1	2.7	5.0	7.5	3.1	5.5	6.8	3.5	6.1
	10		10.4	2.1	4.3	9.8	2.4	4.6	9.2	2.7	5.0	8.5	3.1	5.5	7.8	3.5	6.0
004	5		12.8	3.2	6.9	12.1	3.6	7.3	11.2	4.0	7.7	10.4	4.5	8.3	9.5	5.0	8.9
	7		14.0	3.2	6.9	13.1	3.6	7.3	12.2	4.0	7.8	11.3	4.5	8.3	10.4	5.0	8.9
	10		15.7	3.2	6.9	14.8	3.6	7.3	13.9	4.0	7.8	12.9	4.5	8.3	11.8	5.0	9.0
005	5		15.4	3.7	6.9	14.5	4.1	7.6	13.5	4.7	8.3	12.5	5.2	9.2	11.5	5.9	10.2
	7		16.7	3.7	6.9	15.6	4.1	7.6	14.6	4.7	8.3	13.6	5.2	9.2	12.5	5.9	10.2
	10		18.7	3.7	7.0	17.5	4.1	7.6	16.4	4.7	8.3	15.2	5.2	9.2	14.1	5.9	10.2
006	5		19.3	4.7	10.9	18.2	5.3	11.5	17.0	6.0	12.2	15.8	6.8	13.1	14.7	7.7	14.1
	7		21.0	4.7	10.9	19.7	5.3	11.5	18.5	6.0	12.2	17.2	6.8	13.1	16.0	7.7	14.1
	10		23.6	4.7	10.9	22.2	5.3	11.5	20.8	5.9	12.2	19.5	6.7	13.1	18.1	7.7	14.1
007	5		23.5	5.7	13.0	22.1	6.4	13.7	20.7	7.2	14.5	19.3	8.0	15.5	17.9	9.0	16.6
	7		25.4	5.7	13.0	23.9	6.4	13.7	22.4	7.2	14.5	20.9	8.0	15.5	19.4	9.0	16.6
	10		28.4	5.7	13.0	26.8	6.4	13.6	25.2	7.2	14.5	23.5	8.1	15.5	21.9	9.0	16.6
010	5		33.4	8.1	15.1	31.5	9.1	16.3	29.5	10.2	17.7	27.4	11.5	19.4	25.3	13.0	21.3
	7		36.1	8.1	15.2	34.0	9.1	16.3	31.8	10.3	17.8	29.6	11.5	19.4	27.4	13.0	21.3
	10		40.4	8.2	15.2	38.1	9.1	16.4	35.7	10.3	17.8	33.3	11.6	19.4	30.8	13.0	21.4

Heating capacity table for SKAH

Type	Water outlet °C	Ambient Temperature °C															
		-5			0			2			7			10			
		Heating cap. kW	Absorbed power kW	Current A	Heating cap. kW	Absorbed power kW	Current A	Heating cap. kW	Absorbed power kW	Current A	Heating cap. kW	Absorbed power kW	Current A	Heating cap. kW	Absorbed power kW	Current A	Current A
001-1	35	5.5	1.8	8.5	5.9	1.8	8.5	6.2	1.8	8.5	7.3	1.8	8.4	8.0	1.8	8.3	
	40	5.4	2.1	9.6	5.8	2.0	9.5	6.1	2.0	9.5	7.1	2.0	9.4	7.8	2.0	9.3	
	45	5.4	2.3	10.8	5.7	2.3	10.8	6.0	2.3	10.7	6.9	2.3	10.6	7.5	2.3	10.5	
002-1	35	6.6	2.1	10.1	7.0	2.1	10.1	7.4	2.1	10.0	8.7	2.1	9.9	9.5	2.1	9.8	
	40	6.5	2.4	11.3	6.9	2.4	11.3	7.3	2.4	11.3	8.5	2.4	11.1	9.2	2.4	11.0	
	45	6.4	2.8	12.8	6.8	2.8	12.8	7.2	2.7	12.7	8.2	2.7	12.6	9.0	2.7	12.5	
002	35	6.4	2.1	4.1	6.8	2.1	4.1	7.3	2.1	4.1	8.6	2.1	4.1	9.4	2.0	4.0	
	40	6.3	2.4	4.4	6.7	2.4	4.4	7.1	2.4	4.4	8.4	2.3	4.4	9.2	2.3	4.4	
	45	6.2	2.7	4.9	6.6	2.7	4.9	7.0	2.7	4.9	8.2	2.7	4.8	8.9	2.6	4.8	
003	35	7.5	2.4	4.7	8.0	2.4	4.7	8.5	2.4	4.7	10.0	2.4	4.7	11.0	2.4	4.6	
	40	7.4	2.8	5.1	7.9	2.8	5.1	8.4	2.8	5.1	9.8	2.7	5.1	10.7	2.7	5.0	
	45	7.3	3.1	5.6	7.8	3.1	5.6	8.2	3.1	5.6	9.6	3.1	5.5	10.4	3.1	5.5	
004	35	11.1	3.5	7.2	11.9	3.5	7.2	12.8	3.6	7.2	15.1	3.6	7.3	16.7	3.6	7.3	
	40	10.9	4.0	7.7	11.7	4.0	7.7	12.5	4.0	7.7	14.7	4.0	7.7	16.2	4.0	7.8	
	45	10.7	4.4	8.2	11.4	4.4	8.2	12.2	4.4	8.3	14.3	4.5	8.3	15.7	4.5	8.3	
005	35	13.5	4.1	7.5	14.4	4.1	7.6	15.3	4.1	7.6	18.0	4.1	7.6	19.7	4.1	7.6	
	40	13.1	4.6	8.3	14.0	4.6	8.3	15.0	4.6	8.3	17.5	4.7	8.3	19.1	4.7	8.3	
	45	12.8	5.2	9.1	13.7	5.2	9.1	14.6	5.2	9.1	17.0	5.2	9.2	18.6	5.2	9.2	
006	35	16.9	5.4	11.5	18.1	5.4	11.5	19.3	5.3	11.5	22.6	5.3	11.5	24.9	5.3	11.5	
	40	16.7	6.0	12.2	17.8	6.0	12.2	18.9	6.0	12.2	22.1	6.0	12.2	24.3	6.0	12.2	
	45	16.5	6.7	13.1	17.6	6.8	13.1	18.7	6.8	13.1	21.7	6.8	13.1	23.7	6.8	13.1	
007	35	20.8	6.4	13.7	22.2	6.4	13.7	23.6	6.4	13.7	27.5	6.4	13.7	30.2	6.4	13.7	
	40	20.5	7.2	14.5	21.8	7.2	14.5	23.1	7.2	14.5	26.9	7.2	14.5	29.4	7.2	14.5	
	45	20.2	8.0	15.5	21.4	8.0	15.5	22.7	8.0	15.5	26.2	8.0	15.5	28.6	8.0	15.5	
010	35	29.8	9.1	16.3	31.7	9.1	16.3	33.6	9.1	16.3	39.2	9.1	16.3	42.9	9.1	16.4	
	40	29.3	10.2	17.6	31.1	10.2	17.7	33.0	10.2	17.7	38.2	10.2	17.7	41.8	10.3	17.8	
	45	28.9	11.4	19.2	30.6	11.4	19.3	32.4	11.5	19.3	37.3	11.5	19.4	40.7	11.6	19.4	

5. Water Pressure Drop

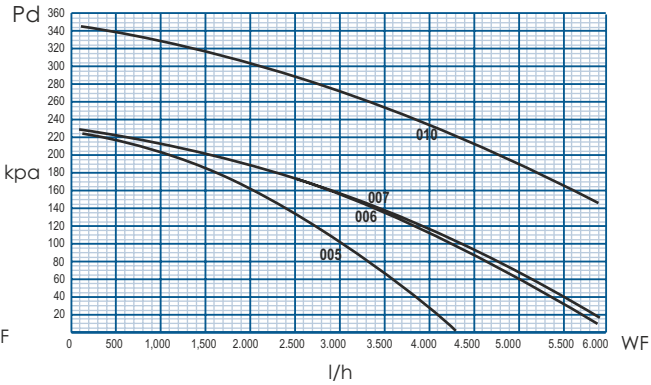
SKAH 001- 010 **B**



Notes

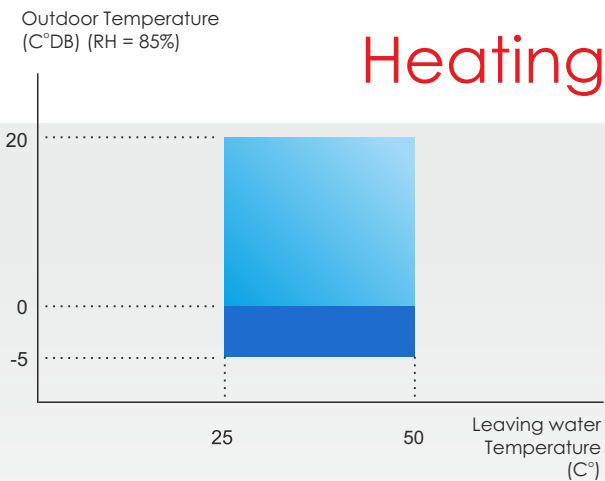
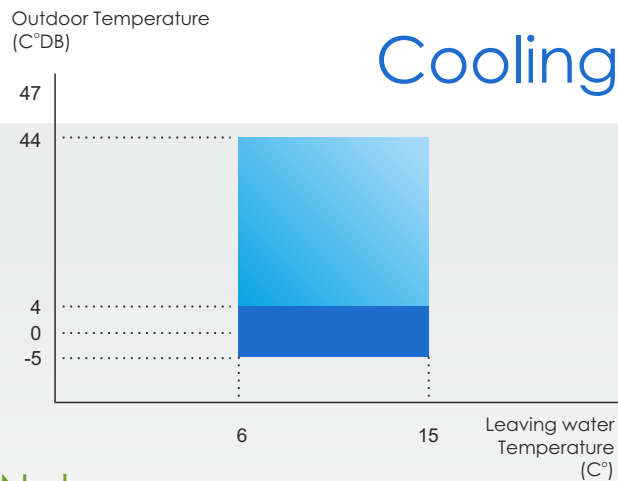
PD: pressure drop
WF: water flow rate
1. SKAH 001-002
2. SKAH 003

3. SKAH 004
4. SKAH 005
5. SKAH 006
6. SKAH 007-010



% Ethylene Glycol by volume	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

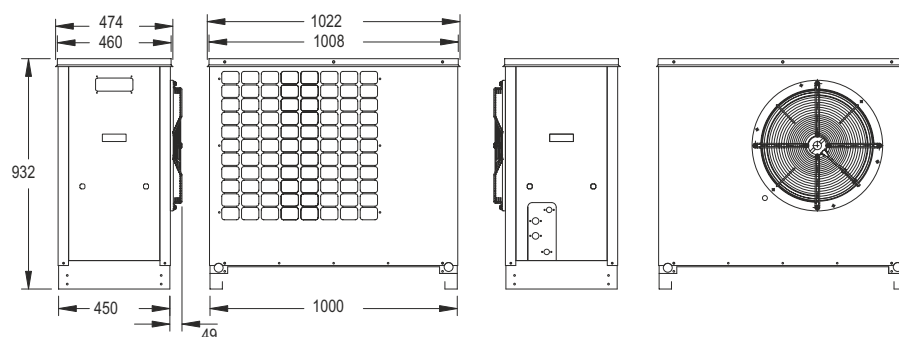
Protect the water circuit against freezing

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.

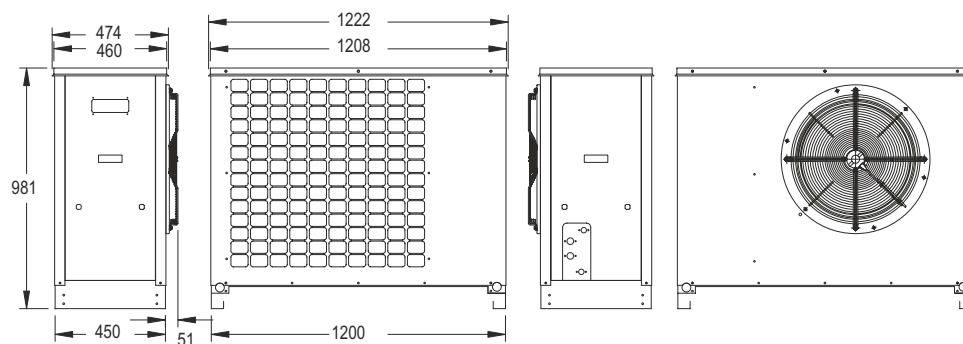
For operation with leaving water temperature below 6°C it is required to confirm with Klimallco at the time of order and the addition of glycol into the system.

7. Outlook Drawings

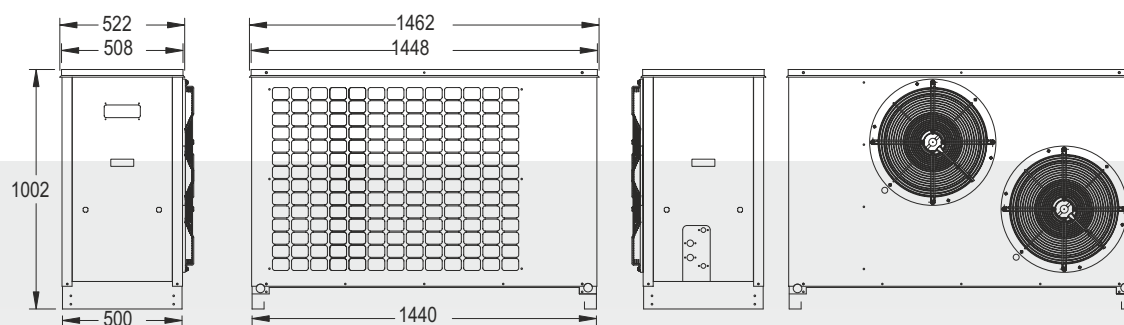
SKAC/SKAH 001 - 002



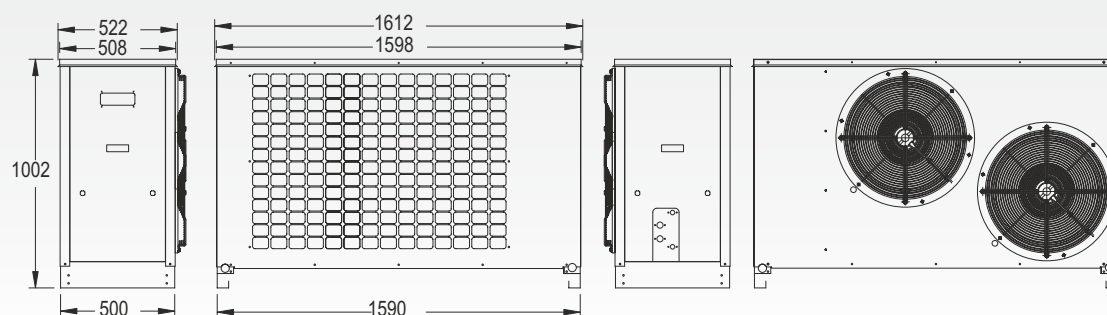
SKAC/SKAH 003



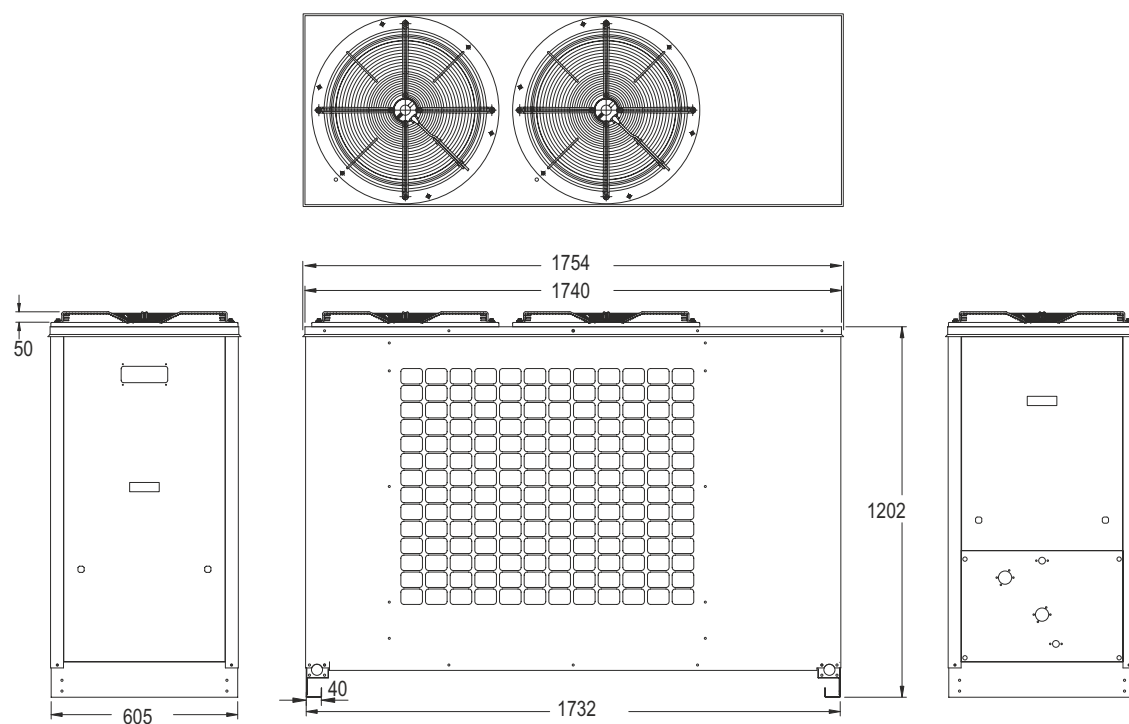
SKAC 004 H



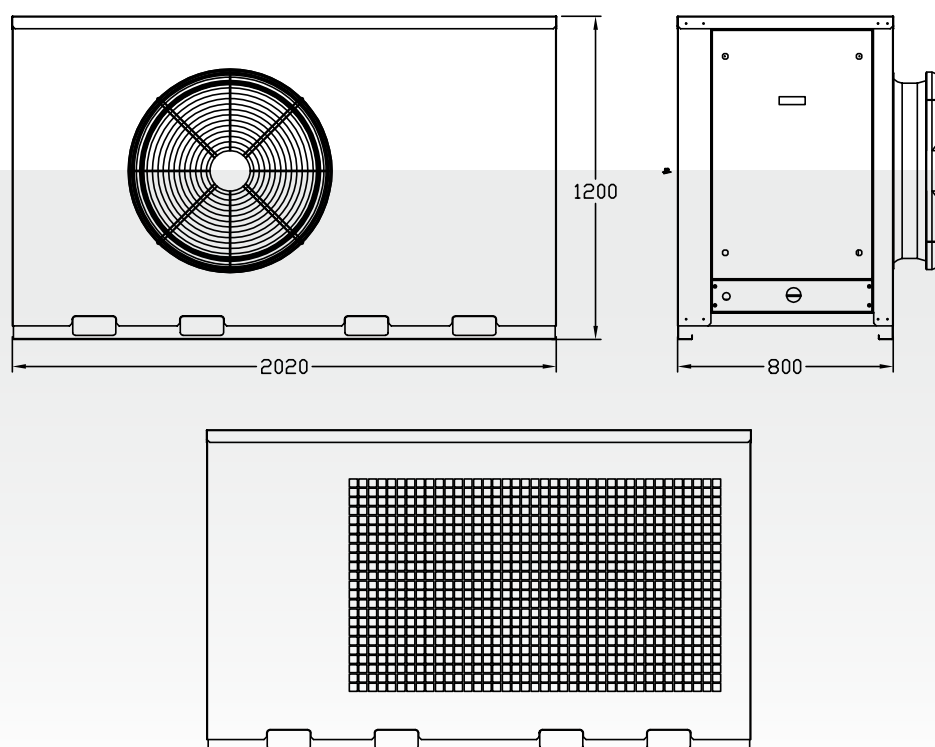
SKAC/SKAH 005



SKAC/SKAH 006

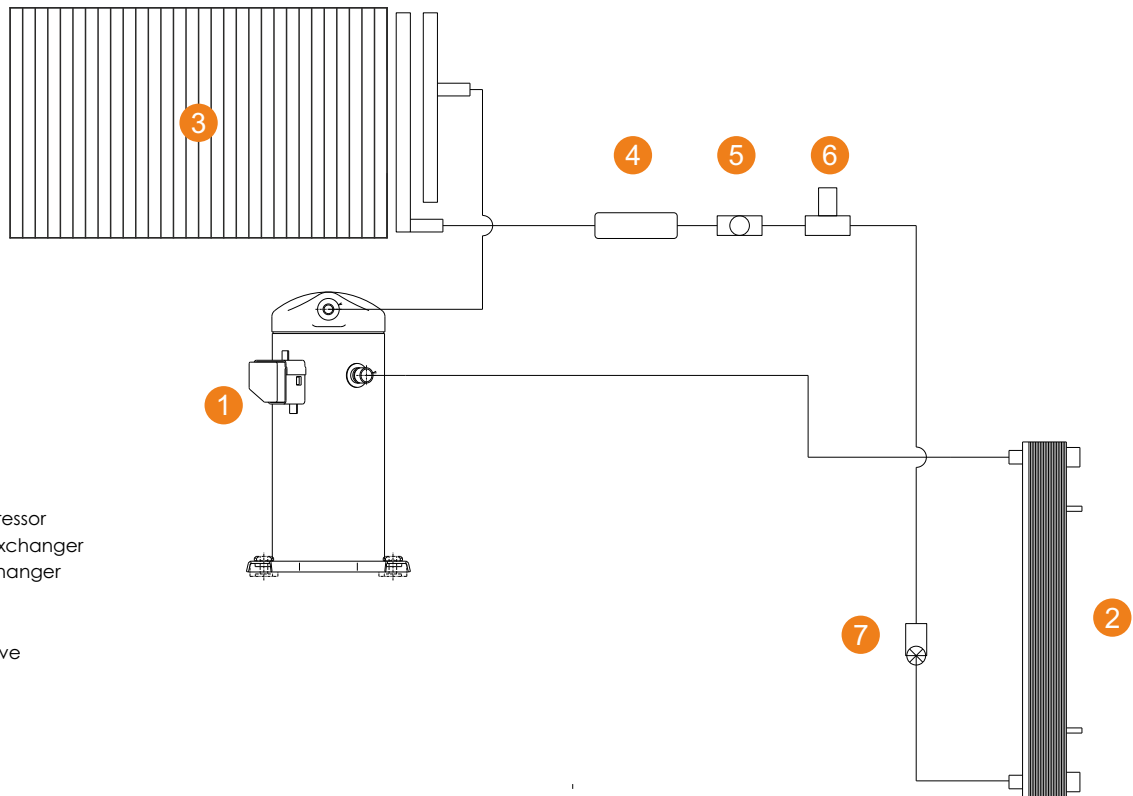


SKAC/SKAH 007-010



8. Refrigerant Diagramms

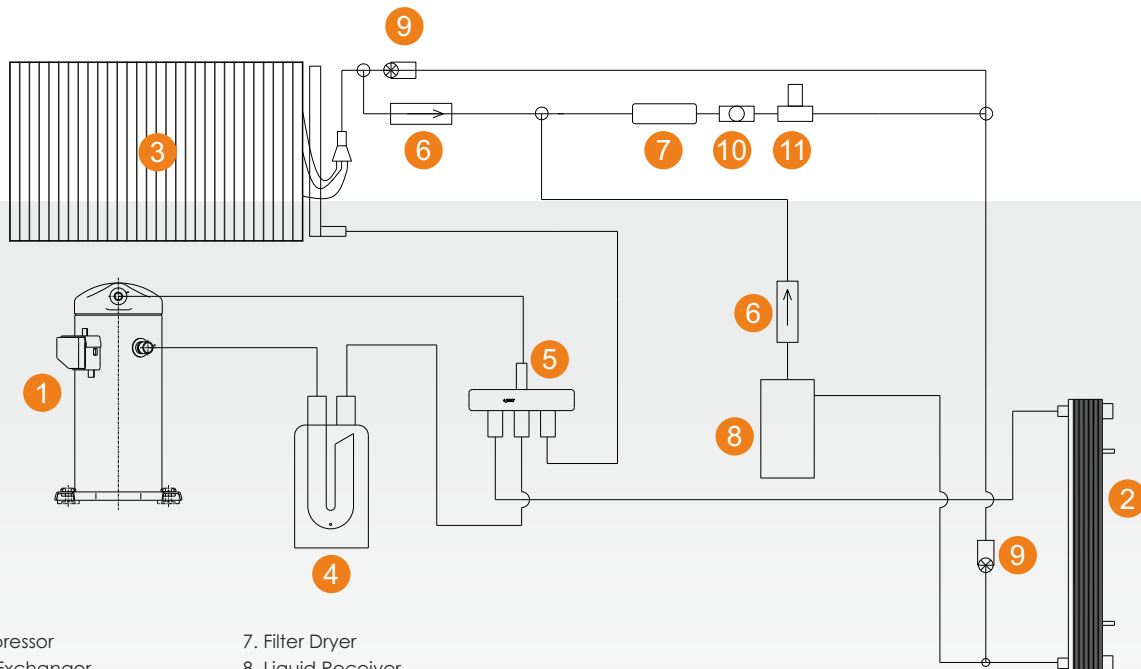
SKAC



Notes

1. Scroll Compressor
2. Plate Heat Exchanger
3. Air Heat Exchanger
4. Filter Dryer
5. Liquid Glass
6. Solenoid Valve
7. TXV

SKAH

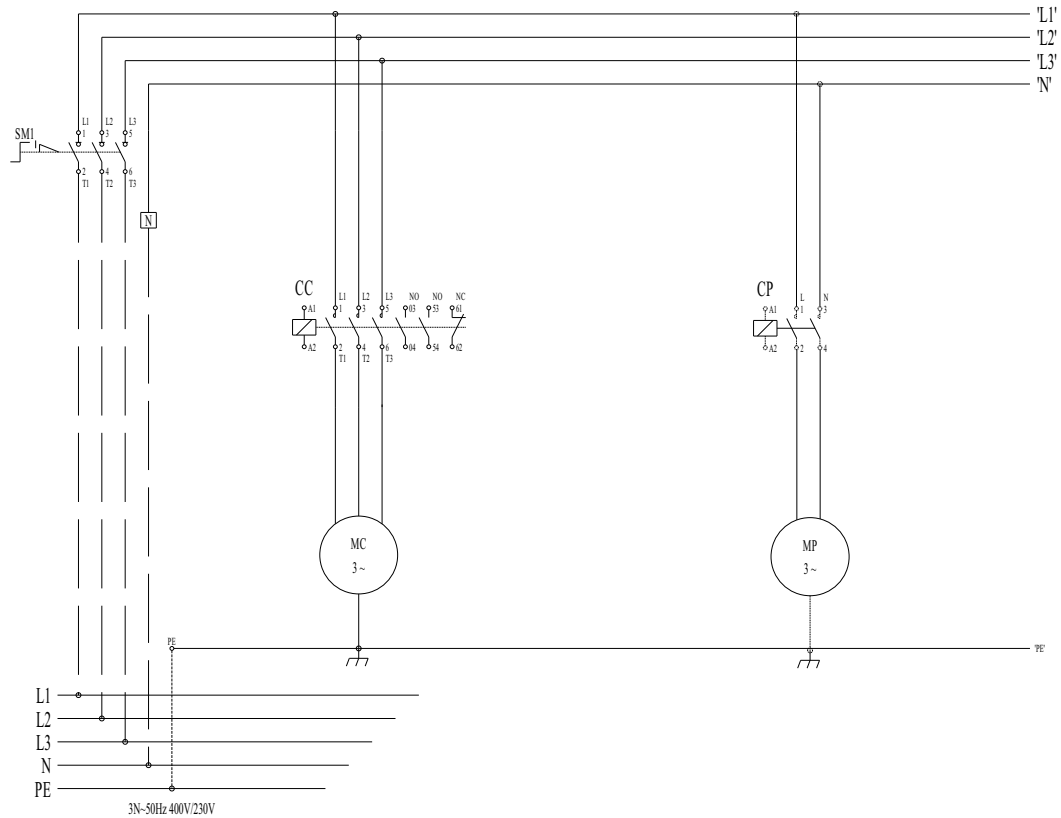


Notes

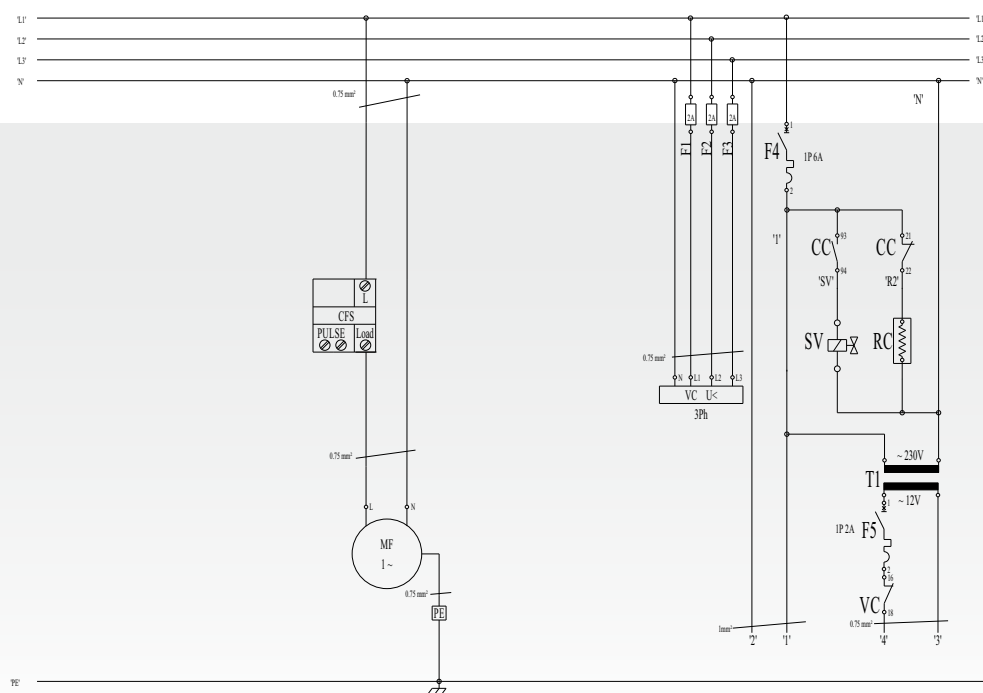
1. Scroll Compressor
2. Plate Heat Exchanger
3. Air Heat Exchanger
4. Accumulator
5. 4 Way Reversing Valve
6. Check Valve
7. Filter Dryer
8. Liquid Receiver
9. Txv
10. Liquid Glass
11. solenoid Valve

9. Wiring Diagrams

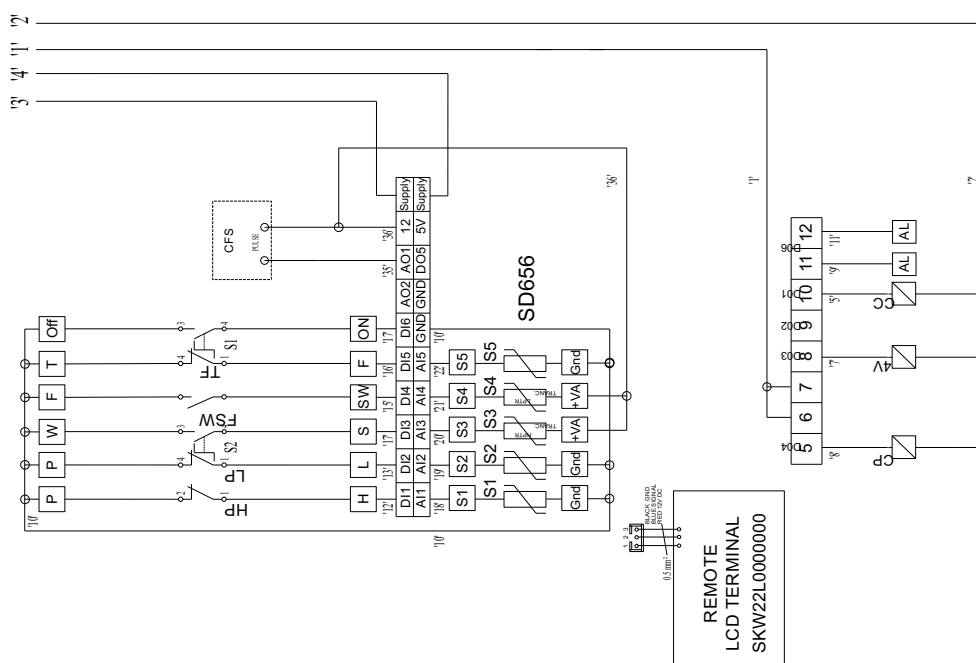
Power Circuit



Control Circuit

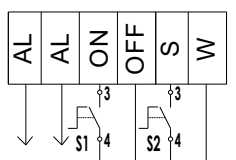


Microprocessor Circuit



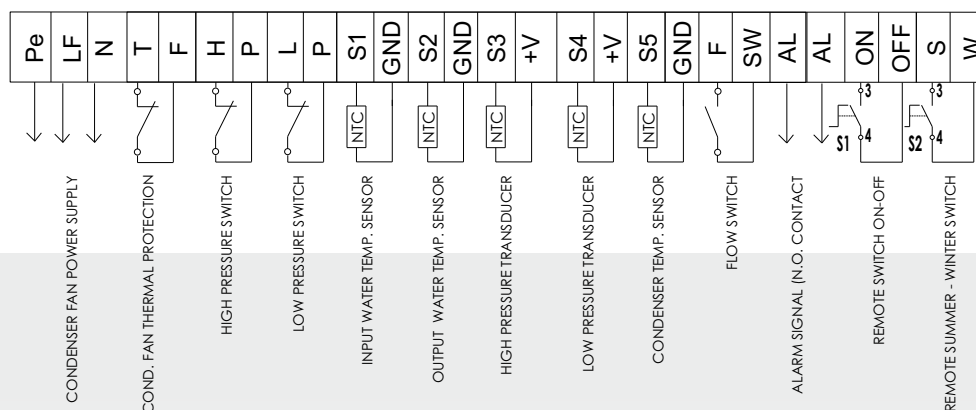
Connections

FIELD CONNECTIONS



AL-AL ALARM SIGNAL (N.O. CONTACT)
 ON-OFF REMOTE ON OFF SWITCH
 S-W REMOTE SUMMER - WINTER SWITCH

TERMINALS



CONDENSER FAN POWER SUPPLY

COND. FAN THERMAL PROTECTION

HIGH PRESSURE SWITCH

LOW PRESSURE SWITCH

INPUT WATER TEMP. SENSOR

OUTPUT WATER TEMP. SENSOR

HIGH PRESSURE TRANSDUCER

LOW PRESSURE TRANSDUCER

CONDENSER TEMP. SENSOR

FLOW SWITCH

ALARM SIGNAL (N.O. CONTACT)

REMOTE SWITCH ON-OFF

REMOTE SUMMER - WINTER SWITCH

Notes

Symbols' Explanation

SM1	Main switch-disconnector	VC	3 phase voltage surveyor	T.IN(S1)	Water inlet temperature NTC probe
CC_	Compressor's contactor	RC_	Compressor's crankcase heater	T.OUT(S2)	Water outlet temperature NTC probe
FCS	Condenser fans' speed controller	T	Transformer 230VAC / 12VAC	T.TRANS.(S3)	High pressure transducer 4-20mA
TF	Condenser fan's thermal protection	MC_	Compressor's motor	T.TRANS.(S4)	Low pressure transducer 4-20mA
CP	Water pump motor contactor	MF_	Fan's motor	T.COND.(S5)	Condenser temperature NTC probe
HP_	High pressure pressostat	MP_	Water pump motor		
LP_	Low pressure pressostat	FSW_	Flow switch		
F_	Fuse	SV_	Liquid Solenoid valve		

Main Alarm Table

ER00	Off by remote control switch	ER41	Condenser fan thermal protection
ER01	High pressure switch (digital)	ER60	Inlet water NTC temp.sensor faulty(S1)
ER03	High pressure switch (analogue)	ER61	Outlet water NTC temp.sensor faulty(S2)
ER05	Low pressure switch (digital)	ER62	Condenser NTC temp.sensor faulty(S2)
ER07	Low pressure switch (analogue)	ER69	High pressure transducer faulty (S3)
ER20	Flow switch	ER70	Low pressure transducer faulty (S4)

10. Installation



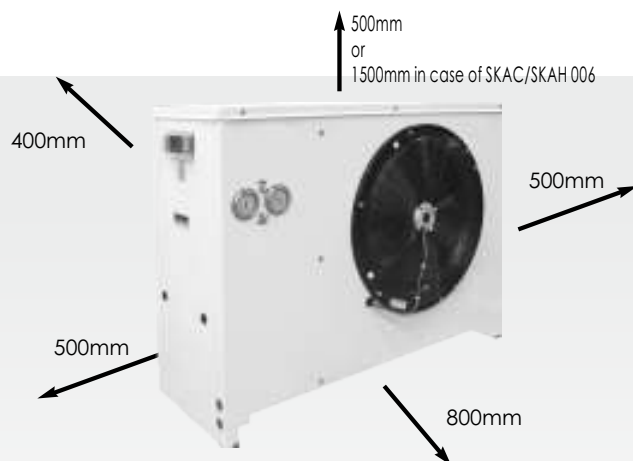
10.1 Selection of Location

Installation and Service space

The SKAC/SKAH 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.



10.4 Water charge, 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.

Type	Minimum water volume (l)	Minimum water flow (m)	Nominal water flow (m)	Maximum water flow (m)
SKAH-001-1	29	948	998	1097
SKAH-002-1	35	1127	1187	1305
SKAH-002	35	1127	1187	1305
SKAH-003	41	1324	1393	1533
SKAH-004	61	1993	2098	2308
SKAH-005	73	2386	2511	2762
SKAH-006	93	3023	3182	3500
SKAH-007	112	3660	3853	4238
SKAH-010	159	5196	5470	6017

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

Items	Evaporator Water		Heated Water		Tendency if out of criteria
	/ 蒸发水 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 referred 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.

R407C	Cooling mode (region)	Minimum (outdoor temp. 15 °CDB) (leaving water temp 6 °CDB)	Nominal (outdoor temp. 35°CDB) (leaving water temp. 7°CDB)	Maximum (outdoor temp. 38 °CDB) (leaving water temp. 25 °CDB)
	Low pressure	3,5-4 bar	4-5 bar	5,5-6 bar
	High pressure	17-19 bar	21-23 bar	24-26 bar
	Heating mode (region)	Minimum (outdoor temp. -5°CDB) (leaving water temp 25°CDB)	Nominal (outdoor temp. 7°CDB) (leaving water temp. 45°CDB)	Maximum (outdoor temp. 21°CDB) (leaving water temp. 50°CDB)
	Low pressure	2,5-3 bar	3-3,5 bar	3-3,5 bar
	High pressure	15-18 bar	21-23 bar	25-26 bar

R410a	Cooling Mode (region)	Minimum (outdoor temp. 20°C DB) (leaving water temp. 6°C)	Nominal (outdoor temp. 35°C DB) (leaving water temp. 7°C)	Maximum (outdoor temp. 40°C DB) (leaving water temp. 15°C)
	Low pressure	7,0 - 7,3 bar	7,1 - 7,8 bar	9,5 - 10 bar
	High pressure	19 - 21 bar	24 - 28 bar	31 - 34 bar
	Heating Mode (region)	Minimum (outdoor temp. -5°C DB) (leaving water temp. 45°C)	Nominal (outdoor temp. 7°C DB) (leaving water temp. 45°C)	Maximum (outdoor temp. 15°C DB) (leaving water temp. 45°C)
	Low pressure	5,4 - 5,6 bar	7 - 7,2 bar	9,2 - 9,6 bar
	High pressure	34-36 bar	29 - 31 bar	30 - 32 bar



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

SKAC
SKAH

KLIMALLCO S.A.
Manufacturers Of Air Conditioning Equipment
Tripio Lithari, Mandra Attiki - Greece P.O. Box: 15, 19 600
Tel : +30 210 5550360 / FAX : +30 210 5551919
e-mail: info@klimallco.gr <http://www.klimallco.com>

Klimallco sa Air Treatment Experts

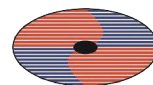


KLIMALLCO's quality management system is certified according to **ISO 9001:2015** and **ISO 14001:2015** for:
Design, manufacturing and trading of air conditioning equipment.

Technical Data
2019

IRAN Agent:

HEPACO



Air Processing & Heat Recovery Sys.
Unit. 17 & 18, 5th floor, No.2 Atarod Alley,
Malek Al Shoara St. Taleghani Ave.
Tehran-IRAN zip code: 15717 15539.
Telefax: 88825400, 88839940, 88843148,
88843149
info@hepa-co.com
www.hepa-co.com