



Liebert[®] AFC

Air-Cooled chiller and Freecooling chiller with Screw Compressors

Product Documentation

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Liebert® AFC

New **Liebert® AFC** is the high-end air-cooled freecooling chiller designed for the efficient and reliable thermal management of medium and big Data Centers.

The extreme efficiency of new **Liebert® AFC** is the result of its capability to satisfy most of the annual cooling request with freecooling, while inverter-screw compressors are covering the remaining load in high ambient temperature conditions.

New **Liebert® AFC** ensures top reliability and availability, being designed for the operation up to extremely high ambient temperatures, in conditions of unstable power supply and since it features only high-quality components and state-of-the-art technologies.

The N** versions combines the high performance of the freecooling system with an innovative glycol free system that allows confining the glycol inside the unit reducing the risks of environmental pollution.

The *IZ models are equipped with an inverter driven screw compressor that allows to maximize efficiency, in particular way during the partial loads or when unit is operating in mixed mode.

The unit uses the environmental friendly refrigerant HFO (R1234ze), with a low level of GWP.



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The product conforms to European Union directives 2006/42/EC; 2014/30/EU; 2014/35/EU; 2014/68/EU.

Units are supplied complete with a test certificate and conformity declaration and control component list.



Liebert® AFC units are CE marked as they comply with the European directives concerning mechanical, electrical and electromagnetic safety.

Features and Benefits

Liebert® AFC air-cooled chillers have been designed for the production of chilled water.

They are also produced in versions with built-in freecooling or freecooling glycol free device and with pump group mounted on the unit; the units can be provided with numerous accessories included in the price list.

The **Liebert® AFC** line is designed according to the most advanced techniques available in the industry today and is complete with all the elements necessary for automatic and efficient operation. Each unit is completely assembled in the factory; after the vacuum, it is charged with the necessary quantity of refrigerant and tested.

All units are equipped with one or two independent refrigerant circuits, each consisting of: air-cooled condenser, semi-hermetic screw compressor (with or without inverter regulation), shell and tube evaporator and pipes. The components of the refrigerant circuit present in the liquid line are the filling valves, the dehydrating filters, the shut-off manual valve, the humidity indicator light and the electronic expansion valve; on the compressor there is always the tap on the delivery line while it is optional on the suction line.

The hydraulic circuit consists of grooved hydraulic pipes connected by joints (Victaulic type), status flow and, in the freecooling versions, by chilled water coils and two two-way valves; in the freecooling glycol-free versions an intermediate plate exchanger separates the heat exchange between the air exchangers, where glycol is present, and the hydraulic circuit of the evaporator where there is chilled water from the user circuit; suitable heating elements prevent the water from freezing in the hydraulic circuit of the evaporator.

The semi-hermetic screw compressors are complete with the following protection / safety devices: oil heater, internal safety valve, oil level (optional), electronic protection with function for controlling the temperature of the motor windings, the oil temperature and the sense of screw rotation.

In the versions with screw compressors with integrated inverter, the operating stability and operating efficiency of the chiller is further improved thanks to the continuous speed control of the compressor itself and the optimized management of the V_i compression ratio (thanks to an automatic internal valve); in addition to cooling the inverter itself, the compressor also manages and monitors safety functions with integrated sensors such as high pressure, low pressure, engine temperature, temperature and oil level alarms, operating conditions close to the application limits allowed.

For the operation of the inverter compressor, a line reactor is mounted on the electrical panel; this device is indispensable and provides for reducing the harmonics transmitted by the inverter to the power supply network.

Liebert® AFC water chillers are controlled by the Vertiv™ iCOM3™ microprocessor which manages all the operating conditions of the units. The user can vary and/or modify the operating parameters via the display keyboard installed on the electrical panel.

The electrical control panel is equipped with all the necessary safety and operating devices to ensure reliable operation.

The compressor motors are equipped with protections on all three phases and are started by three-pole contactors.

The refrigerant R1234ze falls into refrigerant safety group A2L in accordance to ISO-5149 and to EN-378 instead R134a and R513A are A1.

The new **Liebert® AFC** liquid chillers are classified as “indirect vented closed system” (according ISO-5149 and EN-378) and are designated to be installed in a location class III (open air) with occupancy access category Class C (as per ISO-5149 and EN- 378) where only authorized personnel have access; with these limits for both A1 and A2L refrigerant gas there aren't any charge restriction. This limitation must be managed by the customer.

Please refer to these standards for further details. This level needs to be confirmed by the customer.

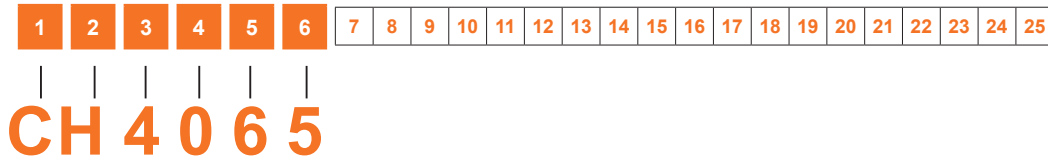
The **Liebert® AFC** units are available in the following versions:

Feature	Versions	
Hydraulic Circuit	<ul style="list-style-type: none"> • Chiller • Freecooling chiller • Freecooling glycol-free chiller 	
Refrigerants, compressor(s) and refrigerant circuit(s)	R134a with standard screw compressors always double circuits R1234ze with inverter screw compressor single and double circuits	R513A with standard screw compressors always double circuits
Noise	Standard version with EC fans base and premium, with standard noise insulation material on compressor box	Low Noise (LN) version with LN fans and standard noise insulation material on compressor box Quiet (Q) version with low speed LN fans advanced sound insulation material on compressor box and all around the most relevant noise sources

Model Number Description

1. Digit Nomenclature

The unit is fully defined by twenty-five (25) digits.



Dig.	Feature	Value	Description
1	Versions	C	Chiller
		F	Free cooling
		N	Free cooling - Glycol free
2	Compressor type	H	Screw
		I	Inverter screw
3	Refrigerant	4	R134a
		Z	R1234ze
		3	R513A*
4-6	Size	XXX	Cooling capacity / 10 kW
7	Water Regime	S	Standard delta T
		H	High delta T
		G	High Efficiency
9	Power supply	0	400V/50Hz
10	Fans and Acoustics	C	EC fans / Base
		E	EC Fans / Premium
		L	Low noise
		Q	Quiet*
11	Pumps	0	None
		1	Single standard head pump + Hydraulic kit
		2	Single high head pump + Hydraulic kit
		3	Double standard head pump + Hydraulic kit*
		4	Double high head pump + Hydraulic kit*
		5	Single inverter pump + Hydraulic kit + Flow meter
		6	Double inverter pump + Hydraulic kit + Flow meter*
		7	Hydraulic kit
		A	Variable flow - 1 inverter pump + H.K. + Flow meter
		B	Variable flow - 2 inverter pump + H.K. + Flow meter*
C	Variable flow - NO pumps + H.K. + Flow meter		
12	Adiabatic System	0	None

Dig.	Feature	Value	Description
13	Coil options	0	Microchannel Condenser
		1	Microchannel Condenser / Base coating
		2	Microchannel Condenser / Premium Coating
		A	Microchannel Condenser + Microchannel FC Coil
		B	Microchannel Condenser + Microchannel FC Coil / Base Coating
		C	Microchannel Condenser + Microchannel FC Coil / Premium Coating
		D	Microchannel Condenser + Finned FC coil
14	Display and switch	E	Microchannel Condenser + Finned FC coil / Base Coating
		F	Microchannel Condenser + Finned FC coil / Premium Coating
		A	Small graphic display with monitoring
14	Display and switch	B	Large touch display with monitoring
		0	None
15	Refrigerant circuit options	1	Suction shut-off valve on compressors
		2	Dual Relief valve and change-over valve
		3	Suction shut-off valve on compressors + Dual Relief valve
		4	Plumbed shut-off valve for refrigerant safety valve*
		5	Suction shut-off valve on compressors +Plumbed shut-off valve*
16	Low / High Ambient temperature	0	None
		1	Heater for electrical panel
		2	Heater for electrical panel + Trace heaters
17	Power supply line option	0	Single line (main line)
		1	Single line (main line) + Ultracap for control
		2	Double line: main line + second line for control
		3	Double line: main line + second line for control + Ultracap
		A	ATS on main line
		B	ATS on main line + Ultracap for control
		C	ATS on main line + second line for control
		D	ATS on main line + second line for control + Ultracap
18	Condensing coil filter / Protection grid	0	None
		1	Condensing coil filters
		2	Protection grid
19	Packing	3	Condensing coil filters + protection grid
		0	Standard
		1	Seaworthy + skid for flat rack
25	Special Request	2	Wooden box + Seaworthy
		3	Wooden Cage + Seaworthy
		0	None
		X	As specified

*Available on request, please contact Vertiv™ support.

Operating Range

Working Limits

Minimum temperature of outdoor air entering condenser coils (with standard operating unit):

- - 25°C for Freecooling models with R134a;
- - 20° C with R1234ze, -20° C for all N* glycol free units
- - 20° C for all units with inverter pump
- - 10°C for Chiller models.

Maximum outdoor air temperature varies according to the model, as indicated in the following tables.

The permitted water flow rate is indicated in the Operating limits Table. Higher flow values can cause erosion and vibrations inside the tube bundle heat exchanger.

The minimum allowed water flow corresponds to a maximum thermal variation of about 8°C for S (standard delta T) version, about 12°C for H (high delta T) version. More severe operating conditions can cause the action of the safety devices that block the unit.

The maximum return water temperature with a fully loaded unit is 32°C; higher return temperatures are allowed only at start-up.

The maximum percentage of glycol allowed is 50% (35% with pump groups). The minimum percentage of glycol required depends on the minimum ambient air temperature conditions relating to the installation site.

The maximum hydraulic operating pressure is 10 barg; consider that this limit does not depend on the presence / absence of pumps mounted on the unit, therefore it is necessary to check the maximum static head of the pump (indicated on the pump plate) and that the circuit water is never pressurized to more than 10 barg-maximum static head of the pump.

Nominal power supply tolerance: 400V +/- 10%; max. voltage unbalance: 2%.

See the 'Operation Range Table' in which each model's limits are indicated; for different values ask your agent.

Max altitude: < 2000 mt

Unit storage conditions:

- Between - 10°C and + 45°C for all models; humidity 80% R.H.; non condensing.

Refrigerant

This unit is designed for use with R134a/R513A/R1234ze (all group 2, not dangerous according to PED Directive).

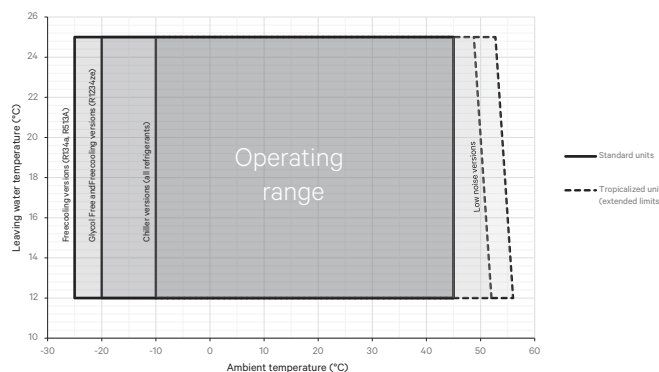
According ASTM E681-04 @ 21°C R1234ze is not flammable, so the Safety Data Sheet of this refrigerant says that is not flammable with no issue for stock or transport for the refrigerant cylinders; for the unit see dedicated chapter.

According to ISO-819, R134a and R513A are classified in safety group A1, instead R1234ze(E) is classified in safety group A2L: lower flammability.

One of the characteristics of this refrigerant (R1234ze) is the absence of flammable mixture with air under 21°C of ambience and controlled humidity conditions; however when humidity or temperature goes up, this refrigerant can become flammable and can represent a potential danger if flammability risks are not properly mitigated

See UM for A2L restrictions

Operating Limits



The graph indicates the general limits of the AFC range; the tables show the maximum thermal limits model by model; above the ambient temperature of 45°C (tropicalized units) some components can be resized for this purpose according to the version / model chosen; if so, contact VERTIV™ or its representative.

Table 3.1 – CH4 model

Models: CH4		065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0	125 SG0	140 SG0	165 HG0	180 HG0	195 HG0	
Standard operating range													
Maximum air inlet temperature ⁽¹⁾	°C	56		54	55		54	53	52		46		
Minimum air inlet temperature	°C	-10											
Maximum leaving water temperature	°C	25											
Minimum leaving water temperature	°C	12											
Min fluid flow	m³/h	50	60		70		75	90	80	85	90		
Max fluid flow	m³/h	150	185		220		240	320	220	260	320		
Safety devices settings													
High pressure switch set	barg	20											
High pressure safety valve set	barg	22											
HP safety valve (each circuit)	#	1			2					3			
High pressure safety valve connection	inch	1 1/4" G											
Low pressure switch	barg	0,5											
Low pressure safety valve set	barg	14											
LP safety valve (each circuit)	#	1											
Low pressure safety valve connection	inch	3/4" G								1" G			

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.2 – CIZ model

Models: CIZ		065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0	125 SG0	140 HG0	150 HG0		
Standard operating range												
Maximum air inlet temperature ⁽¹⁾	°C	56	55	56	55	56	54	53				
Minimum air inlet temperature	°C	-10										
Maximum leaving water temperature	°C	25										
Minimum leaving water temperature	°C	12										
Min fluid flow	m³/h	50	60		70		75	65	70			
Max fluid flow	m³/h	150	185		220		240	220	220			
Safety devices settings												
High pressure switch set	barg	18										
High pressure safety valve set	barg	22										
HP safety valve (each circuit)	#	1			2							
High pressure safety valve connection	inch	1 1/4" G										
Low pressure switch	barg	0,5										
Low pressure safety valve set	barg	14										
LP safety valve (each circuit)	#	1										
Low pressure safety valve connection	inch	3/4" G								1" G		

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.3 – CH4-Low Noise model

Models: CH4 Low Noise		065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0	125 SG0	140 SG0	165 HG0	180 HG0	195 HG0	
Standard operating range													
Maximum air inlet temperature ⁽¹⁾	°C	53	52	50	51	50		48	47	40			
Minimum air inlet temperature	°C	-10											
Maximum leaving water temperature	°C	25											
Minimum leaving water temperature	°C	12											
Min fluid flow	m³/h	50	60		70		75	90	80	85	90		
Max fluid flow	m³/h	150	185		220		240	320	220	260	320		
Safety devices settings													
High pressure switch set	barg	20											
High pressure safety valve set	barg	22											
HP safety valve (each circuit)	#	1			2					3			
High pressure safety valve connection	inch	1 1/4" G											
Low pressure switch	barg	0,5											
Low pressure safety valve set	barg	14											
LP safety valve (each circuit)	#	1											
Low pressure safety valve connection	inch	3/4" G								1" G			

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.4 – CIZ-Low Noise model

Models: CIZ Low Noise		065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0	125 SG0	140 HG0	150 HG0	
Standard operating range											
Maximum air inlet temperature ⁽¹⁾	°C	52	50	52	51	52	49		49		
Minimum air inlet temperature	°C						-10				
Maximum leaving water temperature	°C						25				
Minimum leaving water temperature	°C						12				
Min fluid flow	m ³ /h	50		60		70		75	65	70	
Max fluid flow	m ³ /h	150		185		220		240	220	220	
Safety devices settings											
High pressure switch set	barg						18				
High pressure safety valve set	barg						22				
HP safety valve (each circuit)	#	1			2						
High pressure safety valve connection	inch						1 1/4" G				
Low pressure switch	barg						0,5				
Low pressure safety valve set	barg						14				
LP safety valve (each circuit)	#						1				
Low pressure safety valve connection	inch						3/4" G			1" G	

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.5 – FH4 model

Models: FH4		065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0	125 SG0	140 SG0	165 HG0	180 HG0	195 HG0	
Standard operating range													
Maximum air inlet temperature ⁽¹⁾	°C	56	54	55	53	54		52	50		44		
Minimum air inlet temperature	°C						-25						
Maximum leaving water temperature	°C						25						
Minimum leaving water temperature	°C						12						
Min fluid flow	m ³ /h	50		60		70		75	90	80	85	90	
Max fluid flow	m ³ /h	150		185		220		240	320	220	260	320	
Safety devices settings													
High pressure switch set	barg						20						
High pressure safety valve set	barg						22						
HP safety valve (each circuit)	#	1			2					3			
High pressure safety valve connection	inch						1 1/4" G						
Low pressure switch	barg						0,5						
Low pressure safety valve set	barg						14						
LP safety valve (each circuit)	#						1						
Low pressure safety valve connection	inch						3/4" G			1" G			

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.6 – FIZ model

Models: FIZ		065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0	125 SG0	140 HG0	150 HG0	
Standard operating range											
Maximum air inlet temperature ⁽¹⁾	°C	55	53	55	54	55	52		52		
Minimum air inlet temperature	°C						-10				
Maximum leaving water temperature	°C						25				
Minimum leaving water temperature	°C						12				
Min fluid flow	m ³ /h	50		60		70		75	65	70	
Max fluid flow	m ³ /h	150		185		220		240	220	220	
Safety devices settings											
High pressure switch set	barg						18				
High pressure safety valve set	barg						22				
HP safety valve (each circuit)	#	1			2						
High pressure safety valve connection	inch						1 1/4" G				
Low pressure switch	barg						0,5				
Low pressure safety valve set	barg						14				
LP safety valve (each circuit)	#						1				
Low pressure safety valve connection	inch						3/4" G			1" G	

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.7 – FH4-Low Noise model

Models: FH4 Low Noise		065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0	125 SG0	140 SG0	165 HG0	180 HG0	195 HG0	
Standard operating range													
Maximum air inlet temperature ⁽¹⁾	°C	52	50	51	49	50	50	49	47	46		39	
Minimum air inlet temperature	°C	-25											
Maximum leaving water temperature	°C	25											
Minimum leaving water temperature	°C	12											
Min fluid flow	m³/h	50		60		70		75	90	80	85	90	
Max fluid flow	m³/h	150		185		220		240	320	220	260	320	
Safety devices settings													
High pressure switch set	barg	20											
High pressure safety valve set	barg	22											
HP safety valve (each circuit)	#	1				2				3			
High pressure safety valve connection	inch	1 1/4" G											
Low pressure switch	barg	1,1											
Low pressure safety valve set	barg	14											
LP safety valve (each circuit)	#	1											
Low pressure safety valve connection	inch	3/4" G								1" G			

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.8 – FIZ-Low Noise model

Models: FIZ Low Noise		065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0	125 SG0	140 HG0	150 HG0		
Standard operating range												
Maximum air inlet temperature ⁽¹⁾	°C	51	49	51	50	51	47	50	48	47		
Minimum air inlet temperature	°C	-20										
Maximum leaving water temperature	°C	25										
Minimum leaving water temperature	°C	12										
Min fluid flow	m³/h	50		60		70		75	65	70		
Max fluid flow	m³/h	150		185		220		240	220	220		
Safety devices settings												
High pressure switch set	barg	18										
High pressure safety valve set	barg	22										
HP safety valve (each circuit)	#	1				2						
High pressure safety valve connection	inch	1 1/4" G										
Low pressure switch	barg	0,5										
Low pressure safety valve set	barg	14										
LP safety valve (each circuit)	#	1										
Low pressure safety valve connection	inch	3/4" G								1" G		

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.9 – NH4 model

Models: FH4 Low Noise		065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0	125 SG0	140 SG0	165 HG0	180 HG0	195 HG0	
Standard operating range													
Maximum air inlet temperature ⁽¹⁾	°C	56	54	55	53	54	53	51	50			44	
Minimum air inlet temperature	°C	-20											
Maximum leaving water temperature	°C	25											
Minimum leaving water temperature	°C	12											
Min fluid flow	m³/h	50		60		70		75	90	80	85	90	
Max fluid flow	m³/h	150		185		220		240	320	220	260	320	
Safety devices settings													
High pressure switch set	barg	20											
High pressure safety valve set	barg	22											
HP safety valve (each circuit)	#	1				2				3			
High pressure safety valve connection	inch	1 1/4" G											
Low pressure switch	barg	1,1											
Low pressure safety valve set	barg	14											
LP safety valve (each circuit)	#	1											
Low pressure safety valve connection	inch	3/4" G								1" G			

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.10 – NIZ model

Models: NIZ		065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0	125 SG0	140 HG0	150 HG0	
Standard operating range											
Maximum air inlet temperature ⁽¹⁾	°C	55	53	55	54	55	52		52		
Minimum air inlet temperature	°C						-20				
Maximum leaving water temperature	°C						25				
Minimum leaving water temperature	°C						12				
Min fluid flow	m³/h	50		60		70		75	65	70	
Max fluid flow	m³/h	150		185		220		240	220	220	
Safety devices settings											
High pressure switch set	barg						18				
High pressure safety valve set	barg						22				
HP safety valve (each circuit)	#	1			2						
High pressure safety valve connection	inch						1 1/4" G				
Low pressure switch	barg						0,5				
Low pressure safety valve set	barg						14				
LP safety valve (each circuit)	#						1				
Low pressure safety valve connection	inch						3/4" G			1" G	

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.11 – NH4-Low Noise model

Models: NH4 Low Noise		065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0	125 SG0	140 SG0	165 HG0	180 HG0	195 HG0		
Standard operating range														
Maximum air inlet temperature ⁽¹⁾	°C	52	50	51	49			46	45	38				
Minimum air inlet temperature	°C						-20							
Maximum leaving water temperature	°C						25							
Minimum leaving water temperature	°C						12							
Min fluid flow	m³/h	50		60		70		75	90	80	85	90		
Max fluid flow	m³/h	150		185		220		240	320	220	260	320		
Safety devices settings														
High pressure switch set	barg						20							
High pressure safety valve set	barg						22							
HP safety valve (each circuit)	#	1			2					3				
High pressure safety valve connection	inch						1 1/4" G							
Low pressure switch	barg						1,1							
Low pressure safety valve set	barg						14							
LP safety valve (each circuit)	#						1							
Low pressure safety valve connection	inch						3/4" G				1" G			

(1) - Nominal air flow; water outlet temperature 20°C; full load

Table 3.12 – NIZ-Low Noise model

Models: NIZ Low Noise		065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0	125 SG0	140 HG0	150 HG0	
Standard operating range											
Maximum air inlet temperature ⁽¹⁾	°C	51	49	51	50	51	47		47		
Minimum air inlet temperature	°C						-20				
Maximum leaving water temperature	°C						25				
Minimum leaving water temperature	°C						12				
Min fluid flow	m³/h	50		60		70		75	65	70	
Max fluid flow	m³/h	150		185		220		240	220	220	
Safety devices settings											
High pressure switch set	barg						18				
High pressure safety valve set	barg						22				
HP safety valve (each circuit)	#	1			2						
High pressure safety valve connection	inch						1 1/4" G				
Low pressure switch	barg						0,5				
Low pressure safety valve set	barg						14				
LP safety valve (each circuit)	#						1				
Low pressure safety valve connection	inch						3/4" G			1" G	

(1) - Nominal air flow; water outlet temperature 20°C; full load

Tab 4.1 - Technical Data - FH4

Models: FH4		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	669	754	836	947	1035	1104	1277	1425	1688	1838	1986
Compressors power input	kW	131	154	169	198	208	225	261	301	348	416	453
Total power input (Base fans)	kW	163	186	208	237	253	270	313	353	406	481	518
Total power input (Premium fans)	kW	156	179	200	229	243	261	302	342	393	467	504
Unit EER (Base fans)	-	4,11	4,03	4,01	3,90	4,09	4,07	4,07	4,02	4,14	3,81	3,82
Unit EER (Premium fans)	-	4,29	4,20	4,18	4,14	4,26	4,24	4,23	4,17	4,29	3,94	3,94
Fluid flow	m ³ /h	107	121	134	152	166	177	205	228	180	196	212
Total fluid side pressure drop	kPa	115	147	135	175	129	141	163	137	176	163	163
Max freecooling capacity ⁽²⁾	kW	410	424	498	515	590	601	689	691	969	1071	1094
Freecooling capacity ⁽³⁾	kW	286	295	347	359	408	414	475	477	630	696	711
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER (Base fans)	-	9,8	9,6	9,9	9,5	9,8	9,6	9,4	9,1	10,9	11,3	10,7
Unit EER (Premium fans)	-	11,0	10,5	10,9	10,4	10,8	10,5	10,2	9,9	12,0	12,5	11,6
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	9,6	8,2	9,2	7,5	8,4	7,6	7,4	5,3	6,3	6,6	5,3
Unit EER at ZET point (Base fans)	-	21	24	22	25	23	25	25	28	30	29	31
Unit EER at ZET point (Premium fans)	-	26	30	28	31	29	31	32	35	37	36	39
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER (Base fans)	-	9,5	8,9	8,7	8,7	8,9	9,0	8,9	9,2	10,3	10,6	10,7
Unit EER (Premium fans)	-	11,5	10,6	10,5	10,3	10,7	10,8	10,5	10,7	12,1	12,5	12,5
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	14,5	14,0	14,2	13,5	14,0	13,6	13,5	12,4	12,9	13,1	12,4
Unit EER at ZET point (Base fans)	-	11	12	11	12	12	12	13	14	15	14	16
Unit EER at ZET point (Premium fans)	-	13	15	14	16	15	16	16	18	19	18	20
Sound levels												
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	84,4	84,5	84,8	84,9	85,1	85,2	85,4	85,4	85,7	85,9	86,0
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	105,9	106,0	106,7	106,8	107,5	107,5	108,1	108,1	108,7	109,2	109,3
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	78,4	78,6	78,8	79,0	79,2	79,3	79,7	79,9	80,2	80,6	80,8
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	99,9	100,1	100,8	101,0	101,6	101,7	102,4	102,6	103,3	104,0	104,2
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	42/42	42/42	50/50	50/50					80/73	89/81	89/81
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Base fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Total power input	kW	31,8	31,8	38,2	38,2	44,4	44,4	50,7	50,7	57	63,4	63,4
Total air flow rate	m ³ /h	238384	238384	286061	286061	333738	333738	381415	381415	429092	476768	476768

Models: FH4		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Premium fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Total power input	kW	25,3	25,3	30,4	30,4	35,5	35,5	40,5	40,5	45,6	50,7	50,7
Total air flow rate	m³/h	242520	242520	291024	291024	339528	339528	388032	388032	436536	485039	485039
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8
Freecooling coil												
Material tubes/fins	-	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium
Number of rows / fin spacing	#/mm	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	768	768	827	827	n.a.	n.a.	n.a.	n.a.	1891	1944	1894
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights												
Net weight	kg	7507	7540	8332	8384	9566	9566	10836	10836	13280	14247	14320
Operating weight	kg	8275	8307	9159	9210	2350	2350	2350	2350	15171	16191	16214

Notes:

- (1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); ethylene glycol 30%; power supply 400V/3ph/50Hz;
- (2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;
- (3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;
- (4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;
- (5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.2 - Technical Data - FH4 + Low Noise

Models: FH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	637	712	794	894	980	1039	1202	1335	1576	1716	1857
Compressors power input	kW	140	166	182	215	223	243	281	330	382	452	496
Total power input	kW	152	178	197	229	241	260	301	349	404	477	520
Unit EER	-	4,20	3,99	4,04	3,90	4,07	4,00	4,00	3,82	3,90	3,60	3,57
Fluid flow	m3/h	102	114	127	143	157	167	193	214	168	183	198
Total fluid side pressure drop	kPa	105	132	122	157	116	126	146	121	155	143	144
Freecooling capacity 100% load ⁽²⁾	kW	341	349	412	423	487	493	565	566	801	885	902
Freecooling capacity 50% load ⁽³⁾	kW	237	244	287	295	340	344	394	395	521	576	584
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER	-	11,2	10,2	11,0	9,8	10,6	10,0	9,7	11,4	10,7	10,6	9,6
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	7,2	5,5	6,7	4,8	5,4	4,8	4,6	2,3	3,3	3,7	2,1
Unit EER at ZET point	-	52	58	54	61	57	61	61	68	72	70	76
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER	-	13,6	13,1	13,2	12,1	13,2	12,9	12,5	12,5	14,3	14,9	14,5
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	13,5	12,6	13,2	12,3	12,8	12,3	12,2	11,0	11,4	11,6	11,0
Unit EER at ZET point	-	26	29	27	30	29	30	31	34	36	35	38
Sound levels												
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	72,3	73,0	73,2	73,9	74,1	74,4	75,0	75,8	76,4	77,1	77,7
Sound Power Level PWL ⁽⁵⁾	dB(A)	93,8	94,5	95,2	95,9	96,4	96,8	97,7	98,5	99,5	100,5	101,1
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	42/42	42/42	50/50	50/50					80/73	89/81	89/81
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total power input	kW	12,2	12,2	14,7	14,7	17,1	17,1	19,6	19,6	22	24,5	24,5
Total air flow rate	m3/h	175803	175803	210963	210963	246124	246124	281284	281284	316445	351605	351605
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8
Freecooling coil												
Material tubes/fins	-	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium
Total face area	m ²	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8
Internal volume (each)	l	25	25	30	30	35	35	40	40	45	50	50

Models: FH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Freecooling coil												
Material tubes/fins	-	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum	Copper / Aluminum
Number of rows / fin spacing	# / mm	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	768	768	827	827	n.a.	n.a.	n.a.	n.a.	1891	1944	1894
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights												
Net weight	kg	7507	7540	8332	8384	n.a.	n.a.	n.a.	n.a.	13280	14247	14320
Operating weight	kg	8275	8307	9159	9210	n.a.	n.a.	n.a.	n.a.	15171	16191	16214

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); ethylene glycol 30%; power supply 400V/3ph/50Hz;

(2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.3 - Technical Data - FIZ

Models: FIZ		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Mechanical cooling performance ⁽¹⁾ :										
Cooling capacity	kW	671	735	782	853	960	1106	1258	1432	1586
Compressors power input	kW	127	153	152	174	191	232	261	288	323
Total power input (Base fans)	kW	159	185	191	213	236	277	313	347	388
Total power input (Premium fans)	kW	152	178	182	204	226	267	301	334	374
Unit EER (Base fans)	-	4,20	3,97	4,09	4,00	4,06	3,98	4,01	4,12	4,08
Unit EER (Premium fans)	-	4,40	4,14	4,29	4,17	4,25	4,14	4,18	4,29	4,24
Fluid flow	m ³ /h	107	118	125	137	154	177	202	153	169
Total fluid side pressure drop	kPa	118	141	127	146	111	146	164	171	195
Max freecooling capacity ⁽²⁾	kW	411	421	488	501	578	563	685	940	1044
Freecooling capacity ⁽³⁾	kW	286	294	340	349	403	392	477	611	678
Freecooling mixed mode performance [100% load] ⁽²⁾ :										
Unit EER (Base fans)	-	16,0	15,7	12,6	11,7	11,8	10,9	10,9	14,1	14,3
Unit EER (Premium fans)	-	16,6	16,4	14,3	13,3	13,5	12,2	12,1	16,1	16,0
Total freecooling [100% load] ⁽²⁾ :										
ZET temperature	°C	9,6	8,5	9,9	8,9	9,3	7,5	7,6	9,1	9,2
Unit EER at ZET point (Base fans)	-	21	23	21	22	22	25	25	25	25
Unit EER at ZET point (Premium fans)	-	26	29	26	28	27	31	31	31	31
Freecooling mixed mode performance [50% load] ⁽³⁾ :										
Unit EER (Base fans)	-	15,3	15,8	11,5	11,9	11,9	12,2	12,2	13,2	13,5
Unit EER (Premium fans)	-	15,5	16,0	13,1	13,5	13,6	13,8	13,8	15,1	15,3
Total freecooling [50% load] ⁽³⁾ :										
ZET temperature	°C	14,5	14,1	14,8	14,3	14,5	13,6	13,6	14,4	14,4
Unit EER at ZET point (Base fans)	-	11	12	10	11	11	12	12	13	13
Unit EER at ZET point (Premium fans)	-	13	14	13	14	14	16	15	16	16
Sound levels										
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	84,5	84,5	84,9	84,9	85,2	85,2	85,4	85,6	85,8
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	106,0	106,0	106,8	106,9	107,5	107,5	108,1	108,6	109,1
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	78,6	78,9	79,0	79,3	79,5	79,3	79,7	79,8	80,1
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	100,1	100,4	101,0	101,3	101,9	101,7	102,4	102,9	103,5
Refrigeration circuits										
Number of refrigeration circuits	#	1	1	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	85/-	85/-	48/48	48/48				78/71	85/78
Compressors										
Number of compressors	#	1	1	2	2	2	2	2	2	2
Type	-	Inverter screw	Inverter screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter Screw/ Screw	Inverter Screw/ Screw
Nominal power	HP	240	290	160/140	200/160	200/180	240/210	240/240	290/280	290/320
Fans										
Base fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	110	110	110	110	110	110	110	1100	1100
Power input (each)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Total power input	kW	31,7	31,7	38	38	44,4	44,4	50,7	57,0	63,4
Total air flow rate	m ³ /h	238272	238272	285926	285926	333581	333581	381235	428890	476544
Premium fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5

Models: FIZ		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Total power input	kW	25,4	25,4	30,4	30,4	35,5	35,5	40,6	45,6	50,7
Total air flow rate	m³/h	242403	242403	290883	290883	339364	339364	387844	436325	484805
Evaporator										
Number of evaporators	#	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr.side)	l	94	94	55	55	63,5	68	78,5	115	129
Condensing coil										
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m²	25	25	30	30	35	35	40	45	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,8	8,8
Freecooling coil										
Material tubes/fins	-	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium
Number of rows / fin spacing	#/mm	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8
Total face area	m²	25	25	30	30	35	35	40	45	50
Water connections										
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	768	768	827	827	n.a.	n.a.	n.a.	1859	1911
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-
Dimensions										
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights										
Net weight	kg	6844	6854	8230	8830	n.a.	n.a.	n.a.	13178	13990
Operating weight	kg	7612	7622	9098	9697	n.a.	n.a.	n.a.	15037	15901

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); ethylene glycol 30%; power supply 400V/3ph/50Hz;

(2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.4 - Technical Data - FIZ + Low Noise

Models: FIZ (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Mechanical cooling performance ⁽¹⁾ :										
Cooling capacity	kW	639	698	745	808	914	1042	1186	1353	1498
Compressors power input	kW	140	169	166	192	208	257	289	317	355
Total power input	kW	153	181	180	207	225	275	309	339	380
Unit EER	-	4,19	3,86	4,13	3,91	4,06	3,80	3,84	3,99	3,95
Fluid flow	m ³ /h	102	112	119	129	146	167	190	145	160
Total fluid side pressure drop	kPa	108	127	115	132	101	130	146	153	175
Freecooling capacity 100% load ⁽²⁾	kW	341	348	406	414	479	472	563	784	870
Freecooling capacity 50% load ⁽³⁾	kW	237	242	283	288	334	328	392	510	566
Freecooling mixed mode performance [100% load] ⁽²⁾ :										
Unit EER	-	16,4	16,3	14,2	12,2	12,6	10,6	10,6	14,9	15,4
Total freecooling [100% load] ⁽²⁾ :										
ZET temperature	°C	7,2	5,9	7,6	6,4	6,9	4,8	4,9	6,5	6,5
Unit EER at ZET point	-	54	59	52	57	53	61	61	62	61
Freecooling mixed mode performance [50% load] ⁽³⁾ :										
Unit EER	-	14,6	15,4	15,9	16,3	16,5	16,3	16,4	17,9	17,4
Total freecooling [50% load] ⁽³⁾ :										
ZET temperature	°C	13,5	12,8	13,7	13	13,3	12,3	12,3	13	13,0
Unit EER at ZET point	-	27	29	26	28	27	30	30	31	31
Sound levels										
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	73,2	74,5	74,1	75,1	75,2	74,5	75,0	75,4	76,0
Sound Power Level PWL ⁽⁵⁾	dB(A)	94,7	96,0	96,1	97,0	97,5	96,9	97,8	98,5	99,4
Refrigeration circuits										
Number of refrigeration circuits	#	1	1	2	2				2	2
Refrigerant charge for each circuit	kg	85/-	85/-	48/48	48/48				78/71	85/78
Compressors										
Number of compressors	#	1	1	2	2	2	2	2	2	2
Type	-	Inverter screw	Inverter screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter Screw/ Screw	Inverter Screw/ Screw
Nominal power	HP	240	290	160/140	200/160	200/180	240/210	240/240	290/280	290/320
Fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total power input	kW	11,9	11,9	14,3	14,3	17,1	17,1	19,6	22	24,5
Total air flow rate	m ³ /h	175733	175733	210880	210880	240626	240626	281173	316319	351466
Evaporator										
Number of evaporators	#	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr.side)	l	94	94	55	55	63,5	68	78,5	115	129
Condensing coil										
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	45	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,8	8,8
Freecooling coil										
Material tubes/fins	-	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium
Number of rows / fin spacing	#/mm	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8
Total face area	m ²	25	25	30	30	35	35	40	45	50

Models: FIZ (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Water connections										
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	768	768	827	827	n.a.	n.a.	n.a.	1859	1911
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-
Dimensions										
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights										
Net weight	kg	6844	6854	8230	8830	n.a.	n.a.	n.a.	13178	13990
Operating weight	kg	7612	7622	9098	9697	n.a.	n.a.	n.a.	15037	15901

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); ethylene glycol 30%; power supply 400V/3ph/50Hz;

(2) : 26°C fluid inlet temperature (SGO models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(3) : 23°C fluid inlet temperature (SGO models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.5 - Technical Data - FH3

Models: FH3		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	664	746	830	939	1027	1093	1266	1424	1670	1817	1969
Compressors power input	kW	135	159	175	205	215	233	270	313	361	414	462
Total power input (Base fans)	kW	167	192	214	244	260	278	322	365	420	479	527
Total power input (Premium fans)	kW	160	185	206	236	250	268	311	354	407	464	512
Unit EER (Base fans)	-	3,97	3,88	3,87	3,83	3,94	3,92	3,92	3,88	3,97	3,78	3,72
Unit EER (Premium fans)	-	4,15	4,04	4,03	3,98	4,10	4,07	4,07	4,02	4,11	3,91	3,84
Fluid flow	m ³ /h	106	120	133	150	165	175	203	228	178	194	210
Total fluid side pressure drop	kPa	114	145	133	173	127	138	161	137	172	160	160
Max freecooling capacity ⁽²⁾	kW	409	423	497	514	589	599	687	691	966	1067	1092
Freecooling capacity ⁽³⁾	kW	285	295	346	358	411	417	479	481	628	693	710
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER (Base fans)	-	9,9	9,6	9,9	9,5	9,7	9,5	9,2	9,0	10,8	11,2	10,4
Unit EER (Premium fans)	-	11,6	10,4	11,0	10,4	10,7	10,4	10,0	9,8	11,8	12,4	11,3
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	9,7	8,3	9,2	7,7	8,5	7,7	7,5	5,3	6,4	6,8	5,4
Unit EER at ZET point (Base fans)	-	21	24	22	25	23	25	25	28	29	29	31
Unit EER at ZET point (Premium fans)	-	26	29	27	31	29	31	31	35	37	36	39
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER (Base fans)	-	9,0	8,8	8,7	8,7	8,9	9,0	8,9	9,2	10,2	10,3	10,3
Unit EER (Premium fans)	-	11,0	10,5	10,5	10,3	10,6	10,6	10,5	10,7	12,0	12,1	12,0
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	14,7	14,0	14,5	13,7	14,1	13,7	13,6	12,5	13	13,1	12,5
Unit EER at ZET point (Base fans)	-	10	12	11	12	12	12	12	14	15	14	16
Unit EER at ZET point (Premium fans)	-	13	15	14	15	14	15	16	18	18	18	19
Sound levels												
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	84,4	84,5	84,9	84,9	85,1	85,2	85,4	85,5	85,7	85,9	86,0
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	105,9	106,0	106,8	106,8	107,5	107,5	108,1	108,2	108,7	109,2	109,3
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	78,4	78,6	78,9	79,1	79,3	79,4	79,8	80,0	80,3	80,6	80,9
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	99,9	100,1	100,9	101,1	101,7	101,8	102,5	102,7	103,4	104,0	104,3
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	46/46	46/46	55/55	55/55					84/76	93/85	93/85
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Base fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Total power input	kW	31,7	31,7	38,0	38,0	44,4	44,4	50,7	50,7	57,0	63,4	63,4
Total air flow rate	m ³ /h	238272	238272	285926	285926	333581	333581	381235	381235	428890	476544	476544

Models: FH3		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Premium fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
Total power input	kW	25,4	25,4	30,4	30,4	35,5	35,5	40,6	40,6	45,6	50,7	50,7
Total air flow rate	m³/h	242403	242403	290883	290883	339364	339364	387844	387844	436325	484805	484805
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8
Freecooling coil												
Material tubes/fins	-	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium
Number of rows / fin spacing	#/mm	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	768	768	827	827	n.a.	n.a.	n.a.	n.a.	1891	1944	1894
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights												
Net weight	kg	7507	7540	8332	8384	n.a.	n.a.	n.a.	n.a.	13280	14247	14320
Operating weight	kg	8275	8307	9159	9210	n.a.	n.a.	n.a.	n.a.	15171	16191	16214

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); ethylene glycol 30%; power supply 400V/3ph/50Hz;

(2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.6 - Technical Data - FH3 + Low Noise

Models: FH3 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	630	702	786	883	968	1024	1186	1325	1550	1688	1809
Compressors power input	kW	145	173	189	223	231	251	291	342	395	450	499
Total power input	kW	157	185	204	238	248	268	310	362	417	475	523
Unit EER	-	4,02	3,80	3,86	3,71	3,89	3,81	3,82	3,66	3,71	3,56	3,46
Fluid flow	m3/h	101	113	126	141	155	164	190	212	166	180	193
Total fluid side pressure drop	kPa	103	129	120	153	113	123	142	119	150	139	137
Freecooling capacity 100% load ⁽²⁾	kW	340	348	411	422	486	492	564	565	797	882	896
Freecooling capacity 50% load ⁽³⁾	kW	237	243	287	294	339	343	393	394	518	573	583
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER	-	11,3	10,3	11,1	9,8	10,3	9,8	9,5	11,3	10,6	10,8	9,8
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	7,4	5,8	6,8	5,0	6,0	5,1	4,9	2,4	3,6	4,0	2,6
Unit EER at ZET point	-	52	58	53	60	57	60	61	68	70	69	74
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER	-	13,9	13,0	13,3	12,1	13,1	12,8	12,4	12,4	14,2	14,2	13,5
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	13,6	12,7	13,3	12,4	12,9	12,4	12,3	11,1	11,5	11,7	11,1
Unit EER at ZET point	-	26	29	27	30	28	30	30	34	35	34	37
Sound levels												
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	72,4	73,1	73,4	74,1	74,2	74,5	75,2	76,0	76,6	77,1	77,7
Sound Power Level PWL ⁽⁵⁾	dB(A)	93,9	94,6	95,4	96,1	96,6	96,9	97,9	98,7	99,7	100,5	101,1
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	46/46	46/46	55/55	55/55					84/76	93/85	93/85
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total power input	kW	12,2	12,2	14,7	14,7	17,1	17,1	19,6	19,6	22	24,5	24,5
Total air flow rate	m3/h	175733	175733	210880	210880	246026	246026	281173	281173	316319	351466	351466
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8
Freecooling coil												
Material tubes/fins	-	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium	Copper / Aluminium
Total face area	m ²	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8	3/1,8
Internal volume (each)	l	25	25	30	30	35	35	40	40	45	50	50

Models: FH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	768	768	827	827	n.a.	n.a.	n.a.	n.a.	1891	1944	1894
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights												
Net weight	kg	7507	7540	8332	8384	n.a.	n.a.	n.a.	n.a.	13280	14247	14320
Operating weight	kg	8275	8307	9159	9210	n.a.	n.a.	n.a.	n.a.	15171	16191	16214

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); ethylene glycol 30%; power supply 400V/3ph/50Hz;

(2) : 26°C fluid inlet temperature (SGO models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(3) : 23°C fluid inlet temperature (SGO models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; ethylene glycol 30%;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.7 - Technical Data - CH4

Models: CH4		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	689	776	861	977	1067	1138	1315	1470	1740	1894	2046
Compressors power input	kW	129	152	167	195	205	221	257	295	340	408	443
Total power input (Base fans)	kW	159	182	203	232	247	264	306	344	395	469	505
Total power input (Premium fans)	kW	152	175	195	223	237	254	294	332	382	455	490
Unit EER (Base fans)	-	4,32	4,25	4,22	4,21	4,31	4,30	4,29	4,26	4,39	4,02	4,04
Unit EER (Premium fans)	-	4,52	4,43	4,41	4,38	4,49	4,48	4,47	4,43	4,56	4,16	4,18
Fluid flow	m ³ /h	99	112	124	141	153	164	189	212	167	182	196
Total fluid side pressure drop	kPa	44	58	51	70	43	50	62	53	68	58	48
Sound levels												
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	85,2	85,2	85,6	85,6	85,9	85,9	86,1	86,2	86,4	86,6	86,7
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	106,7	106,7	107,5	107,5	108,2	108,2	108,8	108,9	109,4	109,9	110
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	77,2	77,4	77,6	77,9	78,1	78,2	78,6	78,9	79,2	79,6	79,9
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	98,7	98,9	99,6	99,9	100,5	100,6	101,3	101,6	102,3	103	103,3
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	42/42	42/42	50/50	50/50					80/73	89/81	89/81
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Base fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3	3	3
Total power input	kW	29,7	29,7	35,6	35,6	41,5	41,5	47,5	47,5	53,4	59,3	59,3
Total air flow rate	m ³ /h	264838	264838	317805	317805	370773	370773	423740	423740	476708	529675	529675
Premium fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3
Total power input	kW	23,4	23,4	28,0	28,0	32,7	32,7	37,4	37,4	42	46,7	46,7
Total air flow rate	m ³ /h	270618	270618	324742	324742	378865	378865	432989	432989	487113	541236	541236
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,75	8,75	8,75

Models: CH4		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	354	354	334	334	n.a.	n.a.	n.a.	n.a.	1079	1047	999
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights												
Net weight	kg	6202	6234	6796	6847	n.a.	n.a.	n.a.	n.a.	10914	11651	11724
Operating weight	kg	6556	6588	7130	7181	n.a.	n.a.	n.a.	n.a.	11993	12698	12723

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.8 - Technical Data - CH4 + Low Noise

Models: CH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	658	736	821	925	1013	1075	1243	1383	1632	1777	1921
Compressors power input	kW	137	163	179	210	219	238	276	322	372	442	484
Total power input	kW	149	174	192	224	235	254	294	340	392	465	506
Unit EER	-	4,43	4,22	4,27	4,14	4,31	4,24	4,23	4,07	4,16	3,82	3,79
Fluid flow	m3/h	95	106	118	133	146	155	179	199	157	171	184
Total fluid side pressure drop	kPa	40	53	47	63	39	45	56	47	60	52	43
Sound levels												
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	71,9	72,6	72,8	73,6	73,7	74,0	74,7	75,5	76	76,9	77,4
Sound Power Level PWL ⁽⁵⁾	dB(A)	93,4	94,1	94,8	95,6	96,0	96,4	97,4	98,2	99,1	100,3	100,8
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	42/42	42/42	50/50	50/50					80/73	89/81	89/81
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
Total power input	kW	11,3	11,3	13,6	13,6	15,8	15,8	18,1	18,1	20,4	22,6	22,6
Total air flow rate	m³/h	194919	194919	233902	233902	272886	272886	311870	311870	350853	389837	389837
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,75	8,75	8,75
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	354	354	334	334	n.a.	n.a.	n.a.	n.a.	1079	1047	999
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights												
Net weight	kg	6202	6234	6796	6847	n.a.	n.a.	n.a.	n.a.	10914	11651	11724
Operating weight	kg	6556	6588	7130	7181	n.a.	n.a.	n.a.	n.a.	11993	12698	12723

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.9 - Technical Data - CIZ

Models: CIZ		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Mechanical cooling performance ⁽¹⁾ :										
Cooling capacity	kW	686	757	804	878	986	1139	1294	1468	1625
Compressors power input	kW	124	149	149	170	187	226	254	281	315
Total power input (Base fans)	kW	154	179	185	206	229	269	303	336	376
Total power input (Premium fans)	kW	147	172	177	198	220	259	296	323	362
Unit EER (Base fans)	-	4,46	4,21	4,33	4,25	4,29	4,22	4,26	4,35	4,3
Unit EER (Premium fans)	-	4,68	4,40	4,54	4,44	4,49	4,40	4,44	4,54	4,49
Fluid flow	m ³ /h	99	109	116	126	142	164	186	141	156
Total fluid side pressure drop	kPa	46	55	48	57	38	53	63	52	68
Sound levels										
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	85,2	85,3	85,6	85,7	85,9	85,9	86,1	86,3	86,5
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	106,7	106,8	107,6	107,6	108,3	108,2	108,8	109,3	109,8
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	77,3	77,7	77,8	78,2	78,4	78,2	78,5	78,7	79
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	98,8	99,2	99,8	100,1	100,8	100,6	101,2	101,8	102,4
Refrigeration circuits										
Number of refrigeration circuits	#	1	1	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	85/-	85/-	48/48	48/48				78/71	85/78
Compressors										
Number of compressors	#	1	1	2	2	2	2	2	2	2
Type	-	Inverter screw	Inverter screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter Screw/ Screw	Inverter Screw/ Screw
Nominal power	HP	240	290	160/140	200/160	200/180	240/210	240/240	290/280	290/320
Fans										
Base fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0
Total power input	kW	29,7	29,7	35,6	35,6	41,5	41,5	47,5	53,4	59,3
Total air flow rate	m ³ /h	264697	264697	317636	317636	370575	370575	423515	476454	529393
Premium fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3
Total power input	kW	23,4	23,4	28	28	32,7	32,7	37,4	42	46,7
Total air flow rate	m ³ /h	270462	274062	324555	324555	378647	378647	432739	486832	540924
Evaporator										
Number of evaporators	#	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr.side)	l	94	94	55	55	63,5	68	78,5	115	129
Condensing coil										
Material tubes/fins	-	Aluminium / Aluminum	Aluminium / Aluminum	Aluminium / Aluminum	Aluminium / Aluminum	Aluminium / Aluminum	Aluminium / Aluminum	Aluminium / Aluminum	Aluminium / Aluminum	Aluminium / Aluminum
Total face area	m ²	25	25	30	30	35	35	40	45	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,8	8,8
Water connections										
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	354	354	334	334	n.a.	n.a.	n.a.	1048	1016
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-

Models: CIZ		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Dimensions										
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights										
Net weight	kg	5538	5548	6695	7295	n.a.	n.a.	n.a.	10812	11393
Operating weight	kg	5892	5902	7029	7629	n.a.	n.a.	n.a.	11860	12409

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.10 - Technical Data - CIZ + Low Noise

Models: CIZ (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Mechanical cooling performance ⁽¹⁾ :										
Cooling capacity	kW	659	720	768	835	941	1077	1225	1393	1542
Compressors power input	kW	136	164	162	186	203	249	280	308	345
Total power input	kW	147	175	175	200	218	265	298	329	368
Unit EER	-	4,47	4,12	4,39	4,18	4,31	4,06	4,11	4,24	4,19
Fluid flow	m ³ /h	95	104	111	120	135	155	176	134	148
Total fluid side pressure drop	kPa	42	50	44	51	35	47	57	47	62
Sound levels										
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	72,8	74,1	73,7	74,7	74,8	74,1	74,6	75	75,6
Sound Power Level PWL ⁽⁵⁾	dB(A)	94,3	95,6	95,7	96,6	97,2	96,5	97,4	98,1	99
Refrigeration circuits										
Number of refrigeration circuits	#	1	1	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	85/-	85/-	48/48	48/48				78/71	85/78
Compressors										
Number of compressors	#	1	1	2	2	2	2	2	2	2
Type	-	Inverter screw	Inverter screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter Screw/ Screw	Inverter Screw/ Screw
Nominal power	HP	240	290	160/140	200/160	200/180	240/210	240/240	290/280	290/320
Fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
Total power input	kW	11,3	11,3	13,6	13,6	15,8	15,8	18,1	20,4	22,6
Total air flow rate	m ³ /h	194829	194829	233795	233795	272760	272760	311726	350692	389658
Evaporator										
Number of evaporators	#	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr.side)	l	94	94	55	55	63,5	68	78,5	115	129
Condensing coil										
Material tubes/fins	-	Aluminum / Aluminum	Aluminum / Aluminum	Aluminum / Aluminum	Aluminum / Aluminum	Aluminum / Aluminum	Aluminum / Aluminum	Aluminum / Aluminum	Aluminum / Aluminum	Aluminum / Aluminum
Total face area	m ²	25	25	30	30	35	35	40	45	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,75
Water connections										
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	354	354	334	334	n.a.	n.a.	n.a.	1048	1016
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-
Dimensions										
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights										
Net weight	kg	5538	5548	6695	7295	n.a.	n.a.	n.a.	10812	11393
Operating weight	kg	5892	5902	7029	7629	n.a.	n.a.	n.a.	11860	12409

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.11 - Technical Data - CH3

Models: CH3		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	684	770	856	969	1059	1127	1305	1471	1723	1874	2036
Compressors power input	kW	133	157	173	202	212	229	266	307	353	405	453
Total power input (Base fans)	kW	163	187	209	239	254	272	314	356	408	467	515
Total power input (Premium fans)	kW	156	180	201	230	244	262	303	344	395	452	500
Unit EER (Base fans)	-	4,18	4,1	4,08	4,05	4,16	4,14	4,14	4,12	4,2	4	3,94
Unit EER (Premium fans)	-	4,38	4,27	4,26	4,21	4,33	4,31	4,30	4,27	4,36	4,15	4,07
Fluid flow	m ³ /h	98	111	123	139	152	162	188	212	165	180	195
Total fluid side pressure drop	kPa	44	57	51	69	42	49	61	53	67	57	48
Sound levels												
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	85,2	85,2	85,6	85,7	85,9	85,9	86,1	86,2	86,4	86,6	86,7
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	106,7	106,7	107,5	107,6	108,2	108,2	108,8	108,9	109,4	109,9	110,0
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	77,2	77,4	77,7	77,9	78,2	78,3	78,7	79,0	79,3	79,6	79,9
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	98,7	98,9	99,7	99,9	100,6	100,7	101,4	101,7	102,4	103,0	103,3
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	46/46	46/46	55/55	55/55					84/76	93/85	93/85
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Base fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0
Total power input	kW	29,7	29,7	35,6	35,6	41,5	41,5	47,5	47,5	53,4	59,3	59,3
Total air flow rate	m ³ /h	264697	264697	317636	317636	370575	370575	423515	423515	476454	529393	529393
Premium fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3	2,3
Total power input	kW	23,4	23,4	28,0	28,0	32,7	32,7	37,4	37,4	42	46,7	46,7
Total air flow rate	m ³ /h	270462	270462	324555	324555	378647	378647	432739	432739	486832	540924	540924
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8

Models: CH3		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	354	354	334	334	n.a.	n.a.	n.a.	n.a.	1079	1047	999
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights												
Net weight	kg	6202	6234	6796	6847	n.a.	n.a.	n.a.	n.a.	10914	11651	11724
Operating weight	kg	6556	6588	7130	7181	n.a.	n.a.	n.a.	n.a.	11993	12698	12723

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.12 - Technical Data - CH3 + Low Noise

Models: CH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	651	727	813	915	1002	1060	1228	1376	1608	1751	1881
Compressors power input	kW	142	169	186	218	227	246	285	334	385	440	489
Total power input	kW	153	180	199	232	243	262	303	352	406	463	511
Unit EER	-	4,24	4,03	4,08	3,94	4,12	4,05	4,05	3,90	3,96	3,78	3,68
Fluid flow	m ³ /h	94	105	117	132	144	153	177	198	154	168	181
Total fluid side pressure drop	kPa	40	51	46	61	38	44	55	47	59	50	41
Sound levels												
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	72,1	72,8	73,0	73,8	73,9	74,2	74,8	75,7	76,3	76,8	77,5
Sound Power Level PWL ⁽⁵⁾	dB(A)	93,6	94,3	95,0	95,8	96,2	96,6	97,5	98,4	99,4	100,2	100,9
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2,0
Refrigerant charge for each circuit	kg	46/46	46/46	55/55	55/55					84/76	93/85	93/85
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1
Total power input	kW	11,3	11,3	13,6	13,6	15,8	15,8	18,1	18,1	20,4	22,6	22,6
Total air flow rate	m ³ /h	194829	194829	233795	233795	272760	272760	311726	311726	350692	389658	389658
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,75	8,75	8,75
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	354	354	334	334	n.a.	n.a.	n.a.	n.a.	1079,0	1047,0	999,0
Fluid volume (internal glycol circuit)	l	-	-	-	-	-	-	-	-	-	-	-
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights												
Net weight	kg	6202	6234	6796	6847	n.a.	n.a.	n.a.	n.a.	10914	11651	11724
Operating weight	kg	6556	6588	7130	7181	n.a.	n.a.	n.a.	n.a.	11993	12698	12723

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.13 - Technical Data - NH4

Models: NH4		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	678	763	848	960	1049	1117	1290	1441	1703	1855	2003
Compressors power input	kW	132	155	171	200	209	227	263	304	350	419	457
Total power input (Base fans)	kW	164	188	210	239	255	272	315	356	409	485	522
Total power input (Premium fans)	kW	157	181	202	231	245	262	304	344	396	470	508
Unit EER (Base fans)	-	4,13	4,05	4,03	4,01	4,11	4,09	4,08	4,03	4,15	3,81	3,82
Unit EER (Premium fans)	-	4,31	4,22	4,21	4,16	4,28	4,25	4,25	4,18	4,3	3,94	3,95
Fluid flow	m3/h	98	110	122	138	151	161	186	207	163	178	192
Total fluid side pressure drop	kPa	125	158	108	140	103	117	139	148	102	94	91
Freecooling capacity 100% load ⁽²⁾	kW	351	359	433	444	512	519	597	608	841	932	950
Freecooling capacity 50% load ⁽³⁾	kW	244	250	299	307	355	359	413	421	541	600	612
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER (Base fans)	-	7,9	7,6	7,8	7,6	7,7	7,7	7,6	8,8	8,63	8,45	8,2
Unit EER (Premium fans)	-	8,5	8,2	8,4	8,1	8,3	8,3	8,2	9,5	9,28	9,11	8,79
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	6,9	5,0	6,6	4,7	5,8	4,8	4,7	2,6	2,9	3,4	1,7
Unit EER at ZET point (Base fans)	-	16	18	16	18	18	19	18	20	21,94587629	21,24856816	22,94387171
Unit EER at ZET point (Premium fans)	-	19	21	19	21	21	22	21	24	25,72507553	24,86595174	26,84986595
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER (Base fans)	-	6,8	6,6	6,4	6,3	6,5	6,7	6,5	6,9	7,65	7,79	8
Unit EER (Premium fans)	-	7,6	7,4	7,2	7,1	7,4	7,5	7,3	7,8	8,59	8,8	8,98
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	13,4	12,5	13,3	12,3	12,8	12,3	12,3	11,3	11,2	11,5	10,7
Unit EER at ZET point (Base fans)	-	8	9	8	9	9	9	9	10	10,97293814	10,62428408	11,47193585
Unit EER at ZET point (Premium fans)	-	9	10	9	11	10	11	11	12	12,86253776	12,43297587	13,42493298
Sound levels												
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	84,3	84,4	84,7	84,8	85,0	85,1	85,3	85,4	85,6	85,8	85,9
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	105,8	105,9	106,6	106,7	107,5	107,4	108,0	108,1	108,6	109,1	109,2
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	78,7	78,8	79,1	79,3	79,5	79,6	80,0	80,2	80,4	80,8	81
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	100,2	100,3	101,1	101,3	101,9	102,0	102,7	102,9	103,5	104,2	104,4
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2	2	2	2	2	2	2	2
Refrigerant charge for each circuit	kg	42/42	42/42	50/50	50/50					80/73	89/81	89/81
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Base fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Total power input	kW	31,8	31,8	38,2	38,2	44,6	44,6	50,9	50,9	57,3	63,7	63,7
Total air flow rate	m³/h	236043	236043	283251	283251	330460	330460	377668	377668	424877	472085	472085

Models: NH4		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Premium fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6
Total power input	kW	25,5	25,5	30,6	30,6	35,7	35,7	40,8	40,8	45,9	51	51
Total air flow rate	m³/h	240117	240117	288140	288140	336164	336164	384187	384187	432211	480234	480234
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,75	8,75	8,75
Freecooling coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Number of rows / fin spacing	#/mm	25	25	30	30	35	35	40	40	45	50	50
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	456	456	460	460	n.a.	n.a.	n.a.	n.a.	1421	1431	1383
Fluid volume (internal glycol circuit)	l	499	499	563	563	-	-	-	-	1066	1189	1189
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights												
Net weight	kg	7708	7740	8742	8793	n.a.	n.a.	n.a.	n.a.	14134	15154	15226
Operating weight	kg	8664	8696	9816,11	9867,11	n.a.	n.a.	n.a.	n.a.	16621	17774	17798

Notes:

- (1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;
- (2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;
- (5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.14 - Technical Data - NH4 + Low Noise

Models: NH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	645	719	804	904	991	1049	1213	1347	1588	1728	1870
Compressors power input	kW	141	168	184	217	226	245	284	333	386	457	501
Total power input	kW	153	181	199	232	243	262	304	353	408	482	525
Unit EER	-	4,21	3,99	4,05	3,90	4,08	4,00	4,00	3,82	3,89	3,59	3,56
Fluid flow	m3/h	93	104	116	130	142	151	175	194	152	166	179
Total fluid side pressure drop	kPa	114	142	97	125	93	104	124	130	90	83	80
Freecooling capacity 100% load ⁽²⁾	kW	291	296	358	365	422	426	490	497	684	759	772
Freecooling capacity 50% load ⁽³⁾	kW	201	205	245	250	290	293	336	342	442	491	496
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER	-	8,5	9,1	8,2	8,4	8,1	9,2	8,8	9,4	10,2	7,6	10,3
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	4,1	2,2	3,6	1,5	2,8	1,8	1,6	-0,4	-0,2	0,2	0
Unit EER at ZET point	-	28	31	27	31	30	32	31	34	37	36	39
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER	-	8,3	8,3	7,9	7,8	8,5	8,5	8,1	8,5	9,5	9,7	9,7
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	12,0	10,9	11,8	10,6	11,2	10,7	10,6	9,4	9,4	9,7	8,7
Unit EER at ZET point	-	14	15	14	15	15	16	15	17	19	18	19
Sound levels												
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	72,4	73,1	73,3	74,1	74,2	74,5	75,1	75,9	76,5	77,2	77,8
Sound Power Level PWL ⁽⁵⁾	dB(A)	93,9	94,6	95,3	96,1	96,5	96,9	97,8	98,6	99,6	100,6	101,2
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2					2	2	2
Refrigerant charge for each circuit	kg	42/42	42/42	50/50	50/50					80/73	89/81	89/81
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total power input	kW	12,3	12,3	14,8	14,8	17,3	17,3	19,7	19,7	22,2	24,7	24,7
Total air flow rate	m3/h	173722	173722	208467	208467	243211	243211	277956	277956	312700	347445	347445
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8
Freecooling coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50

Models: FH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	456	456	460	460	n.a.	n.a.	n.a.	n.a.	1421	1431	1383
Fluid volume (internal glycol circuit)	l	499	499	563	563	-	-	-	-	1066	1189	1189
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights												
Net weight	kg	7708	7740	8742	8793	n.a.	n.a.	n.a.	n.a.	14134	15154	15226
Operating weight	kg	8664	8696	9816,11	9867,11	n.a.	n.a.	n.a.	n.a.	16621	17774	17798

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(2) : 26°C fluid inlet temperature (SGO models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;

(3) : 23°C fluid inlet temperature (SGO models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.15 - Technical Data - NIZ

Models: NIZ		065 SGO	075 SGO	080 SGO	085 SGO	095 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Mechanical cooling performance ⁽¹⁾ :										
Cooling capacity	kW	679	745	792	864	971	1118	1271	1443	1597
Compressors power input	kW	128	154	153	175	192	234	262	290	325
Total power input (Base fans)	kW	160	186	192	214	237	279	315	349	390
Total power input (Premium fans)	kW	153	179	184	206	228	269	303	336	376
Unit EER (Base fans)	-	4,23	3,99	4,12	4,02	4,08	3,99	4,03	4,13	4,08
Unit EER (Premium fans)	-	4,43	4,16	4,31	4,20	4,27	4,15	4,19	4,29	4,25
Fluid flow	m ³ /h	98	107	114	124	140	161	183	138	153
Total fluid side pressure drop	kPa	127	151	97	115	90	120	138	78	99
Max freecooling capacity ⁽²⁾	kW	351	358	427	435	504	519	595	803	886
Freecooling capacity ⁽³⁾	kW	244	248	294	300	349	359	412	521	575
Freecooling mixed mode performance [100% load] ⁽²⁾ :										
Unit EER (Base fans)	-	11,7	11,7	9,1	9,4	8,8	8,4	8,3	10,0	10,0
Unit EER (Premium fans)	-	11,9	12,1	10,0	8,6	9,7	9,1	8,9	11,0	11,1
Total freecooling [100% load] ⁽²⁾ :										
ZET temperature	°C	6,9	5,5	7,6	6,3	6,9	4,5	4,9	5,9	5,8
Unit EER at ZET point (Base fans)	-	16	17	15	16	16	19	18	19	18
Unit EER at ZET point (Premium fans)	-	19	20	17	19	19	22	21	22	21
Freecooling mixed mode performance [50% load] ⁽³⁾ :										
Unit EER (Base fans)	-	9,5	9,9	7,6	8,0	8,2	8,6	8,4	8,9	8,6
Unit EER (Premium fans)	-	9,8	10,0	8,3	8,7	8,9	9,4	9,1	9,7	9,3
Total freecooling [50% load] ⁽³⁾ :										
ZET temperature	°C	13,4	12,7	13,7	13,1	13,4	12,3	12,4	12,8	12,8
Unit EER at ZET point (Base fans)	-	8	9	7	8	8	9	9	9	9
Unit EER at ZET point (Premium fans)	-	9	10	9	10	10	11	11	11	11
Sound levels										
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	84,4	84,5	84,8	84,8	85,1	85,1	85,3	85,5	85,7
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	105,9	106,0	106,7	106,8	107,4	107,4	108,0	108,5	109
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	78,8	79,1	79,3	79,5	79,8	79,6	79,9	80,1	80,4
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	100,3	100,6	101,3	101,5	102,2	102,0	102,6	103,2	103,8
Refrigeration circuits										
Number of refrigeration circuits	#	1	1	2	2				2	2
Refrigerant charge for each circuit	kg	85/-	85/-	48/48	48/48				78/71	85/78
Compressors										
Number of compressors	#	1	1	2	2	2	2	2	2	2
Type	-	Inverter screw	Inverter screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter Screw/ Screw	Inverter Screw/ Screw
Nominal power	HP	240	290	160/140	200/160	200/180	240/210	240/240	290/280	290/320
Fans										
Base fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Total power input	kW	31,8	31,8	38,2	38,2	44,6	44,6	50,9	57,3	63,7
Total air flow rate	m ³ /h	235932	235932	283119	283119	330305	330305	377492	424678	471865
Premium fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6

Models: NIZ		065 SGO	075 SGO	080 SGO	085 SGO	095 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Total power input	kW	25,5	25,5	30,6	30,6	35,7	35,7	40,8	45,9	51
Total air flow rate	m3/h	240003	240003	288004	288004	336004	336004	384005	432006	480006
Evaporator										
Number of evaporators	#	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr.side)	l	94	94	55	55	63,5	68	78,5	115	129
Condensing coil										
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m2	25	25	30	30	35	35	40	45	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,8	8,8
Freecooling coil										
Material tubes/fins		Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m2	25	25	30	30	35	35	40	45	50
Water connections										
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	456	456	460	460	n.a.	n.a.	n.a.	1389	1356
Fluid volume (internal glycol circuit)	l	499	499	563	563	-	-	-	1066	1144
Dimensions										
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights										
Net weight	kg	7044	7054	8640	9240	n.a.	n.a.	n.a.	13933	14785
Operating weight	kg	8000	8010	9699	10299	n.a.	n.a.	n.a.	16388	17285

Notes:

- (1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;
- (2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;
- (5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.16 - Technical Data - NIZ + Low Noise

Models: NIZ (low noise)		065 SGO	075 SGO	080 SGO	085 SGO	095 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Mechanical cooling performance ⁽¹⁾ :										
Cooling capacity	kW	646	705	753	817	923	1051	1196	1361	1507
Compressors power input	kW	142	170	167	194	210	260	292	320	358
Total power input	kW	154	183	182	209	227	277	311	342	383
Unit EER	-	4,20	3,86	4,14	3,92	4,07	3,79	3,84	3,98	3,94
Fluid flow	m3/h	93	101	108	118	133	151	172	131	145
Total fluid side pressure drop	kPa	116	137	88	103	82	107	123	70	89
Freecooling capacity 100% load ⁽²⁾	kW	291	295	353	359	416	426	488	660	729
Freecooling capacity 50% load ⁽³⁾	kW	201	204	242	246	286	293	335	427	472
Freecooling mixed mode performance [100% load] ⁽²⁾ :										
Unit EER	-	11,8	12,0	9,6	8,5	8,8	10,2	10,4	9,7	9,8
Total freecooling [100% load] ⁽²⁾ :										
ZET temperature	°C	4,1	2,6	4,7	3,3	4,0	1,7	1,9	2,6	2,6
Unit EER at ZET point	-	28	30	25	28	28	32	30	32	31
Freecooling mixed mode performance [50% load] ⁽³⁾ :										
Unit EER	-	9,3	9,9	9,2	9,7	10,0	10,4	10,0	10,7	10,3
Total freecooling [50% load] ⁽³⁾ :										
ZET temperature	°C	11,9	11,1	12,4	11,6	12,0	10,7	10,8	11,1	11
Unit EER at ZET point	-	14	15	13	14	14	16	15	16	16
Sound levels										
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	73,4	74,6	74,2	75,2	75,4	74,6	75,2	75,5	76,0
Sound Power Level PWL ⁽⁵⁾	dB(A)	94,9	96,1	96,2	97,2	97,7	97,0	97,9	98,6	99,5
Refrigeration circuits										
Number of refrigeration circuits	#	1	1	2	2				2	2
Refrigerant charge for each circuit	kg	85/-	85/-	48/48	48/48				78/71	85/78
Compressors										
Number of compressors	#	1	1	2	2	2	2	2	2	2
Type	-	Inverter screw	Inverter screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter screw/ Screw	Inverter Screw/ Screw	Inverter Screw/ Screw
Nominal power	HP	240	290	160/140	200/160	200/180	240/210	240/240	290/280	290/320
Fans										
Number of fans	#	10	10	12	12	14	14	16	18	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G801
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total power input	kW	12,3	12,3	14,8	14,8	17,3	17,3	19,7	22,2	24,7
Total air flow rate	m³/h	173654	173654	208385	208385	243116	243116	277847	312578	347309
Evaporator										
Number of evaporators	#	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr.side)	l	94	94	55	55	63,5	68	78,5	115	129
Condensing coil										
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m2	25	25	30	30	35	35	40	45	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,8	8,8
Freecooling coil										
Material tubes/fins		Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m2	25	25	30	30	35	35	40	45	50
Water connections										
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"

Models: NIZ (low noise)		065 SGO	075 SGO	080 SGO	085 SGO	095 SGO	110 SGO	125 SGO	140 HGO	150 HGO
Fluid volume (user side)	l	456	456	460	460	n.a.	n.a.	n.a.	1389	1356
Fluid volume (internal glycol circuit)	l	499	499	563	563	-	-	-	1066	1144
Dimensions										
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	12106	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights										
Net weight	kg	7044	7054	8640	9240	n.a.	n.a.	n.a.	13933	14785
Operating weight	kg	8000	8010	9699	10299	n.a.	n.a.	n.a.	16388	17285

Notes:

(1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;

(2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;

(3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;

(4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;

(5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.17 - Technical Data - NH3

Models: NH3		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	673	755	841	951	1040	1105	1279	1439	1684	1833	1984
Compressors power input	kW	136	161	177	207	217	235	272	316	364	417	465
Total power input (Base fans)	kW	168	193	216	246	262	280	324	368	423	482	531
Total power input (Premium fans)	kW	161	186	208	238	252	270	313	357	410	468	516
Unit EER (Base fans)	-	3,99	3,90	3,89	3,85	3,96	3,93	3,93	3,89	3,97	3,79	3,72
Unit EER (Premium fans)	-	4,17	4,05	4,05	4,00	4,12	4,09	4,09	4,03	4,11	3,92	3,84
Fluid flow	m3/h	97	109	121	137	150	159	184	207	162	176	190
Total fluid side pressure drop	kPa	123	155	106	137	101	115	137	147	100	92	89
Freecooling capacity 100% load ⁽²⁾	kW	350	359	432	443	511	517	596	608	838	929	947
Freecooling capacity 50% load ⁽³⁾	kW	243	249	299	306	354	358	412	421	545	605	616
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER (Base fans)	-	7,9	7,7	7,8	7,6	7,8	7,6	7,5	8,8	8,5	8,6	8,2
Unit EER (Premium fans)	-	8,5	8,3	8,5	8,1	8,4	8,2	8,0	9,4	9,2	9,3	8,8
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	7,0	5,2	6,7	4,8	5,7	4,8	4,7	2,5	3	3,8	2,1
Unit EER at ZET point (Base fans)	-	16	18	16	18	17	18	18	20	22	21	23
Unit EER at ZET point (Premium fans)	-	18	21	19	21	20	22	21	24	25	25	27
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER (Base fans)	-	6,6	6,4	6,1	6,3	6,5	6,6	6,5	6,9	7,6	7,5	7,7
Unit EER (Premium fans)	-	7,5	7,2	6,9	7,0	7,4	7,5	7,3	7,8	8,6	8,5	8,6
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	13,4	12,5	13,3	12,3	12,9	12,4	12,3	11,3	11,4	11,7	10,9
Unit EER at ZET point (Base fans)	-	8	9	8	9	9	9	9	10	11	10	11
Unit EER at ZET point (Premium fans)	-	9	10	9	10	10	11	11	12	13	12	13
Sound levels												
Sound Pressure Level SPL (Base fans) ⁽⁴⁾	dB(A)	84,3	84,4	84,8	84,8	85,0	85,1	85,3	85,4	85,6	85,8	85,9
Sound Power Level PWL (Base fans) ⁽⁵⁾	dB(A)	105,8	105,9	106,7	106,7	107,4	107,4	108,0	108,1	108,6	109,1	109,2
Sound Pressure Level SPL (Premium fans) ⁽⁴⁾	dB(A)	78,7	78,9	79,1	79,3	79,5	79,6	80,0	80,3	80,5	80,8	81,1
Sound Power Level PWL (Premium fans) ⁽⁵⁾	dB(A)	100,2	100,4	101,1	101,3	101,9	102,0	102,7	103,0	103,6	104,2	104,5
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2					2	2	2
Refrigerant charge for each circuit	kg	46/46	46/46	55/55	55/55					84/76	93/85	93/85
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Base fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091	FN091
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100	1100
Power input (each)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Total power input	kW	31,8	31,8	38,2	38,2	44,6	44,6	50,9	50,9	57,3	63,7	63,7
Total air flow rate	m³/h	235932	235932	283119	283119	330305	330305	377492	377492	424678	471865	471865

Models: NH3		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Premium fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910	S3G910
Wheel nominal diameter	mm	910	910	910	910	910	910	910	910	910	910	910
Rotation speed	1/min	980	980	980	980	980	980	980	980	980	980	980
Power input (each)	kW	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6	2,6
Total power input	kW	25,5	25,5	30,6	30,6	35,7	35,7	40,8	40,8	45,9	51	51
Total air flow rate	m³/h	240003	240003	288004	288004	336004	336004	384005	384005	432006	480006	480006
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8
Freecooling coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m²	25	25	30	30	35	35	40	40	45	50	50
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	456	456	460	460	n.a.	n.a.	n.a.	n.a.	1421	1431	1383
Fluid volume (internal glycol circuit)	l	499	499	563	563	-	-	-	-	1066	1189	1189
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784	2784
Unit height (Premium fans)	mm	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865	2865
Weights												
Net weight	kg	7708	7740	8742	8793	n.a.	n.a.	n.a.	n.a.	14134	15154	15226
Operating weight	kg	8664	8696	9816	9867	n.a.	n.a.	n.a.	n.a.	16621	17774	17798

Notes:

- (1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SG0 models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;
- (2) : 26°C fluid inlet temperature (SG0 models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (3) : 23°C fluid inlet temperature (SG0 models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;
- (5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Tab 4.18 - Technical Data - NH3 + Low Noise

Models: NH3 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Mechanical cooling performance ⁽¹⁾ :												
Cooling capacity	kW	637	709	795	892	978	1033	1196	1336	1560	1699	1818
Compressors power input	kW	146	174	191	226	234	254	293	346	399	455	503
Total power input	kW	158	187	206	240	251	271	313	366	421	479	528
Unit EER	-	4,02	3,79	3,86	3,71	3,90	3,81	3,82	3,65	3,7	3,55	3,44
Fluid flow	m3/h	92	102	114	128	141	149	172	192	149,7	163	175
Total fluid side pressure drop	kPa	111	138	95	122	90	101	121	128	87	80	76
Freecooling capacity 100% load ⁽²⁾	kW	290	296	357	364	421	424	488	496	682	756	767
Freecooling capacity 50% load ⁽³⁾	kW	200	204	245	250	289	292	335	341	440	488	492
Freecooling mixed mode performance [100% load] ⁽²⁾ :												
Unit EER	-	8,5	7,9	8,2	8,3	8,0	9,0	8,7	9,3	8,0	7,8	7,4
Total freecooling [100% load] ⁽²⁾ :												
ZET temperature	°C	4,3	2,5	3,8	1,8	3,0	2,0	1,9	-0,2	0,1	0,6	-0,8
Unit EER at ZET point	-	27	30	27	30	30	32	30	34	37	35	38
Freecooling mixed mode performance [50% load] ⁽³⁾ :												
Unit EER	-	8,3	8,2	7,9	7,8	8,4	8,4	8,0	8,5	9,3	9,2	9,0
Total freecooling [50% load] ⁽³⁾ :												
ZET temperature	°C	12,1	11,1	11,9	10,8	11,4	10,8	10,8	9,5	9,6	9,8	9,1
Unit EER at ZET point	-	14	15	13	15	15	16	15	17	18	18	19
Sound levels												
Sound Pressure Level SPL ⁽⁴⁾	dB(A)	72,6	73,3	73,5	74,3	74,3	74,6	75,3	76,1	76,7	77,2	77,8
Sound Power Level PWL ⁽⁵⁾	dB(A)	94,1	94,8	95,5	96,3	96,7	97,0	98,0	98,8	99,8	100,6	101,2
Refrigeration circuits												
Number of refrigeration circuits	#	2	2	2	2					2	2	2
Refrigerant charge for each circuit	kg	46/46	46/46	55/55	55/55					84/76	93/85	93/85
Compressors												
Number of compressors	#	2	2	2	2	2	2	2	2	2	2	2
Type	-	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw	Screw/ Screw
Nominal power	HP	125/125	140/140	160/160	180/180	210/180	210/210	240/240	280/280	300/300	320/320	320/320
Fans												
Number of fans	#	10	10	12	12	14	14	16	16	18	20	20
Type	-	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800	S3G800
Wheel nominal diameter	mm	800	800	800	800	800	800	800	800	800	800	800
Rotation speed	1/min	850	850	850	850	850	850	850	850	850	850	850
Power input (each)	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total power input	kW	12,3	12,3	14,8	14,8	17,3	17,3	19,7	19,7	22,2	24,7	24,7
Total air flow rate	m3/h	173654	173654	208385	208385	243116	243116	277847	277847	312578	347309	347309
Evaporator												
Number of evaporators	#	1	1	1	1	1	1	1	1	1	1	1
Type	-	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube	Shell & Tube
Internal volume per circuit (refr. side)	l	43,5	47	51	55	59	63,5	73,5	83,5	101,5	115	136
Condensing coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50
Internal volume (each)	l	8,8	8,8	8,8	8,8	8,75	8,75	8,75	8,75	8,8	8,8	8,8
Freecooling coil												
Material tubes/fins	-	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium	Aluminium / Aluminium
Total face area	m ²	25	25	30	30	35	35	40	40	45	50	50

Models: FH4 (low noise)		065 SGO	075 SGO	080 SGO	090 SGO	100 SGO	110 SGO	125 SGO	140 SGO	165 HGO	180 HGO	195 HGO
Water connections												
Diameter	DN / "	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN125 / 5"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"	DN150 / 6"
Fluid volume (user side)	l	456	456	460	460	n.a.	n.a.	n.a.	n.a.	1421	1431	1383
Fluid volume (internal glycol circuit)	l	499	499	563	563	-	-	-	-	1066	1189	1189
Dimensions												
Unit length	mm	7026	7026	8296	8296	9566	9566	10836	10836	12106	13376	13376
Unit depth	mm	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
Unit height (Base fans)	mm	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845	2845
Weights												
Net weight	kg	7708	7740	8742	8793	n.a.	n.a.	n.a.	n.a.	14134	15154	15226
Operating weight	kg	8664	8696	9816	9867	n.a.	n.a.	n.a.	n.a.	16621	17774	17798

Notes:

- (1) : 35°C ambient temperature; 26-20°C fluid inlet/outlet temperature (SGO models); 29-20°C fluid inlet/outlet temperature (HGO models); water; power supply 400V/3ph/50Hz;
- (2) : 26°C fluid inlet temperature (SGO models); 29°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (3) : 23°C fluid inlet temperature (SGO models); 24,5°C fluid inlet temperature (HGO models); 16°C ambient temperature; nominal fluid flow; water;
- (4) : The value of SPL is measured in free field conditions and 1 meter from the unit according to ISO 3744 average method, at nominal working conditions⁽¹⁾;
- (5) : The value of PWL is calculated in according to ISO 3744 procedure method, at nominal working conditions⁽¹⁾.

Mechanical Specifications

Construction frame and panels

The **Liebert® AFC** series has been designed for outdoor installations.

All the components of the frame are made to withstand the action of atmospheric agents.

The base is made of metal profiles – main beams with 6mm thick, S275JR steel and side beams 4mm thick S355MC steel, fixed by means of special screws or rivets with high mechanical characteristics.

All screws are stainless steel or galvanized type instead rivets are all galvanized.

Bolted lifting brackets in 15mm thick S355J2 steel are provided on the base and side holes (ø56 mm) are provided on the main beams for fixing the anti-vibration mounts to the bottom (ø20 mm), available as an option.

The top frame of the unit supporting the air exchangers and the E. P. are all made of Z275 galvanized sheet metal with thicknesses from 1.2 to 3mm except for the lower longitudinal beams of the top air exchanger frame which are in S275JR 6mm thickness, completely similar to those provided for the base.

The compressors are positioned in a closed compartment (placed in the front side of the unit), protected from external agents and isolated from the air flow to avoid the transmission of noise.

The compressor / s compartment is made entirely of 2mm thick Z275 galvanized steel. The right and left side panels are equipped with waterproof seals and are locked with triangular insert locks (the appropriate key is supplied) for easy and quick disassembly.

In the versions with A2L gas, the compressor compartment is flushed with forced ventilation (ATEX fan) in order to declassify the closed area where are located the compressors themselves.

The compressors are fixed to the base on anti-vibration supports to prevent the transmission of vibrations to the structure.

The compressor box is designed to reduce to the maximum the levels of noise through the use of sound-absorbing/damping materials.

All exposed sheet metal parts are painted directly with polyester powder RAL7032 on zinc-plated Z275 components, for non-galvanized components they are painted with polyester powder RAL7032 after a treatment with a suitable primer; so all parts (galvanized and not galvanized) are set to ensure good corrosion resistance equivalent to a C3 Medium grade (according to ISO 12944) for an application in urban and industrial environments with modest pollution and coastal areas with low salinity.



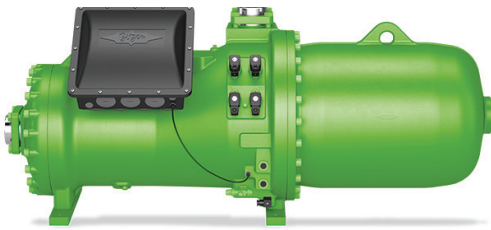
Refrigeration Circuit

The unit is equipped with multiple screw compressors, configured in a single independent refrigeration circuit for each compressor.

Each circuit includes:

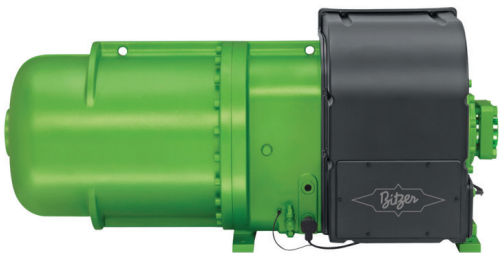
- safety pressure switch for high pressure
- an electronic safety pressure switch for low pressure
- an electronic expansion valve, including a stepper motor with:
 - Continuous adjustment with unlimited adjustment position
 - Extremely high positioning speed;
- Very accurate control on overheating; microprocessor - algorithms highly adjustable and adaptable for the most different load variations (transients).
- a filter dryer with disposable anti-acid solid cartridge, a humidity indicator and liquid sight glass
- high and low pressure safety valves
- charge connections and a manual ON-OFF valve;
- liquid injection circuit for versions with Inverter compressor
- Low pressure switch with manual reset to avoid air entry into refrigerant circuit (only for R1234ze units)

The units are supplied charged with refrigerant R134a/R1234ze and oil as determined in the factory for the operating conditions within the indicated limits.



Type	Semi-hermetic screw compressors Integrated shut-off valve on the discharge line
Safety	Internal safety valve
Protection	Electronic protection controlling: <ul style="list-style-type: none"> - the temperature of the motor windings - the oil temperature - the screw rotating direction <p>The compressor motors are equipped with protection on all the three phases and are started by their three-pole contactors.</p>
Oil system	Oil heater Oil sight glass Oil level control (optional) Fine filter 10 µm mesh size

Inverter Compressors

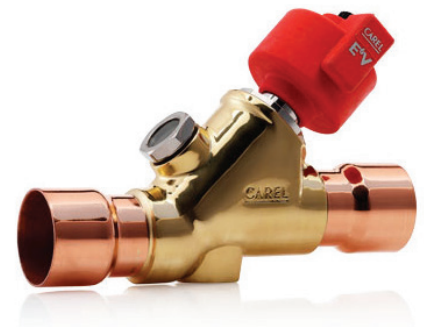


Type	Semi-hermetic screw compressors with integrated frequency inverter for variable speed control Integrated solenoid valve for automatic Vi control and for automatic inverter cooling Integrated shut-off valve on the discharge line
Safety	Internal safety valve External rupture disk for A2L refrigerants in case of leakage of inverter refrigerant circuit cooling Line reactor to comply cat. C3 of EN61800-3 and RFI filter to comply cat. C2 of EN61800-3
Protection	Integrated electronic on inverter for protection & controlling of: <ul style="list-style-type: none"> • the temperature of the motor windings • the oil temperature • minimum oil level • high and low pressure • overcurrent, over and under voltage, phase failure • warnings (or cut out) communication close (or on excess) to the application limits • Inverter electronics temperature monitoring • Oil heater automatic smart control <p>The compressor motor is equipped with protection on all the three phases and is started by the three-pole contactors for safety issues on A2L units.</p>
Monitoring	Data log of all operating parameters with interval about 5 – 10 sec Memory capacity of about 2 weeks Alarms message and statistics of the last 36 days

Electronic expansion valve

The electronic expansion valve used in the **Liebert® AFC** range enables accurate control of the overheating of the gas sucked by the compressor under all load conditions, together with the operation at low condensation and compressor unloading. Under such application conditions a mechanical expansion valve can never reach the performance ensured by an electronic expansion valve (with energy benefits) nor the functional stability, above all during the transients of the load variations (with benefits as for reliability).

The final result of the application of the electronic expansion valve on **Liebert® AFC** is therefore an improved energy operating costs and a higher reliability, thanks to its special adjustment features above all on partial loads, conditions under which every chiller operates for most of the time. **Liebert® AFC** units are equipped with direct expansion, shell and tube type evaporators, designed, constructed, tested (pressure test on both refrigerant and water sides) and documented to comply with PED: 2014/68/EU standards.



Features

The electronic expansion valve used in the **Liebert® AFC** range enables accurate control of the super-heating of the gas under all load conditions. It manage also the operation at low condensation and high compressor choking.

The final result of the application of the electronic expansion valve on **Liebert® AFC** is therefore an improved energy operating costs and a higher reliability, thanks to its special adjustment features above all on partial loads conditions under which every chiller operates for most of the time.

Operation

The superheat setpoint will be automatically adjusted according to the operating conditions and to the application limit of the compressor.

The operating parameters and their programming in the microprocessor dedicated to the EEV control are described in the Vertiv™ iCOM3™ User Manual.

Evaporator

Liebert® AFC units are equipped with direct expansion, shell and tube type evaporators, designed, constructed, tested (pressure test on both refrigerant and water sides) and documented to comply with PED: 2014/68/EU standards.

They incorporate two refrigeration circuits and one water circuit. The shell is fabricated from seamless carbon steel with internally finned copper tubes and tube sheets of heavy gauge carbon steel.

Baffles are of plastic material; heads are constructed of special cast iron, gaskets of an asbestos free compound and bolts of carbon steel. They are externally insulated with closed cell elastomer with high resistance to UV rays HT-type for outdoor installations.

The evaporators are equipped with drainage and vent connections and are protected against freezing by a paddle-type flow switch and an antifreeze sensor directly managed by the microprocessor.

As an option, a thermostatically controlled electric heater is fitted inside the shell to prevent freezing with outdoor temperatures below 0°C.

Temperature and pressure working limits and pressure test values are indicated below:



Tab. 5.1 - Evaporator working limits

Design temperature	Design pressure		Test pressure	
	Refrigerant* (R134a)	Water	Refrigerant* (R134a)	Water
Min. / Max.				
-10 / +80 °C	16,0 / 24,5 bar	10,5 bar	17,6 / 27,0 bar	11,5 bar

* 16 bar - 17,6 bar only on evaporator with 660 mm shell diameter

Condensers and Free-cooling coils

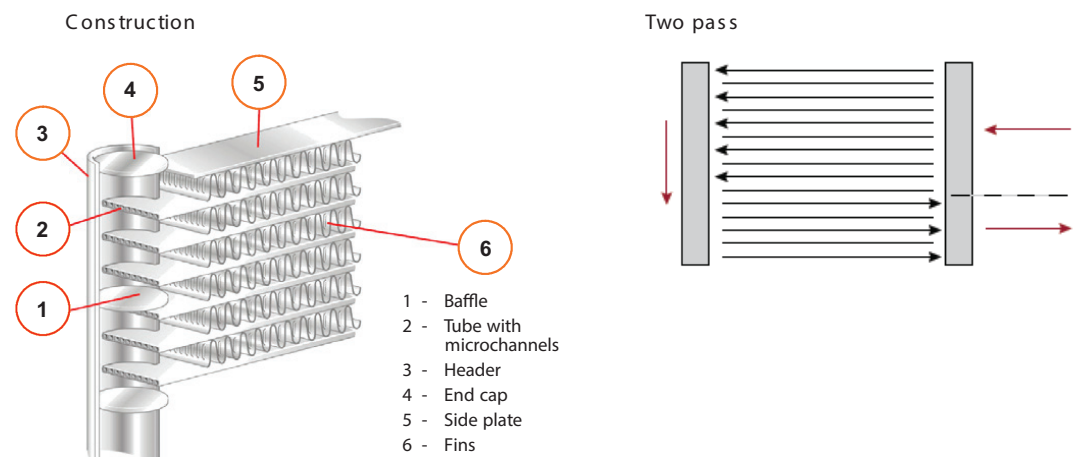
Condensing and Freecooling coils are full aluminum micro-channel type (for FC only on Glycol Free versions) and is mounted in modular configuration with multiple “V” geometry to allow a larger heat exchange surface.

On all other freecooling versions, cooling coils are made with with copper tubes and aluminum fins, to provide a larger heat exchange surface, integrated in in modular configuration with multiple “V” geometry with airflow in series with condenser coils

The microchannel coils allow to maximize the heat exchange, increasing the overall efficiency both in mechanical and freecooling mode and at the same time allow to reduce the weight and refrigerant quantity.

The R134a/R513A/R1234ze refrigerant condensation is obtained by multiple microchannel mounted in parallel multiple “V” configuration.

Microchannel Heat Exchanger is a two pass aluminum brazed product; it has better joint connection than mechanically assembled heat exchanger; each component has a specific aluminum alloy chemistry that ensures optimum performance against corrosion; it's made of:



- tube MPE (Multi Port Extrusion) HA9108;
- fins HA3968;
- header HA3905.

The microchannel condensing heat exchanger design pressure is 30 bar.

Comparing Microchannel technology with traditional condenser made of copper tubes and aluminum fins, there are many benefits, such as:

- Compact solution.
- Minimized weight.
- Reduced pressure drop.
- Increased heat transfer surface.
- Less refrigerant charge.
- No galvanic corrosion due to the presence of a single metal.
- 100 % Aluminum, easy to recycle.

Coated coil treatment (optional)

When **Liebert® AFC** model is working in harsh conditions, such as the sea coast and other corrosive environments, an added coating for coil protection is a must. According to environment characteristics, Vertiv™ serves different coating treatment as optional.

For not louvered fin coils:

- Pre-painted aluminum fin (polyester), which characteristics are summarized below
 - Corrosion resistance: 1000 h according ASTM B117
 - UV resistance: 500h according QUVA UVA 340

For only microchannel coils:

- Full immersion cathodic deposition + top coat (TKPro), which characteristics are summarized below
 - Corrosion resistance: 100 gg according SWAAT TEST ASTM G85
 - UV resistance OK according ISO 1674-3 QUVB313

For all other air heat exchangers:

- ElectroFin® E-coat coating: a full immersion process where the fins are coated with the aid of electrical power. This guarantees that the complete surface is coated, of a 15-30 micron coating layer, even in the center of the fin.
 - Corrosion resistance: 6000 h according ASTM B117
 - ElectroFin® + UV top coat protection durability: C5 marine & C5 industrial according ISO 12944-6
 - Heat transfer reduction: <1% according AHRI 410

NOTE: When ElectroFin® E-coat coating is chosen, it needs its own cleaning procedure (Annex: Procedures for cleaning ElectroFin E-coat coated coils) to grant its reliability and performance.

ElectroFin® E-coat coating is a flexible epoxy polymer coating process engineered specifically for HVAC heat transfer coils.

Freecooling execution

Liebert® AFC models in the 'Freecooling execution' are designed with an integrated freecooling system consisting of:

- cooling coils with copper tubes and aluminium fins, mounted in multiple **V** configuration to provide a larger heat exchange surface
- vent and drainage valves on the freecooling coils
- low pressure drop double 2-way butterfly valve with modulating servo-control

All the freecooling functions are managed by the microprocessor controls, according to ambient conditions and thermal load:

The following working modes are possible, managed by the microprocessor controller according to the ambient conditions of dry bulb temperature, and to the thermal load:

- Freecooling mode: 100% coolant flow first through the free cooling coils and then through the evaporator without operation of the compressors;
- Mixed mode, DX and freecooling: 100% coolant flow first through the freecooling coils and then through the evaporator with partial operation of compressors;
- Mechanical cooling mode (or DX = Direct expansion) mode with compressor operation only: 100% coolant flow through the evaporator;

The precise control of water supply temperature in total freecooling mode is ensure first by the control of fans speed and then 2 way butterfly valve.

Compressor starting and compressor unload, fan speed control, 2-way valve control are managed by the controls with different strategies in order to increase the energy saving to the maximum possible and keeping as much as possible the LWT stability.

Free cooling glycol free system

The units are designed with an integrated freecooling system, made of:

- Cooling coils with aluminium microchannel coils, to provide a larger heat exchange surface, integrated in series with condenser coils.
- Stainless-steel plate heat exchanger sized for a small temperature approach between water and glycol circuit.
- High efficiency circulation pump with integrated inverter.
- Fine mesh glycol filter with stainless steel body and replaceable core.
- A mixture of Glycol and Water as fluid to prevent the risk of freezing even if the unit is stopped with low external temperature.

The precise control of water supply temperature in total freecooling mode is ensure by the control of fans speed and no-glycol inverter pump speed with dedicated control algorithm in order to increase the energy saving to the maximum possible.

Fans and acoustic configuration

Fans are axial type, with die-cast aluminium blades statically and dynamically balanced and directly coupled to an EC motor with external rotor. Fans have Electronically Commutated motors (EC-Fans) with IP54 protection, Class F winding insulation and internal thermal protection.

Fans are complete with safety protection grilles and high efficiency nozzles with a specific design to eliminate cross and recycling airflow. There are stator blades that allow the redirection of the air flow, with a consequent increase in efficiency and noise reduction.

Fan speed control are achieved by means of a continuous fans speed regulation, managed directly by iCOM3™ control for higher energy saving and lower sound emission spectrum



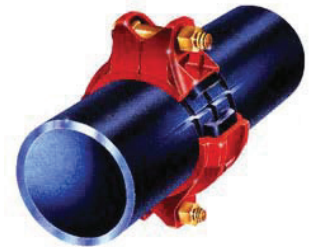
Two version versions are available more than the standard ones, for reaching the efficiency or the best noise keeping the same airflow.

On **Low Noise version**, fans speed and the relevant airflow is reduced for keeping the sound emission according reduced noise levels.

Hydraulic circuit

The hydraulic circuit utilize carbon steel pipes connected with grooved-end (Victaulic®) fittings and couplings; gaskets are made of EPDM. This arrangement permits compensation for thermal expansion, reduces noise and vibration propagation through the hydraulic pipelines and facilitates ease of maintenance.

Insulation of the hydraulic circuit are made of close cell synthetic elastomer with high resistance to UV rays HT type for outdoor installations.



Recirculating pumps

All models of the **Liebert® AFC** series can be equipped with double factory-connected water circulation pumps. On each unit it is possible to select the type of pump (low or high head) both in the standard version and with inverter and integrated electronic regulation. All pumps are dynamically balanced according to ISO 1940 class 6.3. The electronic pump regulation algorithm allows you to modulate the pump speed so as to keep the flow rate constant through the evaporator even when the hydraulic load changes: this allows a significant energy saving, variable according to the applications. In particular in the Freecooling units this beneficial effect occurs especially in the summer season when the Freecooling battery is short-circuited.

The inverter pump can also be regulated according to the “variable flow” logic managed according to particular algorithms determined by plant requirements; the pump and machine safety devices and protections are always guaranteed.

The pumps are suitable for operation with ethylene glycol-water mixture up to 35/65% by weight and refrigerant fluid temperatures up to 4°C. The pumps are of the monobloc centrifugal type, with two-pole electric motor with IP54 protection, Class F insulation and at least IE3 efficiency class.

Motors with this efficiency class (the highest on the market) not only guarantee greater energy savings compared to pumps with a lower efficiency class, but also allow a quieter operation of the electric motor and allow to reach very high limits use at room temperature (up to 60°C). The pump housings are made of cast iron, as well as the impellers, the stainless-steel shafts and the mechanical seals in silicon carbide / EPDM with dimensions according to EN12756, suitable for use of water mixtures containing ethylene glycol.



The hydraulic circuit of the pump includes a check valve on the delivery of each pump. The pump body, the lantern, the stator body and the fixing bolts are subjected to electrophoretic painting; this allows the use of these pumps in outdoor environments subject to atmospheric agents without any problem of corrosion. Each pump is also equipped with an automatic electrical protection switch.

The microprocessor controls manage the rotation and stand-by of the pumps and automatically start the pump in stand-by in case of failure of the primary one.

If the electronic inverter pump is replaced, all the parameters must be set; this intervention must be carried out by a Vertiv™ expert technician.

Hydraulic performance (available net pressure, pump power input) are declared according to ISO9906.

Hydraulic Kit

The unit is equipped with an expansion vessel - charged at 1.5bar and with 10bar maximum operating pressure – and a safety valve set at 6.0bar.

Variable flow

Unit can operate in variable flow in a passive way, adapting its thermal regulation logic to the upcoming variable flow control by an external control (external pump). For this configuration it must be ensured that the water flow variations are within defined limits: minimum flow, maximum flow and maximum flow variation speed.

Flow rates below the minimum values can result in laminar flow through the exchangers causing freeze-up problems, scaling, efficiency drop down and poor control. Flow rates above the maximum values will result in unacceptable pressure drops and can cause excessive erosion, potentially leading to failure.

Unit controller manages the minimum and maximum limits of flow rate through the embedded flow meter as well as its fluctuations; if the unit is working next to indicated limits, warning and then alarm are generated.



Electrical Panel

The electrical panel is complied with IEC standards (EN60204-1). The panel shall have a degree of protection equivalent to IP54 and is cooled by an internal fan (with thermostat). For low ambient application (down to -5 °C) an electrical heater is included inside.

Supply 400+/- 10% V/3/50HZ + PE.

Auxiliary supply circuit at 230V/1/50HZ and 24V/1/50HZ.

Wired according to safety IEC norms (EN60204-1) with a door-interlocked main switch on the Power panel.

Main switch for auxiliary circuit and fast start ramp

Protection fuses for compressors.

Protection MCBs for fans and pumps;

Contactors for compressors and pumps.

Relay for checking phase sequence, minimum voltage, loss one or more phase;

Compressor manual operation through iCOM3 controller.

For fast start option, a double power supply is installed: the main for compressors and pumps, the secondary for iCOM3™ control that need an external UPS. Also, in case of external UPS power unavailability, the iCOM3™ controller, is powered by an internal Ultra-capacitor which stores the energy taken from the mains line and makes it available during the power failure.

Controls

Units are equipped with an on-board control iCOM3™ type able to secure system optimization and energy savings.

On board control allow the programming of temperature and pressure thresholds. All the set-up is possible from Graphic display, through symbols and codes, ensures a reliable and flexible man-machine interface.

- The standard software includes special control algorithms that ensure real energy savings and enhance the reliability of the full system.
- Sequential auto-restart timer allows phased units restart after power failure.
- Double / shift set point
- The condenser fan speed control ensures to run the compressors always with optimum working efficiency.
- All settings shall be protected through a 3-Level Password system.
- Input for Remote on-off and Volt-free contacts for simple remote monitoring of alarms and warnings are available.

Packing

Units are shipped with plastic film protection.

Warranty Clauses

The warranty does not apply for any damage or malfunction that may occur during or as a result of operation outside of the application range. The warranty does not apply for freecooling units damaged by frost if the hydraulic circuit has not been charged with a water-glycol mixture with suitable percentage for the min. temperatures in the installation site. The company is not responsible for damage due to incorrect or improper use of the product and it reserves the right to change technical specifications without any prior notice.

Final Tests and Reference Standards

The units are designed, manufactured and tested in compliance with the European directives 2006/42/EC; 2014/30/EU; 2014/35/EU; 2014/68/EU.

The machine is supplied with a final test certificate and a declaration of conformity with the norms.

All Liebert® AFC units are “**CE**” marked.

Accessories

Pumps group

Available head pressure values are declared at the unit's hydraulic connections and are referred to the nominal working conditions of each unit.

Please contact us for different fluid flow rates or head pressures. All pumps can work with up to 35 % ethylene glycol percentage by weight.

In all chiller versions and most freecooling models one pump is operating and one is in stand-by, as indicated by (1+1); in some freecooling models both pumps can be operating simultaneously, as indicated by (2). In the version “Inverter pump”, (inverter pump available up to the max. power of 22 kW) one inverter pump is operating and a traditional pump is in stand-by (1+1). The indicated hydraulic performance refers to the inverter pump in their max. capacities (if available); obviously, they will adapt from such values to the hydraulic load required by the user circuit and by the chiller inner circuit; in case of freecooling unit, they will adapt their performance so as to keep the flow rate crossing the evaporator steady with relevant energy saving.



Table 5.2 – (2 Poles) Standard head pressure Pump Option*

Freecooling Models	FH4	065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0
	FIZ	065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0
Pump model	-	65-125/137	65-125/144	65-125/144	65-160/173	80-160/151	80-160/161
Nominal motor power	kW	7,5	11,0	11,0	15,0	15,0	18,5
Sound power level	dB(A)	73,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	179	224	224	234	294	309
Freecooling Glycol-free Models	NH4	065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0
	NIZ	065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0
Pump model	-	65-125/137	65-125/144	65-125/144	65-160/173	80-160/151	80-160/151
Nominal motor power	kW	7,5	11,0	11,0	15,0	15,0	15,0
Sound power level	dB(A)	73,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	179	224	224	234	294	294
Chiller Models	CH4	065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0
	CIZ	065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0
Pump model	-	65-125/127	65-125/127	65-125/137	65-125/144	NB 80-160/147-127	NB 80-160/147-127
Nominal motor power	kW	5,5	5,5	7,5	11,0	11,0	11,0
Sound power level	dB(A)	73,0	73,0	73,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	169	169	179	224	284	284

Freecooling Models	FH4	125 SG0	140 SG0			165 HG0	185 HG0	195 HG0
	FIZ	125 SG0	-	140 HG0	150 HG0			
Pump model	-	80-160/161	80-160/167	80-160/151	80-160/161	80-160/161	80-160/161	80-160/167
Nominal motor power	kW	18,5	22,0	15,0	18,5	18,5	18,5	22,0
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	309	325	294	309	309	309	325
Freecooling Glycol-free Models	NH4	125 SG0	140 SG0			165 HG0	185 HG0	195 HG0
	NIZ	125 SG0	-	140 HG0	150 HG0			
Pump model	-	80-160/161	80-160/161	NB 80-160/147-127	NB 80-160/147-127	NB 80-160/147-127	80-160/151	80-160/151
Nominal motor power	kW	18,5	18,5	11,0	11,0	11,0	15,0	15,0
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	309	309	284	284	284	294	294
Chiller Models	CH4	125 SG0	140 SG0			165 HG0	185 HG0	195 HG0
	CIZ	125 SG0	-	140 HG0	150 HG0			
Pump model	-	80-160/151	80-160/151	NB 80-160/147-127	NB 80-160/147-127	NB 80-160/147-127	NB 80-160/147-127	NB 80-160/151
Nominal motor power	kW	15,0	15,0	11,0	11,0	11,0	11,0	15
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	294	294	284	284	284	284	294

* data referred to each pump at nominal design conditions

Table 5.3 (2 Poles) High head pressure Pump Option *

Freecooling Models	FH4	065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0
	FIZ	065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0
Pump model	-	65-160/157	65-160/173	65-160/173	65-160/177	80-160/161	80-160/167
Nominal motor power	kW	11,0	15,0	15,0	18,5	18,5	22,0
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	221	234	234	247	309	325
Freecooling Glycol-free Models	NH4	065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0
	NIZ	065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0
Pump model	-	65-160/157	65-160/173	65-160/173	65-160/177	80-160/161	80-160/161
Nominal motor power	kW	11,0	15,0	15,0	18,5	18,5	18,5
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	221	234	234	247	309	309
Chiller Models	CH4	065 SG0	075 SG0	080 SG0	090 SG0	100 SG0	110 SG0
	CIZ	065 SG0	075 SG0	080 SG0	085 SG0	095 SG0	110 SG0
Pump model	-	65-125/137	65-125/144	65-125/144	65-160/173	80-160/151	80-160/151
Nominal motor power	kW	7,5	11,0	11,0	15,0	15,0	15,0
Sound power level	dB(A)	73,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	179	224	224	234	294	294

Freecooling Models	FH4	125 SG0	140 SG0			165 HG0	185 HG0	195 HG0
	FIZ	125 SG0	-	140 HG0	150 HG0			
Pump model	-	80-160/167	80-160/177	80-160/161	80-160/167	80-160/167	80-160/177	80-160/177
Nominal motor power	kW	22,0	30,0	18,5	22,0	22,0	30,0	30,0
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	325	440	309	325	325	440	440
Freecooling Glycol-free Models	NH4	125 SG0	140 SG0			165 HG0	185 HG0	195 HG0
	NIZ	125 SG0	-	140 HG0	150 HG0			
Pump model	-	80-160/167	80-160/167	80-160/151	80-160/151	80-160/161	80-160/161	80-160/161
Nominal motor power	kW	22,0	22,0	15,0	15,0	18,5	18,5	18,5
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	325	325	294	294	309	309	309
Chiller Models	CH4	125 SG0	140 SG0			165 HG0	185 HG0	195 HG0
	CIZ	125 SG0	-	140 HG0	150 HG0			
Pump model	-	80-160/161	80-160/161	80-160/151	80-160/151	80-160/151	80-160/161	80-160/161
Nominal motor power	kW	18,5	18,5	15,0	15,0	15,0	18,5	18,5
Sound power level	dB(A)	75,0	75,0	75,0	75,0	75,0	75,0	75,0
Additional unit weight (single pump option)	kg	309	309	294	294	294	309	309

* data referred to each pump at nominal design conditions

Anti-vibration support

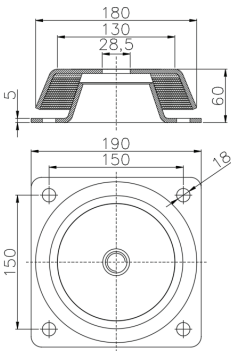
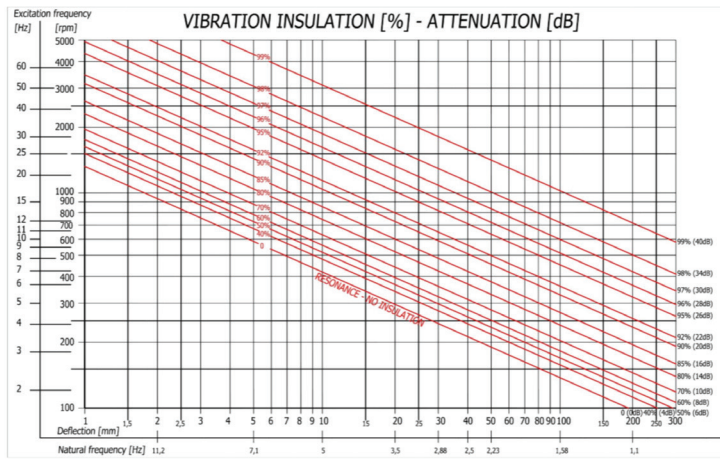
The anti-vibration supports have the function of isolating the structure, on which the chiller is placed, from the vibrations created by the chiller itself.

They can be of the rubber or spring type, sized and selected on the basis of the expected level of insulation calculated starting from their elastic characteristics and the weight supported by each of them.

There are therefore various kits of vibration dampers combined with each chiller, identifiable in a dedicated manual which also illustrates the procedures for their correct installation.

Unit	10 - 12 fans	6 stands
	14 - 16 fans	8 stands
	18 - 20 fans	10 stands

The rubber antivibration mounts are able to isolate vibrations with an efficiency of about 70-80% for forces of 20 Hz (1200 RPM)
 The spring antivibration mounts are able to isolate vibrations with an efficiency of about 90% for forces of 14 Hz (850 RPM)
 Below are the dimensional and mechanical characteristics of said anti-vibration

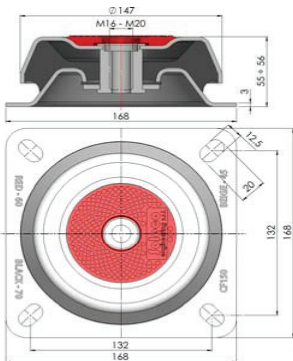


Elastic body: Black natural rubber (NR) ASTM D1418.

Operating temperatures: -40°C +70°C

Metal body: Galvanized steel

Each kit is complete with stainless steel fixing screws and plain washers for unit assembly



Elastic body: Natural rubber.

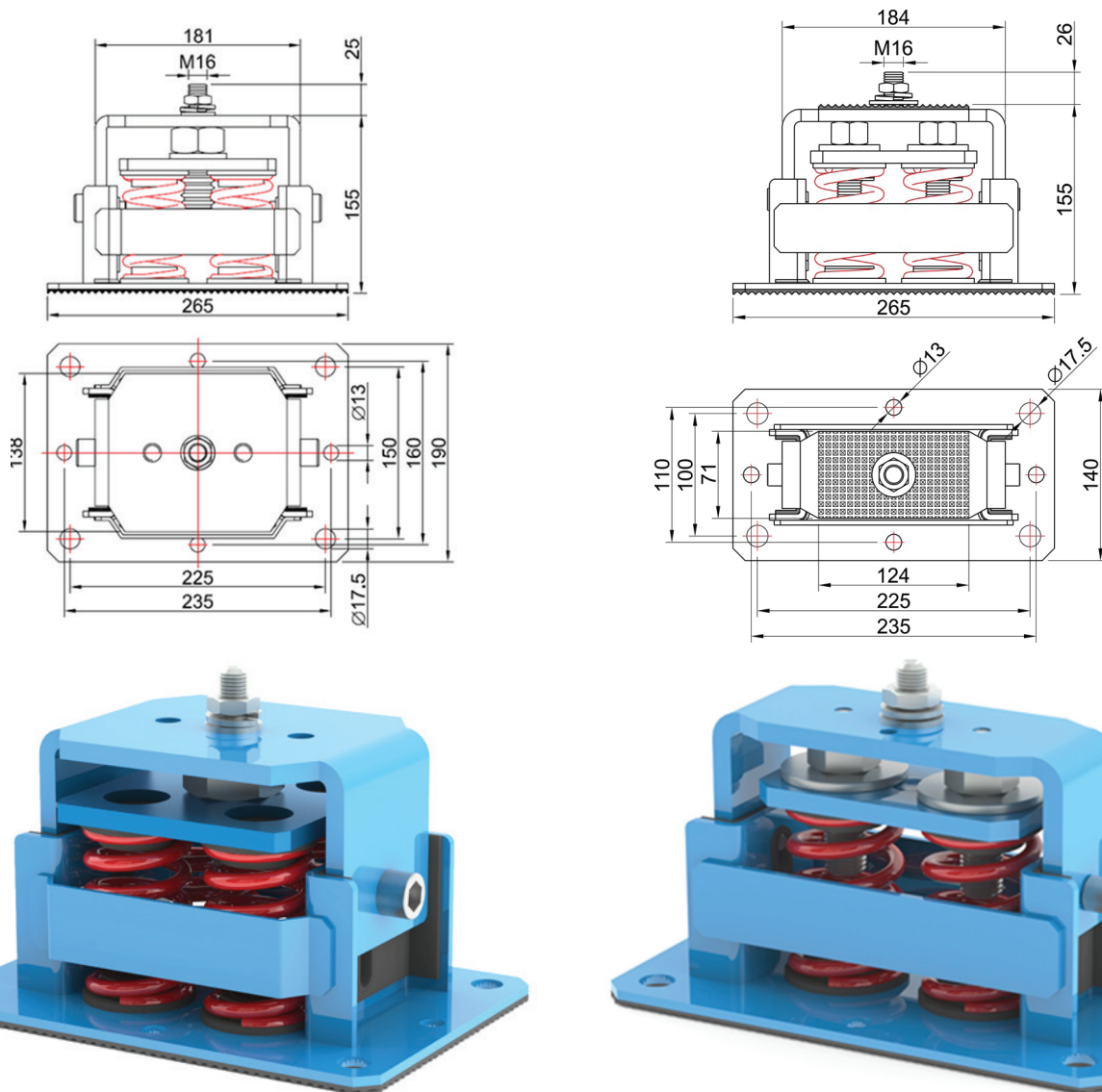
Operating temperatures: -20°C +90°C

Metal body: Zinc UNI ISO 2081Fe/Zn 15c Awhite Steel UNI EN 10111 DD13

Upper pad: Thermoplastic elastomer TPV 80shA

Each kit is complete with stainless steel fixing screws and plain washers for unit assembly

Antivibration mouth with antiseismic structure



- **Spring** in harmonic steel UNI EN 10270 1 SH with surface protected by cathoretic treatment;
- **8 / 4 nylon disks** lock the spring to the structure and prevent the metal contact;
- **Container structure:** base & upper plates made with S235JR UNI EN 10025 steel sandblasted, protected by cathoretic treatment and epoxy powder coated:
 - **Base plate** with holes for the anchorage to the floor, welded special profile guides to consent upper plate sliding and barriers to prevent the escape of the spring;
 - **Upper plate** in folded plate 10 mm thick with 2 lateral M16 holes;
- **Fixation to the unit** by Central M16 threaded rod in stainless steel AISI304;
- **Intermediate plate** in sandblasted steel, protected by cathoretic treatment and coated with epoxy powder;
- **Rod and nut M30 / M20** positioned under the upper plate, to control the level of the machine;
- **2 elastomer guide profiles** inside the steel guide, to prevent the metal contact and assure insulation continuity even with transversal thrusts;
- **Neoprene pad** placed under the base plate with deformable reliefs surface permits to the loaded antivibration mount to stand for friction;
- **2 lateral M16 / M12 screws** to block the lid to the base and prevent spring displacement.

Power factor correction with capacitors (option)



Caution: Discharge and short circuit capacitor before handling!

This option is not available for inverter compressors.

Enhancing power quality – improvement of power factor – saves costs and ensures a fast return on investment. In power distribution networks, PFC focuses on the power flow $\cos(\phi)$ and the optimization of voltage stability by generating reactive power – to improve voltage quality and reliability at distribution level.

PhaseCap capacitors in cylindrical aluminum cases have been designed for power factor correction in low-voltage applications. Dielectric is made of propylene film.

Safety:

- Self-healing
- Overpressure disconnecter
- Shock hazard protected terminals
- Discharge resistor pre-mounted
- IP54 with terminal CAP
- -40D execution with -40 / +55 °C min / max working air temperature

Capacitors are activated when the compressors are operating; their contactors are selected for this particular use in combination with discharge throttle.

A relay normally open has to be managed by customer in order to enable their operation, so it's necessary to read carefully the following notes before enabling their full functionality.

It's recommended to disable capacitors:

- After power off and before switching the power from the main line to the genset power line
- When there is low power input quality as:
 - transient over under voltage
 - transient over current
 - Interaction with other reactive power components, and also parasitic capacitances (cable) or inductivities in common circuits
 - network harmonics, resonances created by harmonics or flicker even when they occur only briefly or cyclically
 - network harmonics are normally produced in the operation of electric loads with a non linear voltage / current characteristic as rectifiers and inverters for drives, welding apparatus and uninterruptible power supplies

Harmonics and relevant resonance may cause very high overcurrents which can lead to capacitor failures, and worst case, to explosion and fire.

Energy and flow meter

The electronic devices are a full system enabling the following functions:

- measuring and monitoring electrical values;
- measuring the fluid flow of the unit;
- counting the used electric power;
- protecting the system against electric supply quality problems (optional).

Other Accessories

The following accessories can be installed as option:

- Ten inch touch screen, fitted on board.
- Metal filters protecting the coils.
- Expansion tank, evaporator and piping heaters to protect these components against frost.
- Monitoring device according to different communications standards.
- "Y"-shaped mechanical filter protecting the hydraulic circuit (recommended to aid the plate exchanger maintenance-cleaning).
- Top extension for electrical pan



The **Liebert® AFC** water chillers are controlled by the Vertiv™ iCOM3™ microprocessor, managing all of the unit operating conditions.

The user can change and/or modify the operating parameters through the display keyboard installed on the electrical panel.

The electrical control board with fan is equipped with all the safety and operating devices needed for reliable automatic operation.

See the *Vertiv™ iCOM3™ User Manual* for details.

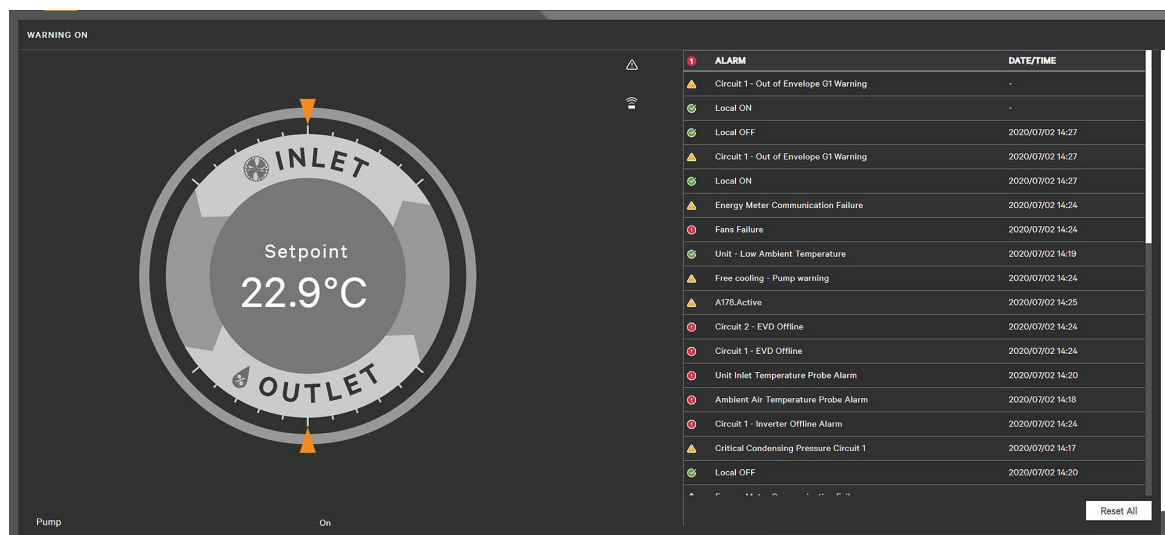


NOTICE

The **Liebert® AFC** are equipped with their own microprocessor control for the water temperature adjustment. There is no connection for a remote ON-OFF control. Any modification is forbidden.

Protective Functions

The **Liebert® AFC** water chillers are automatically protected through a series of warning and alarm to prevent damages to the chiller itself:



Pressure control	High pressure and low pressure alarm
Out of Envelope alarm	Modulation of capacity based on the value of high pressure, low pressure, superheat and subcooling and the operating map of the compressor installed
Oil level	Low level alarm
Refrigerant charge check function	Monitoring of the subcooling value with warning or alarm depending on the working conditions
Compressors	<p>The compressors are equipped with an electronic protection device blocking their start if the phase sequence is not correct, or stopping their operation if a thermal relay intervenes.</p> <p>This device is essential for the integrity of the mechanical and electrical components of the compressors.</p> <p>In case of stop due to this device intervention:</p> <ol style="list-style-type: none"> 1. Isolate this device 2. Remove the causes of the lock-out 3. Reset the device by the Vertiv™ iCOM3™

Tab 6.1 - Technical Data - Vertiv ICOM for Liebert® AFC

Technical Data	Vertiv ICOM
Flash memory	128 Mbit
Microcontroller	ARM9 200MHz
Analogue Input	10x0- 1V, 0- 5V, 0- 10V, 0- 20mA, 4- 20mA, NTC, PTC, DI (configurable)
Digital Input	20 x opto- coupled
Analogue Output	4x0- 10V, 2x0- 10V, 4- 20mA, PWM, Relay (configurable)
Digital Output	12 Relay output 5A and 3 relay output 8A
USB port	1
Ethernet network connector	1 RJ45 socket
CAN bus	1 Disconnectable screw connector
Remote LCD display	1 Dedicated connector
RS 485	1 Master+ 1 Slave

10" Touch Display

(special option fitted on Panel)

The Touch display featuring a 24h / 7 days graphic record of controlled parameters as well as the last 200 events occurred.

- Display (TFT Color-LED 1280 x 800 pixel).
- System Window: system operation status at a glance.
- Self - explanatory icons: they are used for the Menu-Layout of the Display.
- Status Report of the latest 200 event/messages of the unit/system.
- Four different Graphic Data Records.
- Timer and Date mode (electronic timer included in the software).
- Semi or full manual mode software management including all safety devices.
- 4-Level passwords system to protect all the settings.
- Ergonomic design for use also as portable device (start-up and "flying connections" by service personnel).



TOUCH SCREEN DISPLAY TECHNICAL DATA :

Display / Backlight TFT Color - LED	Colors 16M
Resolution 1280X800	Diagonal (inches) 10.1" widescreen
Dimming yes	Flash 4GB
SD card slot yes	RAM 1GB
Serial Port RS232, RS485, RS422 SW configurable	USB port 2 Host interface version 2.0 max. 500mA
Ethernet port 2 10/100Mb, 1 10/100/1000Mb	Expansion slot 2 Optional Plugin
Battery rechargeable	Real Time Clock yes
Voltage 24Vdc (10-32Vdc accepted range)	Current rating (at 24VDC) 1.00A
Weight 1.7 Kg	Size 282mm * 197mm (cut out 271mm * 186mm)

Liebert® AFC Connectivity

The control and Touch Display allow Connectivity with superior levels of control and supervision systems:

Available connectivity protocols

- WEB
- MODBUS on RS485 and Over-IP
- BACnet MS/TP and IP
- SNMP

Liebert® AFC can support as optional devices:

- **ENERGY METER** which provides the instant electrical power consumption reading (including primary pump consumption if this is integrated in the unit)
- **CHILLED WATER FLOW METER** which provides the chilled water flow speed (m/s)
- **ADIABATIC FLOW METER** which provides the flow reading (l/h) on adiabatic side (only if adiabatic tanks are present)

IF CHILLED WATER FLOW METER IS PRESENT UNIT CONTROL IS ABLE TO ELABORATE THE FOLLOWING CALCULATED DATA OUTPUT

- Total Capacity (KW)
- Mechanical Capacity (KW)
- Free cooling Capacity (KW)

IF BOTH CHILLED WATER FLOW METER AND ENERGY METER ARE PRESENT UNIT CONTROL IS ALSO ABLE TO ELABORATE THE FOLLOWING CALCULATED DATA OUTPUT

- EER (including primary pump consumption if this is integrated in the unit)
- pPUE (including primary pump consumption if this is integrated in the unit)

IF BOTH CHILLED WATER FLOW METER AND ADIABATIC WATER METER ARE PRESENT UNIT CONTROL IS ABLE TO ELABORATE THE FOLLOWING CALCULATED DATA OUTPUT

- WUE

Where:

Capacity depends on instant values on fluid flow, temperature and glycol percentage (necessary to set on unit control)

EER: is a ration instant Total Capacity and instant Total Electrical Power Consumption readings (in the same time period)

$$\text{pPUE} = [(1) + (1/\text{EER})]$$

WUE = (adiabatic water meter flow instant) / (instant total Capacity) [lt/(h*KW)] with instant readings in the same time period.

All data outputs are calculated using instant values and also the site operating conditions cannot ensure stable measurements, whereby they can provide only an indicative value. These values must not be considered valid as official performance measurements due to conditions of measurement and precision of the instruments which are different from laboratory measurement conditions and instruments.

Performance Adjustment Factors

Correction Factors

Glycol mixture correction factors

The water glycol mixtures are used as a thermal carrier fluid, in very cold climates with temperatures below 0°C. The use of low freezing point mixtures causes a modification in the main thermodynamic properties of the units.

The main parameters affected by the use of glycol mixtures are the following:

- Cooling capacity
- Mixture volumetric flow
- Pressure drop
- Compressor power input

In the table below are reported correction factors referred to the most common ethylene glycol mixtures.

Tab. 7.1 - Chiller table

Ethylene glycol [% in weight]		0	10	20	30	40	50
Freezing temperature	°C	0	- 4,4	- 9,9	- 16,6	- 25,2	- 37,2
Refrigeration capacity correcting factor	F3	1	0,987	0,977	0,969	0,958	0,950
Mixture volume flow rate correcting factor	F4	1	1,046	1,080	1,098	1,150	1,210
Mixture side pressure drop correcting factor	F5	1	1,053	1,109	1,168	1,234	1,311
Compressor power input correcting factor	F6	1	0,995	0,990	0,990	0,985	0,975

Tab. 7.2 - Freecooling table

Ethylene glycol [% in weight]		0	10	20	30	40	50
Freezing temperature	°C	0	- 4,4	- 9,9	- 16,6	- 25,2	- 37,2
Refrigeration capacity correcting factor	F3	1,032	1,023	1,013	1	0,989	0,981
Mixture volume flow rate correcting factor	F4	0,911	0,926	0,956	1	1,048	1,102
Mixture side pressure drop correcting factor	F5	0,856	0,902	0,950	1	1,056	1,122
Compressor power input correcting factor	F6	1,010	1,010	1,005	1	0,995	0,985

We indicate as R0, V0, P0 respectively the unit capacity, volumetric flow rate and compressor power input with 0% ethylene glycol on Chiller models or 30% ethylene glycol on Super chiller models; when we use glycol mixtures with different % with the same inlet and outlet temperatures at the evaporator, the performance will vary as follows:

- Refrigeration capacity = R0 x F3
- Volumetric flow rate = V0 x F3 x F4
- Mixture pressure drop=DP1 x F5, where DP1 is the unit water pressure drop for the new volumetric mixture flow rate
- Compressor power input = P0 x F6

Fouling: Correction factors

Tab. 7.3 - Fouling correction factors

Fouling factors [$10^{-4} \text{ m}^2 \text{ } ^\circ\text{C}/\text{W}$]	Correction factors	
	F1a refrigeration capacity correction factor	F2a compressor power input correction factor
0,18	1	1
0,44	0,996	0,999
1,32	0,984	0,994

Unit performance reported in the tables are given for the condition exchanger with fouling factor corresponding at $0,18 \cdot 10^{-4} \text{ m}^2\text{ } ^\circ\text{C} / \text{W}$. For different fouling factor values, performances should be corrected with the correction factors shown above. For optimum unit operation, proper water treatment must be maintained. Scaling and dirt in a system will vary significantly depending on local water conditions. Water treatment should be based on characteristics of the area's water. Improper or untreated water can lead to scale build up, erosion and corrosion in the evaporator.

Vertiv™ will not accept responsibility for poorly or improperly treated water.

Sea level: Correction factors

Tab. 7.4 - Sea level correction factors

Elevation above sea level [meters]	Correction factors	
	F1b refrigeration capacity correction factor	F2b compressor power input correction factor
0	1	1
600	0,997	1,004
1200	0,993	1,007
1800	0,988	1,015
352	0,915	0,965

Unit performance reported in the tables are given for sea level conditions.

For different altitudes, performances should be corrected with the correction factors shown above.

Variable Primary Flow

Variable Primary Flow

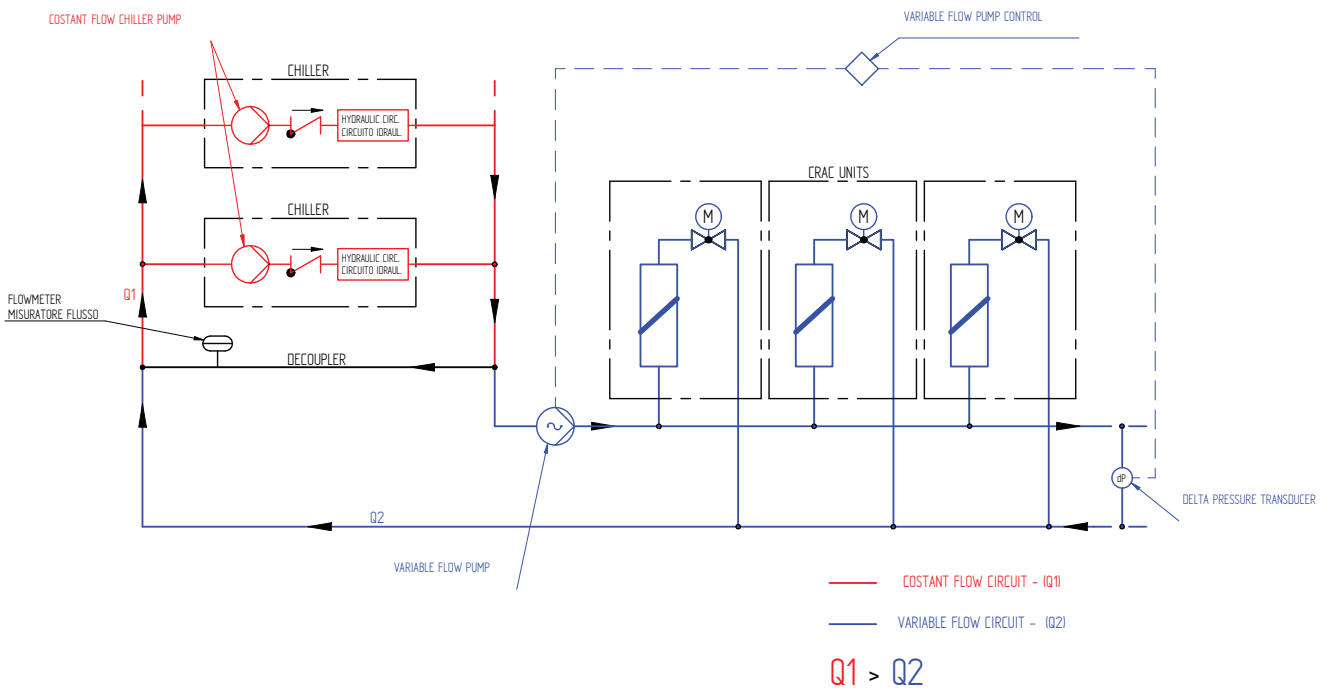
General Overview of VPF Hydronic Systems

The variable-primary-flow (VPF) hydronic system is an evolution of the concept of the constant primary–variable secondary design, more commonly known as the “decoupled” system.

A comparison of the hydraulic schematics in Figures 1 and 2 shows the similarities and differences between “decoupled” and VPF systems.

Figure 8.1

COSTANT FLOW ON PRIMARY – VARIABLE FLOW ON SECONDARY



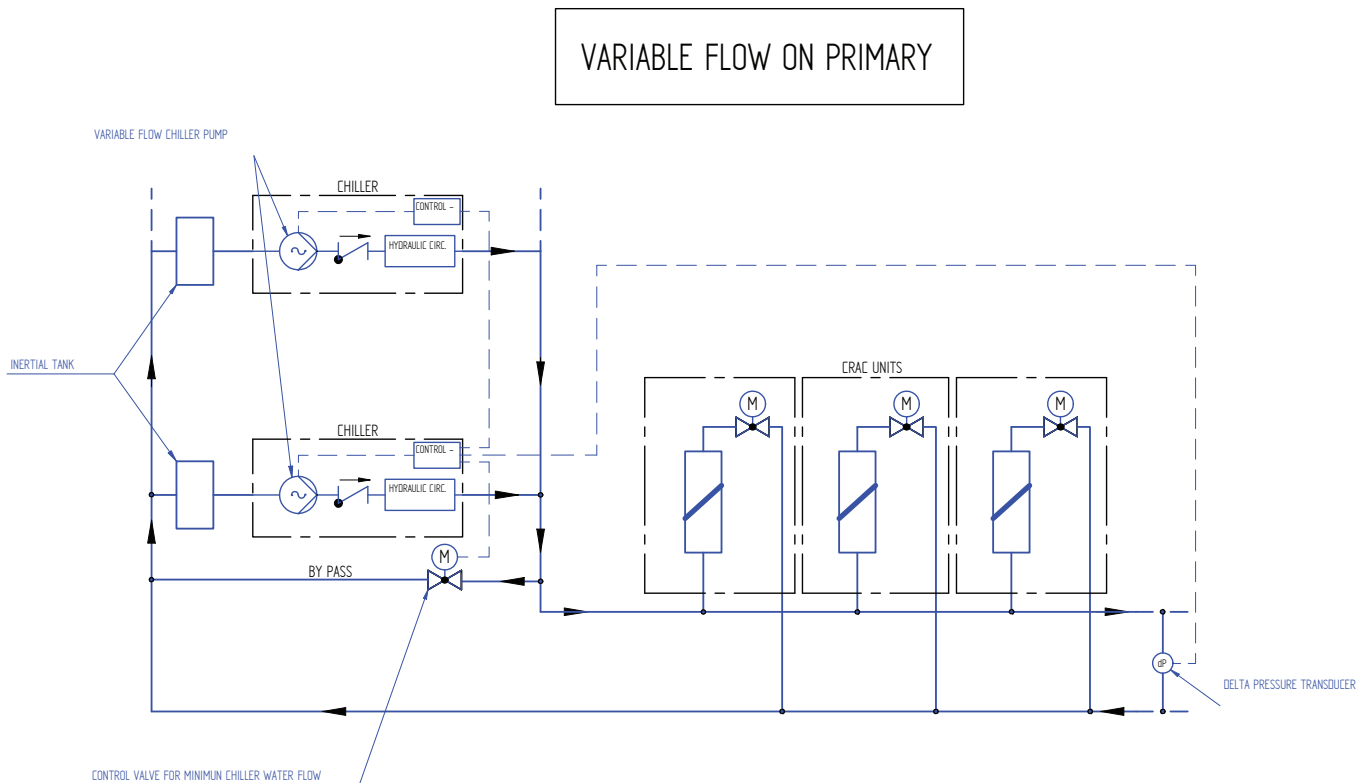
The “decoupled” system shown in Figure 8.1 uses constant water flow through each chiller and variable water flow through each CRAC unit to satisfy the data center loads.

This hydronic design requires:

- a constant-speed pump (and check valve) for each chiller;
- two-way control valves embedded in each CRAC unit to regulate the amount of chilled water that flows through the cooling coils;
- a variable-flow secondary circuit distribution pump to serve the CRAC units coils (usually managed by a drive that read and keep constant DP through CRAC units);
- a bypass to hydraulically decouple the primary (production) and secondary (distribution) sides of the system able to manage the water flow of the largest chiller (primary) pump
- for multi-chiller systems, a BMS or a Chiller Sequencer Controller able to maintain Primary Flow higher than the secondary one

Each CRAC unit adjusts the flow of chilled water to satisfy the data center’s cooling demand, consequently the secondary circuit distribution pump responds by regulating the amount of chilled water delivered. Specifically, the secondary flow rate is produced to maintain the necessary system pressure differential. As the primary loop’s water flow cannot deliver a step-less modulation, water flows through the bypass to balance the system. Primary flow must always meet or exceed the secondary flow. Any excess primary water flows through the decoupler to the return side and back to the chillers. Any time the primary flow is less than the secondary flow, warm return water will flow “backwards” through the decoupler and mix with the primary flow going out to the Data Center. This condition (known as Low DT Syndrome) has to be avoided because the chiller load control is based on return temperature of the primary circuit. It means that DT on secondary circuit has to be always higher than DT on primary or water flow on primary circuit has to be always higher than flow on secondary one.

Figure 8.2



The VPF system in fig. 8.2, varies water flow throughout the entire system through each operating chiller as well as through the CRAC units. The variable flow logic can be implemented also with different hydraulic configurations, with similar logic (for example with variable flow primary pumps external to the chillers, which can be either one pump in series to each chiller, or connected in a single manifold and put in series with the chillers’ system).

This hydronic design requires:

- two-way control valves for each CRAC unit, to regulate the amount of chilled water that flows through the cooling coils;
- Variable-flow chiller pumps, to eliminate the need for a separate secondary distribution pump.
- A pressure transducer, able to read and keep a constant Delta Pressure through the CRAC units, by managing the speed of the primary pumps
- A bypass positioned upstream the CRAC units, able to manage the minimum water flow admitted by the primary loop (which corresponds to the minimum load admitted by the single chiller)

- A control valve in the bypass which ensures that the amount of flow that returns to the operating chiller(s) never falls below the minimum limit
- Inertial tank at each chiller water inlet in order to ensure the requested thermal inertia for a proper chiller capacity regulation (the chiller load control is based on return temperature of water loop)

The VPF system is designed to maintain a constant DT through the entire water loop (CRAC and Chiller); the variation of the thermal load is done from the change of flow until where it is possible corresponds to a variation of flow on all the circuit, until the minimum flow admitted by the primary loop is reached. For lower flows, the primary loop remains at the minimum flow, while the excess flow is bypassed in the bypass pipe.

On VPF system in Figure 2 there are several cost-saving benefits not only directly related to the pumps.

The most obvious cost savings comes from energy saving at part load where the inverter pumps allow reducing their power consumption more than proportionally to the flow reduction; in addition eliminating the secondary distribution pump and having a single set of pumps enables simplification on design that ensures substantial savings in initial investment costs.

With the same thermal load required, the VPF system (operating within the working limits indicated below), increases operation efficiency of both the traditional chiller (better evaporator efficiency) but especially of free cooling units, increasing significantly the FC utilization factor during the year, thanks to the higher freecooling inlet fluid temperature at partial load, if compared to a fixed primary flow system.

On the other hand, VPF requires more robust (complex and properly calibrated) control system with coordinated control of chillers, pumps and isolation valves (if present). Of course this implies potentially longer commissioning times to tune the system and experienced facility managers to operate/maintain properly.

Variable Primary Flow with Liebert® AFC

Variable water flow involves changing the water flow through the chiller as the load changes with direct ratio. **Liebert® AFC** units with variable flow option are designed for this duty provided that the water flow variations are within defined limits: minimum flow, maximum flow and maximum flow variation speed.

The recommended maximum change in water flow is 10 percent of the nominal flow per minute. This specified limit is valid if there is the recommended inertial water volume at the hydraulic chiller inlet connection. Overcoming this limit could affect EEV control and compressors reliability.

Flow rates below the minimum values can result in laminar flow through the exchangers causing freeze-up problems, scaling, efficiency drop down and poor control. Flow rates above the maximum values will result in unacceptable pressure drops and can cause excessive erosion, potentially leading to failure.

In the evaluation of the minimum flow rate associated with each model must be evaluated carefully the required accuracy on the chiller's leaving water temperature (LWT)

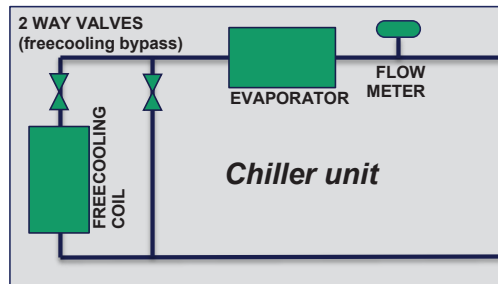
Unit controller manages the minimum and maximum limits of flow rate as well as its fluctuations; if the unit is working next to indicated limits, warning and then alarm are generated with a different strategy according the presence of inverter pump installed on the unit or not.

Tab. 8.1 - Minimum and Maximum flow limits for each model

Model/Version	Nominal fluid flow [m ³ /h]			Min fluid flow [m ³ /h]	Min fluid flow [m ³ /h]
	Chiller (C ^{**})	Freecooling (F ^{**})	Glycol-free (N ^{**})		
*H4 065 SG0	99	107	98	50	150
*H4 075 SG0	112	121	110	50	150
*H4 080 SG0	124	134	122	60	185
*H4 090 SG0	141	152	138	60	185
*H4 100 SG0	153	166	151	70	220
*H4 110 SG0	164	177	161	70	220
*H4 125 SG0	189	205	186	75	240
*H4 140 SG0	212	228	207	90	320
*H4 165 HG0	167	180	163	80	220
*H4 180 HG0	182	196	178	85	260
*H4 195 HG0	196	212	192	90	320
*H4 065-LN SG0	95	102	93	50	150
*H4 075-LN SG0	106	114	104	50	150
*H4 080-LN SG0	118	127	116	60	185
*H4 090-LN SG0	133	143	130	60	185
*H4 100-LN SG0	146	157	142	70	220
*H4 110-LN SG0	155	167	151	70	220
*H4 125-LN SG0	179	193	175	75	240
*H4 140-LN SG0	199	214	194	90	320
*H4 165-LN HG0	157	168	152	80	220
*H4 180-LN HG0	171	183	166	85	260
*H4 195-LN HG0	184	198	179	90	320
*IZ 065 SG0	99	107	98	50	150
*IZ 075 SG0	109	118	107	50	150
*IZ 080 SG0	116	125	114	60	185
*IZ 085 SG0	126	137	124	60	185
*IZ 095 SG0	142	154	140	70	220
*IZ 110 SG0	164	177	161	70	220
*IZ 125 SG0	186	202	183	75	240
*IZ 140 HG0	141	153	138	65	220
*IZ 150 HG0	156	169	153	70	220
*IZ 065-LN SG0	95	102	93	50	150
*IZ 075-LN SG0	104	112	101	50	150
*IZ 080-LN SG0	111	119	108	60	185
*IZ 085-LN SG0	120	129	118	60	185
*IZ 095-LN SG0	135	146	133	70	220
*IZ 110-LN SG0	155	167	151	70	220
*IZ 125-LN SG0	176	190	172	75	240
*IZ 140-LN HG0	134	145	131	65	220
*IZ 150 HG0	148	160	145	70	220

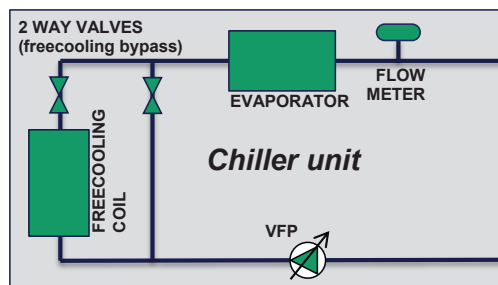
VPF solutions available for Liebert AFC

Three types of variable primary flow logics are available on **Liebert® AFC**:



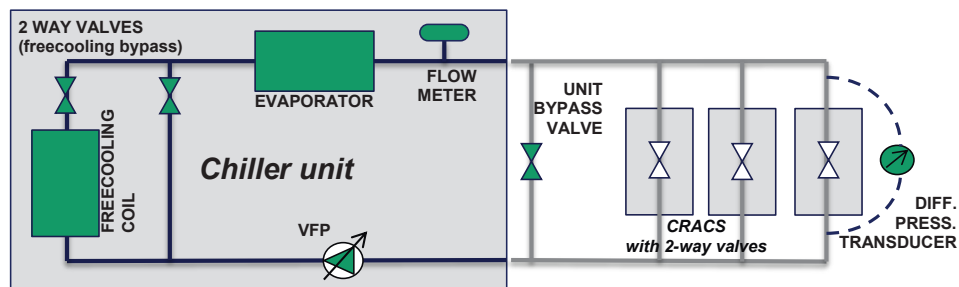
VPF Solution A (digit 12 = 7):

- Unit without pump
- Embedded flow-meter reads the incoming variable flow
- The unit regulation logic automatically adapts to the flow conditions
- Unit limits (max / min flow, max variation speed) → if limits are exceeded, **Liebert® AFC** delivers a warning and consequently an alarm



VPF Solution B (digit 12 = 5 or 6):

- Unit with inverter pump (also available with second backup pump)
- **Liebert® AFC** regulates the primary flow on the base of an external request (BMS) with signal 4-20 mA or 0-10 V
- The unit regulation logic automatically adapts to the flow conditions
- Unit limits (max / min flow, max variation speed) automatically ensured



VPF Solution C (digit 12 = 5 or 6 and additional accessory kit for Delta Pressure (DP) control):

- **Liebert® AFC** with inverter pump (also available with second backup pump)
- The unit regulates the primary flow to maintain a DP in the circuit
- The solution package includes the following items to be installed on site:
 - Embedded differential pressure transducer
 - Embedded bypass valve for operation at loads near to zero

Solution A (selectable with digit 12 = 7): unit without pump, predisposed for operation with variable primary flow.

The variable flow regulation is passive: the chiller doesn't include the primary pump. The chiller adapts its thermal regulation logic to the incoming variable water flow (provided by external pump) within the application limits indicated in the previous paragraph. This solution is recommended where external inverter pump are provided by customer; in this case it's necessary to take care about flow limits and fluctuation in order to let the unit works without warning / alarms; this solution could be applied to VPF system as well a primary / secondary water loop hydronic system where there's a variable flow on primary too.

For a multi-chiller application it's necessary a motorized gate valve at chiller's water inlet connection and a chiller sequencer or BMS able to manage both gate valve and chiller sequence / rotation.

It does not require any electrical connection.

Solution B (selectable with digit 12 = 5 or 6): unit with pump (or double pump), variable primary flow guided by external request (BMS).

The variable flow regulation is passive: the chiller regulates the primary flow on the base of an external request which must be provided with a signal 4-20 mA or 0-10 V, within the application limits indicated in the previous paragraph. This solution is recommended where external inverter pump are managed but not provided by customer; in this case BMS has to take care about flow limits and fluctuation in similar way as for solution A, but with the additional benefit that the control of **Liebert® AFC** provides a higher level of safety, as it is capable of filtering the external BMS request in order to avoid flow warning or alarms. This solution could be applied to VPF system as well a primary / secondary water loop hydronic system where there's a variable flow on primary too. Anyway on both cases it's necessary to have a BMS system able to read the hydronic

plant flow conditions and managing properly the variable flow pump installed in the unit.
 For a multi-chiller application for sure it's not necessary to foresee a motorized gate valve for each chiller, because each **Liebert® AFC** with this option is provided by a check valve on pump delivery; anyway the BMS have to manage not only the flow as above indicated but also chiller sequence / rotation.

See electrical diagram included with the chiller.

Connect Electrically the BMS signal to Device A12 (configurable optoisolator see the component's datasheet included on the documentation) using the terminal blocks :

- XA2: 1110 + 20V DC
- XA2: 1111 + 0VDC
- XA2: 1112 Signal.

Solution C (selectable with digit 12 = 5 or 6 and additional accessory kit for delta pressure control): unit with pump (or double pump), variable primary flow guided by Liebert AFC based on circuit delta pressure. As standard, this solution is available for single chiller systems only.

The variable primary flow is active and guided by **Liebert® AFC**, in order to maintain a set of delta pressure on the CRAC units. It is very important to follow the installation indications for the unit's by pass valve (next to the chiller with the shortest by-pass pipe size according to the DN valve) and differential pressure transducer on the farthest pipe of the plant as indicated on above sketch. These components are supplied loose as a kit and their hydraulic connection and electrical wiring to **Liebert® AFC** has to be done locally.

The hydraulic balancing valve must be positioned downstream of tank, chiller and two way the by-pass valves. The bypass valve (managed by unit control) ensures that the amount of the flow that returns to the operating chiller never falls below the minimum limit.

The following table shows the correct match between each model and the associated kits showing min flow and valve/motor general characteristics.

Kit p/n	Min flow with 30% e.g.	Kv	By pass 2 way valve	DN valve	Motor valve	Press. Transducer
	[mc/h]					
455545	30 to 50	63	VVF32.65-63	DN65	SKB62	TYPE 692 0-160 Kpa
455546	51 to 80	100	VVF32.80-100	DN80	SKB62	TYPE 692 0-160 Kpa
455547	81 to 160	160	VVF32.100-160	DN100	SKC62	TYPE 692 0-160 Kpa

Note: IP54 motor with spring return, heating element

The delta pressure set-point on the CRAC units is configurable (between min 60 kPa → limit on valve selection and max 160 kPa → limit on pressure transducer reading)

Usually DP set is bigger or equal to CRAC unit pressure drop at full load for having the design water flow at full load through the entire hydraulic loop and a single CRAC unit itself .

Liebert® AFC will manage the pump speed in order to keep a constant DP on their water loop. When the waterflow requested by the CRAC unit is lower than the minimum water flow admitted by the chiller, the two way bypass valve starts to open in order to keep the min flow through the chiller and in the same time maintaining the DP requested on CRAC water loop.

To ensure a stable system and avoid fluctuations, it is preferable to have a carefully balanced hydraulic system on the CRAC units side. For this reason, 2 way pressure independent valves (PRIV) on CRAC units are recommended.

See electrical diagram included with the chiller.

Connect Electrically the differential pressure transducer (DP water) to Device A12 (configurable optoisolator) using the terminal blocks :

- XA2: 1110 + 20V DC
- XA2: 1111 + 0VDC
- XA2: 1112 Signal.

Connect Electrically the unit bypass valve (Y bypass see the component's datasheet included on the documentation) to Device A12 (configurable optoisolator see the component's datasheet included on the documentation) using the terminal blocks :

- XC: 1115 GND signal
- XC: 1116 signal + 0VDC
- XC: 1117 0V AC supply
- XC: 1118 +24V AC supply

Set the unit bypass valve (Y bypass) as described on the electrical diagram

Install and connect Electrically the heating unit bypass valve (Y bypass Heating see the component's datasheet included on the documentation) using the terminal blocks :

- XC: 1117 0V AC supply
- XC: 1118 +24V AC supply

Recommendation for multiple chiller VPS applications

The system shall be managed in accordance with the principle of the diagram shown in fig. 8.2.

To ensure a stable system and avoid fluctuations, it is recommended to balance carefully the hydraulic system and to use 2 way pressure independent valves (PRIV) on CRAC units.

The minimum flow rate must be ensured on the **Liebert® AFC** units when they are ON, by regulating properly the variable pumps flow and the bypass valve.

When the pumps are installed outside the chillers (connected in a single manifold and put in series with the chillers' system) and gates valves are installed on each chiller hydraulic connection, for the flow-based sequencing, it is recommended to have slightly oversized pumps compared to the nominal flow of chillers, in order to have the single pump at indicatively 80% of the speed when providing the nominal flow required by the chiller. In any case during unit sequencing, it's recommended to avoid overcoming the indicated max flow variation speed on each chiller (max 10%/min.) and ensure that the compressors are not enabled while the minimum flow limits are reached.

When the pumps are installed inside each chiller but managed by BMS (solution B of the previous paragraph), together with chiller staging, before starting one more chiller it's necessary to anticipate flow reduction on running chiller while accelerating flow in the incoming one till all the inverter pump system reach the same speed (during this phase, if the control of **Liebert® AFC** recognizes a variation speed higher than 10% min it will keep the compressors OFF until a stable flow is reached, and then start the compressors, if the load requires); the same control with opposite logic shall be foreseen when one chiller is stopped.

The tables show the noise data for different fans configurations, with the unit operating continuously at full load at the following conditions:

Evaporator Fluid temperatures		Air temperature
Inlet	Outlet	
26°C	20°C	35°C

- Note 1** The value of PWL (Sound Power Level) is calculated in according to ISO 3744 procedure method.
Sound Power Level tolerance for each octave band: -0 / +2 dB
- Note 2** The value of SPL (Sound Pressure Level) for every octave band frequency is measured in free field conditions and at 1 meter from the unit according to ISO 3744 average method.
Sound Pressure Level tolerance for each octave band: -0 / +2 dB
- Note 3** The installation of the unit in a high-reverberating environment will adversely affect the declared SPL values.
- Note 4** Avoid positioning in areas with possible reverberation of the sound waves which can adversely effect the noise levels.

- SPL Measured according ISO 3744 methods: PWL calculated according ISO 3744

Standard Version

Table 9.1 – SPL - FH4/NH4 with Base EC Fans Φ 910 @1100rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FH4/NH4	"SPL" Sound pressure level @1m [dB]								
065 SG0	82	85	82	84	78	75	67	60	84,3
075 SG0	82	85	82	84	78	75	67	60	84,4
080 SG0	83	86	83	85	79	76	68	61	84,7
090 SG0	83	86	83	85	79	76	68	61	84,8
100 SG0	83	86	83	85	79	76	68	61	85,0
110 SG0	83	86	83	85	79	76	68	61	85,1
125 SG0	83	86	83	85	79	76	68	61	85,3
140 SG0	83	86	83	85	79	76	68	61	85,4
165 HG0	84	87	84	86	80	77	69	62	85,7
180 HG0	84	87	84	86	80	77	69	62	85,9
195 HG0	84	87	84	86	80	77	69	62	86,0

Table 9.2 – PWL - FH4/NH4 with Base EC Fans Φ 910 @1100rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FH4/NH4	"SPL" Sound pressure level @1m [dB]								
065 SG0	104	107	104	106	100	97	89	82	105,8
075 SG0	104	107	104	106	100	97	89	82	105,9
080 SG0	104	107	104	106	100	97	89	82	106,6
090 SG0	105	108	105	107	101	98	90	83	106,7
100 SG0	105	108	105	107	101	98	90	83	107,4
110 SG0	105	108	105	107	101	98	90	83	107,4
125 SG0	106	109	106	108	102	99	91	84	108,0
140 SG0	106	109	106	108	102	99	91	84	108,1
165 HG0	107	110	107	109	103	100	92	85	108,7
180 HG0	107	110	107	109	103	100	92	85	109,2
195 HG0	107	110	107	109	103	100	92	85	109,3

Table 9.3 – SPL - FH4/NH4 with Premium EC Fans Φ 910 @980rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FH4/NH4	"SPL" Sound pressure level @1m [dB]								
065 SG0	77	80	77	79	73	70	62	55	78,7
075 SG0	77	80	77	79	73	70	62	55	78,8
080 SG0	77	80	77	79	73	70	62	55	79,1
090 SG0	77	80	77	79	73	70	62	55	79,3
100 SG0	77	80	77	79	73	70	62	55	79,5
110 SG0	77	80	77	79	73	70	62	55	79,6
125 SG0	78	81	78	80	74	71	63	56	79,9
140 SG0	78	81	78	80	74	71	63	56	80,1
165 HG0	78	81	78	80	74	71	63	56	80,2
180 HG0	78	81	78	80	74	71	63	56	80,6
195 HG0	79	82	79	81	75	72	64	57	80,8

Table 9.4 – PWL - FH4/NH4 with Premium EC Fans Φ 910 @980rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FH4/NH4	"SPL" Sound pressure level @1m [dB]								
065 SG0	98	101	98	100	94	91	83	76	100,2
075 SG0	98	101	98	100	94	91	83	76	100,3
080 SG0	99	102	99	101	95	92	84	77	101,1
090 SG0	99	102	99	101	95	92	84	77	101,3
100 SG0	100	103	100	102	96	93	85	78	101,9
110 SG0	100	103	100	102	96	93	85	78	102,0
125 SG0	101	104	101	103	97	94	86	79	102,7
140 SG0	101	104	101	103	97	94	86	79	102,9
165 HG0	101	104	101	103	97	94	86	79	103,3
180 HG0	102	105	102	104	98	95	87	80	104,0
195 HG0	102	105	102	104	98	95	87	80	104,2

Low Noise Version

Table 9.5 – SPL - FH4/NH4 Low noise version Φ800 fans @850rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FH4/NH4	"SPL" Sound pressure level @1m [dB]								
065 SG0	72	73	72	73	66	60	53	48	72,3
075 SG0	72	73	73	73	66	60	53	48	73,0
080 SG0	73	74	73	74	67	61	54	49	73,2
090 SG0	73	74	74	74	67	61	54	49	74,0
100 SG0	74	75	74	75	68	62	55	50	74,1
110 SG0	74	75	74	75	68	62	55	50	74,4
125 SG0	74	75	75	75	68	62	55	50	75,0
140 SG0	75	76	76	76	69	63	56	51	75,9
165 HG0	76	77	76	77	70	64	57	52	76,4
180 HG0	77	78	77	78	71	65	58	53	77,1
195 HG0	77	78	78	78	71	65	58	53	77,7

Table 9.6 – PWL - FH4/NH4 Low noise version Φ800 fans @850rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FH4/NH4	"SPL" Sound pressure level @1m [dB]								
065 SG0	93	94	94	94	87	81	74	69	93,8
075 SG0	94	95	94	95	88	82	75	70	94,5
080 SG0	95	96	95	96	89	83	76	71	95,2
090 SG0	95	96	96	96	89	83	76	71	96,0
100 SG0	96	97	96	97	90	84	77	72	96,4
110 SG0	96	97	97	97	90	84	77	72	96,8
125 SG0	97	98	98	98	91	85	78	73	97,7
140 SG0	98	99	99	99	92	86	79	74	98,6
165 HG0	99	100	99	100	93	87	80	75	99,5
180 HG0	100	101	100	101	94	88	81	76	100,5
195 HG0	101	102	101	102	95	89	82	77	101,1

Table 9.7 – SPL - FIZ/NIZ with Base EC Fans Φ910 @1100rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FIZ/NIZ	"SPL" Sound pressure level @1m [dB]								
065 SG0	84	80	83	83	80	74	69	64	84,4
075 SG0	84	80	83	83	81	74	69	64	84,5
080 SG0	84	83	83	84	80	75	68	63	84,8
085 SG0	84	83	83	84	80	75	68	63	84,8
095 SG0	84	83	83	84	80	75	69	63	85,1
110 SG0	84	83	83	84	80	75	69	63	85,1
125 SG0	84	84	84	84	80	76	69	63	85,3
140 HG0	84	84	84	85	81	76	69	63	85,6
150 HG0	85	84	84	85	81	76	69	64	85,8

Table 9.8 – PWL - FIZ/NIZ with Base EC Fans Φ 910 @1100rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FIZ/NIZ	"SPL" Sound pressure level @1m [dB]								
065 SG0	106	102	105	104	102	96	90	86	105,9
075 SG0	106	102	105	104	102	96	90	86	106,0
080 SG0	104	104	105	106	102	94	89	83	106,7
085 SG0	104	105	105	106	102	94	89	83	106,8
095 SG0	105	105	105	106	103	95	89	84	107,4
110 SG0	105	105	105	106	103	95	89	84	107,4
125 SG0	106	106	106	107	103	96	90	85	108,0
140 HG0	106	106	107	108	104	96	91	85	108,6
150 HG0	107	107	107	108	104	97	91	86	109,1

Table 9.9 – SPL - FIZ/NIZ with Premium EC Fans Φ 910 @980rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FIZ/NIZ	"SPL" Sound pressure level @1m [dB]								
065 SG0	79	75	78	77	75	68	63	59	78,8
075 SG0	79	75	78	77	75	69	63	59	79,1
080 SG0	78	78	78	78	74	69	63	57	79,2
085 SG0	78	78	78	79	74	70	63	57	79,5
095 SG0	79	78	78	79	75	70	63	58	79,8
110 SG0	78	78	78	79	75	70	63	57	79,6
125 SG0	79	78	78	79	75	70	63	58	79,8
140 HG0	79	78	78	79	75	70	63	58	79,8
150 HG0	79	78	78	79	75	70	64	58	80,1

Table 9.10 – PWL - FIZ/NIZ with Premium EC Fans Φ 910 @980rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FIZ/NIZ	"SPL" Sound pressure level @1m [dB]								
065 SG0	96	95	97	98	98	88	84	78	100,3
075 SG0	97	96	97	98	98	88	84	78	100,6
080 SG0	100	100	100	100	96	91	85	79	101,2
085 SG0	100	100	100	101	96	92	85	79	101,5
095 SG0	101	101	101	101	97	92	86	80	102,2
110 SG0	101	100	100	101	97	92	86	80	102,0
125 SG0	101	101	101	102	98	93	86	80	102,6
140 HG0	102	101	101	102	98	93	86	81	102,9
150 HG0	102	102	102	103	98	94	87	81	103,5

Table 9.11 – SPL - FIZ/NIZ Low noise version Ø800 fans @850rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FIZ/NIZ	"SPL" Sound pressure level @1m [dB]								
065 SG0	69	68	70	71	71	61	57	51	73,3
075 SG0	70	70	71	72	72	62	58	52	74,5
080 SG0	72	72	72	73	69	62	56	51	74,0
085 SG0	73	73	73	74	70	63	57	52	75,1
095 SG0	73	73	73	74	71	63	57	52	75,3
110 SG0	72	72	73	73	70	62	56	51	74,5
125 SG0	75	75	75	76	73	65	59	54	77,3
140 HG0	74	74	74	74	70	66	59	53	75,4
150 HG0	75	74	74	75	71	66	60	54	76,0

Table 9.12 – PWL - FIZ/NIZ Low noise version Ø800 fans @850rpm

Model	Octave Band Frequency [Hz]								Total PWL [dB(A)]
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
FIZ/NIZ	"SPL" Sound pressure level @1m [dB]								
065 SG0	92	93	93	94	90	82	77	71	94,8
075 SG0	94	94	94	95	91	84	78	73	96,0
080 SG0	94	94	94	95	91	84	78	73	96,0
085 SG0	95	95	95	96	92	85	79	74	97,1
095 SG0	95	95	96	97	93	85	80	74	97,6
110 SG0	95	95	95	96	92	85	79	73	96,9
125 SG0	98	98	98	99	95	88	82	77	100,1
140 HG0	96	96	97	97	94	86	80	75	98,5
150 HG0	97	97	97	98	95	87	81	76	99,4

The sound levels of chiller versions are lower than the values in the table by an average of -0.5dB for the Low noise versions, and -1.5dB for all the others.

Table 10.1 – Electrical Data - NH4xxxSG0 Models

Models NH4xxxSG0		065	075	080	090	100	110	125	140
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating ⁽¹⁾									
Total power input ⁽²⁾	kW	153	180	199	232	243	262	303	353
OA (without PFC) ⁽²⁾	A	265	308	331	407	418	442	504	585
cosφ (without PFC) ⁽²⁾	-	0,83	0,84	0,87	0,82	0,84	0,86	0,87	0,87
cosφ (with PFC) ⁽²⁾	-	0,95	0,94	0,94	0,95	0,94	0,93	0,87	0,87
Rated power									
FLA	A	484	544	582	682	753	813	923	983
Max. power input	kW	240	270	305	336	358	373	429	476
OAm _{ax}	A	394	440	496	562	590	607	695	771
cosφ (without PFC)		0,88	0,88	0,89	0,86	0,88	0,89	0,89	0,89
OAm _{ax} (with PFC)	A	366	412	468	535	542	568	663	771
cosφ (with PFC)		0,95	0,94	0,94	0,91	0,95	0,95	0,94	0,89
LRA	A	832	908	1008	1069	1140	926	1039	1232
Max. fuse (gG/aM)	A	800gG/	800gG/	800gG/	800gG/	1250gG / 1250aM	1250gG / 1250aM	1250gG / 1250aM	1250gG / 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm
Control									
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz							
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2	2
Compressors									
Power input	kW	141,2	168,3	184,1	217,3	225,9	245,6	284,2	333,8
Nominal current	A	246	289	308	384	391	415	474	555
Single compressor 1 - FLA	A	171	194	217	250	250	267	306	344
Single compressor 1 - FLI	A	216	246	260	310	310	370	420	450
Single compressor 1 - LRA - Method starting	A	612 - YD	665 - YD	729 - YD	757 - YD	757 - YD	586 - YD	650 - YD	805 - YD
Single compressor 2 - FLA	A	171	194	217	250	267	267	306	344
Single compressor 2 - FLI	A	216	246	260	310	370	370	420	450
Single compressor 2 - LRA - Method starting	A	612 - YD	665 - YD	729 - YD	757 - YD	586 - YD	586 - YD	650 - YD	805 - YD
Fans									
Fans number	-	10	10	12	12	14	14	16	16
Power input ⁽²⁾	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Nominal current ⁽²⁾	A	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9
Max. Current ⁽²⁾	A	5,2	5,2	5,2	5,2	5,2	5,2	5,2	5,2
Pumps									
Std. head pump model	-	NB65- 125/137	NB65- 125/144	NB65- 125/144	NB65- 160/173	NB80- 160/151	NB80- 160/151	NB80- 160/161	NB80- 160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1	20,1

Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5	31,5
LRA	A	169	136	136	184	184	184	221	221
High head pump model	-	NB65-160/157	NB65-160/173	NB65-160/173	NB65-160/177	NB80-160/161	NB80-160/161	NB80-160/167	NB80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0	22,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	20,1	23,4	23,4
Max. current	A	19,4	26,3	26,3	31,5	31,5	31,5	38,0	38,0
LRA	A	136	184	184	221	221	221	274	274
Inverter pump model	-	NBE65-160/157	NBE65-160/173	NBE65-160/173	NBE65-160/177	NBE80-160/161	NBE80-160/161	NBE80-160/167	NBE80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0	22,0
Motor power	kW	12,4	17,7	17,7	21,4	21,6	21,6	25,2	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	34,0	39,9	39,9
LRA	A	NBE65-160/157	NBE65-160/157	NBE80-160/151	NBE80-160/151	NBE80-160/151	NBE80-160/151	NBE80-160/161	NBE80-160/161
No-Glycol pump model	-	11,0	11,0	15,0	15,0	15,0	15,0	18,5	18,5
Nominal power	kW	12,4	12,4	17,5	17,5	17,5	17,5	21,6	21,6
Motor power	kW	19,3	19,3	28,0	28,0	28,0	28,0	34,0	34,0
Max. current	A	19,3	19,3	28,0	28,0	28,0	28,0	34,0	34,0

(1) At nominal conditions: water inlet/outlet temperatures 26/20°C, outdoor air temperature 35°C

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

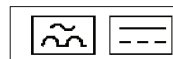


Table 10.2 – Electrical Data - NH4xxxSG0 Low Noise Models

Models NH4xxxSG0 Low Noise		065	075	080	090	100	110	125	140
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating ⁽¹⁾									
Total power input	kW	164	189	210	240	256	273	316	357
OA (without PFC)	A	283	321	349	420	438	459	523	592
cosφ (without PFC)	-	0,84	0,85	0,87	0,82	0,84	0,86	0,87	0,87
cosφ (with PFC)	-	0,94	0,94	0,94	0,95	0,94	0,93	0,87	0,87
Rated power									
FLA	A	480	540	577	677	747	807	916	976
Max. power input	kW	238	268	302	334	355	370	426	473
OAm _{ax}	A	389	435	491	557	584	601	688	764
cosφ (without PFC)		0,88	0,89	0,89	0,86	0,88	0,89	0,89	0,89
OAm _{ax} (with PFC)	A	362	408	463	529	537	562	656	764
cosφ (with PFC)		0,95	0,95	0,94	0,91	0,96	0,95	0,94	0,89
LRA	A	832	908	1008	1069	1140	926	1039	1232
Max. fuse (gG/aM)	A	800gG/	800gG/	800gG/	800gG/	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm
Control									
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz							
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35

Max. fuse (gG/aM)	A	40	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2	2

Compressors

Power input	kW	132,4	156,5	171,9	201,3	210,7	228,2	264,8	306,1
Nominal current	A	234	272	290	361	369	390	445	514
Single compressor 1 - FLA	A	171	194	217	250	250	267	306	344
Single compressor 1 - FLI	A	216	246	260	310	310	370	420	450
Single compressor 1 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	757 - PW	586 - YD	650 - YD	805 - YD
Single compressor 2 - FLA	A	171	194	217	250	267	267	306	344
Single compressor 2 - FLI	A	216	246	260	310	370	370	420	450
Single compressor 2 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	586 - YD	586 - YD	650 - YD	805 - YD

Fans

Fans number	-	10	10	12	12	14	14	16	16
Power input	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Nominal current	A	4,9	4,9	4,9	4,9	4,9	4,9	4,9	4,9
Max. Current	A	4,8	4,8	4,8	4,8	4,8	4,8	4,8	4,8

Pumps

Std. head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/151	NB80-160/161	NB80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5	31,5
LRA	A	169	136	136	184	184	184	221	221
High head pump model	-	NB65-160/157	NB65-160/173	NB65-160/173	NB65-160/177	NB80-160/161	NB80-160/161	NB80-160/167	NB80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0	22,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	20,1	23,4	23,4
Max. current	A	19,4	26,3	26,3	31,5	31,5	31,5	38,0	38,0
LRA	A	136	184	184	221	221	221	274	274
Inverter pump model	-	NBE65-160/157	NBE65-160/173	NBE65-160/173	NBE65-160/177	NBE80-160/161	NBE80-160/161	NBE80-160/167	NBE80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0	22,0
Motor power	kW	12,4	17,7	17,7	21,4	21,6	21,6	25,2	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	34,0	39,9	39,9
LRA	A	19	27	27	32	34	34	19	40
No-Glycol pump model	-	NBE65-160/157	NBE65-160/157	NBE80-160/151	NBE80-160/151	NBE80-160/151	NBE80-160/151	NBE80-160/161	NBE80-160/161
Nominal power	kW	11,0	11,0	15,0	15,0	15,0	15,0	18,5	18,5
Motor power	kW	12,4	12,4	17,5	17,5	17,5	17,5	21,6	21,6
Max. current	A	19,3	19,3	28,0	28,0	28,0	28,0	34,0	34,0
High head pump - LRA	A	19	19	28	28	28	28	19	34

(1) At nominal conditions: water inlet/outlet temperatures 26/20°C, outdoor air temperature 35°C

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

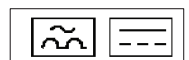


Table 10.3 – Electrical Data - CH4xxxSG0 Models

Models CH4xxxSG0		065	075	080	090	100	110	125	140
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating ⁽¹⁾									
Total power input ⁽²⁾	kW	160	182	204	232	248	264	306	344
OA (without PFC) ⁽²⁾	A	276	312	339	408	426	445	509	574
cosφ (without PFC) ⁽²⁾	-	0,83	0,84	0,87	0,82	0,84	0,86	0,87	0,87
cosφ (with PFC) ⁽²⁾	-	0,94	0,94	0,94	0,95	0,94	0,93	0,87	0,87
Rated power									
FLA	A	480	540	577	677	747	807	916	976
Max. power input	kW	238	268	302	334	355	370	426	473
OAm _{ax}	A	389	435	491	557	584	601	688	764
cosφ (without PFC)		0,88	0,89	0,89	0,86	0,88	0,89	0,89	0,89
OAm _{ax} (with PFC)	A	362	408	463	529	537	562	656	764
cosφ (with PFC)		0,95	0,95	0,94	0,91	0,96	0,95	0,94	0,89
LRA	A	832	908	1005	1066	1136	922	1034	1227
Max. fuse (gG/aM)	A	800gG/	800gG/	800gG/	800gG/	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm
Control									
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz							
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2	2
Compressors									
Power input	kW	129,5	152,4	167,9	196,0	205,6	222,4	258,1	296,4
Nominal current	A	230	266	284	353	362	381	435	500
Single compressor 1 - FLA	A	171	194	217	250	250	267	306	344
Single compressor 1 - FLI	A	216	246	260	310	310	370	420	450
Single compressor 1 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	757 - PW	586 - YD	650 - YD	805 - YD
Single compressor 2 - FLA	A	171	194	217	250	267	267	306	344
Single compressor 2 - FLI	A	216	246	260	310	370	370	420	450
Single compressor 2 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	586 - YD	586 - YD	650 - YD	805 - YD
Fans									
Fans number	-	10	10	12	12	14	14	16	16
Power input ⁽²⁾	kW	3,0	3,0	3,0	3,0	3,0	3,0	3,0	3,0
Nominal current ⁽²⁾	A	4,6	4,6	4,6	4,6	4,6	4,6	4,6	4,6
Max. Current ⁽²⁾	A	4,8	4,8	4,8	4,8	4,8	4,8	4,8	4,8
Pumps									
Std. head pump model	-	NB65- 125/127	NB65- 125/127	NB65- 125/137	NB65- 125/144	NB80- 160/147	NB80- 160/147	NB80- 160/151	NB80- 160/151
Nominal power	kW	5,5	5,5	7,5	11,0	11,0	11,0	15,0	15,0
Motor power	kW	6,1	6,1	8,4	12,1	12,1	12,1	16,4	16,4
Max. current	A	11,2	11,2	15,2	19,4	19,4	19,4	26,3	26,3

LRA	A	131	131	169	136	136	136	184	184
High head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/151	NB80-160/161	NB80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5	31,5
LRA	A	169	136	136	184	184	184	221	221
Inverter pump model	-	NBE65-125/137	NBE65-125/144	NBE65-125/144	NBE65-160/173	NBE80-160/151	NBE80-160/151	NBE80-160/161	NBE80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5	18,5
Motor power	kW	8,6	12,4	12,4	17,7	17,5	17,5	21,6	21,6
Max. current	A	13,4	19,3	19,3	26,6	28,0	28,0	0,0	34,0
LRA	A	13	19	19	27	28	28	13	34

(1) At nominal conditions: water inlet/outlet temperatures ****

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B):

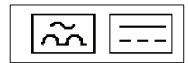


Table 10.4 – Electrical Data - CH4xxxSG0 Low Noise Models

Models CH4xxxSG0 Low Noise		065	075	080	090	100	110	125	140
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating ⁽¹⁾									
Total power input	kW	148	174	192	223	234	253	293	339
OA (without PFC)	A	258	298	320	393	405	427	487	563
cosφ (without PFC)	-	0,83	0,84	0,86	0,82	0,84	0,86	0,87	0,87
cosφ (with PFC)	-	0,94	0,94	0,94	0,95	0,94	0,93	0,87	0,87
Rated power									
FLA	A	484	544	582	682	753	813	923	983
Max. power input	kW	240	270	305	336	358	373	429	476
OAmx	A	394	440	496	562	590	607	695	771
cosφ (without PFC)	-	0,88	0,88	0,89	0,86	0,88	0,89	0,89	0,89
OAmx (with PFC)	A	366	412	468	535	542	568	663	771
cosφ (with PFC)	-	0,95	0,94	0,94	0,91	0,95	0,95	0,94	0,89
LRA	A	832	908	1008	1069	1140	926	1039	1232
Max. fuse (gG/aM)	A	800gG/	800gG/	800gG/	800gG/	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control									
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz							
Pmax	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2	2
Compressors									
Power input	kW	137,1	162,7	178,5	210,0	218,9	237,7	275,4	321,1
Nominal current	A	241	281	300	373	381	403	460	536
Single compressor 1 - FLA	A	171	194	217	250	250	267	306	344
Single compressor 1 - FLI	A	216	246	260	310	310	370	420	450
Single compressor 1 - LRA - Method starting	A	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW757 - PW586 - YD
Single compressor 2 - FLA	A	171	194	217	250	267	267	306	344
Single compressor 2 - FLI	A	216	246	260	310	370	370	420	450
Single compressor 2 - LRA - Method starting	A	612 - PW665 - PW729 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW586 - YD	612 - PW665 - PW729 - PW757 - PW586 - YD
Fans									
Fans number	-	10	10	12	12	14	14	16	16
Power input	kW	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1

Nominal current	A	1,7	1,7	1,7	1,7	1,7	1,7	1,7	1,7
Max. Current	A	5,2	5,2	5,2	5,2	5,2	5,2	5,2	5,2
Pumps									
Std. head pump model	-	NB65-125/127	NB65-125/127	NB65-125/137	NB65-125/144	NB80-160/147	NB80-160/147	NB80-160/151	NB80-160/151
Nominal power	kW	5,5	5,5	7,5	11,0	11,0	11,0	15,0	15,0
Motor power	kW	6,1	6,1	8,4	12,1	12,1	12,1	16,4	16,4
Max. current	A	11,2	11,2	15,2	19,4	19,4	19,4	26,3	26,3
LRA	A	131	131	169	136	136	136	184	184
High head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/151	NB80-160/161	NB80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5	31,5
LRA	A	169	136	136	184	184	184	221	221
Inverter pump model	-	NBE65-125/137	NBE65-125/144	NBE65-125/144	NBE65-160/173	NBE80-160/151	NBE80-160/151	NBE80-160/161	NBE80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5	18,5
Motor power	kW	8,6	12,4	12,4	17,7	17,5	17,5	21,6	21,6
Max. current	A	13,4	19,3	19,3	26,6	28,0	28,0	34,0	34,0
LRA	A	13	19	19	27	28	28	13	34

(1) At nominal conditions: water inlet/outlet temperatures 26/20°C, outdoor air temperature 35°C

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

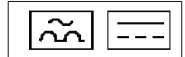


Table 10.5 – Electrical Data - FH4xxxSG0 Models

Models FH4xxxSG0		065	075	080	090	100	110	125	140
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating⁽¹⁾									
Total power input ⁽²⁾	kW	163	187	209	238	254	271	314	355
OA (without PFC) ⁽²⁾	A	281	319	347	417	436	456	520	588
cosφ (without PFC) ⁽²⁾	-	0,84	0,85	0,87	0,82	0,84	0,86	0,87	0,87
cosφ (with PFC) ⁽²⁾	-	0,94	0,94	0,94	0,95	0,94	0,93	0,87	0,87
Rated power									
FLA	A	480	540	577	677	747	807	916	976
Max. power input	kW	238	268	302	334	355	370	426	473
OAm _{max}	A	389	435	491	557	584	601	688	764
cosφ (without PFC)		0,88	0,89	0,89	0,86	0,88	0,89	0,89	0,89
OAm _{max} (with PFC)	A	362	408	463	529	537	562	656	764
cosφ (with PFC)		0,95	0,95	0,94	0,91	0,96	0,95	0,94	0,89
LRA	A	832	908	1005	1066	1136	922	1034	1227
Max. fuse (gG/aM)	A	800gG/	800gG/	800gG/	800gG/	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control									
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz							
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2	2
Compressors									
Power input	kW	131,2	155,0	170,3	199,4	208,9	226,5	262,9	303,3
Nominal current	A	232	270	288	358	367	387	442	510
Single compressor 1 - FLA	A	171	194	217	250	250	267	306	344
Single compressor 1 - FLI	A	216	246	260	310	310	370	420	450

Single compressor 1 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	757 - PW	586 - YD	650 - YD	805 - YD
Single compressor 2 - FLA	A	171	194	217	250	267	267	306	344
Single compressor 2 - FLI	A	216	246	260	310	370	370	420	450
Single compressor 2 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	586 - YD	586 - YD	650 - YD	805 - YD

Fans

Fans number	-	10	10	12	12	14	14	16	16
Power input ⁽²⁾	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Nominal current ⁽²⁾	A	4,9	4,9	4,9	4,9	4,9	4,9	4,9	4,9
Max. Current ⁽²⁾	A	4,8	4,8	4,8	4,8	4,8	4,8	4,8	4,8

Pumps

Std. head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/161	NB80-160/161	NB80-160/167
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	18,5	18,5	22,0
Motor power	kW	8,4	12,1	12,1	16,4	16,4	20,1	20,1	23,4
Max. current	A	15,2	19,4	19,4	26,3	26,3	31,5	31,5	38,0
LRA	A	169	136	136	184	184	221	221	274
High head pump model	-	NB65-160/157	NB65-160/173	NB65-160/173	NB65-160/177	NB80-160/161	NB80-160/167	NB80-160/167	NB80-160/177
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0	30,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	23,4	23,4	32,1
Max. current	A	19,4	26,3	26,3	31,5	31,5	38,0	38,0	52,0
LRA	A	136	184	184	221	221	274	274	364
Inverter pump model	-	NBE65-160/157	NBE65-160/173	NBE65-160/173	NBE65-160/177	NBE80-160/161	NBE80-160/167	NBE80-160/167	NBE80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0	22,0
Motor power	kW	12,4	17,7	17,7	21,4	21,6	25,2	25,2	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	39,9	39,9	39,9
LRA	A	19	27	27	32	34	40	40	40

⁽¹⁾ At nominal conditions: glycol 30% inlet/outlet temperatures ****

⁽²⁾ Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

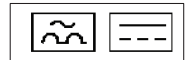


Table 10.6 – Electrical Data - FH4xxxSG0 Low Noise Models

Models FH4xxxSG0 Low Noise		065	075	080	090	100	110	125	140
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating ⁽¹⁾									
Total power input	kW	152	178	197	229	241	260	301	350
OA (without PFC)	A	263	305	328	403	415	438	500	580
cosφ (without PFC)	-	0,83	0,84	0,87	0,82	0,84	0,86	0,87	0,87
cosφ (with PFC)	-	0,94	0,94	0,94	0,95	0,94	0,93	0,87	0,87
Rated power									
FLA	A	484	544	582	682	753	813	923	983
Max. power input	kW	240	270	305	336	358	373	429	476
OAm _{ax}	A	394	440	496	562	590	607	695	771
cosφ (without PFC)	-	0,88	0,88	0,89	0,86	0,88	0,89	0,89	0,89
OAm _{ax} (with PFC)	A	366	412	468	535	542	568	663	771
cosφ (with PFC)	-	0,95	0,94	0,94	0,91	0,95	0,95	0,94	0,89
LRA	A	832	908	1008	1069	1140	926	1039	1232
Max. fuse (gG/aM)	A	800gG/	800gG/	800gG/	800gG/	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control									
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz							
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7	7

Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2	2

Compressors

Power input	kW	139,6	166,4	182,1	215,0	223,7	243,3	281,7	330,3
Nominal current	A	244	286	305	380	388	411	470	550
Single compressor 1 - FLA	A	171	194	217	250	250	267	306	344
Single compressor 1 - FLI	A	216	246	260	310	310	370	420	450
Single compressor 1 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	757 - PW	586 - YD	650 - YD	805 - YD
Single compressor 2 - FLA	A	171	194	217	250	267	267	306	344
Single compressor 2 - FLI	A	216	246	260	310	370	370	420	450
Single compressor 2 - LRA - Method starting	A	612 - PW	665 - PW	729 - PW	757 - PW	586 - YD	586 - YD	650 - YD	805 - YD

Fans

Fans number	-	10	10	12	12	14	14	16	16
Power input	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Nominal current	A	1,9	1,9	1,9	1,9	1,9	1,9	1,9	1,9
Max. Current	A	5,2	5,2	5,2	5,2	5,2	5,2	5,2	5,2

Pumps

Std. head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/161	NB80-160/161	NB80-160/167
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	18,5	18,5	22,0
Motor power	kW	8,4	12,1	12,1	16,4	16,4	20,1	20,1	23,4
Max. current	A	15,2	19,4	19,4	26,3	26,3	31,5	31,5	38,0
LRA	A	169	136	136	184	184	221	221	274
High head pump model	-	NB65-160/157	NB65-160/173	NB65-160/173	NB65-160/177	NB80-160/161	NB80-160/167	NB80-160/167	NB80-160/177
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0	30,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	23,4	23,4	32,1
Max. current	A	19,4	26,3	26,3	31,5	31,5	38,0	38,0	52,0
LRA	A	136	184	184	221	221	274	274	364
Inverter pump model	-	NBE65-160/157	NBE65-160/173	NBE65-160/173	NBE65-160/177	NBE80-160/161	NBE80-160/167	NBE80-160/167	NBE80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0	22,0
Motor power	kW	12,4	17,7	17,7	21,4	21,6	25,2	25,2	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	39,9	39,9	39,9
LRA	A	19	27	27	32	34	40	40	40

(1) At nominal conditions: glycol 30% inlet/outlet temperatures *****

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B):

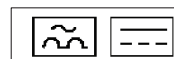


Table 10.7 – Electrical Data - NIZxxxSG0 Models

Models NIZxxxSG0		065	075	080	085	095	110	125	
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating ⁽¹⁾									
Total power input ⁽²⁾	kW	161	187	192	217	241	280	316	
OA (without PFC) ⁽²⁾	A	260	302	319	354	388	464	517	
cosφ (without PFC) ⁽²⁾	-	0,89	0,89	0,87	0,88	0,90	0,87	0,88	
cosφ (with PFC) ⁽²⁾	-	0,89	0,89	0,87	0,88	0,90	0,87	0,88	
Rated power									
FLA	A	468	538	531	677	717	807	856	
Max. power input	kW	265	304	291	322	346	438	465	
OAmx	A	422	488	471	520	554	703	745	
cosφ (without PFC)		0,91	0,90	0,89	0,89	0,90	0,90	0,90	

OAm _{ax} (with PFC)	A	422	488	471	520	554	703	745
cosφ (with PFC)		0,91	0,90	0,89	0,89	0,90	0,90	0,90
LRA	A	469	539	953	753	786	1017	1083
Max. fuse (gG/aM)	A	800gG/	630A gG	800gG/	800gG/	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm

Control

Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz						
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2

Compressors

Power input	kW	129,0	155,0	153,4	178,4	195,8	235,6	264,8
Nominal current	A	211	253	260	295	319	395	439
Single compressor 1 - FLA	A	374	440	231	265	265	374	374
Single compressor 1 - FLI	A	420	490	260	340	340	420	420
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	0	0	183	198	222	262	295
Single compressor 2 - FLI	A	0	0	214	280	310	320	360
Single compressor 2 - LRA - Method starting	A	0	0	665 - PW	436 - YD	465 - YD	586 - YD	650 - YD

Fans

Fans number	-	10	10	12	12	14	14	16
Power input (2)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Nominal current (2)	A	4,9	4,9	4,9	4,9	4,9	4,9	4,9
Max. Current (2)	A	4,8	4,8	4,8	4,8	4,8	4,8	4,8

Pumps

Std. head pump model	-	NB65- 125/137	NB65- 125/144	NB65- 125/144	NB65- 160/173	NB80- 160/151	NB80- 160/151	NB80- 160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5
LRA	A	169	136	136	184	184	184	221
High head pump model	-	NB65- 160/157	NB65- 160/173	NB65- 160/173	NB65- 160/177	NB80- 160/161	NB80- 160/161	NB80- 160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	20,1	23,4
Max. current	A	19,4	26,3	26,3	31,5	31,5	31,5	38,0
LRA	A	136	184	184	221	221	221	274
Inverter pump model	-	NBE65- 160/157	NBE65- 160/173	NBE65- 160/173	NBE65- 160/177	NBE80- 160/161	NBE80- 160/161	NBE80- 160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0
Motor power	kW	12,4	17,7	17,7	21,4	21,6	21,6	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	34,0	39,9
LRA	A	19	27	27	32	34	34	40
No-Glycol pump model	-	NBE65- 160/157	NBE65- 160/157	NBE80- 160/151	NBE80- 160/151	NBE80- 160/151	NBE80- 160/151	NBE80- 160/161
Nominal power	kW	11,0	11,0	15,0	15,0	15,0	15,0	18,5
Motor power	kW	12,4	12,4	17,5	17,5	17,5	17,5	21,6
Max. current	A	19,3	19,3	28,0	28,0	28,0	28,0	34,0
High head pump - LRA	A	19	19	28	28	28	28	34

(1) At nominal conditions: water inlet/outlet temperatures 26/20°C, outdoor air temperature 35°C

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

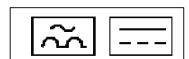


Table 10.8 – Electrical Data - NIZxxxSG0 Low Noise Models

Models NIZxxxSG0 Low Noise		065	075	080	085	095	110	125
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz						
Operating ⁽¹⁾								
Total power input	kW	154	183	181	207	226	277	312
OA (without PFC)	A	250	297	302	340	367	459	511
cosφ (without PFC)	-	0,89	0,89	0,86	0,88	0,89	0,87	0,88
cosφ (with PFC)	-	0,89	0,89	0,86	0,88	0,89	0,87	0,88
Rated power								
FLA	A	472	542	536	682	723	813	863
Max. power input	kW	267	306	293	325	349	440	468
OAm _{ax}	A	426	492	477	525	560	709	752
cosφ (without PFC)	-	0,90	0,90	0,89	0,89	0,90	0,90	0,90
OAm _{ax} (with PFC)	A	426	492	477	525	560	709	752
cosφ (with PFC)	-	0,90	0,90	0,89	0,89	0,90	0,90	0,90
LRA	A	469	539	957	756	790	1021	1088
Max. fuse (gG/aM)	A	800gG/	630A gG	800gG/	800gG/	1250gG/ 1250aM	1250gG/ 1250aM	1250gG/ 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm	M12 / 50- 75Nm
Control								
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz						
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2
Compressors								
Power input	kW	141,8	170,6	166,2	192,8	209,5	260,3	292,3
Nominal current	A	231	278	279	317	340	432	481
Single compressor 1 - FLA	A	374	440	231	265	265	374	374
Single compressor 1 - FLI	A	420	490	260	340	340	420	420
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	0	0	183	198	222	262	295
Single compressor 2 - FLI	A	0	0	214	280	310	320	360
Single compressor 2 - LRA - Method starting	A	0	0	665 - PW	436 - YD	465 - YD	586 - YD	650 - YD
Fans								
Fans number	-	10	10	12	12	14	14	16
Power input	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Nominal current	A	1,9	1,9	1,9	1,9	1,9	1,9	1,9
Max. Current	A	5,2	5,2	5,2	5,2	5,2	5,2	5,2
Pumps								
Std. head pump model	-	NB65- 125/137	NB65- 125/144	NB65- 125/144	NB65- 160/173	NB80- 160/151	NB80- 160/151	NB80- 160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5
LRA	A	169	136	136	184	184	184	221
High head pump model	-	NB65- 160/157	NB65- 160/173	NB65- 160/173	NB65- 160/177	NB80- 160/161	NB80- 160/161	NB80- 160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	20,1	23,4
Max. current	A	19,4	26,3	26,3	31,5	31,5	31,5	38,0
LRA	A	136	184	184	221	221	221	274
Inverter pump model	-	NBE65- 160/157	NBE65- 160/173	NBE65- 160/173	NBE65- 160/177	NBE80- 160/161	NBE80- 160/161	NBE80- 160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	18,5	22,0

Motor power	kW	12,4	17,7	17,7	21,4	21,6	21,6	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	34,0	39,9
LRA	A	19	27	27	32	34	34	40
No-Glycol pump model	-	NBE65-160/157	NBE65-160/157	NBE80-160/151	NBE80-160/151	NBE80-160/151	NBE80-160/151	NBE80-160/161
Nominal power	kW	11,0	11,0	15,0	15,0	15,0	15,0	18,5
Motor power	kW	12,4	12,4	17,5	17,5	17,5	17,5	21,6
Max. current	A	19,3	19,3	28,0	28,0	28,0	28,0	34,0
High head pump - LRA	A	19	19	28	28	28	28	34

(1) At nominal conditions: water inlet/outlet temperatures 26/20°C, outdoor air temperature 35°C
OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

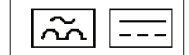


Table 10.9 – Electrical Data - CIZxxxSG0 Models

Models CIZxxxSG0		065	075	080	085	095	110	125
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz						
Operating ⁽¹⁾								
Total power input ⁽²⁾	kW	155	180	185	209	233	269	304
OA (without PFC) ⁽²⁾	A	250	291	308	343	376	446	500
cosφ (without PFC) ⁽²⁾	-	0,89	0,89	0,87	0,88	0,89	0,87	0,88
cosφ (with PFC) ⁽²⁾	-	0,89	0,89	0,87	0,88	0,89	0,87	0,88
Rated power								
FLA	A	468	538	531	677	717	807	856
Max. power input	kW	265	304	291	322	346	438	465
OAm _{ax}	A	422	488	471	520	554	703	745
cosφ (without PFC)		0,91	0,90	0,89	0,89	0,90	0,90	0,90
OAm _{ax} (with PFC)	A	422	488	471	520	554	703	745
cosφ (with PFC)		0,91	0,90	0,89	0,89	0,90	0,90	0,90
LRA	A	469	539	953	753	786	1017	1083
Max. fuse (gG/aM)	A	800gG/	630A gG	800gG/	800gG/	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control								
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz						
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2
Compressors								
Power input	kW	124,6	149,6	149,0	173,3	191,0	227,3	255,5
Nominal current	A	204	245	253	288	312	382	426
Single compressor 1 - FLA	A	374	440	231	265	265	374	374
Single compressor 1 - FLI	A	420	490	260	340	340	420	420
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	0	0	183	198	222	262	295
Single compressor 2 - FLI	A	0	0	214	280	310	320	360
Single compressor 2 - LRA - Method starting	A	0	0	665 - PW	436 - YD	465 - YD	586 - YD	650 - YD
Fans								
Fans number	-	10	10	12	12	14	14	16
Power input (2)	kW	3,0	3,0	3,0	3,0	3,0	3,0	3,0
Nominal current (2)	A	4,6	4,6	4,6	4,6	4,6	4,6	4,6
Max. Current (2)	A	4,8	4,8	4,8	4,8	4,8	4,8	4,8
Pumps								
Std. head pump model	-	NB65-125/127	NB65-125/127	NB65-125/137	NB65-125/144	NB80-160/147	NB80-160/147	NB80-160/151

Nominal power	kW	5,5	5,5	7,5	11,0	11,0	11,0	15,0
Motor power	kW	6,1	6,1	8,4	12,1	12,1	12,1	16,4
Max. current	A	11,2	11,2	15,2	19,4	19,4	19,4	26,3
LRA	A	131	131	169	136	136	136	184
High head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/151	NB80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5
LRA	A	169	136	136	184	184	184	221
Inverter pump model	-	NBE65-125/137	NBE65-125/144	NBE65-125/144	NBE65-160/173	NBE80-160/151	NBE80-160/151	NBE80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5
Motor power	kW	8,6	12,4	12,4	17,7	17,5	17,5	21,6
Max. current	A	13,4	19,3	19,3	26,6	28,0	28,0	34,0
LRA	A	13	19	19	27	28	28	34

(1) At nominal conditions: water inlet/outlet temperatures 26/20°C, outdoor air temperature 35°C

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

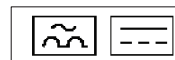


Table 10.10 – Electrical Data - CIZxxxSG0 Low Noise Models

Models CIZxxxSG0 Low Noise		065	075	080	085	095	110	125
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz						
Operating⁽¹⁾								
Total power input	kW	147	174	174	200	219	264	297
OA (without PFC)	A	240	284	292	329	356	440	491
cosφ (without PFC)	-	0,88	0,89	0,86	0,88	0,89	0,87	0,87
cosφ (with PFC)	-	0,88	0,89	0,86	0,88	0,89	0,87	0,87
Rated power								
FLA	A	472	542	536	682	723	813	863
Max. power input	kW	267	306	293	325	349	440	468
OAm _{ax}	A	426	492	477	525	560	709	752
cosφ (without PFC)	-	0,90	0,90	0,89	0,89	0,90	0,90	0,90
OAm _{ax} (with PFC)	A	426	492	477	525	560	709	752
cosφ (with PFC)	-	0,90	0,90	0,89	0,89	0,90	0,90	0,90
LRA	A	469	539	957	756	790	1021	1088
Max. fuse (gG/aM)	A	800gG/	630A gG	800gG/	800gG/	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control								
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz						
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2
Compressors								
Power input	kW	135,8	163,3	160,4	186,3	203,3	249,0	279,6
Nominal current	A	222	266	270	307	331	415	462
Single compressor 1 - FLA	A	374	440	231	265	265	374	374
Single compressor 1 - FLI	A	420	490	260	340	340	420	420
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	0	0	183	198	222	262	295
Single compressor 2 - FLI	A	0	0	214	280	310	320	360
Single compressor 2 - LRA - Method starting	A	0	0	665 - PW	436 - YD	465 - YD	586 - YD	650 - YD

Fans

Fans number	-	10	10	12	12	14	14	16
Power input	kW	1,1	1,1	1,1	1,1	1,1	1,1	1,1
Nominal current	A	1,8	1,8	1,8	1,8	1,8	1,8	1,8
Max. Current	A	5,2	5,2	5,2	5,2	5,2	5,2	5,2

Pumps

Std. head pump model	-	NB65-125/127	NB65-125/127	NB65-125/137	NB65-125/144	NB80-160/147	NB80-160/147	NB80-160/151
Nominal power	kW	5,5	5,5	7,5	11,0	11,0	11,0	15,0
Motor power	kW	6,1	6,1	8,4	12,1	12,1	12,1	16,4
Max. current	A	11,2	11,2	15,2	19,4	19,4	19,4	26,3
LRA	A	131	131	169	136	136	136	184
High head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/151	NB80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	16,4	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	26,3	31,5
LRA	A	169	136	136	184	184	184	221
Inverter pump model	-	NBE65-125/137	NBE65-125/144	NBE65-125/144	NBE65-160/173	NBE80-160/151	NBE80-160/151	NBE80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	15,0	18,5
Motor power	kW	8,6	12,4	12,4	17,7	17,5	17,5	21,6
Max. current	A	13,4	19,3	19,3	26,6	28,0	28,0	34,0
LRA	A	13	19	19	27	28	28	34

(1) At nominal conditions: water inlet/outlet temperatures 26/20°C, outdoor air temperature 35°C

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

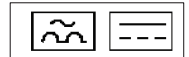


Table 10.11 – Electrical Data - FIZxxxSG0 Models

Models FIZxxxSG0		065	075	080	085	095	110	125
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz						
Operating (1)								
Total power input	kW	160	186	191	216	239	279	314
OA (without PFC)	A	259	300	317	352	386	461	515
cosφ (without PFC)	-	0,89	0,89	0,87	0,88	0,90	0,87	0,88
cosφ (with PFC)	-	0,89	0,89	0,87	0,88	0,90	0,87	0,88
Rated power								
FLA	A	468	538	531	677	717	807	856
Max. power input	kW	265	304	291	322	346	438	465
OAm _{ax}	A	422	488	471	520	554	703	745
cosφ (without PFC)		0,91	0,90	0,89	0,89	0,90	0,90	0,90
OAm _{ax} (with PFC)	A	422	488	471	520	554	703	745
cosφ (with PFC)		0,91	0,90	0,89	0,89	0,90	0,90	0,90
LRA	A	469	539	953	753	786	1017	1083
Max. fuse (gG/aM)	A	800gG/	630A gG	800gG/	800gG/	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control								
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz						
P _{max}	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30
LRA	A	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2
Compressors								
Power input	kW	128,0	153,7	152,1	177,2	194,5	233,8	262,8

Nominal current	A	210	251	258	293	317	392	437
Single compressor 1 - FLA	A	374	440	231	265	265	374	374
Single compressor 1 - FLI	A	420	490	260	340	340	420	420
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	0	0	183	198	222	262	295
Single compressor 2 - FLI	A	0	0	214	280	310	320	360
Single compressor 2 - LRA - Method starting	A	0	0	665 - PW	436 - YD	465 - YD	586 - YD	650 - YD

Fans

Fans number	-	10	10	12	12	14	14	16
Power input (2)	kW	3,2	3,2	3,2	3,2	3,2	3,2	3,2
Nominal current (2)	A	4,9	4,9	4,9	4,9	4,9	4,9	4,9
Max. Current (2)	A	4,8	4,8	4,8	4,8	4,8	4,8	4,8

Pumps

Std. head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/161	NB80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	18,5	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	20,1	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	31,5	31,5
LRA	A	169	136	136	184	184	221	221
High head pump model	-	NB65-160/157	NB65-160/173	NB65-160/173	NB65-160/177	NB80-160/161	NB80-160/167	NB80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	23,4	23,4
Max. current	A	19,4	26,3	26,3	31,5	31,5	38,0	38,0
LRA	A	136	184	184	221	221	274	274
Inverter pump model	-	NBE65-160/157	NBE65-160/173	NBE65-160/173	NBE65-160/177	NBE80-160/161	NBE80-160/167	NBE80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0
Motor power	kW	12,4	17,7	17,7	21,4	21,6	25,2	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	39,9	39,9
LRA	A	19	27	27	32	34	40	40

(1) At nominal conditions: glycol 30% inlet/outlet temperatures *****

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

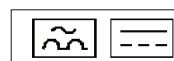


Table 10.12 – Electrical Data - FIZxxxSG0 Low Noise Models

Models FIZxxxSG0 LN		065	075	080	085	095	110	125
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz						
Operating ⁽¹⁾								
Total power input	kW	153	181	179	206	225	275	309
OA (without PFC)	A	248	294	299	337	364	455	507
cosφ (without PFC)	-	0,89	0,89	0,86	0,88	0,89	0,87	0,88
cosφ (with PFC)	-	0,89	0,89	0,87	0,88	0,90	0,87	0,88
Rated power								
FLI	A	472	542	536	682	723	813	863
Max. power input	kW	267	306	293	350	374	440	468
FLA	A	426	492	477	564	599	709	752
cosφ (without PFC)	-	0,90	0,90	0,89	0,89	0,90	0,90	0,90
LRA	A	469	539	957	756	790	1021	1088
Max. fuse (gG/aM)	A	800gG/	800gG/	800gG/	800gG/	800gG/	800gG/	1250gG / 1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control								
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz						
Pmax	kW	0,59	0,59	0,59	0,59	0,59	0,59	0,59
Imax	A	2,30	2,30	2,30	2,30	2,30	2,30	2,30

LRA	A	7	7	7	7	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40	40	40	40	40
Line screw fixing	Nm	2	2	2	2	2	2	2

Compressors

Power input	kW	140,5	168,9	164,5	191,2	207,9	257,7	289,5
Nominal current	A	229	275	276	314	337	428	477
Single compressor 1 - FLA	A	374	440	232	304	304	374	374
Single compressor 1 - FLI	A	420	490	260	340	340	420	420
Single compressor 1 - LRA - Method starting	A	20 - YD	20 - YD	20 - YD	20 - YD	20 - YD	20 - YD	20 - YD
Single compressor 2 - FLA	A			183	198	222	262	295
Single compressor 2 - FLI	A			214	280	310	320	360
Single compressor 2 - LRA - Method starting	A			665 - YD	436 - YD	465 - YD	586 - YD	650 - YD

Fans

Fans number	-	10	10	12	12	14	14	16
Power input	kW	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Nominal current	A	1,9	1,9	1,9	1,9	1,9	1,9	1,9
Max. Current	A	5,2	5,2	5,2	5,2	5,2	5,2	5,2

Pumps

Std. head pump model	-	NB65-125/137	NB65-125/144	NB65-125/144	NB65-160/173	NB80-160/151	NB80-160/161	NB80-160/161
Nominal power	kW	7,5	11,0	11,0	15,0	15,0	18,5	18,5
Motor power	kW	8,4	12,1	12,1	16,4	16,4	20,1	20,1
Max. current	A	15,2	19,4	19,4	26,3	26,3	31,5	31,5
LRA	A	169	136	136	184	184	221	221
High head pump model	-	NB65-160/157	NB65-160/173	NB65-160/173	NB65-160/177	NB80-160/161	NB80-160/167	NB80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0
Motor power	kW	12,1	16,4	16,4	20,0	20,1	23,4	23,4
Max. current	A	19,4	26,3	26,3	31,5	31,5	38,0	38,0
LRA	A	136	184	184	221	221	274	274
Inverter pump model	-	NBE65-160/157	NBE65-160/173	NBE65-160/173	NBE65-160/177	NBE80-160/161	NBE80-160/167	NBE80-160/167
Nominal power	kW	11,0	15,0	15,0	18,5	18,5	22,0	22,0
Motor power	kW	12,4	17,7	17,7	21,4	21,6	25,2	25,2
Max. current	A	19,3	26,6	26,6	32,3	34,0	39,9	39,9

(1) At nominal conditions: glycol 30% inlet/outlet temperatures *****

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

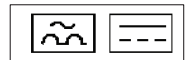


Table 10.13 – Electrical Data - NH4xxxNG0 Models

Models NH4xxxHG0		165	180	195
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz		
Operating ⁽¹⁾				
Total power input ⁽²⁾	kW	410	485	523
OA (without PFC) ⁽²⁾	A	670	1067	851
cosφ (without PFC) ⁽²⁾	-	0,88	0,66	0,89
cosφ (with PFC) ⁽²⁾	-	0,95	0,71	0,94
Rated power				
FLI	A	988	1230	1118
Max. power input	kW	536	640	592
FLA	A	860	1032	956
cosφ (without PFC)		0,90	0,90	0,89
FLA (with PFC)	A	815	984	908
cosφ (with PFC)		0,95	0,94	0,94

LRA	A	1279	1482	1444
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm

Control

Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz		
Pmax	kW	0,59	0,59	0,59
Imax	A	2,30	2,30	2,30
LRA	A	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40
Line screw fixing	Nm	2	2	2

Compressors

Power input	kW	352	421	459
Nominal current	A	582	969	753
Single compressor 1 - FLA	A	386	467	429
Single compressor 1 - FLI	A	450	566	510
Single compressor 1 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Single compressor 2 - FLA	A	386	467	429
Single compressor 2 - FLI	A	450	566	510
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD

Fans

Fans number	-	18	20	20
Power input ⁽²⁾	kW	3,2	3,2	3,2
Nominal current ⁽²⁾	A	4,9	4,9	4,9
Max. Current ⁽²⁾	A	4,9	4,9	4,9

Pumps

Std. head pump model	-	NB80-160/147	NB80-160/151	NB80-160/151
Nominal power	kW	11,0	15,0	15,0
Motor power	kW	12,1	16,4	16,4
Max. current	A	19,4	26,3	26,3
LRA	A	136	184	184
High head pump model	-	NB80-160/161	NB80-160/161	NB80-160/161
Nominal power	kW	18,5	18,5	18,5
Motor power	kW	20,1	20,1	20,1
Max. current	A	31,5	31,5	31,5
LRA	A	221	221	221
Inverter pump model	-	NBE80-160/161	NBE80-160/161	NBE80-160/161
Nominal power	kW	18,5	18,5	18,5
Motor power	kW	21,7	21,7	21,7
Max. current	A	34,0	34,0	34,0
No-Glycol pump model	-	NBE 100-160/160-154	NBE 100-160/167	NBE 100-160/167
Nominal power	kW	18,5	22,0	22,0
Motor power	kW	21,7	25,2	25,2

Max. current	A	34,0	39,9	39,9
Max. current	A	19,3	19,3	28,0
High head pump - LRA	A	19	19	28

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

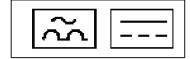


Table 10.14 – Electrical Data - Models NH4xxxHG0 Low Noise

Models NH4xxxHG0 Low Noise		165	180	195
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz		
Operating ⁽¹⁾				
Total power input	kW	408	481	525
OA (without PFC)	A	666	788	855
cosφ (without PFC)	-	0,88	0,88	0,89
cosφ (with PFC)	-	0,95	0,94	0,94
Rated power				
FLI	A	994	1236	1124
Max. power input	kW	539	644	596
FLA	A	866	1038	962
cosφ (without PFC)		0,90	0,90	0,89
FLA (with PFC)	A	820	990	915
cosφ (with PFC)		0,95	0,94	0,94
LRA	A	1285	1488	1531
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control				
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz		
Pmax	kW	0,59	0,59	0,59
Imax	A	2,30	2,30	2,30
LRA	A	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40
Line screw fixing	Nm	2	2	2
Compressors				
Power input	kW	386	457	501
Nominal current	A	632	750	817
Single compressor 1 - FLA	A	386	467	429
Single compressor 1 - FLI	A	450	566	510
Single compressor 1 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Single compressor 2 - FLA	A	386	467	429
Single compressor 2 - FLI	A	450	566	510
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Fans				
Fans number	-	18	20	20
Power input	kW	1,2	1,2	1,2
Nominal current	A	1,9	1,9	1,9

Max. Current	A	5,2	5,2	5,2
Pumps				
Std. head pump model	-	NB80-160/147	NB80-160/151	NB80-160/151
Nominal power	kW	11,0	15,0	15,0
Motor power	kW	12,1	16,4	16,4
Max. current	A	19,4	26,3	26,3
LRA	A	136	184	184
High head pump model	-	NB80-160/161	NB80-160/161	NB80-160/161
Nominal power	kW	18,5	18,5	18,5
Motor power	kW	20,1	20,1	20,1
Max. current	A	31,5	31,5	31,5
LRA	A	221	221	221
Inverter pump model	-	NBE80-160/161	NBE80-160/161	NBE80-160/161
Nominal power	kW	18,5	18,5	18,5
Motor power	kW	21,7	21,7	21,7
Max. current	A	34,0	34,0	34,0
No-Glycol pump model	-	NBE 100-160/160-154	NBE 100-160/167	NBE 100-160/167
Nominal power	kW	18,5	22,0	22,0
Motor power	kW	21,7	25,2	25,2
Max. current	A	34,0	39,9	39,9

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C
 OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

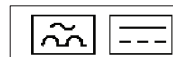


Table 10.15 – Electrical Data - Models CH4xxxHG0

Models CH4xxxHG0		165	180	195
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz		
Operating ⁽¹⁾				
Total power input ⁽²⁾	kW	396	464	505
OA (without PFC) ⁽²⁾	A	650	762	825
cosφ (without PFC) ⁽²⁾	-	0,88	0,88	0,88
cosφ (with PFC) ⁽²⁾	-	0,95	0,94	0,94
Rated power				
FLI	A	988	1230	1118
Max. power input	kW	536	640	592
FLA	A	860	1032	956
cosφ (without PFC)		0,90	0,90	0,89
FLA (with PFC)	A	815	984	908
cosφ (with PFC)		0,95	0,94	0,94
LRA	A	1279	1482	1444
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control				
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz		
Pmax	kW	0,59	0,59	0,59
I _{max}	A	2,30	2,30	2,30

LRA	A	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40
Line screw fixing	Nm	2	2	2

Compressors

Power input	kW	342	410	445
Nominal current	A	567	679	733
Single compressor 1 - FLA	A	386	467	429
Single compressor 1 - FLI	A	450	566	510
Single compressor 1 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Single compressor 2 - FLA	A	386	467	429
Single compressor 2 - FLI	A	450	566	510
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD

Fans

Fans number	-	18	18	20
Power input ⁽²⁾	kW	3,0	3,0	3,0
Nominal current ⁽²⁾	A	4,6	4,6	4,6
Max. Current ⁽²⁾	A	4,9	4,9	4,9

Pumps

Std. head pump model	-	NB80-160/147	NB80-160/147	NB80-160/151
Nominal power	kW	11,0	11,0	15,0
Motor power	kW	12,1	12,1	16,4
Max. current	A	19,4	19,4	26,3
LRA	A	136	136	184
High head pump model	-	NB80-160/151	NB80-160/161	NB80-160/161
Nominal power	kW	15,0	18,5	18,5
Motor power	kW	16,4	20,1	20,1
Max. current	A	26,3	31,5	31,5
LRA	A	184	221	221
Inverter pump model	-	NBE80-160/151	NBE80-160/161	NBE80-160/161
Nominal power	kW	15,0	18,5	18,5
Motor power	kW	17,5	21,7	21,7
Max. current	A	28,0	34,0	34,0

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

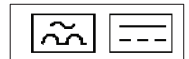


Table 10.16 – Electrical Data - Models CH4xxxHG0 Low Noise

Models CH4xxxHG0 Low Noise		165	180	195
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz		
Operating ⁽¹⁾				
Total power input	kW	392	453	497
OA (without PFC)	A	644	746	813
cosφ (without PFC)	-	0,88	0,88	0,88
cosφ (with PFC)	-	0,95	0,94	0,94
Rated power				
FLI	A	994	1236	1124

Max. power input	kW	539	644	596
FLA	A	866	1038	962
cosφ (without PFC)		0,90	0,90	0,89
FLA (with PFC)	A	820	990	915
cosφ (with PFC)		0,95	0,94	0,94
LRA	A	1285	1488	1450
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm

Control

Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz		
Pmax	kW	0,59	0,59	0,59
Imax	A	2,30	2,30	2,30
LRA	A	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40
Line screw fixing	Nm	2	2	2

Compressors

Power input	kW	372	442	484
Nominal current	A	612	728	791
Single compressor 1 - FLA	A	386	467	429
Single compressor 1 - FLI	A	450	566	510
Single compressor 1 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Single compressor 2 - FLA	A	386	467	429
Single compressor 2 - FLI	A	450	566	510
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD

Fans

Fans number	-	18	10	12
Power input	kW	1,1	1,1	1,1
Nominal current	A	1,8	1,8	1,8
Max. Current	A	5,2	5,2	5,2

Pumps

Std. head pump model	-	18	10	12
Nominal power	kW	1,1	1,1	1,1
Motor power	kW	1,8	1,8	1,8
Max. current	A	5,2	5,2	5,2
LRA	A	136	136	184
High head pump model	-	NB80-160/151	NB80-160/161	NB80-160/161
Nominal power	kW	15,0	18,5	18,5
Motor power	kW	16,4	20,1	20,1
Max. current	A	26,3	31,5	31,5
LRA	A	184	221	221
Inverter pump model	-	NBE80-160/151	NBE80-160/161	NBE80-160/161
Nominal power	kW	15,0	18,5	18,5
Motor power	kW	17,5	21,7	21,7
Max. current	A	28,0	34,0	34,0

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

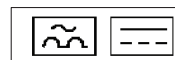


Table 10.17 – Electrical Data - Models FH4xxxHG0

Models FH4xxxHG0		165	180	195
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz		
Operating ⁽¹⁾				
Total power input ⁽²⁾	kW	407	450	493
OA (without PFC) ⁽²⁾	A	666	740	806
cosφ (without PFC) ⁽²⁾	-	0,88	0,88	0,88
cosφ (with PFC) ⁽²⁾	-	0,95	0,94	0,94
Rated power				
FLI	A	988	1230	1118
Max. power input	kW	536	640	592
FLA	A	860	1032	956
cosφ (without PFC)		0,90	0,90	0,89
FLA (with PFC)	A	815	984	908
cosφ (with PFC)		0,95	0,94	0,94
LRA	A	1279	1482	1444
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control				
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz		
Pmax	kW	0,59	0,59	0,59
Imax	A	2,30	2,30	2,30
LRA	A	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40
Line screw fixing	Nm	2	2	2
Compressors				
Power input	kW	349	418	455
Nominal current	A	578	691	747
Single compressor 1 - FLA	A	386	467	429
Single compressor 1 - FLI	A	450	566	510
Single compressor 1 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Single compressor 2 - FLA	A	386	467	429
Single compressor 2 - FLI	A	450	566	510
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Fans				
Fans number	-	18	10	12
Power input ⁽²⁾	kW	3,2	3,2	3,2
Nominal current ⁽²⁾	A	4,9	4,9	4,9
Max. Current ⁽²⁾	A	4,9	4,9	4,9
Pumps				
Std. head pump model	-	NB80-160/161	NB80-160/161	NB80-160/167
Nominal power	kW	18,5	18,5	22,0
Motor power	kW	20,1	20,1	23,4
Max. current	A	31,5	31,5	38,0
LRA	A	221	221	274

High head pump model	-	NB80-160/167	NB80-160/177	NB80-160/177
Nominal power	kW	22,0	30,0	30,0
Motor power	kW	23,4	32,1	32,1
Max. current	A	38,0	52,0	52,0
LRA	A	274	364	364
Inverter pump model	-	NBE80-160/167	NBE80-160/167	NBE80-160/167
Nominal power	kW	22,0	22,0	22,0
Motor power	kW	25,2	25,2	25,2
Max. current	A	39,9	39,9	39,9

(1) At nominal conditions: glycol 30% inlet/outlet temperatures *****

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

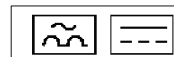


Table 10.18 – Electrical Data - Models FH4xxxHG0 Low Noise

Models FH4xxxHG0 Low Noise		165	180	195
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz		
Operating ⁽¹⁾				
Total power input	kW	404	464	510
OA (without PFC)	A	661	762	833
cosφ (without PFC)	-	0,88	0,88	0,88
cosφ (with PFC)	-	0,95	0,94	0,94
Rated power				
FLI	A	994	1236	1124
Max. power input	kW	539	644	596
FLA	A	866	1038	962
cosφ (without PFC)		0,90	0,90	0,89
FLA (with PFC)	A	820	990	915
cosφ (with PFC)		0,95	0,94	0,94
LRA	A	1285	1488	1450
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control				
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz		
Pmax	kW	0,59	0,59	0,59
Imax	A	2,30	2,30	2,30
LRA	A	7	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40	40
Line screw fixing	Nm	2	2	2
Compressors				
Power input	kW	382	452	496
Nominal current	A	627	743	810
Single compressor 1 - FLA	A	386	467	429
Single compressor 1 - FLI	A	450	566	510
Single compressor 1 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD
Single compressor 2 - FLA	A	386	467	429
Single compressor 2 - FLI	A	450	566	510
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD	917 - YD

Fans

Fans number	-	18	10	12
Power input	kW	1,2	1,2	1,2
Nominal current	A	1,9	1,9	1,9
Max. Current	A	5,2	5,2	5,2

Pumps

Std. head pump model	-	NB80-160/161	NB80-160/161	NB80-160/167
Nominal power	kW	18,5	18,5	22,0
Motor power	kW	20,1	20,1	23,4
Max. current	A	31,5	31,5	38,0
LRA	A	221	221	274
High head pump model	-	NB80-160/167	NB80-160/177	NB80-160/177
Nominal power	kW	22,0	30,0	30,0
Motor power	kW	23,4	32,1	32,1
Max. current	A	38,0	52,0	52,0
LRA	A	274	364	364
Inverter pump model	-	NBE80-160/167	NBE80-160/167	NBE80-160/167
Nominal power	kW	22,0	22,0	22,0
Motor power	kW	25,2	25,2	25,2
Max. current	A	39,9	39,9	39,9

(1) At nominal conditions: glycol 30% inlet/outlet temperatures *****

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

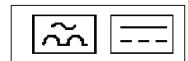


Table 10.19 – Electrical Data - Models NIZxxxHG0

Models NIZxxxHG0		140	150
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz	
Operating ⁽¹⁾			
Total power input ⁽²⁾	kW	349	390
OA (without PFC) ⁽²⁾	A	574	645
cosφ (without PFC) ⁽²⁾	-	0,88	0,87
Rated power			
FLI	A	991	1035
Max. power input	kW	529	553
FLA	A	854	896
cosφ (without PFC)		0,89	0,89
LRA	A	1296	1416
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control			
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz	
Pmax	kW	0,59	0,59
I _{max}	A	2,30	2,30
LRA	A	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40
Line screw fixing	Nm	2	2
Compressors			
Power input	kW	291	326
Nominal current	A	486	547

Single compressor 1 - FLA	A	440	440
Single compressor 1 - FLI	A	490	490
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	326	358
Single compressor 2 - FLI	A	413	447
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD

Fans

Fans number	-	18	20
Power input ⁽²⁾	kW	3,2	3,2
Nominal current ⁽²⁾	A	4,9	4,9
Max. Current ⁽²⁾	A	4,8	4,8

Pumps

Std. head pump model	-	NB80-160/147	NB80-160/147
Nominal power	kW	11,0	11,0
Motor power	kW	12,1	12,1
Max. current	A	19,4	19,4
LRA	A	136	136
High head pump model	-	NB80-160/151	NB80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	16,4	16,4
Max. current	A	26,3	26,3
LRA	A	184	184
Inverter pump model	-	NBE80-160/151	NBE80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	17,5	17,5
Max. current	A	28,0	28,0
No-Glycol pump model	-	NBE80-160/161	NBE80-160/167
Nominal power	kW	18,5	22,0
Motor power	kW	21,7	25,2
Max. current	A	34,0	39,9

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

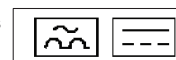


Table 10.20 – Electrical Data - Models NIZxxxHG0 Low Noise

Models NIZxxxHG0 Low Noise		140	150
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz	
Operating ⁽¹⁾			
Total power input	kW	342	370
OA (without PFC)	A	563	613
cosφ (without PFC)	-	0,88	0,87
Rated power			
FLI	A	997	1041
Max. power input	kW	533	557
FLA	A	860	902
cosφ (without PFC)	-	0,89	0,89

LRA	A	1302	1422
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm

Control

Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz	
Pmax	kW	0,59	0,59
Imax	A	2,30	2,30
LRA	A	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40
Line screw fixing	Nm	2	2

Compressors

Power input	kW	320	358
Nominal current	A	529	594
Single compressor 1 - FLA	A	440	440
Single compressor 1 - FLI	A	490	490
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	326	358
Single compressor 2 - FLI	A	413	447
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD

Fans

Fans number	-	18	10
Power input	kW	1,2	1,2
Nominal current	A	1,9	1,9
Max. Current	A	5,2	5,2

Pumps

Std. head pump model	-	NB80-160/147	NB80-160/147
Nominal power	kW	11,0	11,0
Motor power	kW	12,1	12,1
Max. current	A	19,4	19,4
LRA	A	136	136
High head pump model	-	NB80-160/151	NB80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	16,4	16,4
Max. current	A	26,3	26,3
LRA	A	184	184
Inverter pump model	-	NBE80-160/151	NBE80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	17,5	17,5
Max. current	A	28,0	28,0
No-Glycol pump model	-	NBE80-160/161	NBE80-160/167
Nominal power	kW	18,5	22,0
Motor power	kW	21,7	25,2
Max. current	A	34,0	39,9

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

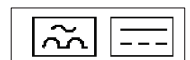


Table 10.21 – Electrical Data - Models CIZxxxHG0

Models CIZxxxHG0		140	150
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz	
Operating ⁽¹⁾			
Total power input ⁽²⁾	kW	337	347
OA (without PFC) ⁽²⁾	A	556	579
cosφ (without PFC) ⁽²⁾	-	0,88	0,87
Rated power			
FLI	A	991	1035
Max. power input	kW	529	553
FLA	A	854	896
cosφ (without PFC)		0,89	0,89
LRA	A	1296	1416
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control			
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz	
Pmax	kW	0,59	0,59
Imax	A	2,30	2,30
LRA	A	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40
Line screw fixing	Nm	2	2
Compressors			
Power input	kW	283	317
Nominal current	A	473	533
Single compressor 1 - FLA	A	440	440
Single compressor 1 - FLI	A	490	490
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	326	358
Single compressor 2 - FLI	A	413	447
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD
Fans			
Fans number	-	18	10
Power input ⁽²⁾	kW	3,0	3,0
Nominal current ⁽²⁾	A	4,6	4,6
Max. Current ⁽²⁾	A	4,9	4,9
Pumps			
Std. head pump model	-	NB80-160/147	NB80-160/147
Nominal power	kW	11,0	11,0
Motor power	kW	12,1	12,1
Max. current	A	19,4	19,4
LRA	A	136	136
High head pump model	-	NB80-160/151	NB80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	16,4	16,4
Max. current	A	26,3	26,3

LRA	A	184	184
Inverter pump model	-	NBE80-160/151	NBE80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	17,5	17,5
Max. current	A	28,0	28,0

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C

(2) Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):



Table 10.22 – Electrical Data - Models CIZxxxHG0 Low Noise

Models CIZxxxHG0 Low Noise		140	150
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz	
Operating ⁽¹⁾			
Total power input	kW	328	356
OA (without PFC)	A	543	592
cosφ (without PFC)	-	0,87	0,87
Rated power			
FLI	A	997	1041
Max. power input	kW	533	557
FLA	A	860	902
cosφ (without PFC)		0,89	0,89
LRA	A	1302	1422
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control			
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz	
Pmax	kW	0,59	0,59
I _{max}	A	2,30	2,30
LRA	A	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40
Line screw fixing	Nm	2	2
Compressors			
Power input	kW	308	345
Nominal current	A	511	574
Single compressor 1 - FLA	A	440	440
Single compressor 1 - FLI	A	490	490
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	326	358
Single compressor 2 - FLI	A	413	447
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD
Fans			
Fans number	-	18	10
Power input	kW	1,1	1,1
Nominal current	A	1,8	1,8
Max. Current	A	5,2	5,2

Pumps

Std. head pump model	-	NB80-160/147	NB80-160/147
Nominal power	kW	11,0	11,0
Motor power	kW	12,1	12,1
Max. current	A	19,4	19,4
LRA	A	136	136
High head pump model	-	NB80-160/151	NB80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	16,4	16,4
Max. current	A	26,3	26,3
LRA	A	184	184
Inverter pump model	-	NBE80-160/151	NBE80-160/151
Nominal power	kW	15,0	15,0
Motor power	kW	17,5	17,5
Max. current	A	28,0	28,0

(1) At nominal conditions: water inlet/outlet temperatures 29/20°C, outdoor air temperature 35°C

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

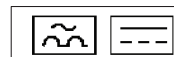


Table 10.23 – Electrical Data - Models FIZxxxHG0

Models FIZxxxHG0		140	150
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz	
Operating ⁽¹⁾			
Total power input ⁽²⁾	kW	348	356
OA (without PFC) ⁽²⁾	A	571	593
cosφ (without PFC) ⁽²⁾	-	0,88	0,87
Rated power			
FLI	A	991	1035
Max. power input	kW	529	553
FLA	A	854	896
cosφ (without PFC)		0,89	0,89
LRA	A	1296	1416
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control			
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz	
Pmax	kW	0,59	0,59
Imax	A	2,30	2,30
LRA	A	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40
Line screw fixing	Nm	2	2
Compressors			
Power input	kW	290	324
Nominal current	A	483	544
Single compressor 1 - FLA	A	440	440
Single compressor 1 - FLI	A	490	490

Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	326	358
Single compressor 2 - FLI	A	413	447
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD

Fans

Fans number	-	18	10
Power input ⁽²⁾	kW	3,2	3,2
Nominal current ⁽²⁾	A	4,9	4,9
Max. Current ⁽²⁾	A	4,8	4,8

Pumps

Std. head pump model	-	NB80-160/161	NB80-160/161
Nominal power	kW	18,5	18,5
Motor power	kW	20,1	20,1
Max. current	A	31,5	31,5
LRA	A	221	221
High head pump model	-	NB80-160/167	NB80-160/167
Nominal power	kW	22,0	22,0
Motor power	kW	23,4	23,4
Max. current	A	38,0	38,0
LRA	A	274	274
Inverter pump model	-	NBE80-160/167	NBE80-160/167
Nominal power	kW	22,0	22,0
Motor power	kW	25,2	25,2
Max. current	A	39,9	39,9

⁽¹⁾ At nominal conditions: glycol 30% inlet/outlet temperatures *****

⁽²⁾ Base EC fans versions

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

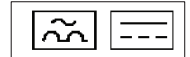


Table 10.24 – Electrical Data - Models FIZxxxHG0 Low Noise

Models FIZxxxHG0 Low Noise		140	150
Power supply	V/Ph/Hz	400V / 3Ph + PE / 50Hz	
Operating ⁽¹⁾			
Total power input	kW	339	367
OA (without PFC)	A	559	609
cosφ (without PFC)	-	0,87	0,87
Rated power			
FLI	A	997	1041
Max. power input	kW	533	557
FLA	A	860	902
cosφ (without PFC)	-	0,89	0,89
LRA	A	1302	1422
Max. fuse (gG/aM)	A	1250gG/1250aM	1250gG/1250aM
Ring terminals with hole/Line screw fixing	mm/Nm	M12 / 50-75Nm	M12 / 50-75Nm
Control			
Control power supply (only for option Fast-Start)	V/Ph/Hz	230V / 1Ph + N + PE / 50Hz	
Pmax	kW	0,59	0,59

I _{max}	A	2,30	2,30
LRA	A	7	7
Cable section min./max.	mm ²	1,5/35	1,5/35
Max. fuse (gG/aM)	A	40	40
Line screw fixing	Nm	2	2

Compressors

Power input	kW	317	355
Nominal current	A	525	590
Single compressor 1 - FLA	A	440	440
Single compressor 1 - FLI	A	490	490
Single compressor 1 - LRA - Method starting	A	20 - Inv.	20 - Inv.
Single compressor 2 - FLA	A	326	358
Single compressor 2 - FLI	A	413	447
Single compressor 2 - LRA - Method starting	A	805 - YD	917 - YD

Fans

Fans number	-	18	10
Power input	kW	1,2	1,2
Nominal current	A	1,9	1,9
Max. Current	A	5,2	5,2

Pumps

Std. head pump model	-	NB80-160/161	NB80-160/161
Nominal power	kW	18,5	18,5
Motor power	kW	20,1	20,1
Max. current	A	31,5	31,5
LRA	A	221	221
High head pump model	-	NB80-160/167	NB80-160/167
Nominal power	kW	22,0	22,0
Motor power	kW	23,4	23,4
Max. current	A	38,0	38,0
LRA	A	274	274
Inverter pump model	-	NBE80-160/167	NBE80-160/167
Nominal power	kW	22,0	22,0
Motor power	kW	25,2	25,2
Max. current	A	39,9	39,9

(1) At nominal conditions: glycol 30% inlet/outlet temperatures *****

OA, FLA, LRA are calculated for unit without pumps.

If the unit with EC-FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols (This circuit breaker is type B.):

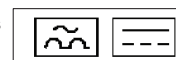
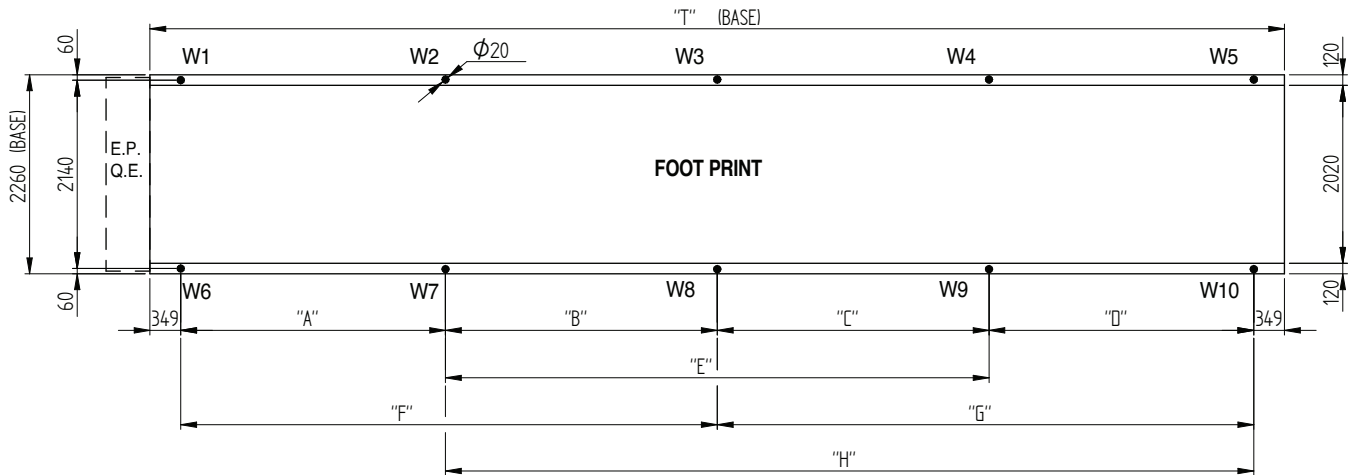


Fig. 11.1 - Support positions and loads



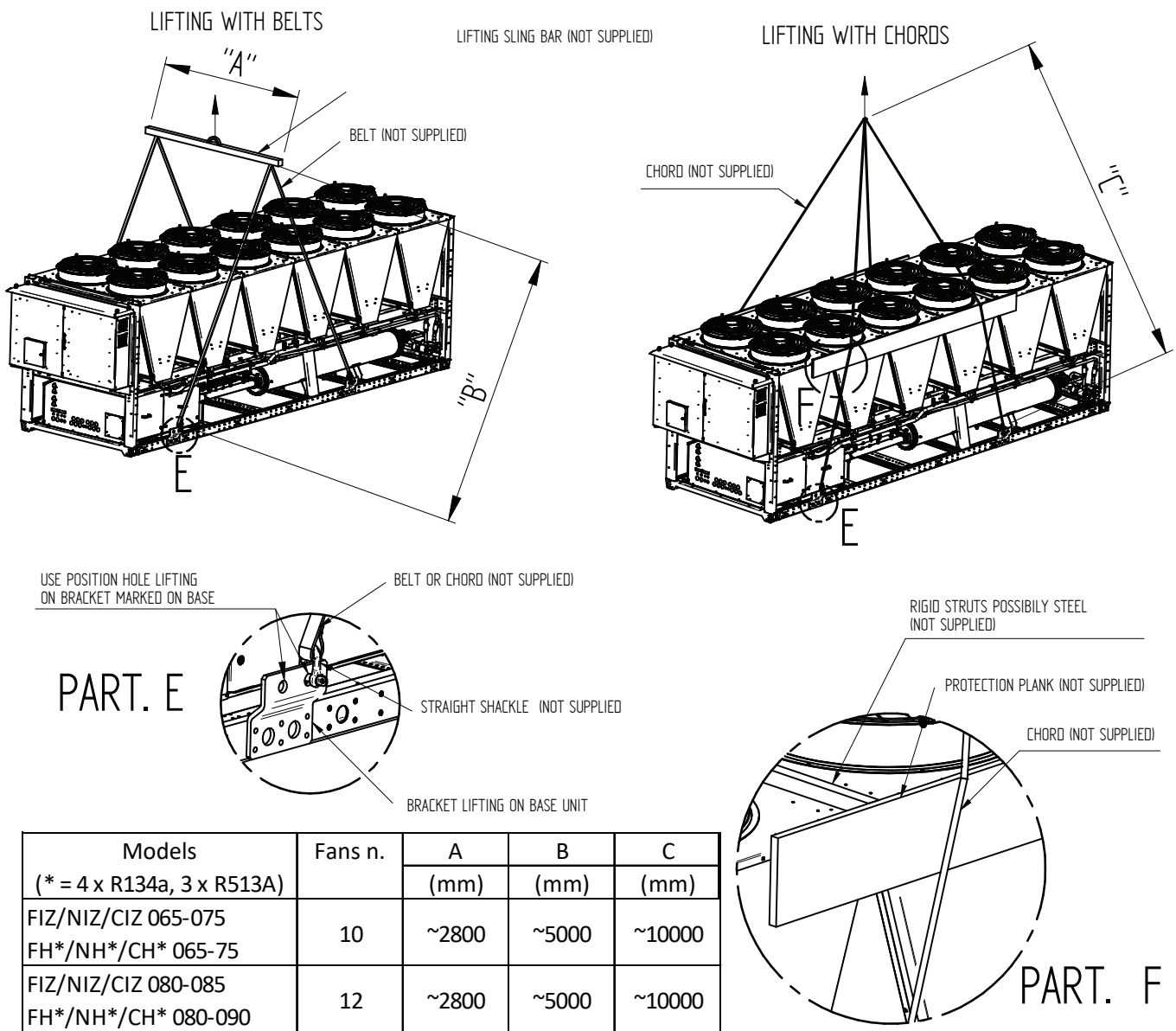
Tab. 11.1 - Dimensions

CH4 - FH4 - NH4	065-075	080-090	100-110	125-140	165	180-195
CIZ - FIZ - NIZ	065-075	080-085	95-110	125	140	150
N° Fans	10	12	14	16	18	20
N° Antivibration	6	6	8	8	10	10
"A" (mm)	2286	3556			2286	2286
"B" (mm)	-	-			2540	2540
"C" (mm)	-	-			3810	3810
"D" (mm)	-	-			2286	3556
"E" (mm)	-	-			6350	6350
"F" (mm)	-	-			4826	4826
"G" (mm)	-	-			6096	7366
"H" (mm)	3556	3556			8636	9906
"T" (mm)	6540	7810			11620	12890

Tab 11.2 - Operating weight distribution - Unit without pumps

Models	Weight distribution (kg)										Total (kg)
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
Chiller models											
CH4 065	913	1590	-	-	362	1177	2050	-	-	467	6556
CH4 075	916	1597	-	-	363	1184	2063	-	-	469	6588
CH4 080	1102	1813	-	-	215	1408	2317	-	-	274	7130
CH4 090	1110	1825	-	-	213	1420	2335	-	-	272	7181
CH4 165	984	1749	1172	967	146	1367	2432	1629	1344	202	11993
CH4 180	1073	1903	951	1074	347	1476	2617	1308	1476	477	12698
CH4 195	1072	1900	959	1072	346	1478	2620	1321	1478	477	12723
CIZ 065	717	1460	-	-	412	913	1860	-	-	525	5892
CIZ 075	721	1465	-	-	412	919	1865	-	-	525	5902
CIZ 080	1055	1774	-	-	232	1365	2296	-	-	300	7029
CIZ 085	870	1985	-	-	431	1150	2625	-	-	569	7629
CIZ 140	967	1721	1168	963	146	1343	2390	1622	1337	203	11860
CIZ 150	1027	1823	956	1074	347	1413	2507	1314	1476	477	12409
Freecooling models											
FH4 065	1142	2250	-	-	615	1218	2400	-	-	655	8275
FH4 075	1146	2258	-	-	614	1224	2412	-	-	656	8307
FH4 080	1438	2597	-	-	445	1502	2713	-	-	465	9159
FH4 090	1447	2610	-	-	443	1513	2730	-	-	463	9210
FH4 165	1294	2329	1696	1540	305	1446	2601	1894	1720	341	15171
FH4 180	1323	2408	1723	1732	528	1457	2652	1898	1908	582	16191
FH4 195	1322	2405	1725	1730	528	1459	2655	1905	1910	582	16214
FIZ 065	937	2124	-	-	672	973	2206	-	-	698	7612
FIZ 075	937	2129	-	-	672	973	2211	-	-	698	7622
FIZ 080	1398	2576	-	-	470	1462	2694	-	-	492	9098
FIZ 085	1425	2706	-	-	539	1535	2914	-	-	581	9697
FIZ 140	1277	2300	1690	1537	307	1423	2561	1882	1713	341	15037
FIZ 150	1221	2332	1779	1726	530	1339	2558	1951	1894	581	15901
Freecooling glycol-free models											
NH4 065	1107	2319	-	-	677	1233	2581	-	-	753	8664
NH4 075	1111	2326	-	-	676	1239	2594	-	-	754	8696
NH4 080	1440	2768	-	-	564	1520	2922	-	-	596	9816
NH4 090	1454	2781	-	-	564	1536	2939	-	-	596	9867
NH4 165	1282	2368	2321	1761	224	1398	2582	2530	1919	245	16621
NH4 180	1336	2487	2376	1926	471	1425	2654	2535	2055	502	17774
NH4 195	1334	2490	2383	1928	471	1426	2661	2547	2062	502	17798
NIZ 065	899	2191	-	-	737	981	2389	-	-	803	8000
NIZ 075	904	2192	-	-	737	986	2388	-	-	803	8010
NIZ 080	1392	2725	-	-	582	1478	2895	-	-	618	9699
NIZ 085	1420	2854	-	-	650	1550	3116	-	-	710	10299
NIZ 140	1213	2344	2329	1735	231	1318	2548	2531	1886	251	16388
NIZ 150	1229	2394	2370	1896	474	1311	2555	2530	2024	506	17285

Fig. 11.2 - Lifting instructions with 4 brackets (12- 20 fans)



The capacity of the lifting gear must be adequate to lift the load in question.
 Check the weight of the units, the capacity of the lifting gear and ropes and the condition and suitability of the aforementioned equipment.
 Lift the unit with a speed suitable for the load to be moved, so as not to damage the structure unit.
 After lifting and positioning the unit, remove lifting accessories (ropes, slings, chains, hooks, brackets).
 Lifting tools as hooks, lifting gear, ropes, chords, belts, rigid struts, protection plank are not provided with the unit.

1. Insert a sling in each of the iron beams.
2. Use a crane to move the unit.



NOTICE

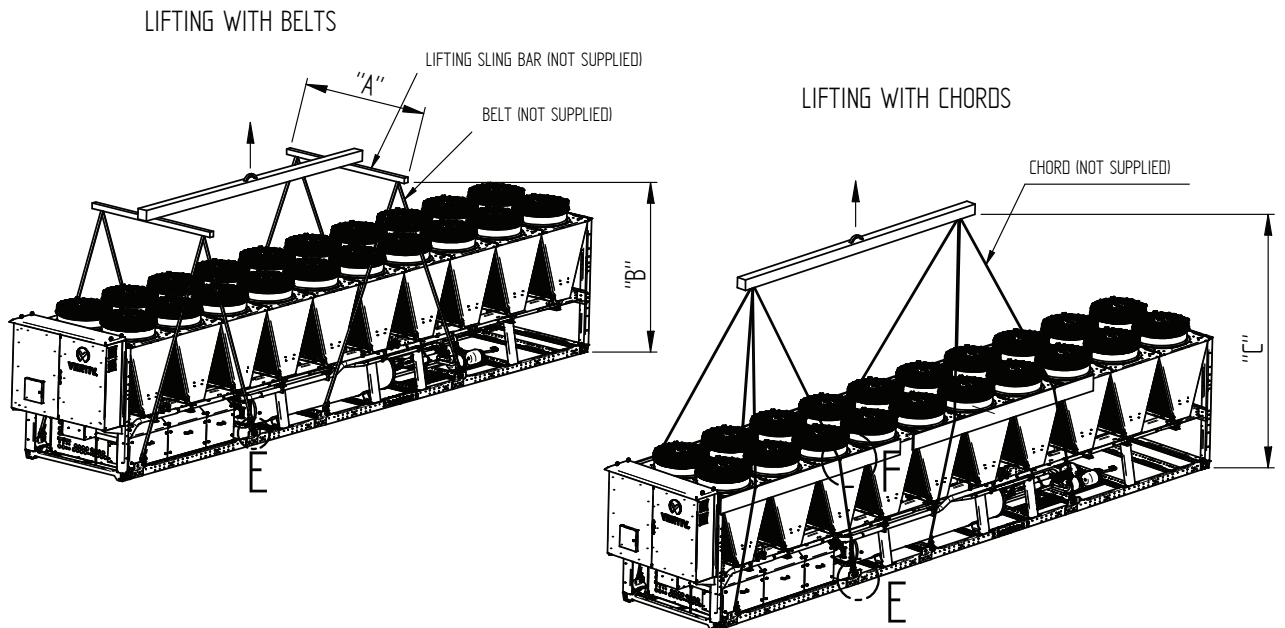
Do not use a forklift to move the unit. The structure does not support heavy loads and would be damaged.



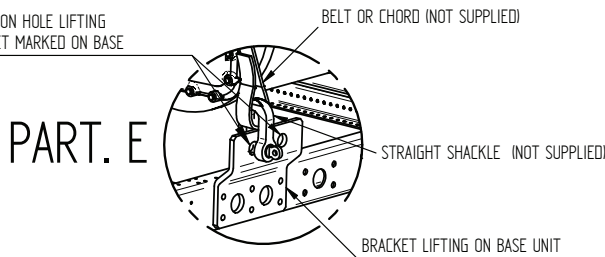
NOTICE

Lift the unit with a speed suitable for the load to be moved, so as not to damage the structure.

Fig. 11.3 - Lifting instructions with 4 brackets (12- 20 fans)

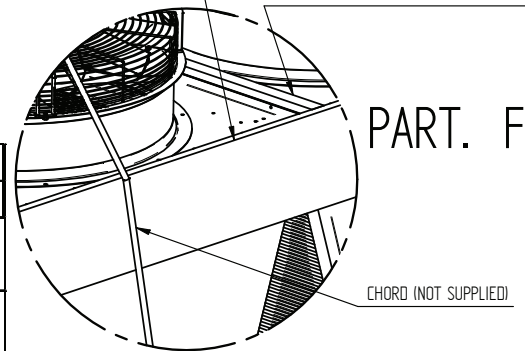


USE POSITION HOLE LIFTING ON BRACKET MARKED ON BASE



PROTECTION PLANK (NOT SUPPLIED)

RIGID STRUTS POSSIBLY STEEL (NOT SUPPLIED)



Models (* = 4 x R134a, 3 x R513A)	Fans n.	A	B	C
		(mm)	(mm)	(mm)
FIZ/NIZ/CIZ 140 FH*/NH*/CH* 165	18	~2800	~5000	~10000
FIZ/NIZ/CIZ 150 FH*/NH*/CH* 180-195	20	~2800	~5000	~10000

The capacity of the lifting gear must be adequate to lift the load in question.
 Check the weight of the units, the capacity of the lifting gear and ropes and the condition and suitability of the aforementioned equipment.
 Lift the unit with a speed suitable for the load to be moved, so as not to damage the structure unit.
 After lifting and positioning the unit, remove lifting accessories (ropes, slings, chains, hooks, brackets).
 Lifting tools as hooks, lifting gear, ropes, chords, belts, rigid struts, protection plank are not provided with the unit.

1. Insert a sling in each of the iron beams.
2. Use a crane to move the unit.



NOTICE

Do not use a forklift to move the unit. The structure does not support heavy loads and would be damaged.



NOTICE

Lift the unit with a speed suitable for the load to be moved, so as not to damage the structure.

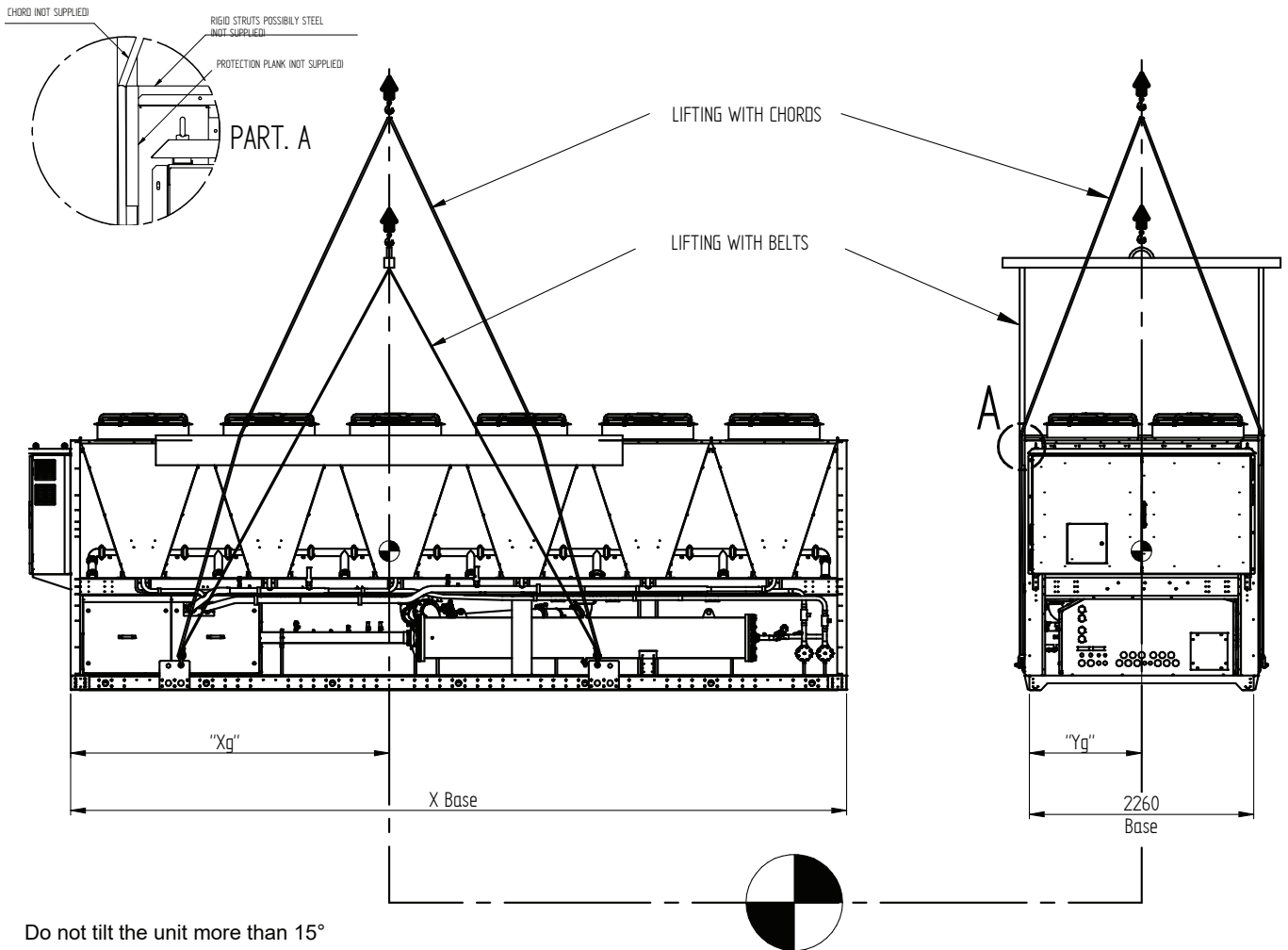
Fig. 11.4 - Lifting barycentric axis with 4 brackets

- If the unit is shipped with a container, for extraction, follow the instructions on the front panel;
- Move the unit by lifting it from above with a crane;
- The holes for lifting are positioned on special yellow brackets fixed to the base frame (when lifting, use spreader bars to protect the side).

The lifting capacity of the lifting parts must be adequate for the load to be lifted. Check the weight of the units, the capacity of the sling bar and the ropes, the validity and the conditions of the aforementioned equipment.

Do not tilt the unit more than 15°.

No force or effort must be applied to pressurized parts, especially via pipes connected to the condensers or to the evaporator



Do not tilt the unit more than 15°

No force must be applied to pressurized parts, especially pipes



WARNING

The lifting point must be aligned with the gravity center

- Make reference to *Annex I – Dimensions and Weights* for dimensions, weight and gravity center position.
- If the unit is still packaged, pay attention to the gravity center and warning labels placed on the unit.

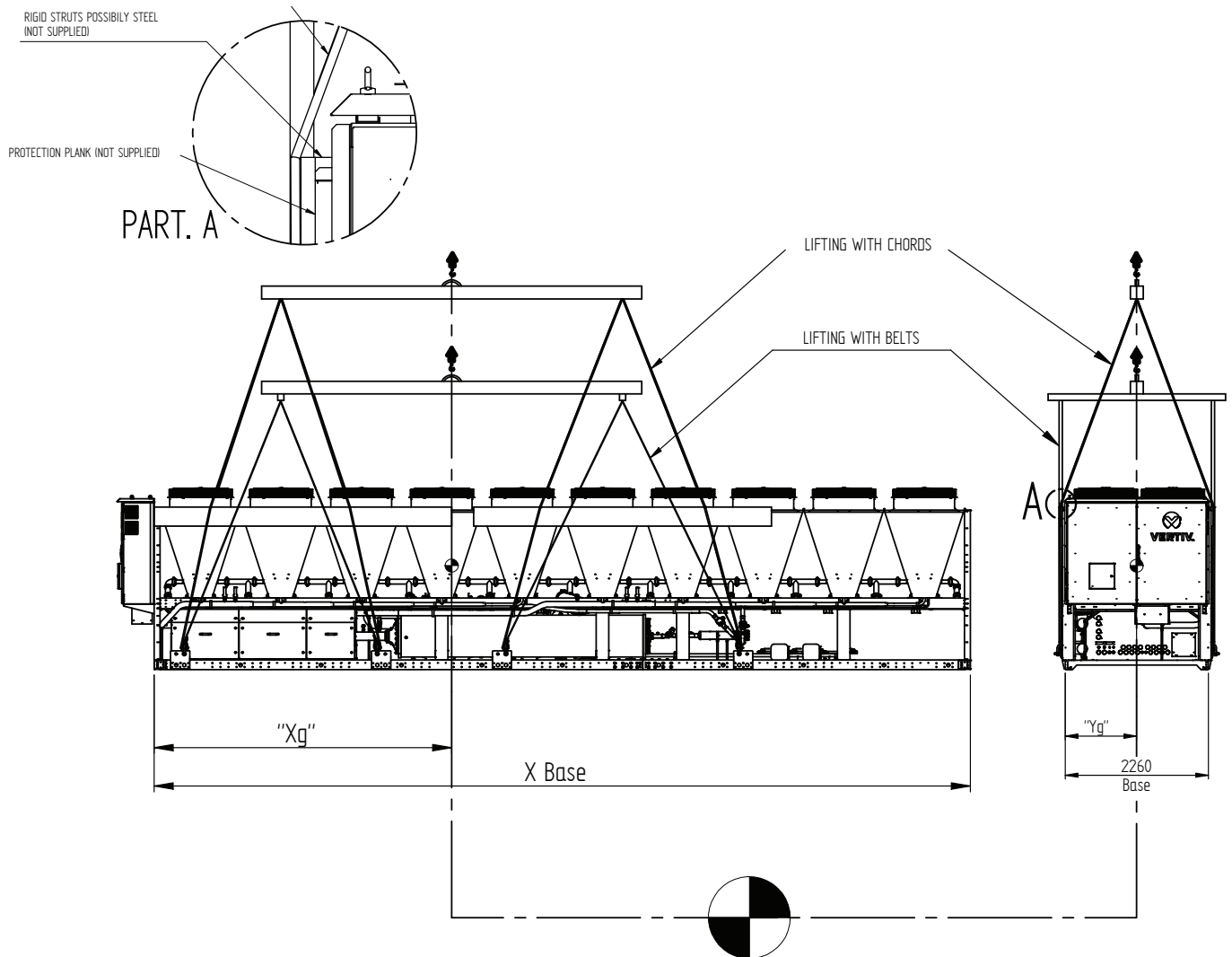
Fig. 11.4 - Lifting barycentric axis with 4 brackets

- If the unit is shipped with a container, for extraction, follow the instructions on the front panel;
- Move the unit by lifting it from above with a crane;
- The holes for lifting are positioned on special yellow brackets fixed to the base frame (when lifting, use spreader bars to protect the side).

The lifting capacity of the lifting parts must be adequate for the load to be lifted. Check the weight of the units, the capacity of the sling bar and the ropes, the validity and the conditions of the aforementioned equipment.

Do not tilt the unit more than 15°.

No force or effort must be applied to pressurized parts, especially via pipes connected to the condensers or to the evaporator



N.B: The lifting point has to be on the vertical baricentric axis, which is individualized by symbols indicated on the base.



WARNING

The lifting point must be aligned with the gravity center

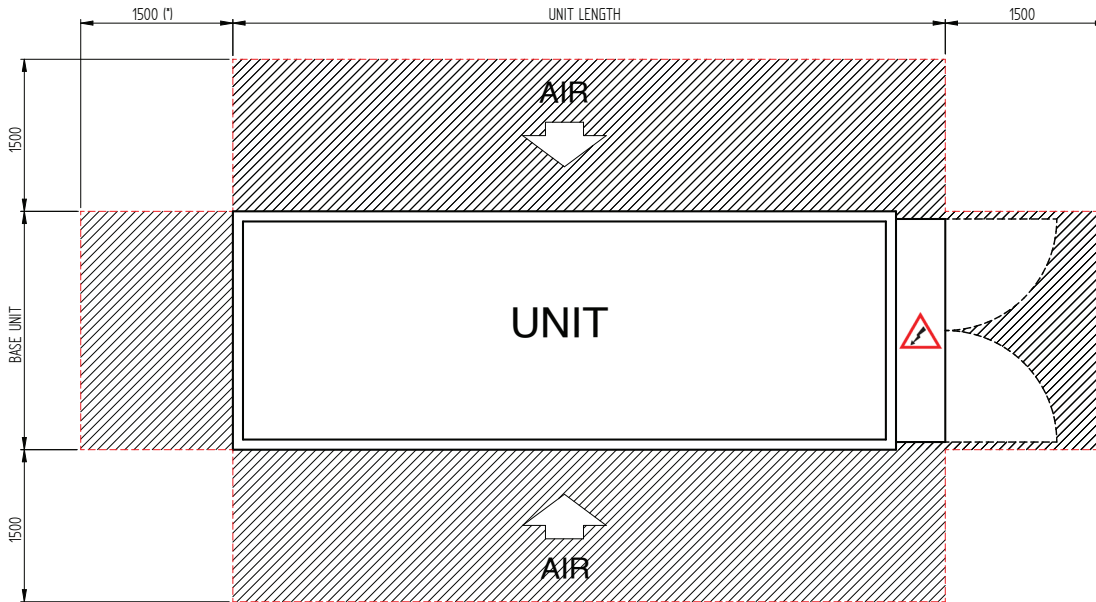
- Make reference to *Annex I – Dimensions and Weights* for dimensions, weight and gravity center position.
- If the unit is still packaged, pay attention to the gravity center and warning labels placed on the unit.

Unit without pumps (* = 4 x R134a, 3 x R513A)				
Models	X Base (mm)	Xg (mm)	Yg (mm)	Weight (kg)
Chiller models				
CH4 065	6540	2269	1238	6202
CH4 075	6540	2268	1239	6234
CH4 080	7810	2786	1238	6796
CH4 090	7810	2779	1238	6847
CH* 165	11620	4100	1266	10914
CH* 180	12890	4432	1266	11651
CH* 195	12890	4440	1267	11724
Freecooling models				
CIZ 065	6540	2481	1228	5538
CIZ 075	6540	2479	1228	5548
CIZ 080	7810	2838	1244	6696
CIZ 085	7810	2953	1258	7295
CIZ 140	11620	4125	1266	10812
CIZ 150	12890	4505	1264	11393
Freecooling glycol-free models				
FH4 065	6540	2428	1160	7507
FH4 075	6540	2429	1162	7540
FH4 080	7810	2990	1155	8332
FH4 090	7810	2993	1156	8384
FH* 165	11620	4387	1177	13280
FH* 180	12890	4770	1174	14247
FH* 195	12890	4775	1177	14320
FIZ 065	6540	2616	1145	6844
FIZ 075	6540	2614	1145	6854
FIZ 080	7810	3034	1160	8230
FIZ 085	7810	3116	1177	8830
FIZ 140	11620	4410	1177	13178
FIZ 150	12890	4826	1173	13826
Freecooling glycol-free models				
NH4 065	6540	2494	1174	7708
NH4 075	6540	2492	1174	7740
NH4 080	7810	3111	1155	8742
NH4 090	7810	3014	1156	8793
NH* 165	11620	4465	1166	14134
NH* 180	12890	4787	1162	15154
NH* 195	12890	4792	1166	15226
NIZ 065	6540	2681	1159	7044
NIZ 075	6540	2679	1159	7054
NIZ 080	7810	3155	1159	8640
NIZ 085	7810	3225	1176	9240
NIZ 140	11620	4474	1165	13933
NIZ 150	12890	4850	1153	14785

Fig. 11.5 - Service areas (top view)

To allow the free passage of air flow and the maintenance of the unit, it is necessary to leave a minimum area around the chiller free of obstructions.

- The hot air expelled by the fans must not find obstacles for a height of at least 2.5 m.
- Avoid hot air recirculation phenomena between suction and delivery, under penalty of loss of unit performance or even interruption of normal operation.



- See *Annex I – Dimensions and Weights* for the unit dimensions
- Keep a free space between the unit and any obstacle as shown in the figure.
- The unit has to be installed in a place that is not accessible to the public or protected against access by non-authorized persons.
- The unit environment must permit easy access for maintenance operations.



NOTICE

The maintenance of the unit become extremely difficult if placed too close to walls or other obstacles

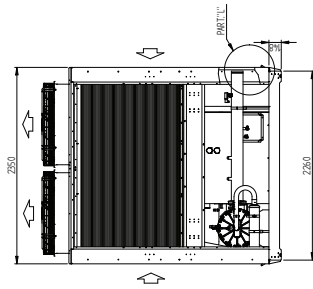


NOTICE

The floor level in the maintenance area on the electrical panel side must be aligned with the surface where the unit is placed, ensuring easy and safe access to the electrical panel, complying with applicable safety regulations

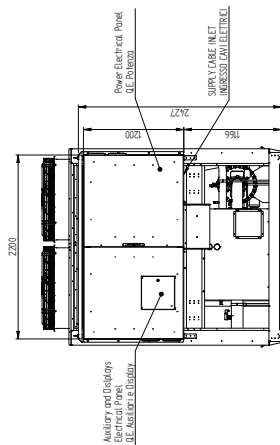
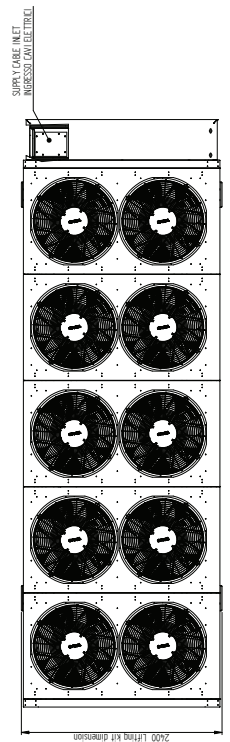
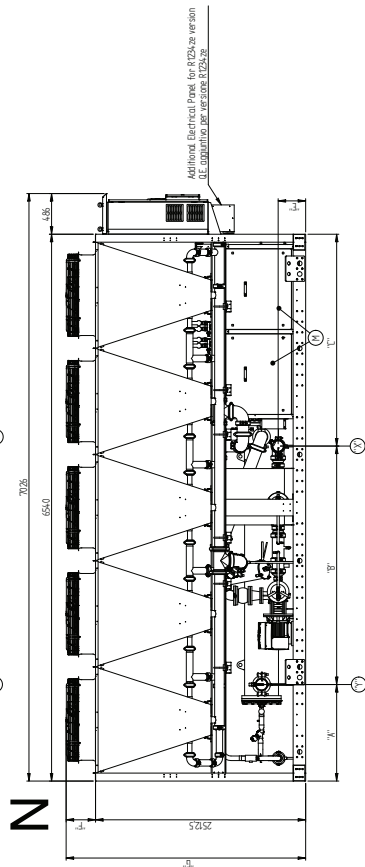
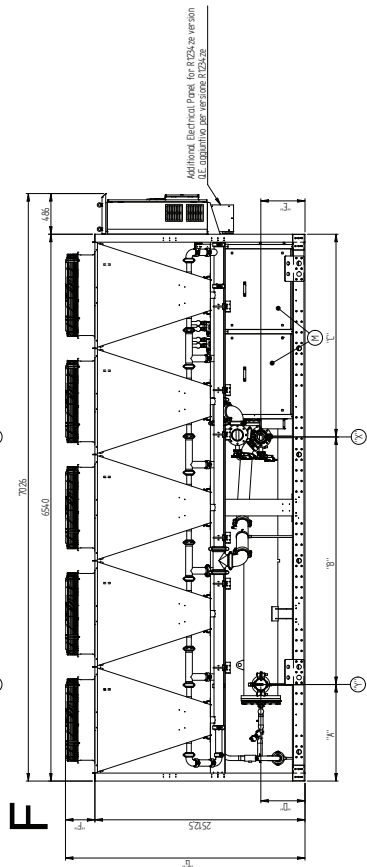
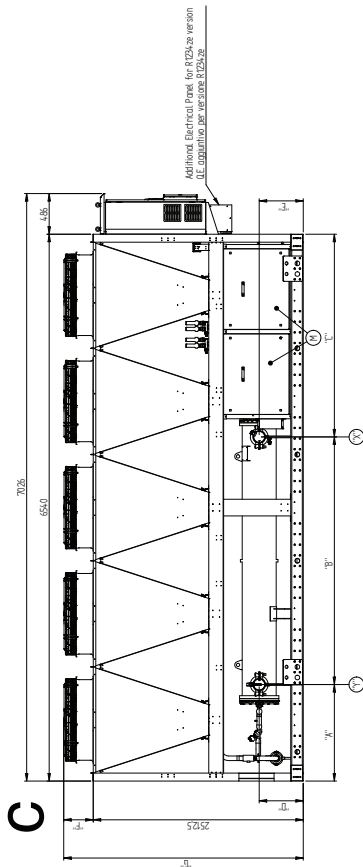
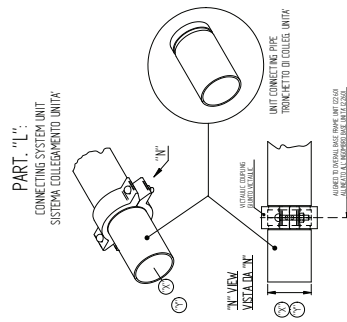
12 Dimensional Data

Overall dimensions - 10 Fans Units



(M) REMOVABLE PANEL
PANNELLO ASPORTABILE

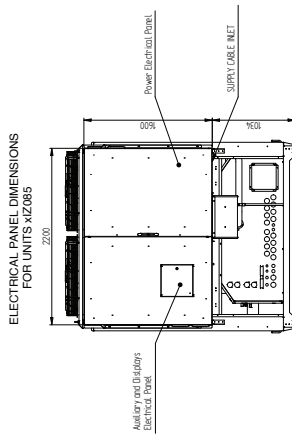
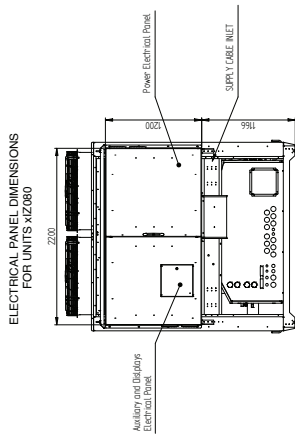
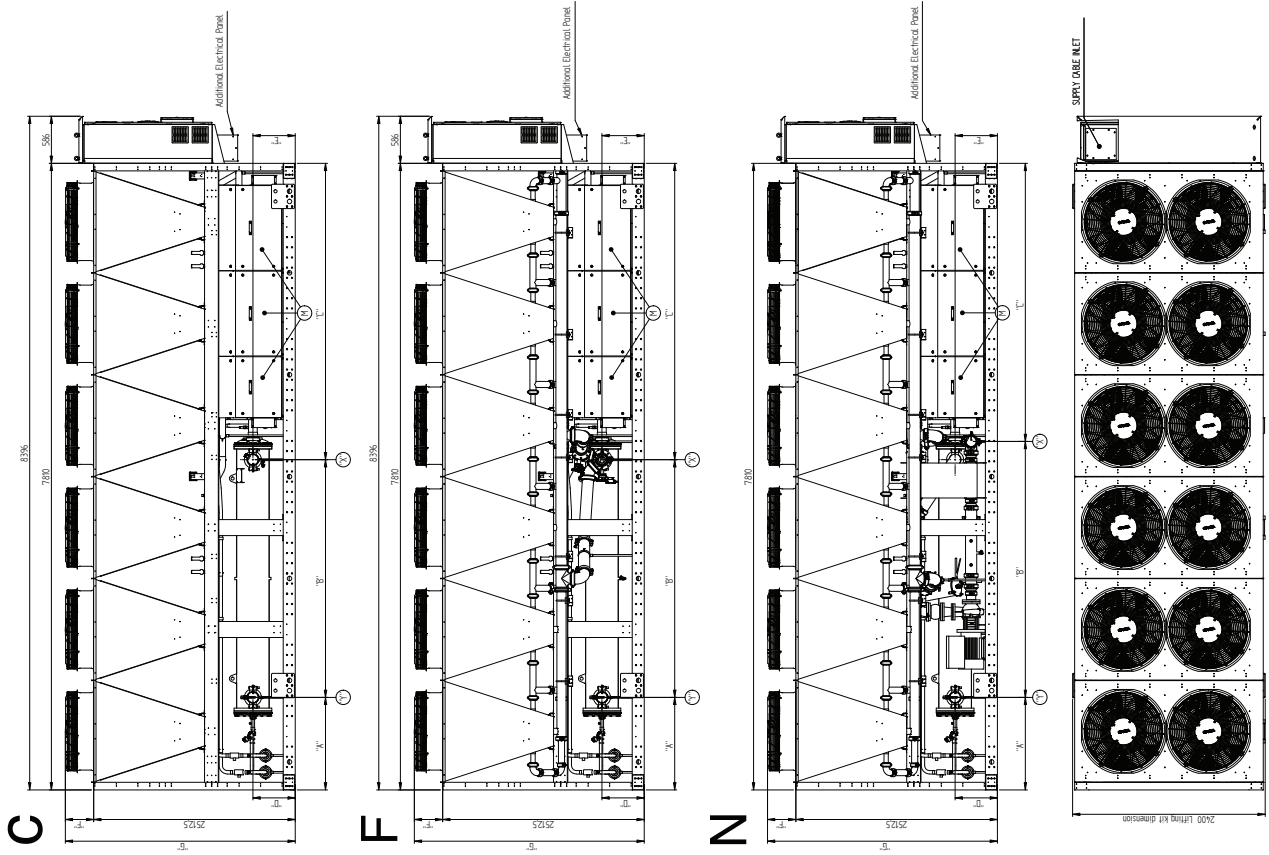
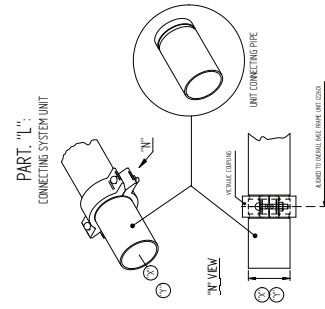
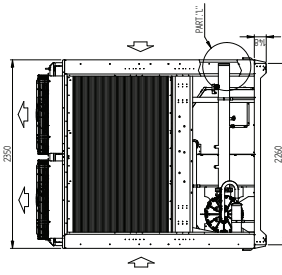
⇄ AIR FLOW
FLUSSO ARIA



C= CHILLER VERSION
F= FREE COOLING VERSION
N= NO-GLYCOL VERSION

Model	Version	N. Fans	Base Fans							Premium Fans			Low Noise Fans			Chilled water connections			
			A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	F (mm)	G (mm)	F (mm)	G (mm)	“X” (mm)	“Y” (mm)	“Z” (mm)	“W” (mm)		
CIZ 065	With out Pumps	10	1154	2962	2424	527.5	527.5	271	2784	352.5	2865	332.5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet	VICTAULIC® DN125-5"-139,7	Outlet	
	With Pumps std low press.		1498.5	2617.5	2424	734	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With Pumps high press.		1498.5	2617.5	2424	734	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With inverter Pump		1498.5	2617.5	2424	734	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
CIZ 075	With out Pumps	10	1154	2962	2424	527.5	527.5	271	2784	352.5	2865	332.5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet	VICTAULIC® DN125-5"-139,7	Outlet	
	With Pumps std low press.		1498.5	2617.5	2424	734	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With Pumps high press.		1517	2599	2424	714	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With inverter Pump		1517	2599	2424	714	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
FIZ 065	With out Pumps	10	1154	2962	2424	527.5	527.5	271	2784	352.5	2865	332.5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet	VICTAULIC® DN125-5"-139,7	Outlet	
	With Pumps std low press.		1498.5	2617.5	2424	711	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With Pumps high press.		1517	2599	2424	733	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With inverter Pump		1515	2601	2424	734	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
FIZ 075	With out Pumps	10	1154	2962	2424	527.5	527.5	271	2784	352.5	2865	332.5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet	VICTAULIC® DN125-5"-139,7	Outlet	
	With Pumps std low press.		1517	2599	2424	714	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With Pumps high press.		1517	2599	2424	734	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With inverter Pump		1517	2599	2424	734	527.5	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
NIZ 065	With out Pumps	10	1154	2852	2534	527.5	329	271	2784	352.5	2865	332.5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet	VICTAULIC® DN125-5"-139,7	Outlet	
	With Pumps std low press.		1517	2507.5	2534	734	329	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With Pumps high press.		1517	2489	2534	734	329	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With inverter Pump		1515	2491	2534	734	329	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
NIZ 075	With out Pumps	10	1154	2852	2534	527.5	329	271	2784	352.5	2865	332.5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet	VICTAULIC® DN125-5"-139,7	Outlet	
	With Pumps std low press.		1517	2489	2534	714	329	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With Pumps high press.		1517	2489	2534	734	329	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			
	With inverter Pump		1517	2489	2534	734	329	271	2784	352.5	2865	332.5	2845	Inlet		Outlet			

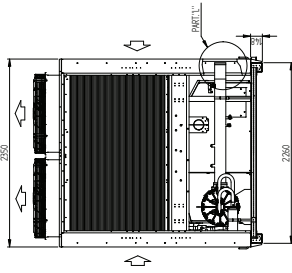
Overall dimensions - 12 Fans Units



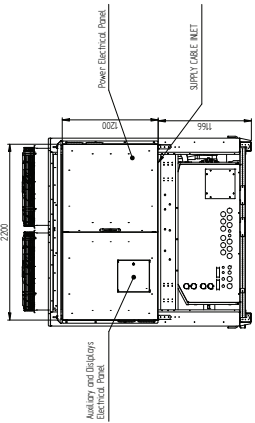
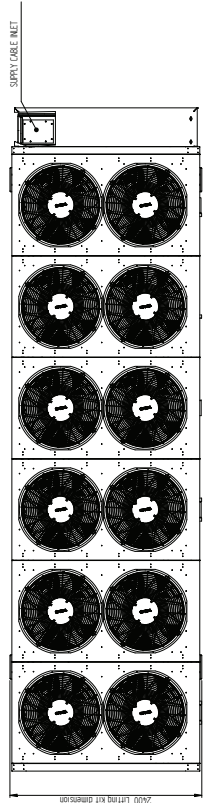
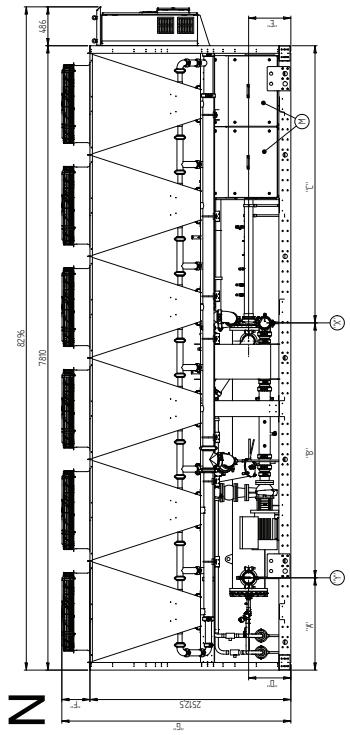
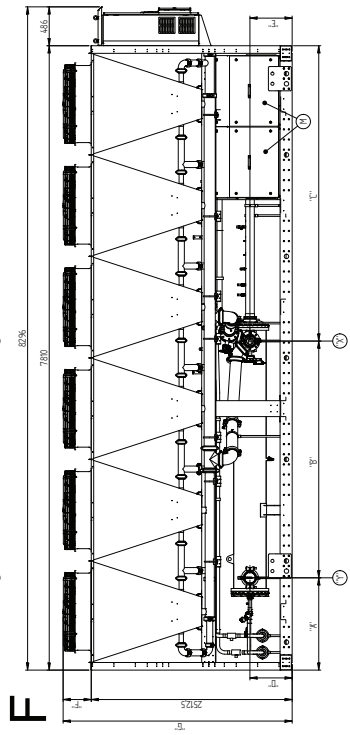
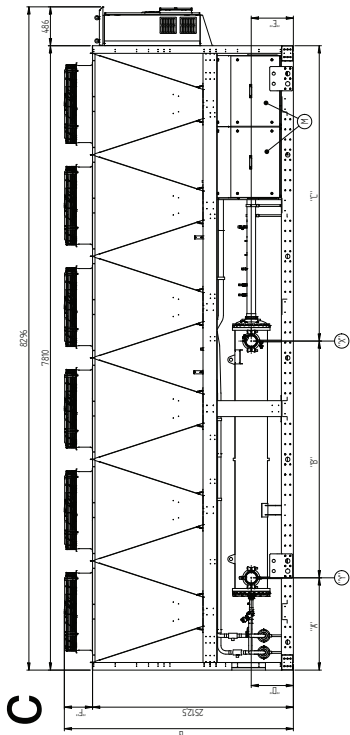
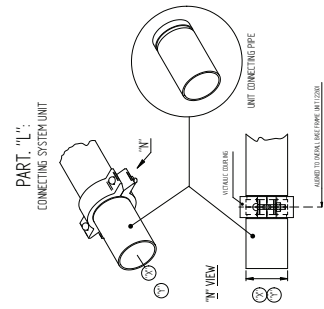
xIZ 080-085

C= CHILLER VERSION
 F= FREE COOLING VERSION
 N= NO-GLYCOL VERSION

Overall dimensions - 12 Fans Units



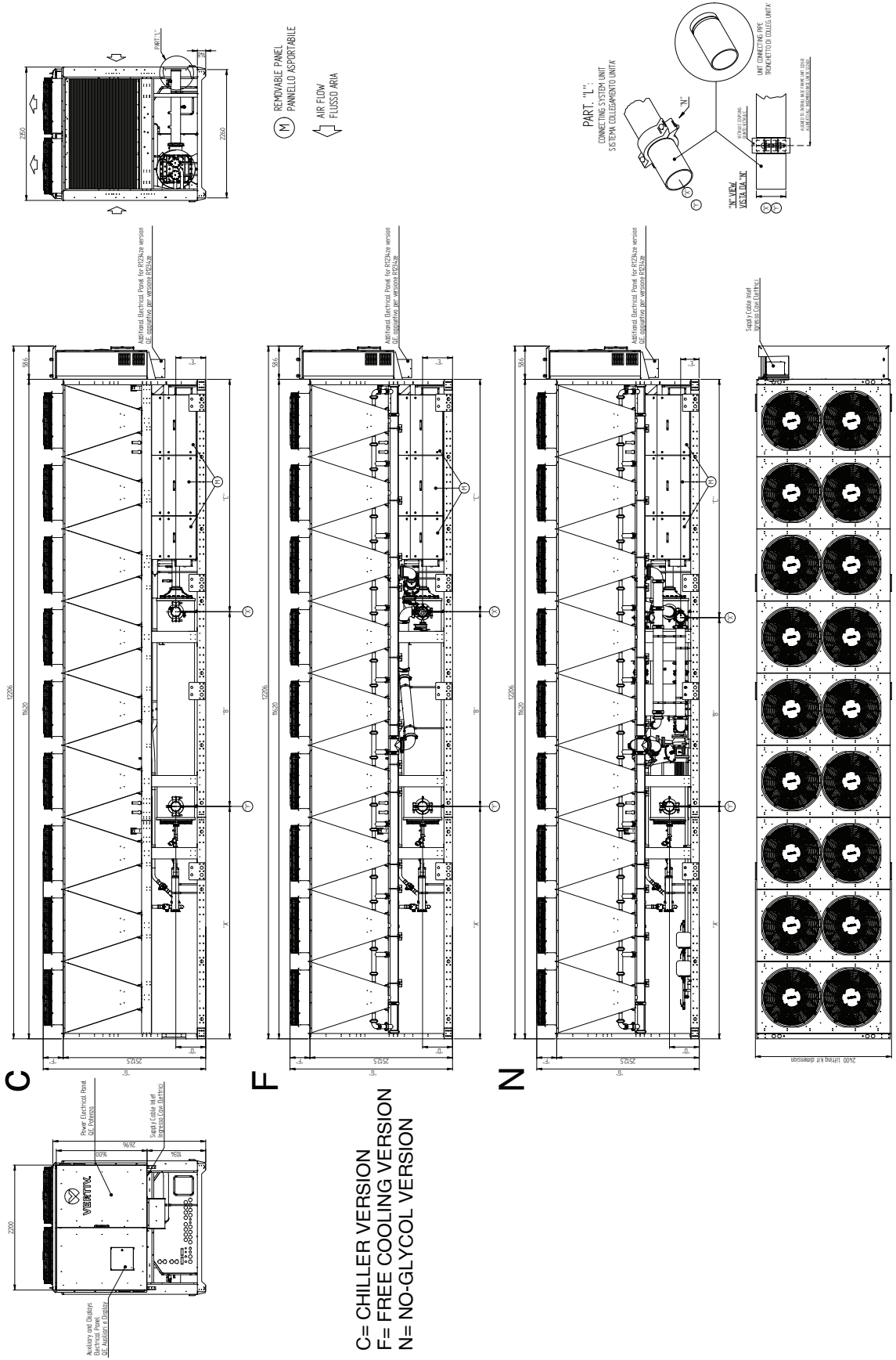
(M) REMOVABLE PANEL
 AIR FLOW



xH4 080-090
 C= CHILLER VERSION
 F= FREE COOLING VERSION
 N= NO-GLYCOL VERSION

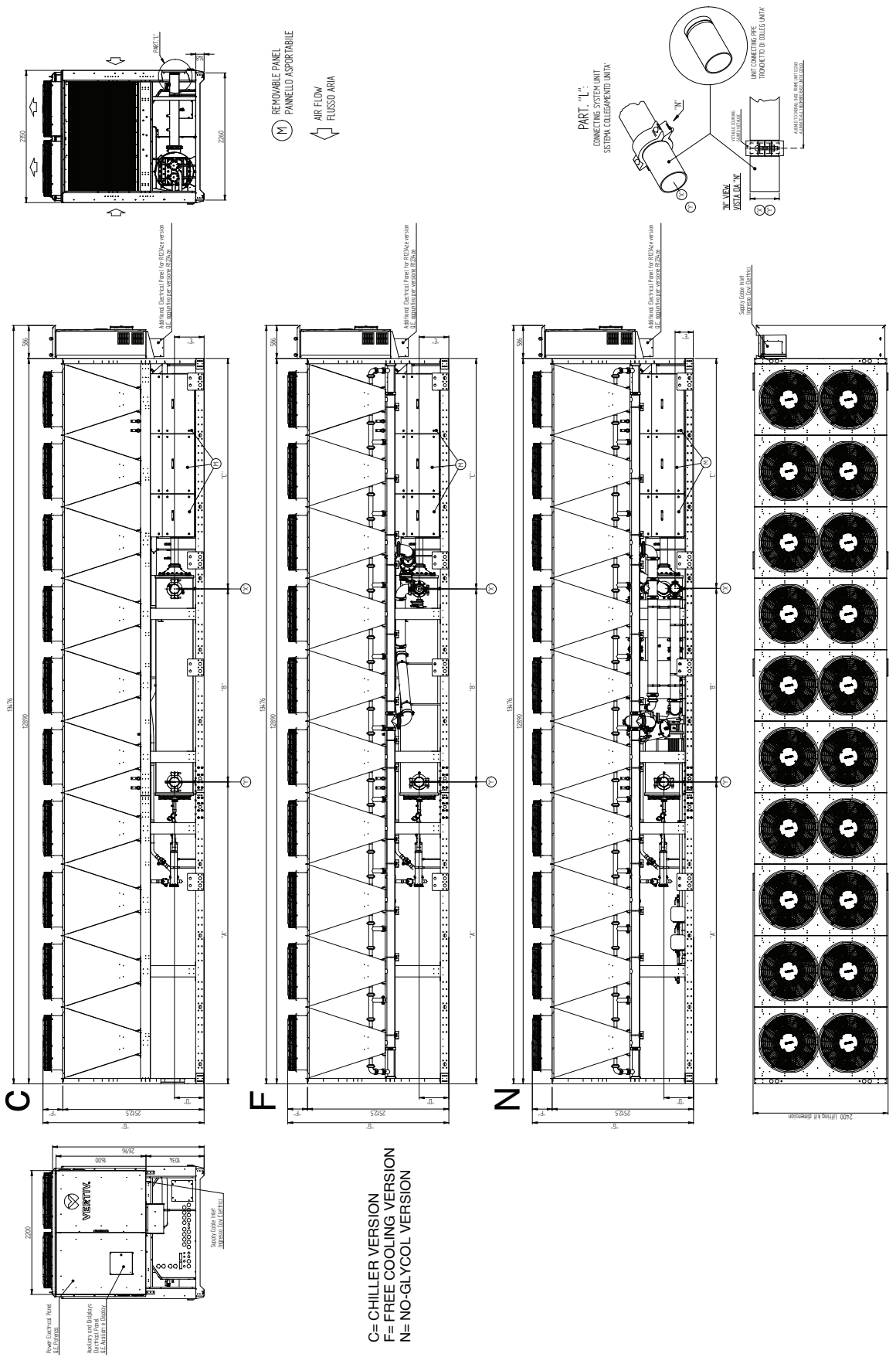
Model	Version	N. Fans	Base Fans					Premium Fans		Low Noise Fans		Chilled water connections				
			A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	F (mm)	G (mm)	"X" (mm)	"Y" (mm)	"Y" (mm)		
CIZ 080 CH4 080	With out Pumps	12	1154	2962	3694	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet
	With Pumps std low press.		1498,5	2617,5	3694	734	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		1517	2599	3694	714	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		1517	2599	3694	714	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
CIZ 085 CH4 090	With out Pumps	12	1154	2962	3694	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet
	With Pumps std low press.		1517	2599	3694	714	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		1517	2599	3694	734	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		1517	2599	3694	734	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
FIZ 080 FH4 080	With out Pumps	12	1154	2962	3694	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet
	With Pumps std low press.		1516	2600	3694	713	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		1516	2600	3694	733	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		1516	2600	3694	733	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
FIZ 085 FH4 090	With out Pumps	12	1154	2962	3694	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet
	With Pumps std low press.		1516	2600	3694	733	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		1516	2600	3694	733	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		1516	2600	3694	733	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
NIZ 080 NH4 080	With out Pumps	12	1154	3189	3467	527,5	327,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet
	With Pumps std low press.		1517	2826	3467	714	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		1517	2826	3467	734	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		1517	2826	3467	734	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
NIZ 085 NH4 090	With out Pumps	12	1154	3189	3467	527,5	327,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN125-5"-139,7	Outlet
	With Pumps std low press.		1517	2826	3467	733	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		1517	2826	3467	734	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		1517	2826	3467	734	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet

Overall dimensions - 18 Fans Units



Model	Version	N. Fans	Base Fans						Premium Fans		Low Noise Fans		Chilled water connections			
			A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	F (mm)	G (mm)	"X" (mm)	"Y" (mm)			
CIZ 140	With out Pumps	18	4095	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	Outlet
	With Pumps std low press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
CH4 165	With out Pumps	18	4095	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	Outlet
	With Pumps std low press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
FIZ 140	With out Pumps	18	4095	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	Outlet
	With Pumps std low press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
FH4 165	With out Pumps	18	4095	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	Outlet
	With Pumps std low press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		3809	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
NIZ 140	With out Pumps	18	4095	3326	4199	527,5	327,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	Outlet
	With Pumps std low press.		3809	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		3809	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		3809	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
NH4 165	With out Pumps	18	4095	3326	4199	527,5	327,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	Outlet
	With Pumps std low press.		3809	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With Pumps high press.		3809	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet
	With inverter Pump		3809	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet		Outlet

Overall dimensions - 20 Fans Units



Model	Version	N. Fans	Base Fans				Premium Fans				Low Noise Fans				Chilled water connections			
			A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	F (mm)	G (mm)	F (mm)	G (mm)	F (mm)	G (mm)	"X" (mm)	"Y" (mm)	
CIZ 150	With out Pumps	20	5365	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
CH4 180	With out Pumps	20	5365	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
CH4 195	With out Pumps	20	5365	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
FIZ 150	With out Pumps	20	5365	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
FH4 180	With out Pumps	20	5365	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5104	3691	4095	783	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
FH4 195	With out Pumps	20	5365	3430	4095	527,5	527,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5104	3691	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3716	4095	758	527,5	271	2784	352,5	2865	332,5	2845	Inlet				
NIZ 150	With out Pumps	20	5365	3326	4199	527,5	327,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5079	3612	4199	783	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3612	4199	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
NH4 180	With out Pumps	20	5365	3440	4085	527,5	327,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3726	4085	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5079	3726	4085	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3726	4085	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
NH4 195	With out Pumps	20	5365	3440	4085	527,5	327,5	271	2784	352,5	2865	332,5	2845	Inlet	VICTAULIC® DN150-6"-168,3	2962	Outlet	
	With Pumps std low press.		5079	3726	4085	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With Pumps high press.		5079	3726	4085	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				
	With inverter Pump		5079	3726	4085	758	327,5	271	2784	352,5	2865	332,5	2845	Inlet				

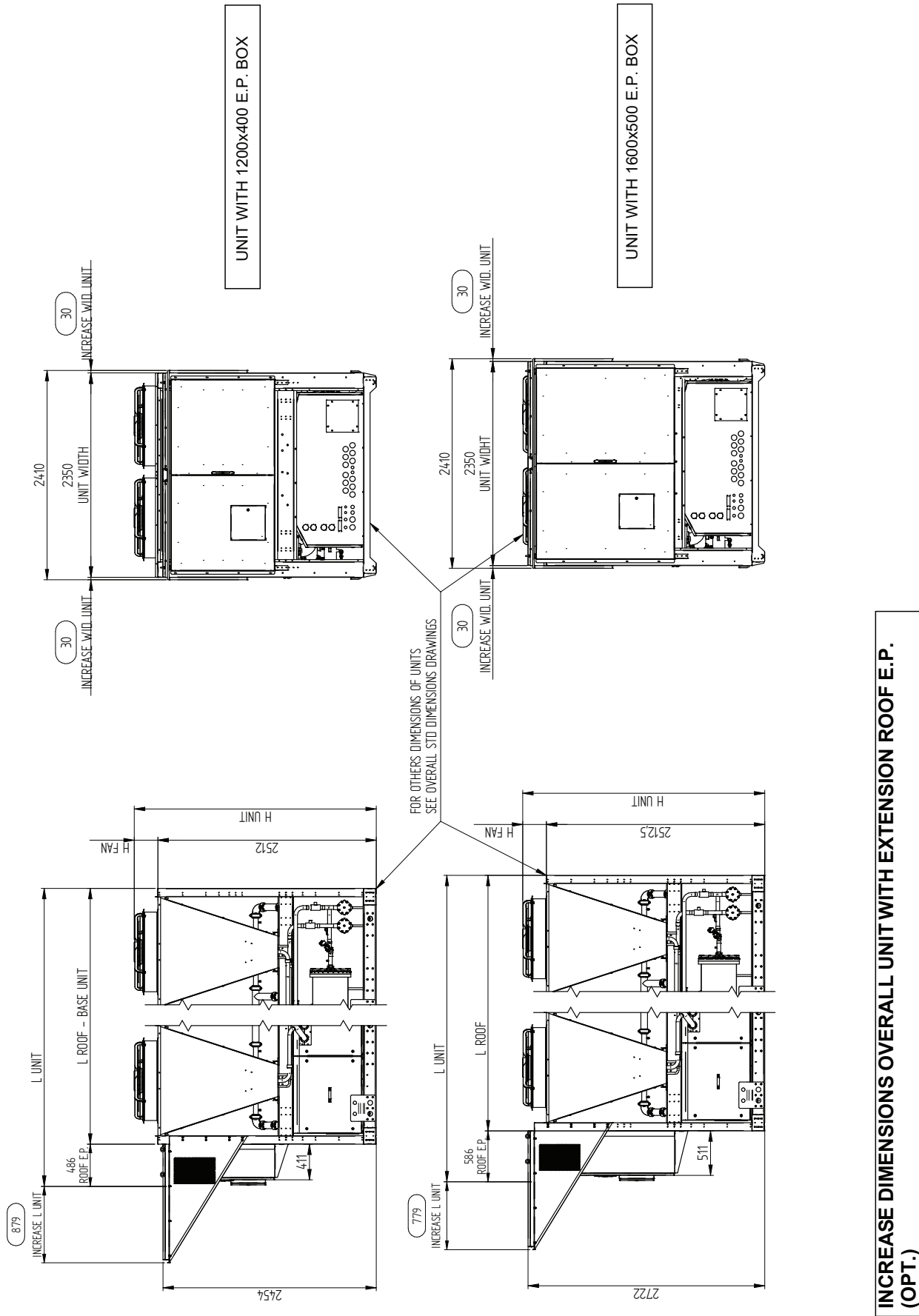
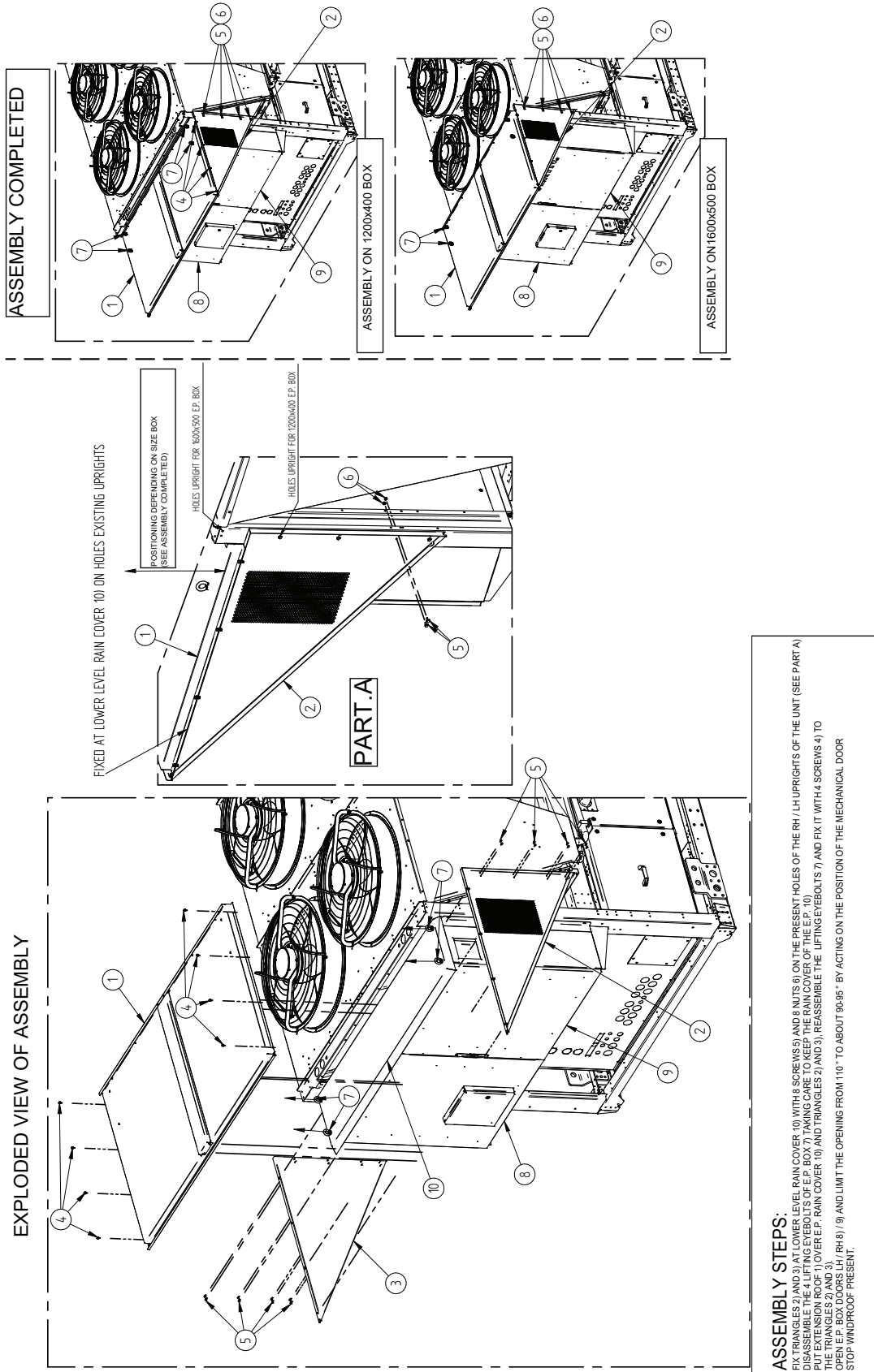


FIG 12.37 - ELECTRICAL PANEL PROTECTION ROOF ASSEMBLY (OPT.)

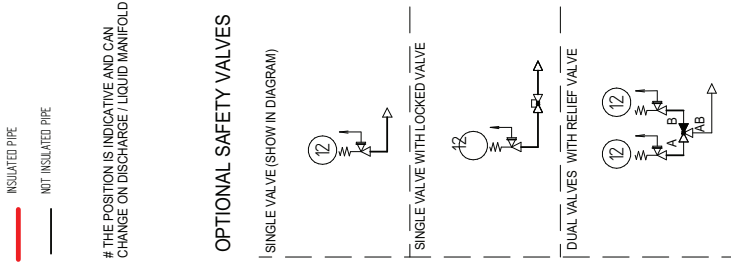
INSTRUCTIONS ASSEMBLY EXTENSION ROOF E.P.



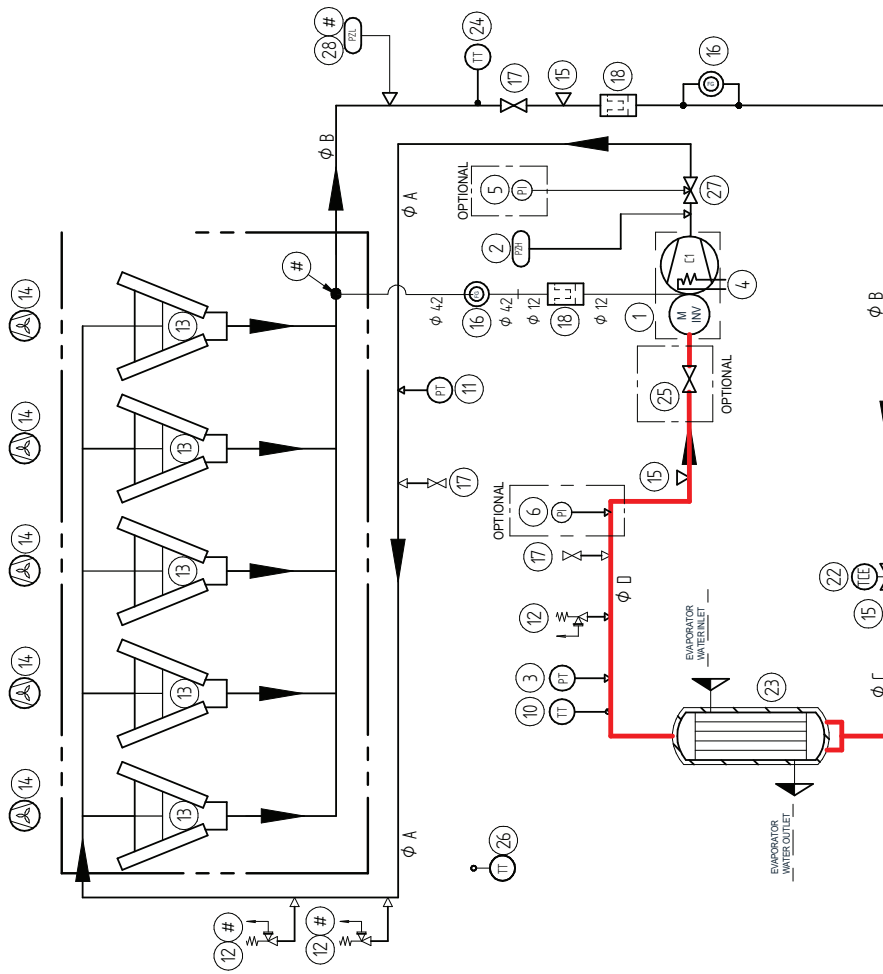
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Refrigerant Diagram

Single inverter screw models

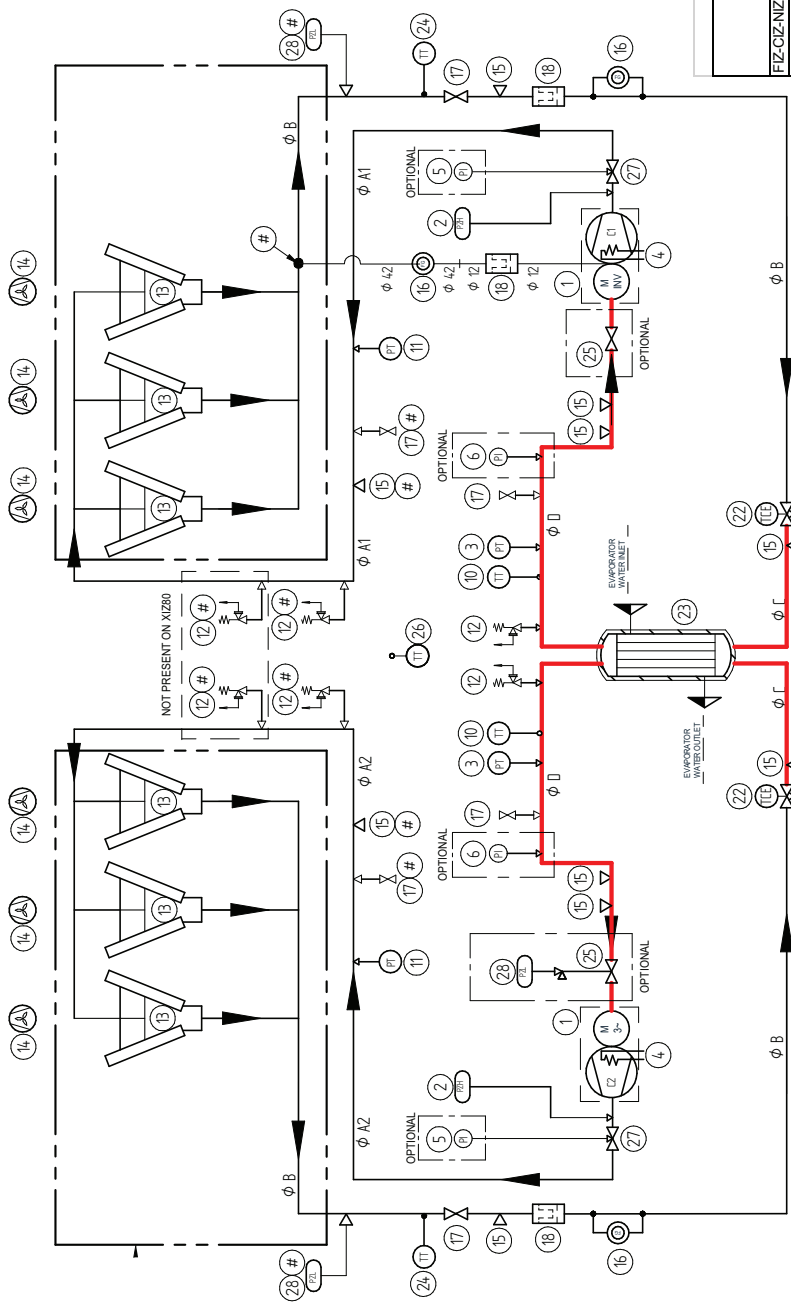
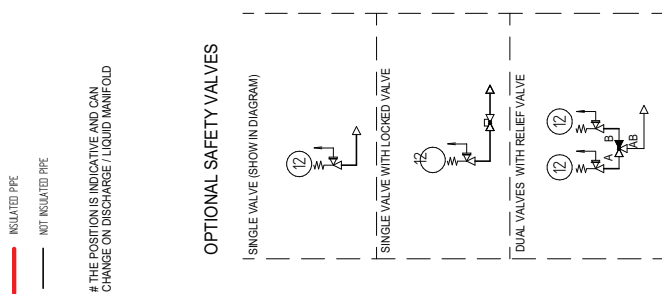


	N. Fans	ΦA delivery	ΦB liquid	ΦC suction	ΦD suction
FIZ-CIZ-NIZ 065	10	89x2	54x1,5	54x1,5	133x3
FIZ-CIZ-NIZ 075	10	89x2	54x1,5	54x1,5	133x3



14	CONDENSER FANS
13	CONDENSER
12	SAFETY VALVE
11	TRANSDUCER PRESSURE SENSOR HP CONTROL
10	TEMPERATURE SENSOR
9	MOTORIZED BALL VALVE
8	NO RETURN VALVE
7	SOLENOID VALVE
6	LOW PRESSURE MANOMETER
5	HIGH PRESSURE MANOMETER
4	CRANKCASE HEATER
3	TRANSDUCER PRESSURE SENSOR LP CONTROL
2	HIGH PRESSURE SWITCH
1	COMPRESSOR
28	LOW PRESSURE SWITCH
27	COMPRESSOR DISCHARGE VALVE
26	EXTERNAL AIR SENSOR
25	COMPRESSOR SUCTION VALVE
24	LIQUID TEMPERATURE SENSOR
23	EVAPORATOR
22	ELECTRONIC EXPANSION VALVE
21	THERMOSTATIC EXPANSION VALVE
20	ECONOMIZER
19	SHUT-OFF SOLENOID VALVE
18	FILTER DRYER
17	SHUT-OFF VALVE
16	SIGHT GLASS
15	SERVICE CONNECTION

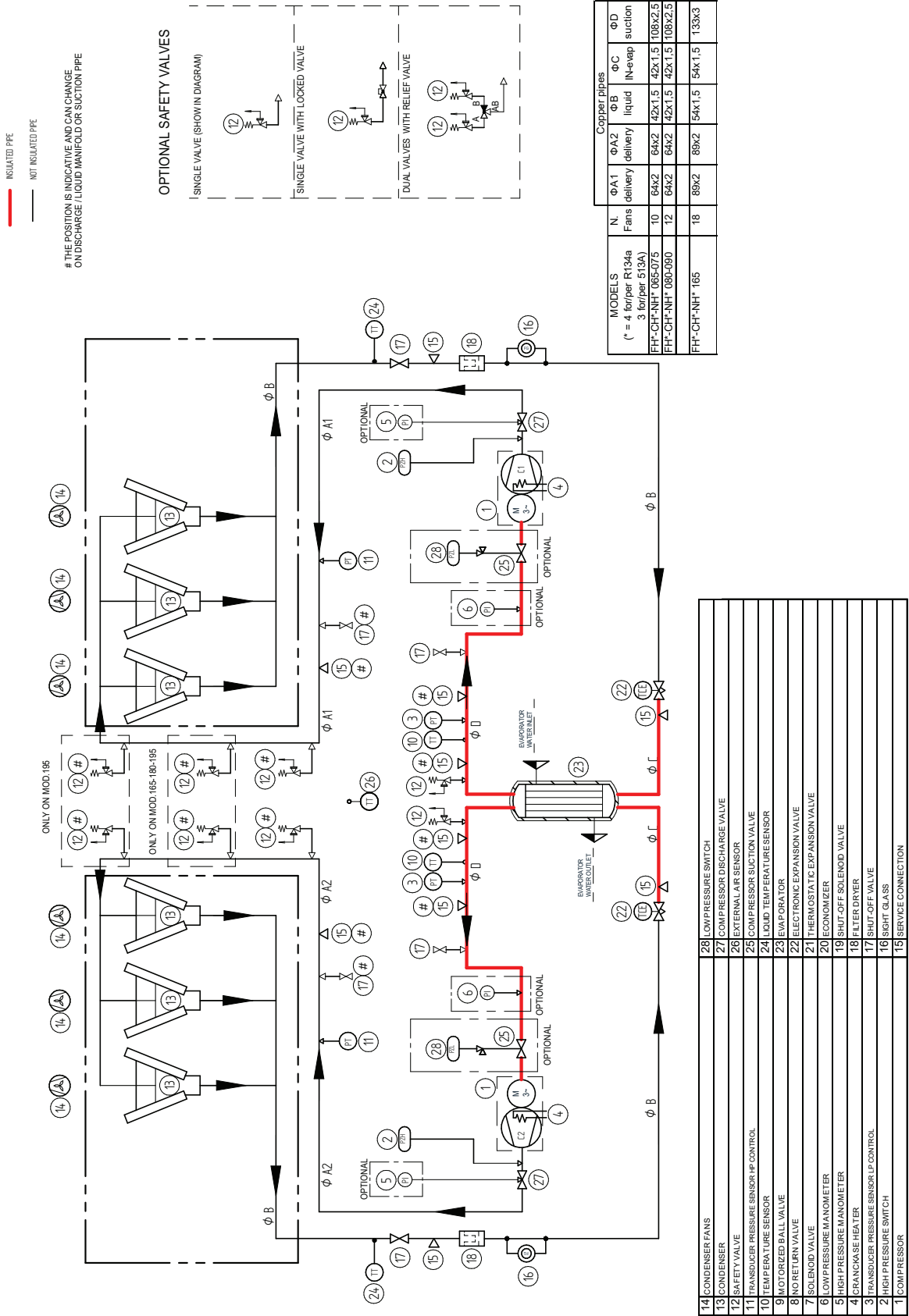
Double screw (one inverter) models



N. Fans Vent.	Copper pipes			
	phi A1 delivery	phi A2 liquid	phi C IN-evap	phi D suction
FIZ-GIZ-NIZ 080	12	76x2	42x1.5	108x2.5
FIZ-GIZ-NIZ 085	12	76x2	42x1.5	108x2.5
FIZ-GIZ-NIZ 140	18	89x2	54x1.5	133x3
FIZ-GIZ-NIZ 150	20	89x2	54x1.5	133x3

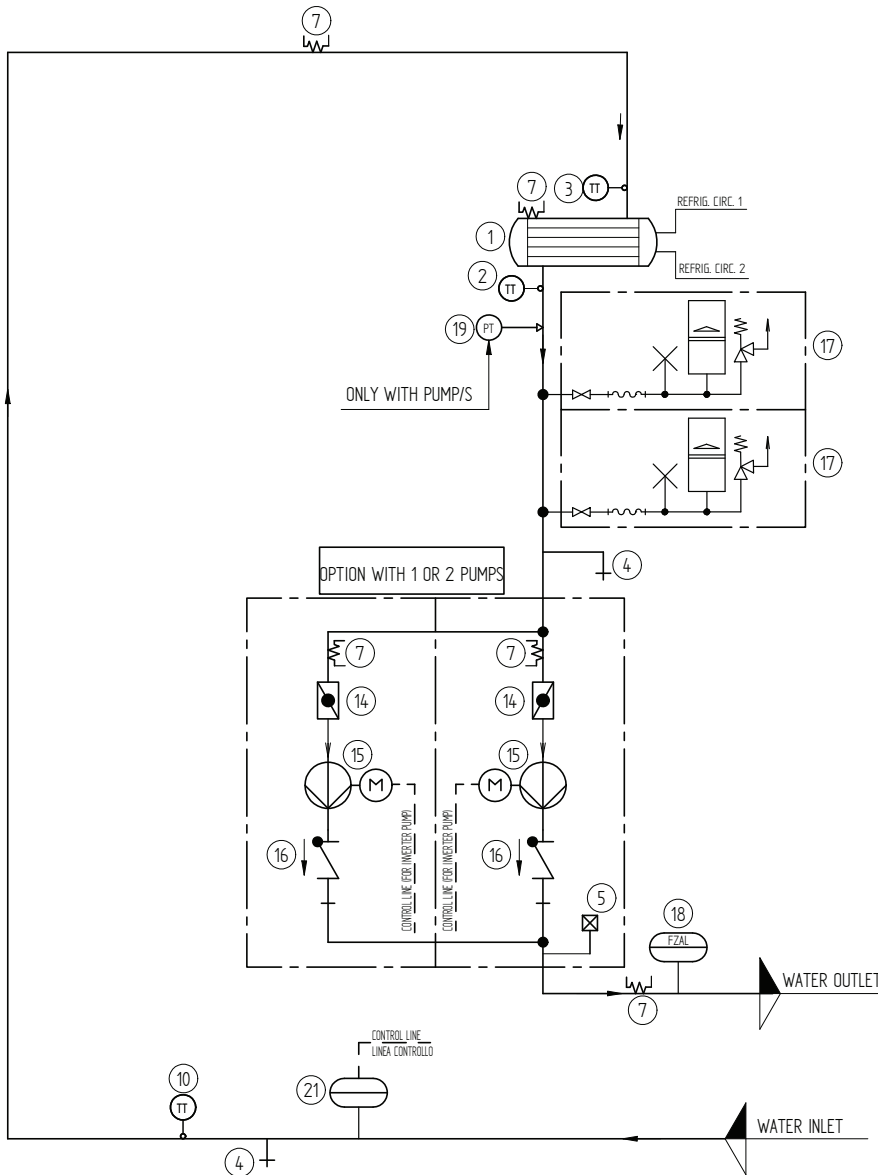
14	CONDENSER FANS
13	CONDENSER
12	SAFETY VALVE
11	TRANSDUCER PRESSURE SENSOR HP/CONTROL
10	TEMPERATURE SENSOR
9	MOTORIZED BALL VALVE
8	NO RETURN VALVE
7	LOW PRESSURE MANOMETER
6	HIGH PRESSURE MANOMETER
5	SOLENOID VALVE
4	CRANKCASE HEATER
3	TRANSDUCER PRESSURE SENSOR LP/CONTROL
2	HIGH PRESSURE SWITCH
1	COMPRESSOR
28	LOW PRESSURE SWITCH
27	COMPRESSOR DISCHARGE VALVE
26	EXTERNAL AIR SENSOR
25	COMPRESSOR SUCTION VALVE
24	LIQUID TEMPERATURE SENSOR
23	EVAPORATOR
22	ELECTRONIC EXPANSION VALVE
21	THERMOSTATIC EXPANSION VALVE
20	ECONOMIZER
19	SHUT-OFF SOLENOID VALVE
18	FILTER DRYER
17	SHUT-OFF VALVE
16	SIGHT GLASS
15	SERVICE CONNECTION

Double screw models



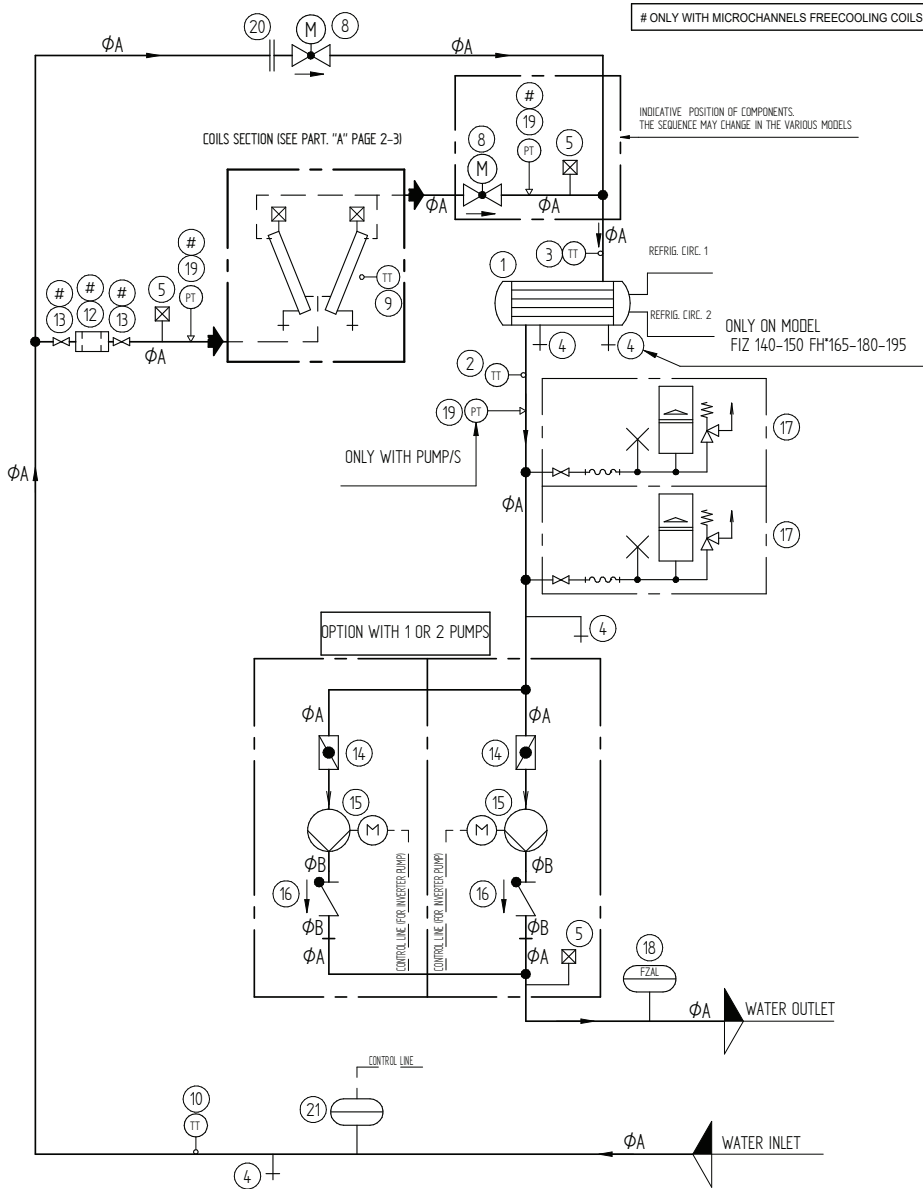
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Hydraulic Diagram



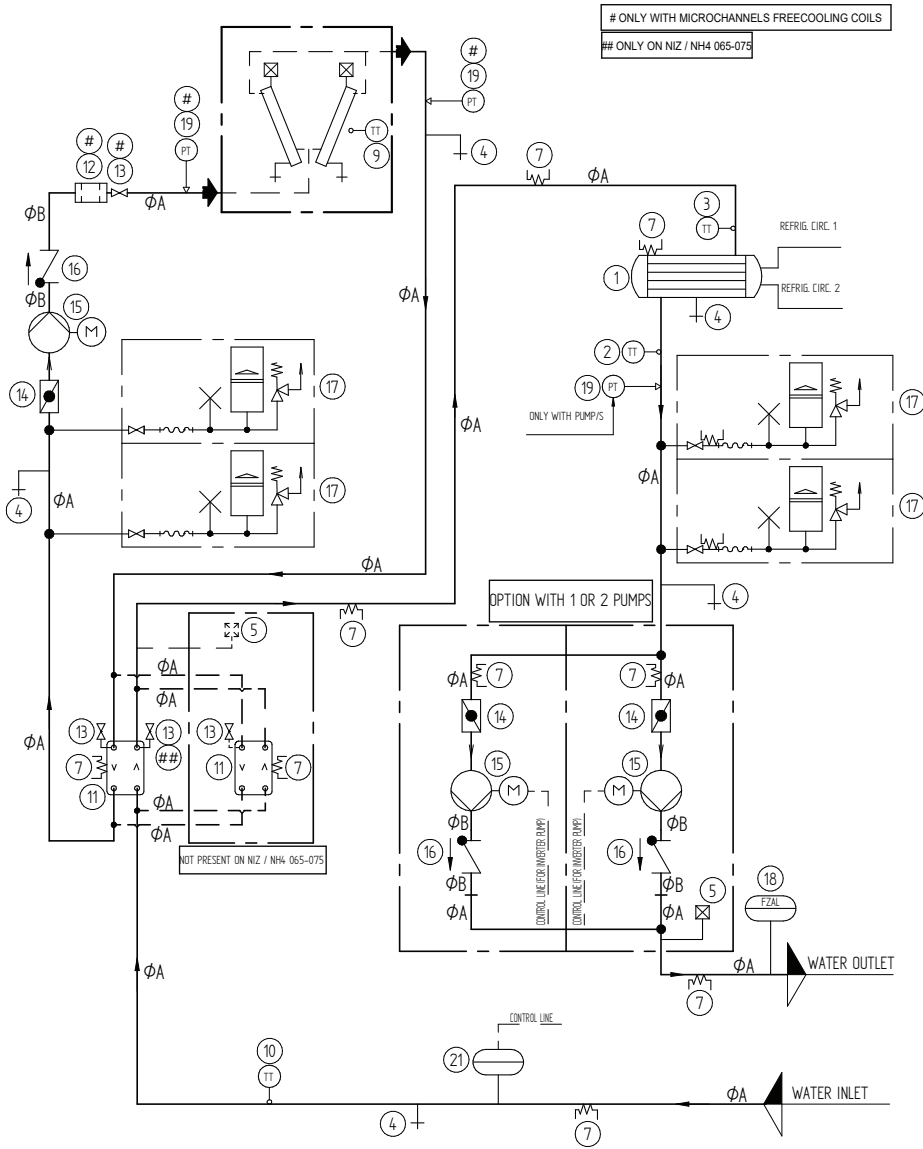
21	FLOW METER (std with electronics pump/s, optional for others)
20	
19	PRESSURE TRASDUCER
18	FLOW SWITCH
17	KIT EXPANSION VASSEL - SAFETY VALVE - MANUAL AIR VALVE - FLEX. PIPE - VALVE (std with pump/s)
16	NO RETURN VALVE
15	PUMP
14	BUTTERFLY VALVE
13	
12	
11	
10	
9	
8	
7	ELECTRICAL HEATERS FOR EXCHANGER / PIPE (OPTIONAL)
6	
5	MANUAL AIR VALVE
4	DISCHARGE VALVE
3	EVAPORATOR WATER INLET SENSOR
2	EVAPORATOR WATER OUTLET SENSOR / ANTIFREEZE
1	EVAPORATOR
N.	DESCRIPTION

Freecooling models



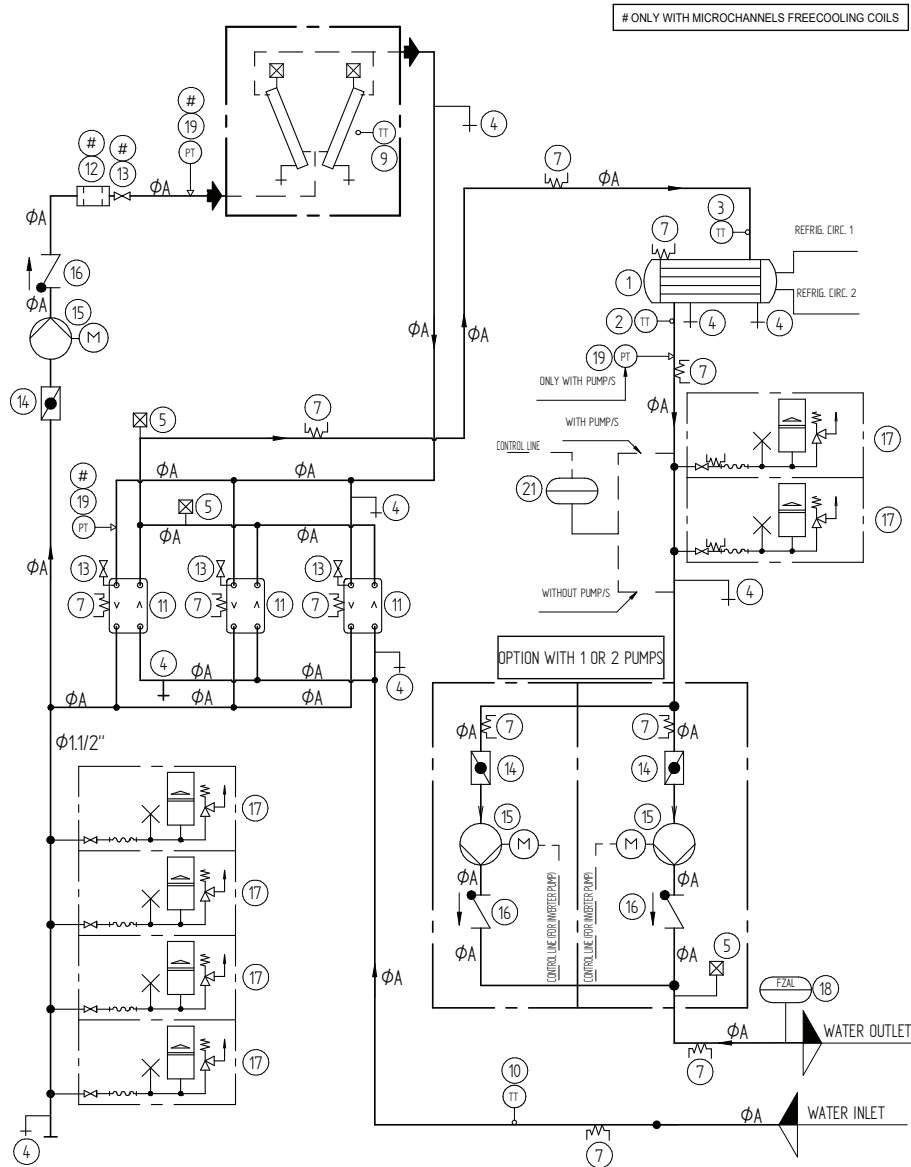
21	FLOW METER (std with electronics pump/s, optional for others)
20	CALIBRATE BAFFLE
19	PRESSURE TRASDUCER
18	FLOW SWITCH
17	KIT EXPANSION VASSEL - SAFETY VALVE - MANUAL AIR VALVE - FLEX PIPE - VALVE (std with pump/s)
16	NO RETURN VALVE
15	PUMP
14	BUTTERFLY VALVE
13	VALVE
12	WATER FILTER
11	
10	CONTROL FREEC. THERMOSTAT SENSOR
9	AIR TEMPERATURE SENSOR
8	2 WAY VALVE
7	
6	FREECOOING COIL
5	MANUAL AIR VALVE
4	DISCHARGE VALVE
3	EVAPORATOR WATER INLET SENSOR
2	EVAPORATOR WATER OUTLET SENSOR / ANTI-FREEZE
1	EVAPORATOR
N.	DESCRIPTION

Freecooling glycol-free models
NIZ 065-075-080-085
NH* 065-075-080-090



21	FLOW METER (std with electronics pump/s, optional for others)
20	CALIBRATE BAFFLE
19	PRESSURE TRASDUCER
18	FLOW SWITCH
17	KIT EXPANSION VASSEL - SAFETY VALVE - MANUAL AIR VALVE - FLEX PIPE - VALVE (std with pump/s)
16	NO RETURN VALVE
15	PUMP
14	BUTTERFLY VALVE
13	VALVE
12	WATER FILTER
11	NO GLYCOL EXCHANGER
10	CONTROL FREEC. THERMOSTAT SENSOR
9	AIR TEMPERATURE SENSOR
8	
7	ELECTRICAL HEATERS FOR EXCHANGER / PIPE
6	FREECOOLING COIL
5	MANUAL AIR VALVE
4	DISCHARGE VALVE
3	EVAPORATOR WATER INLET SENSOR
2	EVAPORATOR WATER OUTLET SENSOR / ANTIFREEZE
1	EVAPORATOR
N.	DESCRIPTION

Freecooling glycol-free models
NIZ 140-150
NH* 165-180-195



21	FLOW METER (std with electronics pump/s, optional for others)
20	CALIBRATE BAFFLE
19	PRESSURE TRASDUCER
18	FLOW SWITCH
17	KIT EXPANSION VASSEL - SAFETY VALVE - MANUAL AIR VALVE - FLEX PIPE - VALVE (std with pump/s)
16	NO RETURN VALVE
15	PUMP
14	BUTTERFLY VALVE
13	VALVE
12	WATER FILTER
11	NO GLYCOL EXCHANGER
10	CONTROL FREEC. THERMOSTAT SENSOR
9	AIR TEMPERATURE SENSOR
8	
7	ELECTRICAL HEATERS FOR EXCHANGER / PIPE
6	FREECOOLING COIL
5	MANUAL AIR VALVE
4	DISCHARGE VALVE
3	EVAPORATOR WATER INLET SENSOR
2	EVAPORATOR WATER OUTLET SENSOR / ANTIFREEZE
1	EVAPORATOR
N.	DESCRIPTION



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