Liebert HPC-S

006-022

Air Cooled Chillers with Scroll Compressors

Product Documentation

English, cod. 273571, rev. 26.06.2017

Liebert HPC- S 006- 022

Liebert HPC-S 006- 022 is the new **Vertiv** product line of air-cooled water chillers, from **60** to **220 kW**, designed to combine the best performance in terms of efficiency and reliability with the lowest impact on the environment and to offer a flexible solution for each different application requirement of this product.

Utilising hermetic Scroll compressors, heat exchangers and fans of the latest generation, specifically designed for air conditioning applications, the new series stands out for its unrivalled efficiency, outstanding compactness and low sound emissions.

The “Freecooling” execution and “Supersaver Evolution” system, providing complete integration with indoor air conditioning units, allow the achievement of extraordinary energy savings and increase system lifetime and reliability.

With **@connectivity**, a highly sophisticated way to let the system components communicate, **Liebert HPC-S 006- 022** is part of the network created for an improved operations management system and significant energy saving.

Liebert HPC- S 006- 022

Solutions Committed to your Business

Liebert HPC- S 006- 022

Contents

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 HPC- S 006- 022 units are CE marked as they comply with the European directives concerning mechanical, electrical, electromagnetic and pressure equipment safety.

1 Features and Benefits

Reliability and Low Environmental Impact

Reliability

The **Liebert HPC- S 006- 022** series is equipped with two hermetic scroll compressors, which represent state- of- the- art technology in this sector. They have been designed and optimized for air- cooled water chillers within air conditioning applications.

The high volumetric efficiency ensures excellent performances of the **Liebert HPC- S 006- 022** units at full load operation and especially at partial load.
Extremely low noise operation and the absence of vibrations aid the installation of the unit in city sites requiring strict noise limits.
The wide operating range, bearing lubrication, component oversizing, absence of vibrations and few moving parts, together with the resistance to liquid slugging and compressor electronic control integrated with the machine microprocessor enhance the well- known characteristics of operating reliability and long life typical of this compressors type.

All **Liebert HPC- S 006- 022** units are run tested at the factory before shipment.

High outdoor temperature

The oversizing of heat exchangers and the wide operating range of the scroll compressors permit the use of **Liebert HPC- S 006- 022** units in high temperature environments as well, up to 46° C at 100% full load.

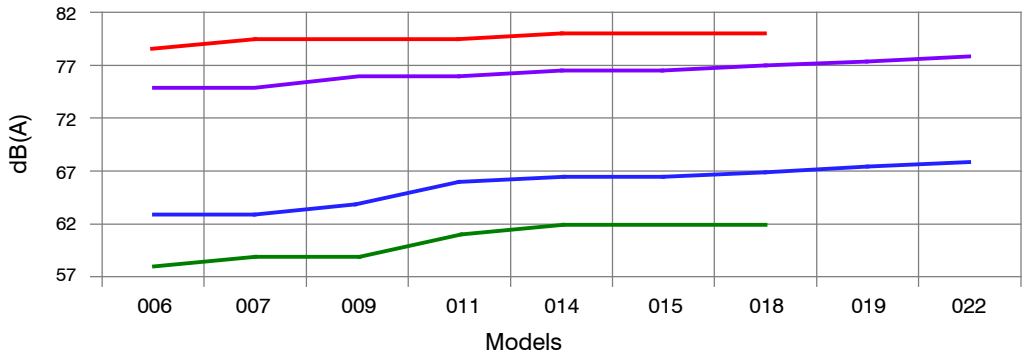
Resistance to liquid slugging

The robust design of the scroll compressors can tolerate/withstand amounts of liquid refrigerant that would severely damage reciprocating compressor valves, piston rods and cylinders.

Low Sound Emission

The **Liebert HPC- S 006- 022** series is characterized by unrivalled low sound emissions.
Compressors supported on anti- vibration mounts and positioned in a closed compartment, common to all versions; fans specifically designed to reduce the sound emissions, a special compressor jacket on the “B” version “models from C/FB0 011” (Digit 11 = B or D) and “G” version with 900 mm fans, and also a special compressor’s box insulated on the “G” version with 800 mm fans “models from C/FG0 011” allow the achievement of such performance.
All the models are equipped with stepless fan speed control, thanks to a special algorithm on the iCOM board, the fan speed could be kept to the minimum. It is possible to reach even lower sound emissions with EC fans (electronically commutated fans), which especially during reduced speed operation, allow noise levels around 50% lower than the values measured at the same conditions with traditional fans.

Liebert HPC- S 006- 022 series sound emissions at 1 m distance

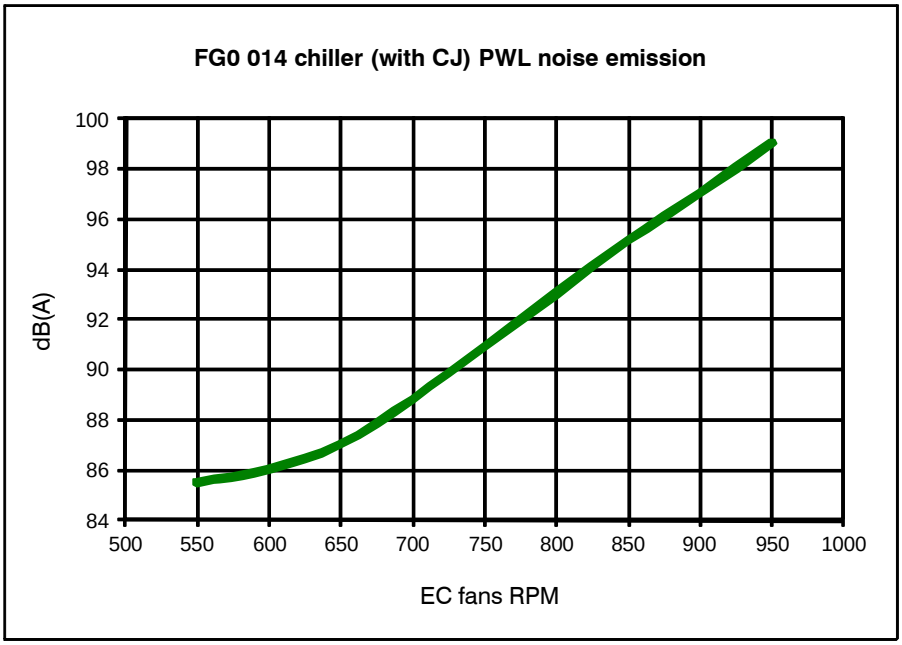


G - version
B - version
B - version + 800 + CJ
G - version + 800 + CJ + Box

800 = 800 mm fans diameter;
CJ = Compressor noise insulation Jacket;
Box = Box noise insulation.

Features and Benefits

In the ”G” version chiller, the characteristics of the ”EC” fans can achieve significant noise reductions according their speed (RPM), as shown in the chart below.

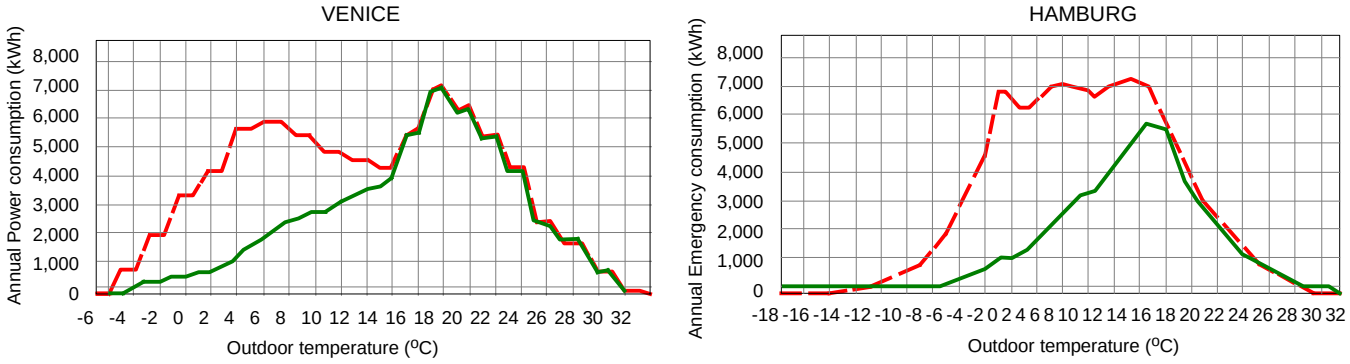


Unequalled Efficiency and Energy Saving

The use of hermetic Scroll compressors of the latest generation; plate heat exchanger evaporators selected for R410A application; aerodynamic profiled blade fans with high efficiency nozzles; large surface condenser coils ensure the achievement of unequalled efficiency figures.

Freecooling Module

The “Freecooling” execution allows **Liebert HPC- S 006- 022** to take advantage of low outdoor air temperatures in the water cooling process in order to save energy, by avoiding compressors running.
A three- way valve arrangement permits the coolant to be diverted via the additional heat exchangers before being fed into the cooling evaporator.
This means that even if the outside ambient temperature is not low enough to provide the complete cooling load, a significant contribution to the running costs of the system can be made whenever the ambient temperatures falls below the coolant inlet temperature.
Reduced space requirements in comparison with a conventional chiller plus a dry- cooler, are obtained through the “Freecooling” execution’s compact design and the reduction of the compressors working hours offers exceptional saving both in the long and short term.
The different strategies adopted by the proprietary microprocessor control in managing the various components, fans - compressors - regulation valves, and operating modes, mechanical and/or free cooling, together with the compressors’ partialisation ensure typical energy savings greater than 30%.



Annual energy consumption, Chiller.

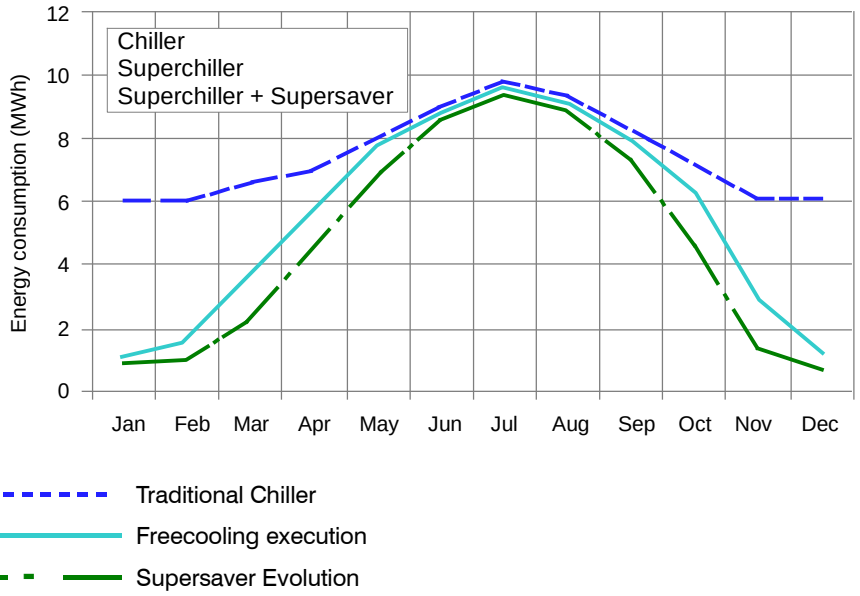
Annual energy consumption, Chiller plus Freecooling module.

Features and Benefits

Seasonal Efficiency

The ”Freecooling” execution finds its best application in combination with the “Supersaver Evolution” system which regulates the coolant temperatures according to the variation of the thermal load, increasing the numbers of hours during which free cooling is possible.
The percentage of energy saving can thus be greater than 35%.

Annual power consumption. Comparison among the systems:



Traditional Chiller

Freecooling execution

Supersaver Evolution

Integration with Indoor Air Conditioners

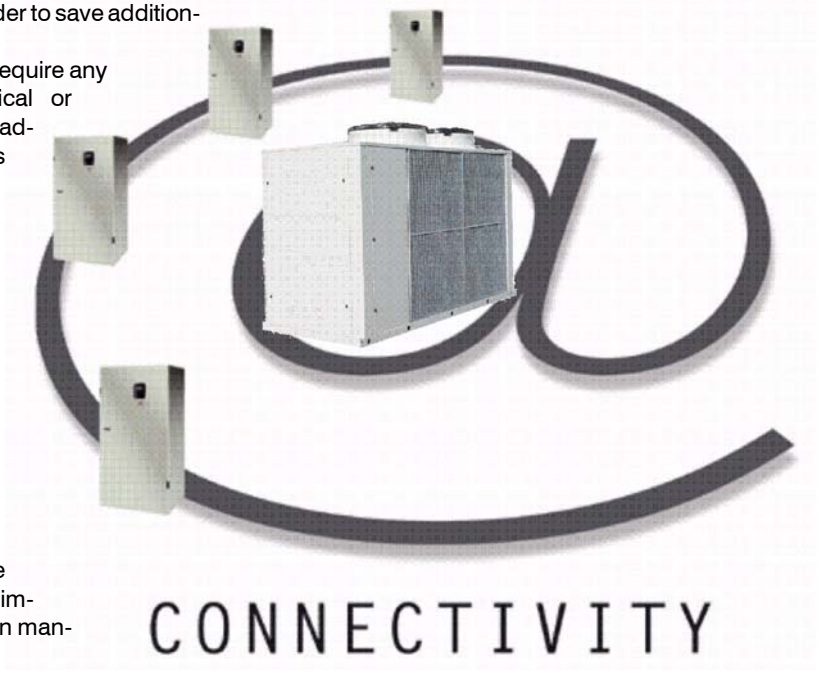
Supersaver Evolution System

A special working mode can be set up in combination with **Vertiv HPAC** indoor units to obtain the ”Supersaver Evolution” system, that enhances the energy saving capabilities and thus op-timizes the SEER (Seasonal Energy Efficiency Ratio) of the system.

Through @connectivity the information on the cooling needs of the air conditioners is available to the **Liebert HPC- S 006- 022** units, that will manage their resources (compressors and free cooling) in the most efficient way in order to save additional energy.
This solution does not require any modification, mechanical or electrical thus avoiding additional components and regulation algorithms which could undermine the reliability of the system.

@ Connectivity

When the room units are equipped with the same type of control system **Vertiv** (iCOM and CDL), it is possible to maximize the energy savings and improve the total operation management.



Features and Benefits

The solution is **@connectivity**, which is a highly sophisticated way to let the system components (the Air- Conditioners as well as the **Liebert HPC- S 006- 022** units, Chiller and Freecooling executions) talk to each other.

The **@connectivity** plug- in allows the setting of different working modes for different situations, such as:

- higher water temperature in low load operation (energy saving);
- lower water temperature for dehumidification (better performance);
- special ”night” Setpoint (energy saving & noise reduction);
- lower water temperature if one or more Air Conditioners fail (keep capacity in emergency situations);
- . . . and much more!

To add the **@connectivity** to your system, it is simply necessary:

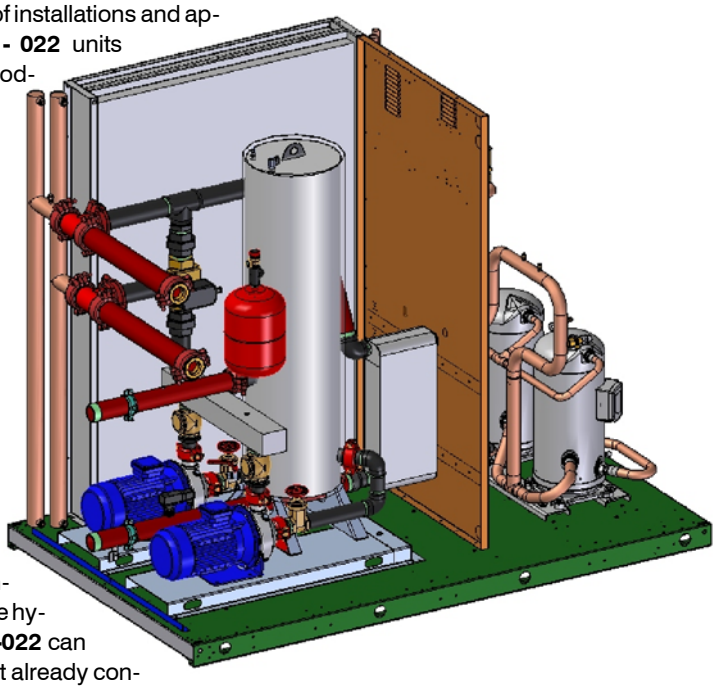
To build up Hironet connection between the room units and the **Liebert HPC- S 006- 022** units. The network can be only 1 (if the distance and the number of units allow this) or it can be split in several networks.

On **@connectivity** it is possible to define the rules that you want your system to respect.

It will be then up to the web capabilities to allow the view and control of your system from any PC of your Local area network (provided that the **@connectivity** PC is connected on the LAN) or even if you have a connection to Internet and your system is open to external access, you will have the possibility to view and control your system via Internet

Flexibility: Hydronic Module

In order to match different kinds of installations and applications, **Liebert HPC-S 006- 022** units are available with a hydronic module, which can be adapted/adjusted depending on the specific requests.
Based on this philosophy, the units can be equipped with everything that is needed for the correct installation and, in this way, reduce the complexity of the commissioning: buffer tank, 1 or 2 circulating pumps, water filter, safety valve, expansion vessel, flow switch. With all these elements included inside the unit, it is just a matter of connecting the chiller to the system.
But, if some or all of these components are already present in the hydraulic line, **Liebert HPC-S 006-022** can be equipped only with what is not already connected in the system. This level of flexibility allows true customisation of the unit.



Compactness: Small Footprint

The **Liebert HPC- S 006- 022** series achieves the high efficiency performance and low sound emission previously described with a compactness which is one the highest in its category.
This result is possible thanks to the high quality components selected and a design which takes into consideration the different aspects and needs of a chiller installation.
In this way the installation area can be optimized, leaving more space for other building elements. Combining this aspect with the possibility of including all of the hydronic components inside the unit, **Liebert HPC- S 006- 022** series is really a leader in terms of easy and compact installation

2 Model Number Description

Model Nomenclature / Digit Numbers

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
C	G	0	0	1	1												

Specification
C = Air cooled Chiller
F = Freecooling Chiller

Cooling Capacity
Cooling capacity (x 10 = kW)

Refrigerant
0 = R410A

Versions
B = Base version
G = High efficiency class version

Liebert HPC- S 006- 022

Digits 1, 2, 3, 4, 5, 6 - Base unit

Base unit main features

- R410A refrigerant;
- One refrigeration circuit;
- HP and LP gauges;
- Fans speed control (TRIAC or EC according **B** or **G** version); on **B** versions, different options with EC fans are available;
- On digit 11 base version **B**, opt. B & D + **G** version opt. C compressors jacket if necessary;
- On digit 11 **G** version opt. D compressors jacket + compressor's box insulated if necessary;
- Expansion valve: **TXV** (Thermostatic expansion Valve) on **B** version; **EEV** (Electronic Expansion Valve) on **G** version;
- Flow switch and Hydraulic Kit (Hydraulic Kit = expansion vessel and safety valve);
- Evaporator electric heater + tank electric heater will protect piping too (only if pump/s are fitted on unit);
- Electrical panel ventilation;
- Buffer tank of 100, 200 and 300 litres (1, 2 and 3 fans).

Digit 7 - Display and Switch

A = FTE display
B = FTE display + Network Switch
E = iCOM Coldfire display large
F = iCOM Coldfire display large + Network Switch

Digit 8 - Soft starter

0 = None
1 = With compressors soft starter

Digit 9 - Monitoring

0 = None
1 = IS Housing (no IS Card included)
2 = Web card
3 = Modbus card
4 = Sitescan card
5 = Web card + Modbus card
6 = Web card + Sitescan card
7 = Modbus card + Sitescan card
8 = Bacnet card (Bacnet or Modbus over IP)

Digit 10 - Buffer tank

0 = None
1 = With buffer tank
2 = With buffer tank + electric heaters (only for chiller models)

Digit 11 - Fans and noise options

A = TRIAC control and 900 mm fans
B = TRIAC control and 800 mm fans + compressor insulation jacket
C = EC Fans, 900 mm
D = EC Fans, 800 mm + compressor insulation jacket and box

Digit 12 - Pumps group (expansion tank and water safety valve always included as standard)

1 = No pumps
2 = With 1 pump LP (low pressure)
3 = With 1 pump HP (high pressure)
4 = With 2 pumps LP (low pressure)
5 = With 2 pumps HP (high pressure)

Digit 13 - Free

Digit 14 - Electric panel options

0 = None
1 = With electric heaters
A = Fast start ramp
B = Fast start ramp and electric heaters

Digit 15 - Evaporator antifreeze protection

0 = None
1 = With evaporator antifreeze protection
2 = With evaporator and pipe antifreeze protection

Digit 16 - Compressor power factor correction

0 = None
1 = With compressors power factor capacitors

Digit 17 - Coil metal filter / Protection grid

0 = None
1 = With coil metal filter

Digit 18 - Special requests

0 = None
X = As specified

Model Number Description

Kits / Accessories shipped loose

- Anti-vibrating mounts (spring or rubber)
- Dee shackle UNI 1947
- Coldfire IP40 remote box
- Water filter

Configuration Rules

In order to give the units the highest flexibility and a high option number, it is necessary to follow the configuration rules indicated here below, so as to select the unit with all compatible options:

Rule valid for all Chiller and Freecooling versions:

Compressor soft starter are not electrically compatible with compressors power factor corrections

- if digit 8 = 1 than digit 16 = 0
  on digit 11: A & B not available on G version (default: A with Base version and C with G version)

Rules valid for Chiller versions only (on Freecooling chillers electric heaters are not available):

Heating resistors have to be selected according to the presence of the pumps, tank, etc.

- if digit 15 = 1 or 2, then digit 10 = 0 or 2
- if digit 15 = 1, then digit 12 = 2, 3, 4 or 5
- if digit 15 = 2, then digit 12 = 1
- if digit 10 = 2, then digit 15 = 1 or 2

3 Operating Range

Working Limits

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

- 25 °C for Freecooling models;
- 10 °C for Chiller models.

Maximum outdoor air temperature is in relation to each model, as indicated in the following tables.
High water flow values (corresponding to a thermal difference at the evaporator lower than 3.5° C - 4° C) may cause corrosions and vibrations inside the plate heat exchanger and in the hydraulic circuit.

The Minimum water flow allowed corresponds to a maximum temperature difference of 8° C.
More extreme operating conditions would active safety devices and the unit would be stopped.
The outlet water temperature must range from 4° C to 15° C.
The maximum allowed water return temperature, when the unit is in full operation, is 20° C; return temperatures over 20° C are allowed only during start- up.

The “G” version with EC fans 900mm (digit 11 = C) admit Maximum Outlet Water Temperature of 20 °C and Maximum Water Return Temperature of 26° C when the units are at full power.
The maximum permitted glycol percentage is 50% (35% with standard pump groups fitted).

The necessary minimum glycol percentage depends on the minimum ambient air temperature conditions referred to the place of installation.

The maximum hydraulic working pressure is 6 barg (safety valve set at 6 barg, optional).

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

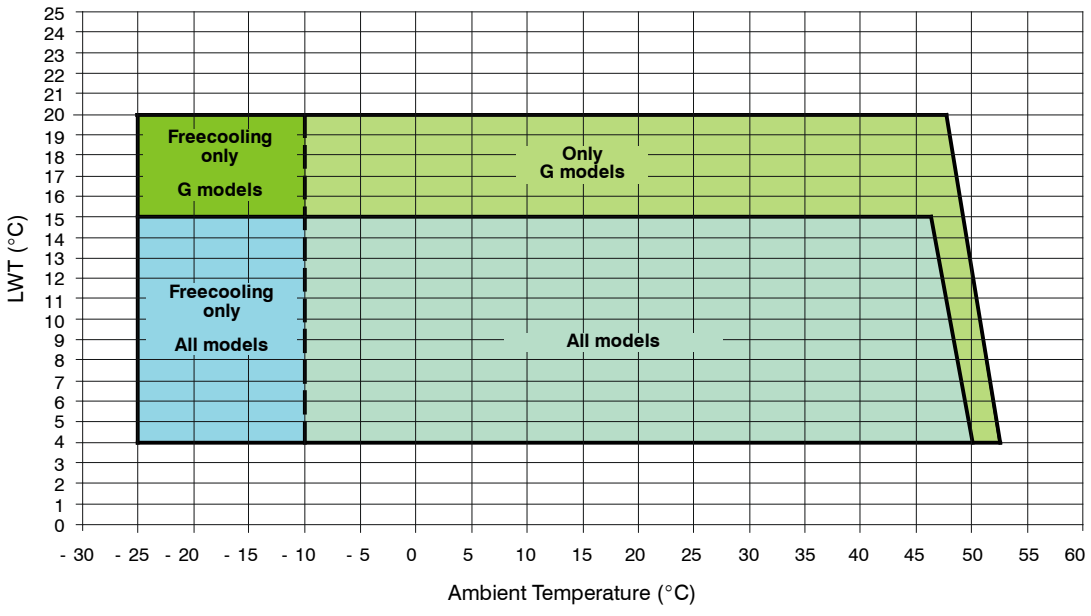
See “Operation range” table reporting the limits for each model; for different values ask your Agent.

All the working limits indicated in both diagrams and tables refer to steady- state operation mode.

Unit storage conditions:

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

Average HPC- S 006- 022 Working Limits



This diagram shows the average working limits of all the products family.
Refer to table 3 for the working limits of each unit.

Operating Range

Tab. 3a - Operating range - Chiller with AC fans 900mm

Models: CB0 006- 022		006	007	009	011	014	015	018	019	022
Operating range										
Max. outdoor temperature (1)	°C	52.0	49.5	54.0	52.5	50.0	48.5	52.0	50.5	49.0
Safety devices settings										
High pressure switch (1)	barg					42				
High pressure safety valve	barg					45				
HP safety valves (each circuit)	Nr.					1				
High pressure safety valve connection	inch					3/4" G				
Low pressure switch	barg					4.4				

(1) - With nominal air flow; water outlet temperature 7° C; full load; R410A refrigerant.

Tab. 3b - Operating range - Chiller with AC fans 800mm

Models: CB0 006- 022		006	007	009	011	014	015	018	019	022
Operating range										
Max. outdoor temperature (1)	°C	50.0	47.0	52.5	50.5	48.0	46.0	50.0	48.0	46.5
Safety devices settings										
High pressure switch (1)	barg					42				
High pressure safety valve	barg					45				
HP safety valves (each circuit)	Nr.					1				
High pressure safety valve connection	inch					3/4" G				
Low pressure switch	barg					4.4				

(1) - With nominal air flow; water outlet temperature 7° C; full load; R410A refrigerant.

Tab. 3c - Operating range - Chiller with EC fans 900mm

Models: CG0 006- 018		006	007	009	011	014	015	018
Operating range								
Max. outdoor temperature (1)	°C	53.0	56.0	56.0	53.5	55.5	54.0	53.0
Safety devices settings								
High pressure switch (1)	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	inch				3/4" G			
Low pressure switch	barg				5			

(1) - With nominal air flow; water outlet temperature 7° C; full load; R410A refrigerant.

Tab. 3d - Operating range - Chiller with EC fans 800mm

Models: CG0 006- 018		006	007	009	011	014	015	018
Operating range								
Max. outdoor temperature (1)	°C	47.0	52.0	51.5	48.0	50.5	48.5	47.0
Safety devices settings								
High pressure switch (1)	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	inch				3/4" G			
Low pressure switch	barg				5			

(1) - With nominal air flow; water outlet temperature 7° C; full load; R410A refrigerant.

Operating Range

Tab. 3e - Operating range - Freecooling with AC fans 900mm

Models: FB0 006- 022		006	007	009	011	014	015	018	019	022
Operating range										
Max. outdoor temperature (1)	°C	50.0	47.0	53.0	51.0	48.5	46.5	50.0	48.5	47.0
Safety devices settings										
High pressure switch (1)	barg					42				
High pressure safety valve	barg					45				
HP safety valves (each circuit)	Nr.					1				
High pressure safety valve connection	inch					3/4" G				
Low pressure switch	barg					4.4				

(1) - With nominal air flow; mixture outlet temperature 10° C; full load; R410A refrigerant.

Tab. 3f - Operating range - Freecooling with AC fans 800mm

Models: FB0 006- 022		006	007	009	011	014	015	018	019	022
Operating range										
Max. outdoor temperature (1)	°C	48.5	45.5	52.0	49.5	46.5	44.0	48.5	46.5	45.0
Safety devices settings										
High pressure switch (1)	barg					42				
High pressure safety valve	barg					45				
HP safety valves (each circuit)	Nr.					1				
High pressure safety valve connection	inch					3/4" G				
Low pressure switch	barg					4.4				

(1) - With nominal air flow; mixture outlet temperature 10° C; full load; R410A refrigerant.

Tab. 3g - Operating range - Freecooling with EC fans 900mm

Models: FG0 006- 018		006	007	009	011	014	015	018
Operating range								
Max. outdoor temperature (1)	°C	51.5	55.0	55.0	52.5	54.5	53.0	52.0
Safety devices settings								
High pressure switch (1)	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	inch				3/4" G			
Low pressure switch	barg				5			

(1) - With nominal air flow; mixture outlet temperature 10° C; full load; R410A refrigerant.

Tab. 3h - Operating range - Freecooling with EC fans 800mm

Models: FG0 006- 018		006	007	009	011	014	015	018
Operating range								
Max. outdoor temperature (1)	°C	45.5	51.5	50.5	46.5	49.5	47.5	45.5
Safety devices settings								
High pressure switch (1)	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	inch				3/4" G			
Low pressure switch	barg				5			

(1) - With nominal air flow; mixture outlet temperature 10° C; full load; R410A refrigerant.

4 Technical Data

Tab. 4a - Technical Data - CB0 006- 022 - AC 900

CB0 model with AC 900 mm fans - R410A		006	007	009	011	014	015	018	019	022
Performance (1)										
Cooling capacity	kW	58.5	70.6	86.8	111.6	132.9	146.5	175.8	193.1	215.9
Compressors power input	kW	16.1	21.5	23.2	31.1	40.4	47.9	49.9	58.3	67.1
Total power input	kW	18.5	23.9	28.0	35.9	45.2	52.7	57.1	65.5	74.3
Unit EER	-	3.16	2.95	3.10	3.11	2.94	2.78	3.08	2.95	2.91
Water flow	m^3/h	10.08	12.14	14.91	19.19	22.85	25.21	30.20	33.19	37.14
Water pressure drop	kPa	47	42	37	41	42	50	48	58	49
Sound level										
SPL (Sound Pressure Level) (2)	dB(A)	75		76		76.5		77	77.5	78
PWL (Sound Power Level) (3)	dB(A)	92		94		94.5		96	96.5	97
Refrigeration circuit										
Number of refrigeration circuits	No	1								
Refrigerant charge (each circuit)	kg	10.5	10.5	13.0	18.0	20.0	20.0	27.5	27.5	28.5
Compressors										
Number of compressors	No	1 + 1								
Type	-	Hermetic Scroll								
Nominal power (each compressor)	HP	10 + 10	13 + 13	15 + 15	15 + 25	25 + 25	25 + 30	30 + 30	30 + 40	40 + 40
Fans										
Number of fans	No	1		2				3		
Type	-	Axial								
Wheel nominal diameter	mm	900								
RPM	1/min	900								
Nominal power input (each fan)	kW	2.4								
Fans power input	kW	2.4		4.8				7.2		
Air flow rate	m^3/h	21900	21400	44800	43800	42800	42800	65700	65700	64200
Evaporator										
Number of evaporators	No	1								
Type	-	Brazed plate heat exchanger								
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6	11.6	14.8
Condensing coil										
Material tubes / Fins	-	Aluminium / Aluminium								
Rows / Fins space	No/mm	3 / 1.8	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00		6.00				9.00		
Internal volume (each coil)	l	7.3		9.8	14.7			22.0		
Water connections										
Diameters inlet / outlet	DN-inch	DN50 2"		DN65 2 1/2"						
Unit volume	l	10	10	23	25	25	26	34	32	36
Dimensions										
Length	mm	2043		3043				4043		
Depth	mm	1201								
Height	mm	1902								
Weights										
Net weight	kg	722	738	895	1035	1152	1170	1392	1404	1444
Operating weight	kg	732	748	918	1060	1177	1196	1426	1436	1480

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.

(2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.

(3) - With outdoor temperature 35 °C; calculated according to ISO 3744.

Technical Data

Tab. 4b - Technical Data - CB0 006- 022 - AC 800

CB0 model with AC 800 mm fans - R410A		006	007	009	011	014	015	018	019	022
Performance *(1)*										
Cooling capacity	kW	56.8	68.0	85.2	108.8	128.8	141.3	171.1	187.3	208.7
Compressors power input	kW	16.9	22.7	23.9	32.4	42.4	50.4	52.1	61.1	70.3
Total power input	kW	18.6	24.4	27.3	35.8	45.8	53.8	57.2	66.2	75.4
Unit EER	-	3.05	2.79	3.12	3.04	2.81	2.63	2.99	2.83	2.77
Water flow	m^3/h	9.77	11.71	14.66	18.72	22.19	24.34	29.41	32.22	35.92
Water pressure drop	kPa	44	39	36	39	39	47	46	55	46
Sound level										
SPL (Sound Pressure Level) *(2)*	dB(A)	63		64	66	66.5		67	67.5	68
PWL (Sound Power Level) *(3)*	dB(A)	80		82	84	84.5		86	86.5	87
Refrigeration circuit										
Number of refrigeration circuits	No	1								
Refrigerant charge (each circuit)	kg	10.5	10.5	13.0	18.0	20.0	20.0	27.5	27.5	28.5
Compressors										
Number of compressors	No	1+1								
Type	-	Hermetic Scroll								
Nominal power (each compressor)	HP	10+10	13+13	15+15	15+25	25+25	25+30	30+30	30+40	40+40
Fans										
Number of fans	No	1		2				3		
Type	-	Axial								
Wheel nominal diameter	mm	800								
RPM	1/min	900								
Nominal power input (each fan)	kW	1.7								
Fans power input	kW	1.7		3.4				5.1		
Air flow rate	m^3/h	18000	17800	37000	36000	35600	35600	54000	54000	53400
Evaporator										
Number of evaporators	No	1								
Type	-	Brazed plate heat exchanger								
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6	11.6	14.8
Condensing coil										
Material tubes / Fins	-	Aluminium / Aluminium								
Rows / Fins space	No/mm	3 / 1.8	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00		6.00				9.00		
Internal volume (each coil)	l	7.3		9.8	14.7			22.0		
Water connections										
Diameters inlet / outlet	DN-inch	DN50 2"		DN65 2 1/2"						
Unit volume	l	10	10	23	25	25	26	34	32	36
Dimensions										
Length	mm	2043		3043				4043		
Depth	mm	1201								
Height	mm	1902								
Weights										
Net weight	kg	722	738	895	1035	1152	1170	1392	1404	1444
Operating weight	kg	732	748	918	1060	1177	1196	1426	1436	1480

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.

(2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.

(3) - With outdoor temperature 35 °C; calculated according to ISO 3744.

Technical Data

Tab. 4c - Technical Data - CG0 006- 018 - EC 900

CG0 model with EC 900 mm fans - R410A		006	007	009	011	014	015	018
Performance *(1)*								
Cooling capacity	kW	59.6	77.8	89.1	113.3	142.2	158.3	178.6
Compressors power input	kW	15.6	18.4	22.1	30.4	36.2	42.3	48.6
Total power input	kW	18.2	23.6	27.3	35.6	44.0	50.1	56.4
Unit EER	-	3.27	3.30	3.27	3.18	3.23	3.16	3.17
Water flow	m^3/h	10.25	13.28	15.31	19.46	24.47	27.17	30.67
Water pressure drop	kPa	49	50	39	42	47	57	50
Sound level								
SPL (Sound Pressure Level) *(2)*	dB(A)	78.5	79.5			80		
PWL (Sound Power Level) *(3)*	dB(A)	95.5	97.5			99		
Refrigeration circuit								
Number of refrigeration circuits	No	1						
Refrigerant charge (each circuit)	kg	10.5	12.5	16.0	18.0	26.5	26.5	27.5
Compressors								
Number of compressors	No	1+1						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	10+10	13+13	15+15	15+25	25+25	25+30	30+30
Fans								
Number of fans	No	1	2			3		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	900						
RPM	1/min	1000						
Nominal power input (each fan)	kW	2.6						
Fans power input	kW	2.6	5.2			7.8		
Air flow rate	m^3/h	23700	50600	48500	47400	72750	72750	71100
Evaporator								
Number of evaporators	No	1						
Type	-	Brazed plate heat exchanger						
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6
Condensing coil								
Material tubes / Fins	-	Aluminium / Aluminium						
Rows / Fins space	No/mm	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00	6.00			9.00		
Internal volume (each coil)	l	7.3	9.8	14.7		22.0		
Water connections								
Diameters inlet / outlet	DN-inch	DN50 2"	DN65 2 1/2"					
Unit volume	l	11	22	20	23	31	33	34
Dimensions								
Length	mm	2043	3043			4043		
Depth	mm	1201						
Height	mm	1931						
Weights								
Net weight	kg	723	888	934	1049	1357	1375	1418
Operating weight	kg	734	910	954	1072	1388	1408	1452

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.

(2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.

(3) - With outdoor temperature 35 °C; calculated according to ISO 3744.

Technical Data

Tab. 4d - Technical Data - CG0 006- 018 - EC 800

CG0 model with EC 800 mm fans - R410A		006	007	009	011	014	015	018
Performance *(1)*								
Cooling capacity	kW	54.3	73.9	84.2	104.7	133.8	147.4	164.3
Compressors power input	kW	18.0	20.1	24.3	34.3	40.1	47.4	55.3
Total power input	kW	18.7	21.5	25.7	35.7	42.2	49.5	57.4
Unit EER	-	2.91	3.44	3.28	2.93	3.17	2.98	2.86
Water flow	m^3/h	9.34	12.70	14.45	18.04	22.99	25.36	28.29
Water pressure drop	kPa	41	46	35	37	42	50	43
Sound level								
SPL (Sound Pressure Level) *(2)*	dB(A)	58	59		61	62		
PWL (Sound Power Level) *(3)*	dB(A)	75	77		79	81		
Refrigeration circuit								
Number of refrigeration circuits	No	1						
Refrigerant charge (each circuit)	kg	10.5	12.5	16.0	18.0	26.5	26.5	27.5
Compressors								
Number of compressors	No	1+1						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	10+10	13+13	15+15	15+25	25+25	25+30	30+30
Fans								
Number of fans	No	1	2			3		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	800						
RPM	1/min	718						
Nominal power input (each fan)	kW	0.7						
Fans power input	kW	0.7	1.4			2.1		
Air flow rate	m^3/h	13900	29200	28200	27800	42300	42300	41700
Evaporator								
Number of evaporators	No	1						
Type	-	Brazed plate heat exchanger						
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6
Condensing coil								
Material tubes / Fins	-	aluminium / aluminium						
Rows / Fins space	No/mm	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00	6.00			9.00		
Internal volume (each coil)	l	7.3	9.8	14.7		22.0		
Water connections								
Diameters inlet / outlet	DN-inch	DN50 2"	DN65 2 1/2"					
Unit volume	l	11	22	20	23	31	33	34
Dimensions								
Length	mm	2043	3043			4043		
Depth	mm	1201						
Height	mm	1874						
Weights								
Net weight	kg	723	888	934	1049	1357	1375	1418
Operating weight	kg	734	910	954	1072	1388	1408	1452

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.

(2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.

(3) - With outdoor temperature 35 °C; calculated according to ISO 3744.

Technical Data

Tab. 4e - Technical Data - FB0 006- 022 - AC 900

FB0 model with AC 900 mm fans - R410A		006	007	009	011	014	015	018	019	022
Performance (1)										
Cooling capacity	kW	61.4	73.7	91.1	116.3	138.5	151.6	182.8	199.7	223.7
Freecooling capacity (2)	kW	45.1	44.9	70.2	87.8	87.6	89.7	133.8	137.8	133.9
Compressors power input	kW	16.8	22.5	23.8	32.4	42.1	50.0	52.1	61.0	70.1
Total power input	kW	19.2	24.9	28.6	37.2	46.9	54.8	59.3	68.2	77.3
Unit EER	-	3.20	2.96	3.19	3.13	2.95	2.77	3.08	2.93	2.89
Fluid flow	m^3/h	11.53	13.91	17.14	21.90	26.08	28.61	34.42	37.64	42.18
Hydraulic pressure drop	kPa	132	146	103	120	140	165	158	183	188
Sound level										
SPL (Sound Pressure Level) (3)	dB(A)	75		76		76.5	76.5	77	77.5	78
PWL (Sound Power Level) (4)	dB(A)	92		94		94.5	94.5	96	96.5	97
Refrigeration circuits										
Number of refrigeration circuits	No	1								
Refrigerant charge (each circuit)	kg	10.5	10.5	13.0	18.0	20.0	20.0	27.5	27.5	28.5
Compressors										
Number of compressors	No	1+1								
Type	-	Hermetic Scroll								
Nominal power (each compressor)	HP	10+10	13+13	15+15	15+25	25+25	25+30	30+30	30+40	40+40
Fans										
Number of fans	No	1		2				3		
Type	-	Axial								
Wheel nominal diameter	mm	900								
RPM	1/min	900								
Nominal power input (each fan)	kW	2.4								
Fans power input	kW	2.4		4.8				7.2		
Air flow rate	m^3/h	19500		41800	39000			58500		
Evaporator										
Number of evaporators	No	1								
Type	-	Brazed plate heat exchanger								
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6	11.6	14.8
Condensing coil										
Material tubes / Fins	-	Copper / Aluminium								
Rows / Fins space	No/mm	3 / 1.8	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00		6.00				9.00		
Internal volume (each coil)	l	7.3		9.8	14.7			22.0		
Freecooling coil										
Material tubes / Fins	-	Copper / Aluminium								
Rows / Fins space	No/mm	3 / 2.1	3 / 2.5	2 / 2.1	3 / 2.1	3 / 2.5	3 / 2.5	3 / 2.1	3 / 2.1	3 / 2.5
Face area	m^2	3.00		6.00				9.00		
Hydraulic connections										
Diameters inlet / outlet	DN-inch	DN50 2"		DN65 2 1/2"						
Unit volume	l	76	77	102	120	122	121	160	160	162
Dimensions										
Length	mm	2043		3043				4043		
Depth	mm	1201								
Height	mm	1902								
Weights										
Net weight	kg	860	876	1062	1248	1369	1387	1678	1690	1728
Operating weight	kg	936	953	1164	1368	1491	1508	1838	1850	1890

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
(2) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; fluid inlet temperature 15 °C; ethylene glycol 30%.
(3) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
(4) - With outdoor temperature 35 °C; calculated according to ISO 3744.

Technical Data

Tab. 4f - Technical Data - FB0 006- 022 - AC 800

FB0 model with AC 800 mm fans - R410A		006	007	009	011	014	015	018	019	022
Performance (1)										
Cooling capacity	kW	59.9	71.3	89.7	114.0	134.9	147.2	178.9	194.8	217.4
Freecooling capacity (2)	kW	41.6	41.0	65.2	81.1	80.5	82.2	123.3	126.7	122.9
Compressors power input	kW	17.5	23.5	24.4	33.5	43.7	52.2	53.9	63.3	72.9
Total power input	kW	19.3	25.3	28.0	37.1	47.3	55.8	59.3	68.7	78.3
Unit EER	-	3.10	2.82	3.20	3.07	2.85	2.64	3.02	2.84	2.78
Fluid flow	m^3/h	11.32	13.45	16.88	21.47	25.44	27.68	33.70	36.76	41.04
Hydraulic pressure drop	kPa	128	137	100	116	134	155	152	176	179
Sound level										
SPL (Sound Pressure Level) (3)	dB(A)	63		64	66	66.5		67	67.5	68
PWL (Sound Power Level) (4)	dB(A)	80		82	84	84.5		86	86.5	87
Refrigeration circuits										
Number of refrigeration circuits	No	1								
Refrigerant charge (each circuit)	kg	10.5	10.5	13.0	18.0	20.0	20.0	27.5	27.5	28.5
Compressors										
Number of compressors	No	1+1								
Type	-	Hermetic Scroll								
Nominal power (each compressor)	HP	10+10	13+13	15+15	15+25	25+25	25+30	30+30	30+40	40+40
Fans										
Number of fans	No	1		2				3		
Type	-	Axial								
Wheel nominal diameter	mm	800								
RPM	1/min	900								
Nominal power input (each fan)	kW	1.8								
Fans power input	kW	1.8		3.6				5.4		
Air flow rate	m^3/h	17000		36000	34000			51000		
Evaporator										
Number of evaporators	No	1								
Type	-	Brazed plate heat exchanger								
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6	11.6	14.8
Condensing coil										
Material tubes / Fins	-	Copper / Aluminium								
Rows / Fins space	No/mm	3 / 1.8	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00		6.00				9.00		
Internal volume (each coil)	l	7.3		9.8	14.7			22.0		
Freecooling coil										
Material tubes / Fins	-	Copper / Aluminium								
Rows / Fins space	No/mm	3 / 2.1	3 / 2.5	2 / 2.1	3 / 2.1	3 / 2.5	3 / 2.5	3 / 2.1	3 / 2.1	3 / 2.5
Face area	m^2	3.00		6.00				9.00		
Hydraulic connections										
Diameters inlet / outlet	DN-inch	DN50 2"		DN65 2 1/2"						
Unit volume	l	76	77	102	120	122	121	160	160	162
Dimensions										
Length	mm	2043		3043				4043		
Depth	mm	1201								
Height	mm	1902								
Weights										
Net weight	kg	860	876	1062	1248	1369	1387	1678	1690	1728
Operating weight	kg	936	953	1164	1368	1491	1508	1838	1850	1890

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
(2) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; fluid inlet temperature 15 °C; ethylene glycol 30%.
(3) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
(4) - With outdoor temperature 35 °C; calculated according to ISO 3744.

Technical Data

Tab. 4g - Technical Data - FG0 006- 018 - EC 900

FG0 model with EC 900 mm fans - R410A		006	007	009	011	014	015	018
Performance (1)								
Cooling capacity	kW	63.0	82.6	93.5	118.8	149.3	165.4	187.2
Freecooling capacity (2)	kW	45.7	70.7	84.2	88.6	130.2	136.5	135.1
Compressors power input	kW	16.1	18.9	22.7	31.3	37.2	43.6	50.1
Total power input	kW	18.8	24.3	28.1	36.7	45.3	51.7	58.2
Unit EER	-	3.35	3.40	3.33	3.24	3.30	3.20	3.22
Fluid flow	m^3/h	11.84	15.50	17.58	22.35	28.08	31.12	35.21
Hydraulic pressure drop	kPa	139	120	99	125	132	157	165
Sound level								
SPL (Sound Pressure Level) (3)	dB(A)	78.5	79.5			80		
PWL (Sound Power Level) (4)	dB(A)	95.5	97.5			99		
Refrigeration circuits								
Number of refrigeration circuits	No	1						
Refrigerant charge (each circuit)	kg	10.5	12.5	16.0	18.0	26.5	26.5	27.5
Compressors								
Number of compressors	No	1+1						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	10+10	13+13	15+15	15+25	25+25	25+30	30+30
Fans								
Number of fans	No	1	2			3		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	900						
RPM	1/min	1000						
Nominal power input (each fan)	kW	2.7						
Fans power input	kW	2.7	5.4			8.1		
Air flow rate	m^3/h	22000	46600	44000		66000		
Evaporator								
Number of evaporators	No	1						
Type	-	Brazed plate heat exchanger						
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6
Condensing coil								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00	6.00			9.00		
Internal volume (each coil)	l	7.3	9.8	14.7		22.0		
Freecooling coil								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 2.5	2 / 2.1	3 / 2.1	3 / 2.5	3 / 2.1	3 / 2.1	3 / 2.5
Face area	m^2	3.00	6.00			9.00		
Hydraulic connections								
Diameters inlet / outlet	DN-inch	DN50 2"	DN65 2 1/2"					
Unit volume	l	77	101	117	121	159	159	160
Dimensions								
Length	mm	2043	3043			4043		
Depth	mm	1201						
Height	mm	1931						
Weights								
Net weight	kg	861	1055	1147	1266	1643	1661	1702
Operating weight	kg	938	1156	1264	1387	1802	1820	1862

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
(2) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; fluid inlet temperature 15 °C; ethylene glycol 30%.
(3) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
(4) - With outdoor temperature 35 °C; calculated according to ISO 3744.

Technical Data

Tab. 4h - Technical Data - FG0 006- 018 - EC 800

FG0 model with EC 800 mm fans - R410A		006	007	009	011	014	015	018
Performance (1)								
Cooling capacity	kW	57.4	78.2	88.3	109.9	140.3	154.0	172.1
Freecooling capacity (2)	kW	33.9	55.3	65.0	66.5	99.7	103.1	100.9
Compressors power input	kW	18.6	20.6	25.0	35.3	41.2	48.9	57.0
Total power input	kW	19.3	22.0	26.4	36.7	43.3	51.0	59.1
Unit EER	-	2.97	3.55	3.34	3.00	3.24	3.02	2.91
Fluid flow	m^3/h	10.82	14.72	16.64	20.73	26.44	29.05	32.49
Hydraulic pressure drop	kPa	118	109	90	109	118	139	143
Sound level								
SPL (Sound Pressure Level) (3)	dB(A)	58	59		61	62		
PWL (Sound Power Level) (4)	dB(A)	75	77		79	81		
Refrigeration circuits								
Number of refrigeration circuits	No	1						
Refrigerant charge (each circuit)	kg	10.5	12.5	16.0	18.0	26.5	26.5	27.5
Compressors								
Number of compressors	No	1+1						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	10+10	13+13	15+15	15+25	25+25	25+30	30+30
Fans								
Number of fans	No	1	2			3		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	800						
RPM	1/min	715						
Nominal power input (each fan)	kW	0.7						
Fans power input	kW	0.7	1.4			2.1		
Air flow rate	m^3/h	13500	28000	27000		40500		
Evaporator								
Number of evaporators	No	1						
Type	-	Brazed plate heat exchanger						
Internal volume (refrigerant side)	l	4.1	5.1	5.6	7.6	9.2	9.2	11.6
Condensing coil								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 1.6	2 / 1.8	3 / 1.8	3 / 1.6	3 / 1.8	3 / 1.8	3 / 1.6
Face area	m^2	3.00	6.00			9.00		
Internal volume (each coil)	l	7.3	9.8	14.7		22.0		
Freecooling coil								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 2.5	2 / 2.1	3 / 2.1	3 / 2.5	3 / 2.1	3 / 2.1	3 / 2.5
Face area	m^2	3.00	6.00			9.00		
Hydraulic connections								
Diameters inlet / outlet	DN-inch	DN50 2"	DN65 2 1/2"					
Unit volume	l	77	101	117	121	159	159	160
Dimensions								
Length	mm	2043	3043			4043		
Depth	mm	1201						
Height	mm	1874						
Weights								
Net weight	kg	861	1055	1147	1266	1643	1661	1702
Operating weight	kg	938	1156	1264	1387	1802	1820	1862

Notes:

(1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
(2) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; fluid inlet temperature 15 °C; ethylene glycol 30%.
(3) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
(4) - With outdoor temperature 35 °C; calculated according to ISO 3744.

5 Mechanical Specifications

Construction and Panels

The **Liebert HPC-S 006- 022** series is designed for outdoor installations, having maximum corrosion protection, with all panels being of heavy gauge, galvanised steel construction, polyester-powder painted in RAL7032.

The base is of 2 mm gauge galvanised steel channels, polyester-powder painted in RAL7032, interconnected using special rivets with elevated mechanical characteristics.
The inner hidden frame parts are constructed of galvanised steel.
Suitable fastening points are seated in the base, where the standardized hooks (UNI 1947) can be fitted for lifting of the unit.

The unit is supplied with a pallet enabling easier handling.

Panels are made of suitable gauge galvanised steel, polyester-powder painted in RAL7032 and provided with waterproof gaskets.
Lateral and rear panels are fixed with screws, panels on the front and the access door for the electrical board are fixed with triangular insert locks (a suitable key is supplied).
All screws and rivets are galvanized.

The access to the hydraulic components is ensured by opening the rear panels.
The compressor is located in a closed compartment, protected against outer agents, and insulated from the airflow to avoid noise transmission and heat dissipation to the air stream.

The compressor compartment cooling is ensured by a grill on the front closing panel.
The compressors are mounted on anti-vibration mounts to prevent vibration transmission to the structure; in the low noise and quiet versions, the compressors feature a shroud made up of sound-insulating and sound-absorbing materials.

Refrigeration Circuit

All models are equipped with one refrigerant circuit in which two compressors are fitted, in tandem configuration.

It includes one safety pressure switch for Mod. 006-009 and two pressure switches for Mod. 011-022 for high pressure, and one low pressure safety switch for only B version, TXV and solenoid valve for B version and EEV for G version, filter-dryer with anti-acid solid cartridge, moisture indicating sight glass, ”HP” safety valves, charge connections 5/16” SAE - Flare, liquid line, manual shut-off valve; ”HP” and ”LP” pressure gauges.

The units are supplied charged with refrigerant R410A and oil set in the factory according to the operating conditions within the indicated limits.

Refrigerant

The units are designed for being used with refrigerant R410A.

Compressor

The **Liebert HPC- S 006- 022** series is equipped with two hermetic, scroll compressors specifically designed for application in refrigeration systems.

Tandem compressors consist of two compressors which can be equal or different size models; they offer advantages over single compressors with equivalent capacity such as:

- Efficient capacity control - through cycling one or two compressors.
- Increased reliability – fewer starts/stops than a single larger compressor.
- Redundancy – part load capacity if one compressor fails, reduced replacement costs.
- Superior performances on seasonal efficiency (ESEER) and consequently lower running costs.

Compressors used in tandem are solid mounted by use of steel spacers on two rigid rails to build a unit in order to keep stresses in the tubing connecting the compressors at reasonable levels; compressors are mounted as close as possible to each other so as to keep the gas-oil equalization line as short as possible. The rails are bolted to the chiller basement through anti-vibration mounts. Connection for both oil and gas equalization is made via sight glass of each compressor even when compressors have different capacity; the so called Two-Phase Tube Line (TPTL) for oil and gas equalization balances the pressures between the shells and so maintains the same oil level in each compressor. This configuration is equipped and fitted with an oil sight glass in the equalization (TPTL) line.

Mechanical Specifications

Each compressor is featured by:

- Optimized R410A design that ensures:
  - Higher EER.
  - Wide operating range: lower condensation and higher evaporation envelope gives more energy savings.
  - Lower sound emission level.
  - Lighter systems.
  - More compact equipment.
- Axial and Radial scroll compliances for high tolerance to liquid.
- Self-lubricated Teflon bearings for high tolerance to liquid sand low oil level.
- Low leak check valve prevent high side liquid migration and facilitate pressure equalization inside. the compressor (unloaded start-up).
- ASTP or PTC scroll thermal protection.
- Discharge system for low sound emissions an high volumetric efficiency.
- High accuracy balancing system to reduce vibrations.
- Motor cooled by the suction gas with suitably fit thermal probes.
- Motor cooling channels with low flow resistance.
- Reduced weight and overall dimensions.
- Case with electric supply terminals and electronic protection module.
- Efficient oil distribution system.

All these features aim to achieve values of efficiency (EER), sound emission, vibrations, reliability, operating range, resistance to liquid blows and compactness that cannot be compared with those of other compressors with the same capacity but with different technology.

Each compressor is equipped with a three- phase asynchronous two- pole motor cooled by the suction gas. The motor is equipped with electronic protection device.

The compressor is further equipped with:

- rubber anti- vibration mounts;
- polyester oil charge;
- oil indicating sight glass;
- oil charge/discharge connections;
- crankcase heater.

The iCOM control manages the operation of the compressors so as to ensure always their operation within their limits with top reliability; the “HP” and “LP” alarms, the motor thermal protection, the start times and the min. operation- pause times and their rotation are indeed motor- driven and controlled.

Electronic Expansion Valve

The electronic expansion valve used in -the **Liebert HPC-S 006- 022** G version enables accurate and min. possible control of the overheating of the gas sucked by the compressor under all load conditions, together with the operation at low condensation and high 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 HPC-S 006- 022** 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.

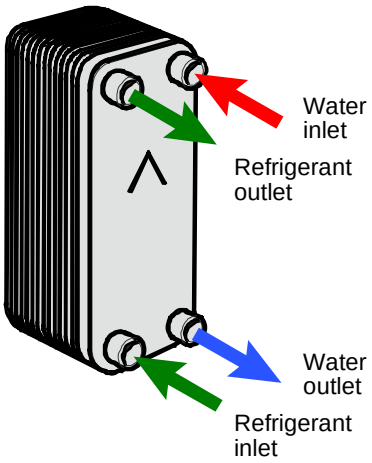
Evaporators

Liebert HPC- S 006- 022 units are equipped with direct expansion, weld- brazed plate type evaporators, designed, constructed, tested (pressure test on both refrigerant and water sides) and documented to comply with PED 2014/68/EU standards. The corrugation (typical angle) and the design of each plate have been thoroughly analyzed and thus optimized to better meet the physical features of the refrigerant (R410A) and provide for an optimal refrigerant distribution. This means really outstanding performance in the thermal energy transfer.
They incorporate one refrigeration circuit and one water circuit. The plates are fabricated from seamless carbon stainless steel AISI 316, reciprocally welded with pure copper.

Mechanical Specifications

All exchangers are optimized for the refrigerant R410A and are complete with an inner device (distributor) evenly distributing the refrigerant gas on each channel.

They are externally insulated against condensate with closed cell elastomer.
The evaporators are connected with lines equipped with drainage and vent connections.
The evaporators are protected against freezing by a paddle-type flow switch and a standard antifreeze sensor directly managed by the microprocessor.
As an option, thermostatically controlled heaters are applied to prevent freezing with outdoor temperatures below 0 °C without primary flow.



Tab. 5a - Working Limits

Design Temp.	Design Pressure		Test Pressure	
Min. / Max.	Refrigerant	Water	Refrigerant	Water
- 196 / +150 °C	45.0 bar	45.0 bar	74.0 bar	74.0 bar

Condensers

The condensing coils design for R410A refrigerant are made of copper tubes and aluminium fins for free-cooling version and aluminium tubes and aluminium fins for chiller version and are mounted in vertical configuration. Copper tubes in staggered rows are mechanically expanded in order to have the best contact with fins. The aluminium fins are manufactured with a special high efficiency rusticate surface that increases the thermal exchange.

The condensing coils are tested at a pressure of 45 bar.

Hydraulic Circuit

The hydraulic circuit - with max. working pressure 6 bar - is made up of carbon steel pipes connected with threaded fittings and couplings; gaskets are made of EPDM.
This arrangement permits compensation for thermal expansion, reduces noise and vibration propagating through hydraulic pipelines and facilitates ease of maintenance. The anti- condensate insulation of the hydraulic circuit is by closed cell synthetic elastomer.
The flow switch is a compulsory protection device for the unit fitted as standard on all units versions with or without recirculation pumps.

Expansion Vessel and Safety Valve

These accessories are directly installed on the unit hydraulic circuit as standard. The expansion vessel (charged at 1.5 bar, max. operating pressure 10 bar) has an 8 litres volume, the safety valve is set at 3.5 bar when pumps are fitted, in other cases it is set at 6 bar. Their installation positions are indicated in the hydraulic circuit scheme. It is recommended that the total expansion vessel capacity required be always checked, depending on the unit volume, the circuit volume, the glycol percentage in the mixture and the expected maximum temperature variation of the mixture.

Freecooling Execution

Liebert HPC- S 006- 022 models in the "Freecooling execution" are designed with an integrated free-cooling system consisting of:

- cooling coils with copper tubes and aluminium fins, mounted in vertical configuration;
- vent and drainage valves on the freecooling coils;
- low pressure drop three- way valve with modulating servo- control.

All the freecooling functions are managed by the microprocessor control in three operating modes, according to ambient conditions and thermal load:

- direct expansion with compressors operation only; 100% water flow through the evaporator;
- direct expansion and Freecooling; 100% water flow first through the freecooling coils and then through the evaporator, with partial compressor operation;

- freecooling; 100% water flow through the freecooling coils and then through the evaporator, without compressors operation.

Fan speed control, compressor starting and compressor partialisation are managed by the microprocessor control with different strategies in order to increase the energy saving as much as possible.

Recirculating Pumps (Option)

All the models of the **Liebert HPC- S 006- 022** series can be equipped with one or two water circulating pumps, factory- piped.
On each **Liebert HPC- S 006- 022** unit it is possible to select the pump type and quantity (with high or low head), depending on the pressure available from the applications. They are suitable for operation with water- ethylene glycol mixture up to 35%- 65% by weight and mixture temperatures down to 4° C.

The pumps are of the close- coupled centrifugal type, with single impeller featuring axial suction and radial discharge, direct driven. The electrical motor is asynchronous, with squirrel cage rotor, close construction, external ventilation, and two poles, having IP 55 protection and Class F insulation. It is standard supplied with IE2 motors and compliant with Regolation (EC) no. 640/2009.

Pump body and impeller are in stainless steel or cast iron. Mechanical seal is in ceramic/carbon rings, EPDM elastomers, other parts are made of stainless steel. Mounting dimensions are according to EN 12756 (ex DIM 24960) and ISO 3069. O- ring are made of EPDM.

Easy maintenance with “back pull- out” design: it is not required to disconnect the pump body from the pipe line, due to back pull- out design.
Suction and discharge ports are threaded (Rp ISO 7/1) or flanged according to EN 1092- 2 (ex UNI 2236) and DIN 2532.

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

Fan Section

Fans are axial type, with blades made of aluminium sheet insert, sprayed with PP plastic statically and dynamically balanced, directly coupled to an electric motor with external rotor. They are balanced G66,3 according to DIN ISO 1940 part 1, have an IP54 degree of protection, Class F winding insulation and internal thermal protection. The characteristics of the motor depend on the unit version:

”G”: . . . . . EC 6-pole motor, propeller diameter 900 mm, 900 rpm as standard, EC 8-pole motor, propeller diameter 800 mm, 700 rpm as option;

”B” BASE: . . AC (EC) 6-pole motor, propeller diameter 900 mm, 900 rpm as standard, AC (EC) 6-pole motor, propeller diameter 800 mm, 900 rpm as option.

The fans are complete with safety protection grilles and high efficiency nozzles.
Die cast aluminium blades with a sickle-shaped profile are used in order to improve the sound attenuation effect.
Fan speed control is achieved - as standard - by means of a continuous fan speed regulator. This ensures also to run the compressors always with optimum working efficiency.

EC Fans

In all versions, as standard or alternative to the modulating adjustment (TRIAC), it is possible to choose fans with electronic switching motor, with the same aeraulic performance as those installed in the selected unit, as well as the possibility of a fan modulating adjustment entirely managed by the micropro-

cessor control. The EC technology includes a permanent magnet rotor combined with an electronic switching control of the stator magnetic field directly integrated in the motor (brushless motor). Such electronic switching device manages the fan rotation speed modulation. Compared to the traditional induction three- phase motors, the inner losses in the iron reduce by 60% and in the copper by 40%, with an electric absorption lower by 20- 30% than those of a traditional fan with induction three- phase motor, getting the same aeraulic performance. Further, while modulating the speed, the absorbed power can be equal to 50 % than one of a traditional fan with phase cutoff adjustment (TRIAC).
A general noise reduction is further obtained, as the EC technology used for the adjustment does not cause magnetic vibrations, not even on special frequencies corresponding to certain rotation speeds. Finally, the decrease of pickup currents thanks to the EC technology and the absence of sliding contacts for the rotor supply significantly reduce the stresses that negatively influence the component life, increasing the machine overall reliability.

Electrical Panel

The electrical panel is designed, constructed and tested in compliance with IEC standards (EN60204- 1). The board is installed in a closed technical compartment (compressors compartment), thus it features a protection degree equivalent to IP54. It is possible to access the iCOM control display without switching the unit off, so as to aid maintenance operations.

The cooling of the electrical panel is achieved through forced ventilation. For low ambient temperatures (below - 5° C) it is possible to have an electric heater fitted inside (optional).

NOTE: Three-phase electric power

Requirements:

The **Liebert HPC- S 006- 022** units are equipped with electrical devices (EC motors, power supplies module, inverter pumps, control devices, etc.) that are designed to operate properly with Star-connected power (Wye) with earthed neutral (TN or TT system).
Three-phase distribution Delta-connected (Δ) or Star-connected power (Wye) without ground or floating ground (IT) contact **Vertiv**.

Main features:

- power supply, 400±10% V/3 ph/50 Hz + PE;
- auxiliary power supply circuit, 230 V/1 ph/50 Hz and 24 V/1 ph/50 Hz;
- main switch;
- protection MCBs for compressors, fans and pumps;
- contactors for compressors and pumps;
- relay for checking phase sequence, minimum voltage, loss one or more phase;
- manual operation through iCOM controller;
- PFC(Power Factor Correction) for compressors (option);
- compressors electronic soft start (option);
- volt- free contacts for remote indication of:
  - compressors in operation;
  - pump(s) in operation;
  - general alarm;
  - warning alarm;
  - external input for remote ON/OFF;
  - only for G version also:
    - tandem compressor alarm 1/2;
    - high temperature inlet/outlet water alarm;
    - water flow alarm;
    - condenser fan failure;
    - configurable free contact;

Packing

Units are shipped with plastic film protection and a pallet.
The pallet must be removed before the unit installation.

Mechanical Specifications

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 to the freecooling units for damage due to frost if the hydraulic circuit has not been charged with a water - glycol mixture with % suitable to the minimum temperatures in the application 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 HPC- S 006- 022** units are "CE" marked.

Accessories

Pump Group

Available head pressure values are declared at the unit 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 and freecooling models with double pumps, one pump is operating and one is in stand-by.

Tab. 5b - 2 Pole, standard head pressure (data referred to each pump)

Models			006	007	009	011	014	015	018	019	022
CB0	Water Flow	m^3/h	10.04	12.14	14.93	19.18	22.83	25.20	30.20	33.18	37.12
	Available Pressure Head	kPa	103	99	87	81	103	81	44	98	96
CG0	Water Flow	m^3/h	10.23	13.34	15.29	19.46	24.43	27.18	30.68	-	-
	Available Pressure Head	kPa	101	84	83	78	89	61	37	-	-
Pump/s number		Nr.	1 / 2								
Pump Rotor Model		-	CEA 210/2			CEA 370/1	CEA 370/2			NSCE 40-125/22	
Nominal Motor Power		kW	0.75			1.10	1.50			2.20	
Noise Level (*)		dB(A)	63				64			65	

(*) - According to ISO 3744

Tab. 5c - 2 Pole, high head pressure (data referred to each pump)

Models			006	007	009	011	014	015	018	019	022
CB0	Water Flow	m^3/h	10.04	12.14	14.93	19.18	22.83	25.20	30.20	33.18	37.12
	Available Pressure Head	kPa	137	134	125	122	142	121	88	142	143
CG0	Water Flow	m^3/h	10.23	13.34	15.29	19.46	24.43	27.18	30.68	-	-
	Available Pressure Head	kPa	135	120	120	120	129	101	82	-	-
Pump/s number		Nr.	1 / 2								
Pump Rotor Model		-	CEA 210/3			CEA 370/2	CEA 370/3			NSCE 40-125/30	
Nominal Motor Power		kW	1.10			1.50	1.85			3.00	
Noise Level (*)		dB(A)	63			64	65			66	

(*) - According to ISO 3744

Mechanical Specifications

Tab. 5d - 2 Pole, standard head pressure (data referred to each pump)

Models			006	007	009	011	014	015	018	019	022
FB0	30% glycol- water Mixture Flow	m^3/h	11.54	13.88	17.13	21.87	26.05	28.57	34.38	37.61	42.15
	Available Pressure Head	kPa	46	69	90	69	70	90	90	125	110
FG0	30% glycol- water Mixture Flow	m^3/h	11.84	15.53	17.59	22.32	28.04	31.09	35.19	-	-
	Available Pressure Head	kPa	38	84	90	62	76	95	81	-	-
Pump/s number		Nr.	1 / 2								
Pump Rotor Model		-	CEA 210/3	CEA 210/4		CEA 370/3	NSCE 40-125/30	NSCE 40-160/40		NSCE 40-160/55	
Nominal Motor Power		kW	1.10	1.50		1.85	3	4		5.5	
Noise Level (*)		dB(A)	63	64		65		66		67	

(*) - According to ISO 3744

Tab. 5e - 2 Pole, high head pressure (data referred to each pump)

Models			006	007	009	011	014	015	018	019	022
FB0	30% glycol- water Mixture Flow	m^3/h	11.54	13.88	17.13	21.87	26.05	28.57	34.38	37.61	42.15
	Available Pressure Head	kPa	95	106	129	124	117	151	158	219	191
FG0	30% glycol- water Mixture Flow	m^3/h	11.84	15.53	17.59	22.32	28.04	31.09	35.19	-	-
	Available Pressure Head	kPa	87	122	129	117	123	162	147	-	-
Pump/s number		Nr.	1 / 2								
Pump Rotor Model		-	CEA 210/4	CEA 210/5		CEA 370/5	NSCE 40-160/40	NSCE 40-160/55		NSCE 40-160/75	
Nominal Motor Power		kW	1.50	1.85		3.00	4.00	5.50		7.50	
Noise Level (*)		dB(A)	64	65		66		67			

(*) - According to ISO 3744

Anti- Vibration Mounts

Rubber anti- vibration supports: "bell"- type supports with a truncated- conic shape. The support is made up of a vulcanised rubber elastic element, on a metal body in galvanised steel with a base arranged for ground fixing. They are suitable for dampening high frequency vibrations and for limiting cross thrusts.

Spring vibration- damping support made of:

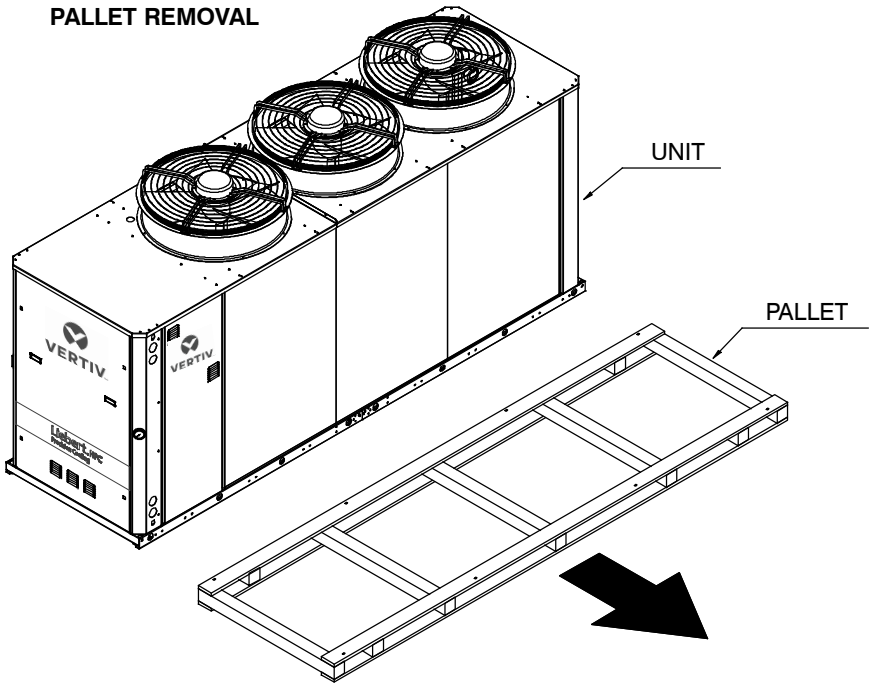
- Base plate in carbon steel; sand-blasted and cataphoresis protected; epoxy powder coated; with welded stiffeners and slots for screwing into ground.
- Cover in carbon steel; sand-blasted and cataphoresis protected; epoxy powder coated; with M12 hole.
- Intermediate plate, to equalize the springs loads; sand-blasted and cataphoresis protected; epoxy powder coated.
- Plastic spring locking rings and guiding profiles to guarantee the insulations from the vibrations.
- Hexagonal head screw and hexagonal nut M12, zinc plated, used to level the unit after positioning.
- Spring steel helicoidal springs (UNI EN 10270 – 1 SH), cataphoresis protected.
- A pad with antislip reliefs stabilizes the damper position by friction.

They are suitable for dampening high and medium frequency vibrations > 10Hz, guaranteeing excellent insulation efficiency > 85% from 15Hz.

The pallet must be removed before the unit installation (see picture on page 5- 8).

Mechanical Specifications

PALLET REMOVAL



Inertial Tank

It enables the inertial stabilizer function, for a better compressor operation, summed up in the following two points:

- it reduces the frequency of the compressor start up and consequent high current peaks, which is higher when the system thermal inertia is lower, improving their performance.
- it naturally eliminates the operation troubles caused by sudden load variations (shown by variations of the chilled water temperature).

The buffer tank is supplied complete with manometer and temperature sensor well, air purge valve, discharge valve and sinking connection for electric heaters; max operating pressure: 3,5 bar with pump and 6 bar in other cases.

Built- in carbon steel and coated with anti-condensate insulation with PVC film proper for outdoor installation.

Technical Data:

- Internal volume (1 fan): . . . . . 100 litres
  (2 fans): . . . . . 200 litres
  (3 fans): . . . . . 300 litres

Other Accessories

The following accessories can be installed as an option:

- Anti- vibrating mounts (spring / rubber).
- Dee shackle UNI 1947.
- Coldfire IP40 remote box.
- Water filter.

6 Controls

Microprocessor Controls

iCOM Control

Liebert HPC- S 006- 022 models are controlled by **iCOM Medium** (Fig. 1).

iCOM is the standard on- board control and its advanced features secure system optimisation and energy savings. Full management of the **Liebert HPC- S 006- 022** units is granted by the on board control iCOM, which allows the programming of temperature and pressure thresholds as well as the teamwork functionality through Ethernet network. User set- up can be done with a simple Operating Display that, through symbols and codes, ensures a reliable and flexible man- machine interface.

iCOM

Fig. 1

- The standard software of the **Liebert HPC- S 006- 022** Units includes special control algorithms that ensure real energy savings and enhance the reliability of the full system.
- Immediate set- up can be available through the "Unit Code" system. In case of re- configuration needs, the full configuration of the unit and recalculation of all the thresholds levels (which depend on the refrigerant type) are available by simply enabling the configuration Unit Code.
- Sequential auto- restart timer allows phased units restart after power failure.
- Pumps' durability is granted by a special auto- rotation start- up function.
- The record of the working hours of compressors, pumps and freecooling is easily available via the CDL iCOM display.
- Auto- selection of the best control strategy at different ambient temperatures is implemented in order to assure an optimised usage of the compressors and condensers fans.
- The "Ambient compensation" function can be enabled to make the unit set- point rise automatically during warm periods, permitting energy savings.
- For low noise versions with fan speed control there is a special algorithm which, together with the compressor management, keeps the fan speed on the lowest possible value.
- Compressors' Run/Stop time management is implemented in order to obtain the optimisation of compressors' operations either within the unit, or, in case of networking Ethernet, within the whole of the **Liebert HPC- S 006- 022** Units system.
- A special working mode can be established in combination with **Vertiv HPAC Units** to obtain the so called "Supersaver" system, that enhances the energy saving capabilities. The information on the cooling needs of the air conditioners is available to the **Liebert HPC- S 006- 022** units, that will manage its resources (compressors and freecooling) in the most efficient way in order to save additional energy.
- When used with Controls electronic expansion valves board, the **Liebert HPC- S 006- 022** provides the control of the superheat in the evaporator. In order to perform this control task, it requires the suction pressure and the suction gas temperature value. These signals can be received through two analogue inputs.
- All settings are 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.
- Up to 16 **Liebert HPC- S 006- 022** units can be easily linked together on a network to provide teamwork mode, stand- by operation and duty cycling without additional hardware. Reliability is not affected if there are problems on the data communication buses, because the units return automatically to the stand- alone mode.

iCOM Technical Data

Technical Data	iCOM Medium
E2prom	4 Mbit + 512 kbit
Flash memory	32 Mbit
RAM memory	128 Mbit
Microcontroller	Coldfire 32 Mbit
Analogue Input	3 x 0- 10V, 0- 5V, 4..20mA (selectable) + 2 PTC/NTC + 3 NTC
Digital Input	9 x opto- coupled
Analogue Output	2 x 0- 10V
Digital Output	7 triacs output and 2 relay output
Time and date	Buffered by an LI- battery
Hirobus Lan connectors	2 RJ45 sockets (for unit in LAN, remote display)
Ethernet network connectors	1 RJ45 socket
CAN bus connectors	1 RJ12 sockets
Hironet connectors	1 RJ10 socket for RS485 (direct connection to proprietary supervision)
RS232 service port	-

CDL Graphic Display
(special option fitted on Electrical Panel chiller board or optional for indoor remote IP40 Box installation)

The CDL graphic display featuring a 24h / 8 days graphic record of controlled parameters as well as the last 200 events occurred.

A back- up battery keeps the data stored in the memory (graphic data record, alarms).

- Medium graphic display (320 x 240 pixel).
- System Window: system operation status at a glance.
- Self- explanatory Icons: they are used for the Menu- Layout of the CDL iCOM.
- Online Help: every single parameter has its own multi- page explanation.
- 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).
- Multi- language menu with on- the- fly language selection.

CDL Technical Data

- Microcontroller: . . . . . Coldfire 32 bit;
- Ethernet network connectors: . . . . . 2 RJ45 sockets (for unit in LAN, remote display);
- CAN bus connectors: . . . . . 2 RJ12 sockets;
- Power supply: . . . . . via CAN bus or external 12 Vdc supply.

Liebert HPC- S 006- 022 Connectivity

iCOM and CDL allow Connectivity with superior levels of control and supervision systems:

Hirovisor IP software

This software allows distance monitoring and telemaintenance, and also the storing in the personal computer of the graphics of water temperature trends and status reports for archiving purposes. Delivery of SMS and e- mail is supported.

BMSs connections

The IS cards and other gateway represent the communication managers portfolio which allow the integration of the **Liebert HPC- S 006- 022** units into the most diffused Building Management Systems. The most diffused are: SNMP, HTTP, MODBUS and LONWORK.

7 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. 7a - Chiller Table - CB0 - CG0

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	0,998	0,993	0,987	0,977	0,969
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	0,998	0,997	0,995	0,992	0,990

Tab. 7b - Freecooling Table - FB0 - FG0

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	1,013	1,007	1,002	1	0,990	0,982
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	1,005	1,003	1,002	1	0,997	0,995

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 Freecooling 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. 7c - Fouling correction factors

Fouling factors [10^{-4} m^2 °C/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 x 10^{-4} m^2 ° C / 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. 7d - 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

Unit performance reported in the tables are given for sea level conditions.
For different altitude, performances should be corrected with the correction factors shown above.

8 Sound Levels

Sound Pressure and Power Levels

SPL

The values of Sound Pressure Level SPL for every octave band frequency, measured with unit on full load operation, at nominal working conditions (ambient air temperature 35°C, evaporator water inlet/outlet temperature 12/7°C), free field conditions and 1 m from unit in according to ISO 3744 average method are indicated in the following tables.

PWL

The values of Power Level PWL for every octave band frequency, with unit on full load operation, at nominal working conditions (ambient air temperature 35°C, evaporator water inlet/outlet temperature 12/7°C), calculated in according to ISO 3744 procedure method are indicated in the following tables.

Tab. 8a - SPL CB0 - FB0 900AC

Models		Octave band frequency [Hz] "SPL" Sound Pressure Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CB0006	FB0006	70	73	73	73	71	65	59	56	75.0
CB0007	FB0007	70	73	73	73	71	65	59	56	75.0
CB0009	FB0009	71	74	74	74	72	66	60	57	76.0
CB0011	FB0011	74	74	74	74	72	67	60	57	76.0
CB0014	FB0014	75	75	74	74	72	69	61	58	76.5
CB0015	FB0015	75	75	74	74	72	69	61	58	76.5
CB0018	FB0018	75	75	74	74	73	69	62	59	77.0
CB0019	FB0019	76	75	75	74	74	69	63	59	77.5
CB0022	FB0022	77	75	76	75	74	70	63	60	78.0

Tab. 8b - PWL CB0 - FB0 900AC

Models		Octave band frequency [Hz] "PWL" Sound Power Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CB0006	FB0006	87	90	90	90	88	82	76	73	92.0
CB0007	FB0007	87	90	90	90	88	82	76	73	92.0
CB0009	FB0009	89	92	92	92	90	84	78	75	94.0
CB0011	FB0011	92	92	92	92	90	85	78	75	94.0
CB0014	FB0014	93	93	92	92	90	87	79	76	94.5
CB0015	FB0015	93	93	92	92	90	87	79	76	94.5
CB0018	FB0018	94	94	93	93	92	88	81	78	96.0
CB0019	FB0019	95	94	94	93	93	88	82	78	96.5
CB0022	FB0022	96	94	95	94	93	89	82	79	97.0

Note:
Sound power levels tolerance for each octave band: - 0/+2 dB

Sound Levels

Tab. 8c - SPL CB0 - FB0 800AC

Models		Octave band frequency [Hz] "SPL" Sound Pressure Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CB0006	FB0006	69	64	61	61	59	53	48	42	63.0
CB0007	FB0007	69	64	61	61	59	53	48	42	63.0
CB0009	FB0009	69	65	62	62	60	54	49	43	64.0
CB0011	FB0011	71	67	64	64	62	56	51	45	66.0
CB0014	FB0014	72	68	65	64	62	58	52	47	66.5
CB0015	FB0015	72	68	65	64	62	58	52	47	66.5
CB0018	FB0018	72	69	66	64	63	58	52	48	67.0
CB0019	FB0019	74	70	66	64	64	58	52	49	67.5
CB0022	FB0022	74	71	66	65	64	59	53	50	68.0

Tab. 8d - PWL CB0 - FB0 800AC

Models		Octave band frequency [Hz] "PWL" Sound Power Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CB0006	FB0006	86	81	78	78	76	70	65	59	80.0
CB0007	FB0007	86	81	78	78	76	70	65	59	80.0
CB0009	FB0009	87	83	80	80	78	72	67	61	82.0
CB0011	FB0011	89	85	82	82	80	74	69	63	84.0
CB0014	FB0014	90	86	83	82	80	76	70	65	84.5
CB0015	FB0015	90	86	83	82	80	76	70	65	84.5
CB0018	FB0018	91	88	85	83	82	77	71	67	86.0
CB0019	FB0019	93	89	85	83	83	77	71	68	86.5
CB0022	FB0022	93	90	85	84	83	78	72	69	87.0

Note:
Sound power levels tolerance for each octave band: - 0/+2 dB

Tab. 8e - SPL CG0 - FG0 900EC

Models		Octave band frequency [Hz] "SPL" Sound Pressure Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CG0006	FG0006	72	74	77	77	74	69	63	60	78.5
CG0007	FG0007	73	75	78	78	75	70	64	60	79.5
CG0009	FG0009	73	75	78	78	75	70	64	60	79.5
CG0011	FG0011	73	75	78	78	75	70	64	60	79.5
CG0014	FG0014	74	76	79	78	76	71	65	61	80.0
CG0015	FG0015	74	76	79	78	76	71	65	61	80.0
CG0018	FG0018	74	76	79	78	76	71	65	61	80.0

Tab. 8f - PWL CG0 - FG0 900EC

Models		Octave band frequency [Hz] "PWL" Sound Power Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CG0006	FG0006	89	91	94	94	91	86	80	77	95.5
CG0007	FG0007	91	93	96	96	93	88	82	78	97.5
CG0009	FG0009	91	93	96	96	93	88	82	78	97.5
CG0011	FG0011	91	93	96	96	93	88	82	78	97.5
CG0014	FG0014	93	95	98	97	95	90	84	80	99.0
CG0015	FG0015	93	95	98	97	95	90	84	80	99.0
CG0018	FG0018	93	95	98	97	95	90	84	80	99.0

Note:
Sound power levels tolerance for each octave band: - 0/+2 dB

Sound Levels

Tab. 8g - SPL CG0 - FG0 800EC

Models		Octave band frequency [Hz] "SPL" Sound Pressure Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CG0006	FG0006	65	58	56	56	54	48	43	38	58.0
CG0007	FG0007	66	59	57	57	55	49	44	38	59.0
CG0009	FG0009	66	59	57	57	55	49	44	38	59.0
CG0011	FG0011	67	61	59	59	57	51	46	40	61.0
CG0014	FG0014	69	62	60	60	58	52	47	41	62.0
CG0015	FG0015	69	62	60	60	58	52	47	41	62.0
CG0018	FG0018	69	62	60	60	58	52	47	41	62.0

Tab. 8h - PWL CG0 - FG0 800EC

Models		Octave band frequency [Hz] "PWL" Sound Power Levels [dB]								Total [dB(A)]
		63	125	250	500	1000	2000	4000	8000	
CG0006	FG0006	82	75	73	73	71	65	60	55	75.0
CG0007	FG0007	84	77	75	75	73	67	62	56	77.0
CG0009	FG0009	84	77	75	75	73	67	62	56	77.0
CG0011	FG0011	85	79	77	77	75	69	64	58	79.0
CG0014	FG0014	88	81	79	79	77	71	66	60	81.0
CG0015	FG0015	88	81	79	79	77	71	66	60	81.0
CG0018	FG0018	88	81	79	79	77	71	66	60	81.0

Note:
Sound power levels tolerance for each octave band: - 0/+2 dB

In the "G" version chiller, the characteristics of the "EC" fans can achieve significant noise reductions according to their speed (RPM).

9 Electrical Data

Tab. 9a - Electrical data - CB0 006- 022

Models CB0		006	007	009	011	014	015	018	019	022
Power supply	V/Ph/Hz	400V / 3Ph+PE / 50Hz								
Total power input (1)	kW	19	24	28	36	45	53	57	65	74
OA (1) (without PFC)	A	35	44	56	67	80	92	102	115	129
cosφ (1) (without PFC)	-	0,76	0,78	0,72	0,77	0,81	0,83	0,81	0,82	0,83
OA (1) (with PFC)	A	31	39	48	60	75	86	94	108	123
cosφ (1) (with PFC)	-	0,86	0,88	0,85	0,86	0,86	0,88	0,87	0,87	0,87
Max. power input	kW	28	38	42	54	66	75	87	98	109
FLA	A	49	67	78	93	107	124	146	163	180
LRA	A	166	176	218	316	331	369	391	488	506
LRA (with compressor soft- start)	A	103	113	140	194	209	230	251	305	323
Compressor - Power input (1)	kW	16	22	23	31	40	48	50	58	67
Compressor - Nominal current (1)	A	30	40	46	56	70	81	86	99	114
Compressor 1 - Max. current	A	22	31	34	49	49	65	65	83	83
Compressor 2 - Max. current	A	22	31	34	34	49	49	65	65	83
Fans number	Nr.	1			2				3	
AC 900 fans - Power input	kW	2,4								
AC 900 fans - Nominal current	A	5,1								
AC 900 fans - Max. current	A	5,3								
AC 800 fans - Power input (option)	kW	1,7								
AC 800 fans - Nominal current (option)	A	3,7								
AC 800 fans - Max. current (option)	A	4,1								
Std. head pressure pump model (option)	-	CEA 210/2			CEA 370/1	CEA 370/2			NSCE 40-125/22	
Std. head pressure pump - Nominal power	kW	0,75			1,1	1,5			2,2	
Std. head pressure pump - Max. current	A	2,0			2,5	3,4			4,6	
High head pressure pump model (option)	-	CEA 210/3			CEA 370/2	CEA 370/3			NSCE 40-125/30	
High head pressure pump - Nominal power	kW	1,1			1,5	1,85			3	
High head pressure pump - Max. current	A	2,5			3,4	4,5			6,3	

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R410A refrigerant.

Tab. 9b - Electrical data - CG0 006- 018

Models CG0		006	007	009	011	014	015	018
Power supply	V/Ph/Hz	400V / 3Ph+PE / 50Hz						
Total power input (1)	kW	18	24	27	36	44	50	56
OA (1) (without PFC)	A	33	42	52	64	77	87	97
cosφ (1) (without PFC)	-	0,80	0,81	0,75	0,80	0,82	0,83	0,84
OA (1) (with PFC)	A	29	38	44	58	72	81	90
cosφ (1) (with PFC)	-	0,90	0,90	0,89	0,89	0,88	0,89	0,90
Max. power input	kW	28	41	43	55	69	79	88
FLA	A	48	70	76	91	109	126	143
LRA	A	165	179	216	314	333	371	388
LRA (with compressor soft- start)	A	102	117	139	192	212	233	249
Compressor - Power input (1)	kW	16	18	22	30	36	42	49
Compressor - Nominal current (1)	A	30	34	44	55	64	74	84
Compressor 1 - Max. current	A	22	31	34	49	49	65	65
Compressor 2 - Max. current	A	22	31	34	34	49	49	65
Fans number	Nr.	1		2			3	
EC 900 fans - Power input	kW	2,6						
EC 900 fans - Nominal current	A	4,1						
EC 900 fans - Max. current	A	4,3						
EC 800 fans - Power input (option)	kW	0,7						
EC 800 fans - Nominal current (option)	A	1,0						
EC 800 fans - Max. current (option)	A	1,4						
Std. head pressure pump model (option)	-	CEA 210/2			CEA 370/1	CEA 370/2		
Std. head pressure pump - Nominal power	kW	0,75			1,1	1,5		
Std. head pressure pump - Max. current	A	2,0			2,5	3,4		
High head pressure pump model (option)	-	CEA 210/3			CEA 370/2	CEA 370/3		
High head pressure pump - Nominal power	kW	1,1			1,5	1,85		
High head pressure pump - Max. current	A	2,5			3,4	4,5		

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R410A refrigerant.

Electrical Data

Tab. 9c - Electrical data - FB0 006- 022

Models FB0		006	007	009	011	014	015	018	019	022
Power supply	V/Ph/Hz	400V / 3Ph+PE / 50Hz								
Total power input (1)	kW	19	25	29	37	47	55	59	68	77
OA (1) (without PFC)	A	36	46	57	69	82	95	105	119	134
cosφ (1) (without PFC)	-	0,77	0,78	0,72	0,78	0,82	0,83	0,82	0,83	0,84
OA (1) (with PFC)	A	32	41	48	62	78	89	97	112	128
cosφ (1) (with PFC)	-	0,87	0,87	0,86	0,86	0,87	0,89	0,88	0,88	0,87
Max. power input	kW	28	38	42	54	66	75	87	98	109
FLA	A	49	67	78	93	108	124	147	164	181
LRA	A	166	176	218	316	331	369	391	489	506
LRA (with compressor soft- start)	A	103	113	140	194	209	230	251	305	323
Compressor - Power input (1)	kW	17	23	24	32	42	50	52	61	70
Compressor - Nominal current (1)	A	32	40	46	58	72	84	90	103	118
Compressor 1 - Max. current	A	22	31	34	49	49	65	65	83	83
Compressor 2 - Max. current	A	22	31	34	34	49	49	65	65	83
Fans number	Nr.	1			2				3	
AC 900 fans - Power input	kW	2,4								
AC 900 fans - Nominal current	A	5,2								
AC 900 fans - Max. current	A	5,3								
AC 800 fans - Power input (option)	kW	1,8								
AC 800 fans - Nominal current (option)	A	3,8								
AC 800 fans - Max. current (option)	A	4,1								
Std. head pressure pump model (option)	-	CEA 210/3	CEA 210/4		CEA 370/3	NSCE 40-125/30	NSCE 40-160/40		NSCE 40-160/55	
Std. head pressure pump - Nominal power	kW	1,1	1,5		1,85	3	4		5	
Std. head pressure pump - Max. current	A	2,5	3,1		4,5	6,3	7,8		10,4	
High head pressure pump model (option)	-	CEA 210/4	CEA 210/5		CEA 370/5	NSCE 40-160/40	NSCE 40-160/55		NSCE 40-200/75	
High head pressure pump - Nominal power	kW	1,5	1,85		3	4	5		7,5	
High head pressure pump - Max. current	A	3,1	4,2		5,9	7,8	10,4		14,1	

(1) - Outdoor temperature 35° C; fluid inlet/outlet temperature 15/10° C; 70- 30% water- glycol mixture; R410A refrigerant.

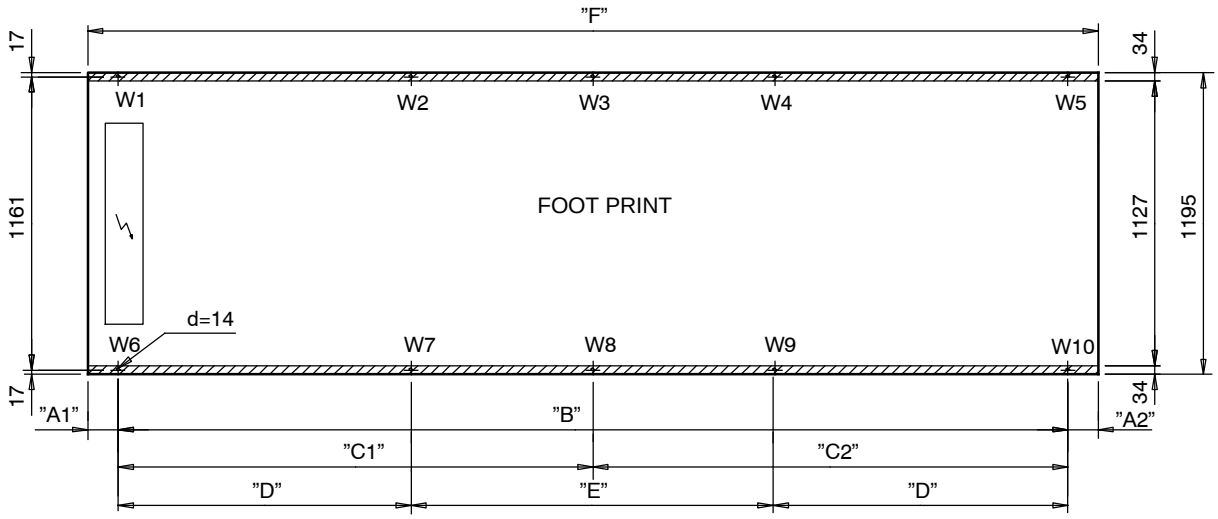
Tab. 9d - Electrical data - FG0 006- 018

Models FG0		006	007	009	011	014	015	018
Power supply	V/Ph/Hz	400V / 3Ph+PE / 50Hz						
Total power input (1)	kW	19	24	28	37	45	52	58
OA (1) (without PFC)	A	34	43	53	66	79	89	99
cosφ (1) (without PFC)	-	0,79	0,82	0,77	0,81	0,83	0,84	0,85
OA (1) (with PFC)	A	30	39	45	60	74	83	92
cosφ (1) (with PFC)	-	0,89	0,91	0,91	0,89	0,88	0,90	0,91
Max. power input	kW	28	41	43	55	69	79	88
FLA	A	48	70	77	92	110	127	144
LRA	A	165	179	217	315	333	372	388
LRA (with compressor soft- start)	A	102	117	139	192	212	233	249
Compressor - Power input (1)	kW	16	19	23	31	37	44	50
Compressor - Nominal current (1)	A	30	36	44	57	66	75	86
Compressor 1 - Max. current	A	22	31	34	49	49	65	65
Compressor 2 - Max. current	A	22	31	34	34	49	49	65
Fans number	Nr.	1		2			3	
EC 900 fans - Power input	kW	2,7						
EC 900 fans - Nominal current	A	4,3						
EC 900 fans - Max. current	A	4,3						
EC 800 fans - Power input (option)	kW	0,7						
EC 800 fans - Nominal current (option)	A	1,0						
EC 800 fans - Max. current (option)	A	1,4						
Std. head pressure pump model (option)	-	CEA 210/3	CEA 210/4		CEA 370/3	NSCE 40-125/30	NSCE 40-160/40	
Std. head pressure pump - Nominal power	kW	1,1	1,5		1,85	3	4	
Std. head pressure pump - Max. current	A	2,5	3,1		4,5	6,3	7,8	
High head pressure pump model (option)	-	CEA 210/4	CEA 210/5		CEA 370/5	NSCE 40-160/40	NSCE 40-160/55	
High head pressure pump - Nominal power	kW	1,5	1,85		3	4	5	
High head pressure pump - Max. current	A	3,1	4,2		5,9	7,8	10,4	

(1) - Outdoor temperature 35° C; fluid inlet/outlet temperature 15/10° C; 70- 30% water- glycol mixture; R410A refrigerant.

10 Application Consideration

Fig. 10a - Support positions and loads - CB0 - CG0 - FB0 - FG0



Tab. 10a - Support position dimensions

Models	Size	Dimensions (mm)							
		"A1"	"A2"	"B"	"C1"	"C2"	"D"	"E"	"F"
CB0 CG0 FB0 FG0	006 - 007 006 006 - 007 006	100	120	1780	-	-	-	-	2000
CB0 CG0 FB0 FG0	009 - 011 - 014 - 015 007 - 009 - 011 009 - 011 - 014 - 015 007 - 009 - 011	100	120	-	1320	1460	-	-	3000
CB0 CG0 FB0 FG0	018 - 019 - 022 014 - 015 - 018 018 - 019 - 022 014 - 015 - 018	100	100	-	-	-	1180	1440	4000

Tab. 10b - Weight distribution without tank and pumps

Models	Size	Weight distribution (kg)										Total (kg)
		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
CB0	006	211	-	-	-	156	210	-	-	-	155	732
	007	216	-	-	-	159	215	-	-	-	158	748
	009	201	-	129	-	129	201	-	129	-	129	918
	011	238	-	132	-	132	264	-	147	-	147	1060
	014	288	-	140	-	140	309	-	150	-	150	1177
	015	296	-	140	-	140	318	-	151	-	151	1196
	018	242	242	-	103	103	258	258	-	110	110	1426
	019	245	245	-	102	102	262	262	-	109	109	1436
	022	253	253	-	105	105	270	270	-	112	112	1480
CG0	006	214	-	-	-	153	214	-	-	-	153	734
	007	205	-	125	-	125	205	-	125	-	125	910
	009	211	-	133	-	133	211	-	133	-	133	954
	011	245	-	132	-	132	271	-	146	-	146	1072
	014	235	235	-	101	101	250	250	-	108	108	1388
	015	240	240	-	101	101	256	256	-	107	107	1408
	018	248	248	-	103	103	265	265	-	110	110	1452

Application Consideration

Models	Size	Weight distribution (kg)										Total (kg)
		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
FB0	006	235	-	-	-	234	234	-	-	-	233	936
	007	240	-	-	-	237	240	-	-	-	236	953
	009	199	-	199	-	184	199	-	199	-	184	1164
	011	247	-	205	-	205	267	-	222	-	222	1368
	014	297	-	214	-	214	314	-	226	-	226	1491
	015	304	-	214	-	214	322	-	227	-	227	1508
	018	269	269	-	179	179	283	283	-	188	188	1838
	019	272	272	-	178	178	287	287	-	188	188	1850
	022	279	279	-	181	181	294	294	-	191	191	1890
FG0	006	238	-	-	-	231	238	-	-	-	231	938
	007	208	-	185	-	185	208	-	185	-	185	1156
	009	214	-	214	-	204	214	-	214	-	204	1264
	011	254	-	206	-	206	275	-	223	-	223	1387
	014	262	262	-	178	178	275	275	-	186	186	1802
	015	267	267	-	177	177	280	280	-	186	186	1820
	018	275	275	-	179	179	289	289	-	188	188	1862

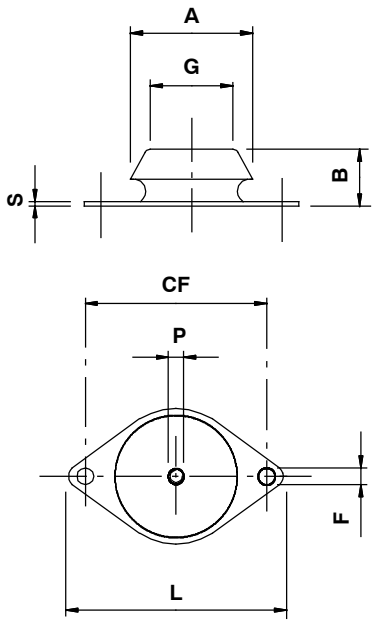
Tab. 10c - Weight distribution with tank and 2 pumps

Models	Size	Weight distribution (kg)										Total (kg)
		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
CB0	006	239	-	-	-	238	241	-	-	-	239	957
	007	245	-	-	-	241	246	-	-	-	242	974
	009	215	-	215	-	259	213	-	213	-	257	1372
	011	242	-	242	-	248	258	-	258	-	265	1513
	014	289	-	255	-	255	302	-	266	-	266	1633
	015	297	-	255	-	255	311	-	267	-	267	1652
	018	263	263	-	254	254	264	264	-	255	255	2072
	019	266	266	-	253	253	267	267	-	255	255	2082
	022	274	274	-	256	256	275	275	-	258	258	2126
CG0	006	242	-	-	-	235	244	-	-	-	237	958
	007	216	-	216	-	253	215	-	215	-	251	1366
	009	223	-	223	-	262	221	-	221	-	260	1410
	011	247	-	247	-	246	263	-	263	-	262	1528
	014	255	255	-	253	253	256	256	-	253	253	2034
	015	260	260	-	252	252	261	261	-	253	253	2052
	018	269	269	-	254	254	270	270	-	255	255	2096
FB0	006	264	-	-	-	317	266	-	-	-	319	1166
	007	270	-	-	-	320	271	-	-	-	322	1183
	009	238	-	238	-	339	236	-	236	-	337	1624
	011	273	-	273	-	344	288	-	288	-	363	1829
	014	308	-	308	-	341	320	-	320	-	353	1950
	015	314	-	314	-	339	326	-	326	-	352	1971
	018	288	288	-	331	331	289	289	-	332	332	2480
	019	292	292	-	331	331	293	293	-	332	332	2496
	022	299	299	-	333	333	301	301	-	335	335	2536
FG0	006	267	-	-	-	314	269	-	-	-	316	1166
	007	239	-	239	-	333	237	-	237	-	330	1615
	009	253	-	253	-	359	252	-	252	-	357	1726
	011	278	-	278	-	342	293	-	293	-	361	1845
	014	281	281	-	330	330	281	281	-	330	330	2444
	015	286	286	-	329	329	287	287	-	330	330	2464
	018	294	294	-	331	331	295	295	-	332	332	2504

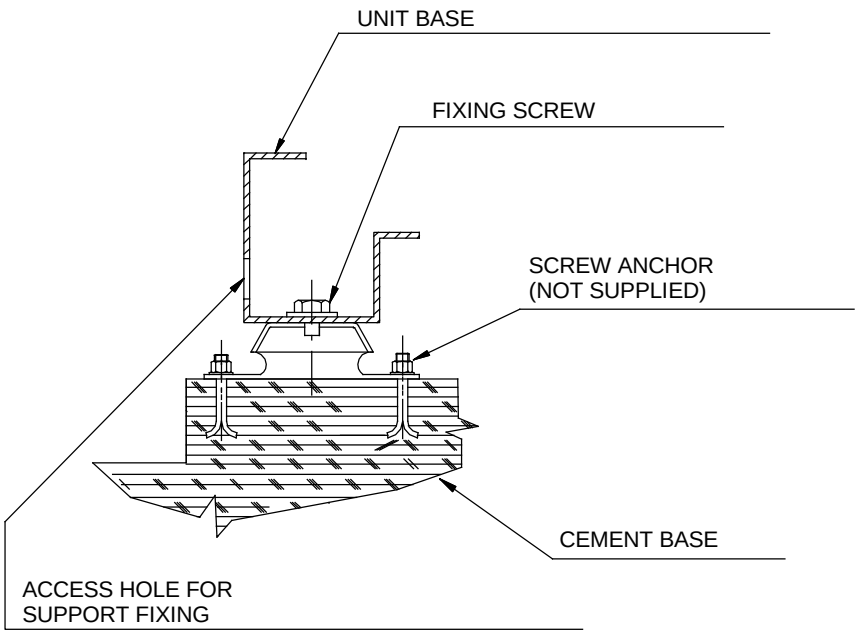
Application Consideration

Fig. 10b - Rubber anti- vibration support

Rubber support dimensions



Rubber support installation



Tab. 10d - Single support code (mm)

Code	A	B	P	F	CF	G	L	S
270327	82	35	M10	11.0	110	60	128	2

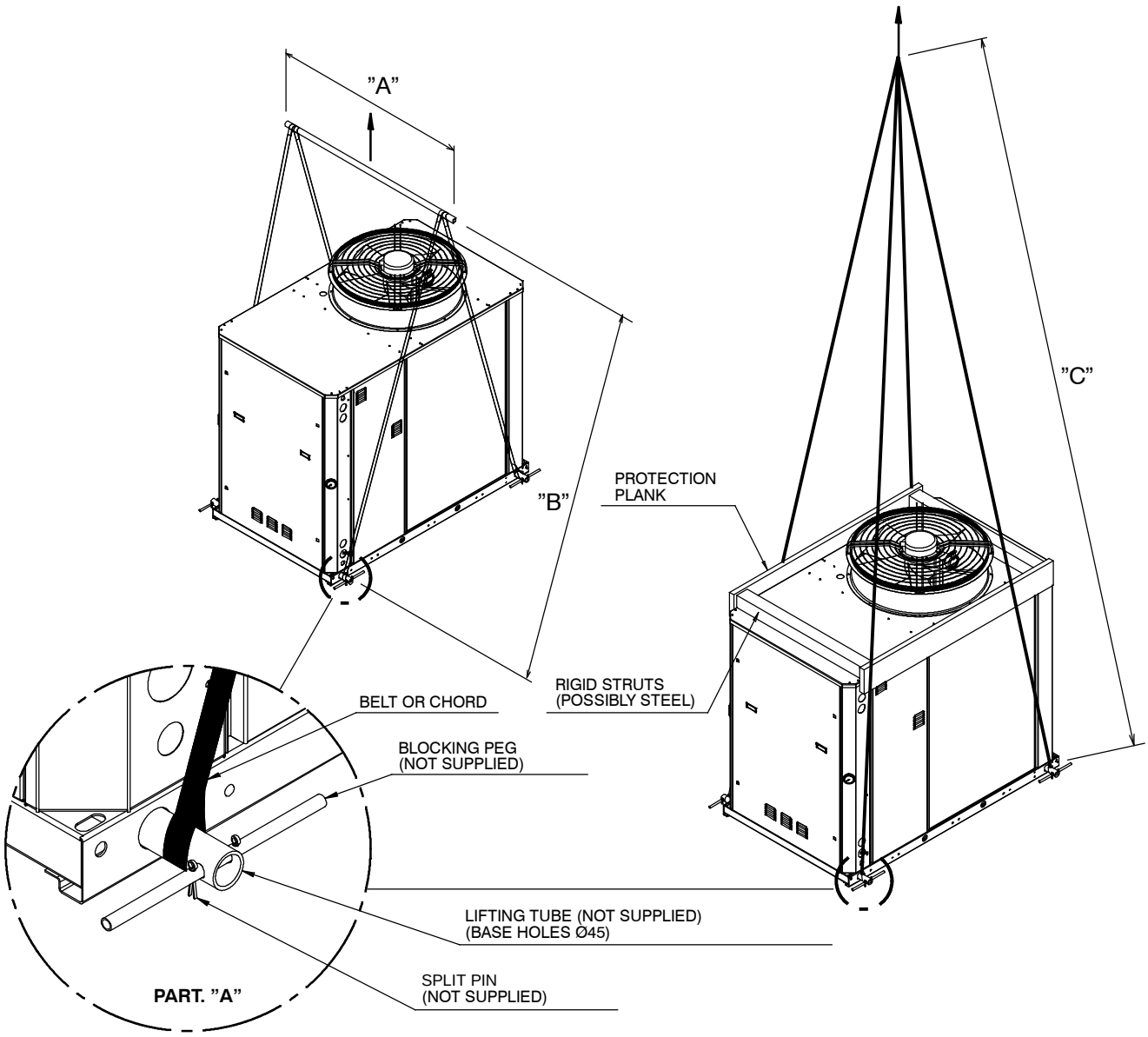
Tab. 10e - Rubber supports

Unit	Configuration	Support kit code	Single support code	Kit support pieces
CB0 / FB0 006 - 007 **CG0 / FG0 006**	1 Fan	485620	270327	4
CB0 / FB0 009 - 011 - 014 - 015 **CG0 / FG0 007 - 009 - 011**	2 Fans	485621		6
CB0 / FB0 018 - 019 - 022 **CG0 / FG0 014 - 015 - 018**	3 Fans	485622		8

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

NOTE: *The pallet must be removed before the unit installation.*

Fig. 10c - Lifting instructions with tubes



N.B: Place the lifting tubes in the holes marked "LIFT HERE" on the base and block the ends of the tubes with pegs and split pins as in PART. "A".
The capacity of the lifting equipment must be sufficient for the load to be lifted. Check the unit weight, the load capacity of the balance, the chords and the quality of the above mentioned apparatus.After lifting and positioning the unit, remove lifting accessories (ropes, slings, chains, hooks, brackets and tubes).
Lifting tools as: hooks, lifting gear, ropes, chords, belts, rigid struts, protection plank are not provided with the unit.

Tab. 10f - Lifting

Models	Fans number	"A" (m)	"B" (m)	"C" (m)
CB0 / FB0 006 - 007 **CG0 / FG0 006**	1	1,7	≈3	≈8
CB0 / FB0 009 - 011 - 014 - 015 **CG0 / FG0 007 - 009 - 011**	2		≈4	
CB0 / FB0 018 - 019 - 022 **CG0 / FG0 014 - 015 - 018**	3			

Application Consideration

Fig. 10d - Lifting instructions with straight shackle (baricentric axis)

Models	Fans Number	"A1+A2" (m)
CB0/FB0 006- 007 CG0/FG0 006	1	≈5
CB0/FB0 009- 011- 014- 015 CG0/FG0 007- 009- 011	2	≈6
CB0/FB0 018- 019- 022 CG0/FG0 014- 015- 018	3	≈6

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

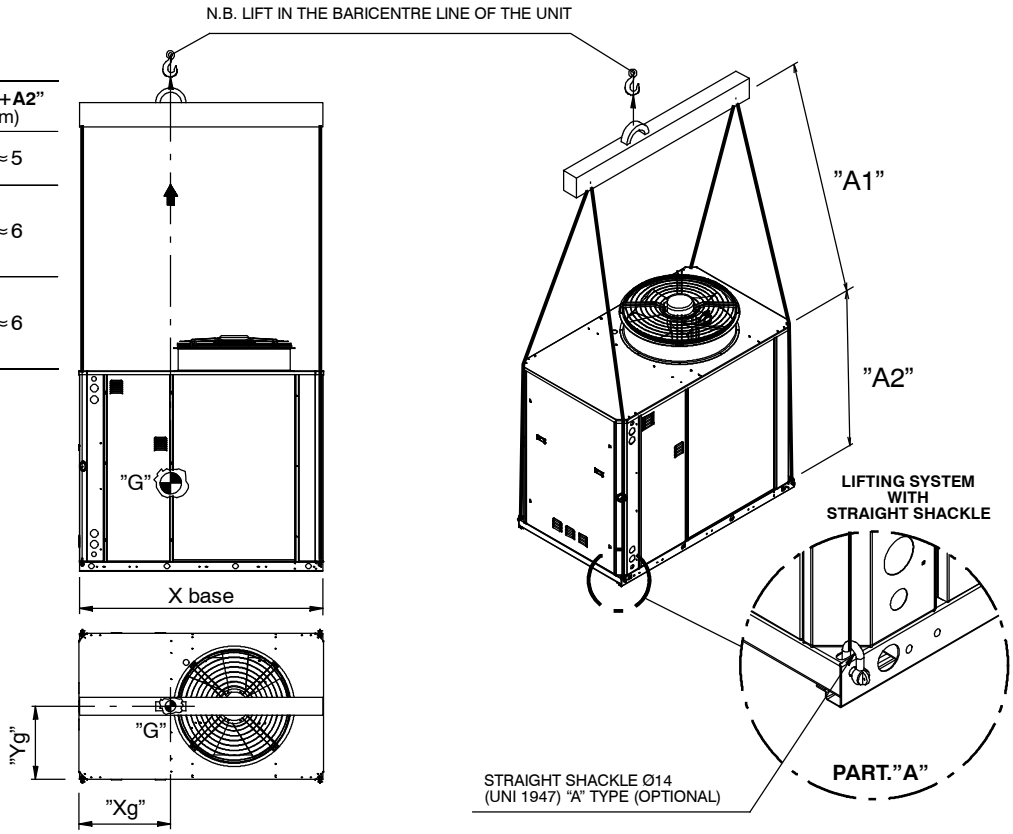
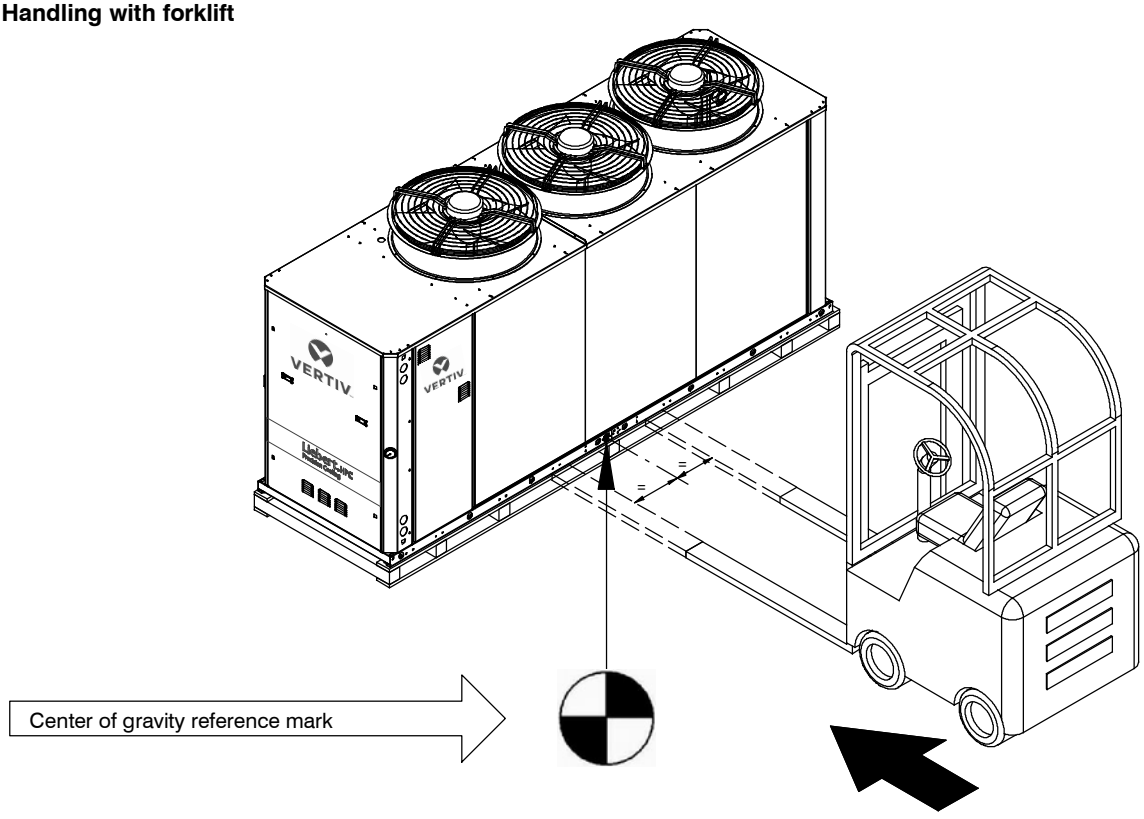


Fig. 10e - Handling with forklift



Application Consideration

Tab. 10g - Shipping weight and unit baricentre position (“G”) - Unit without tank and pumps

Models	Size	Unit without tank and pumps			
		“X base“ (mm)	“Xg“ (mm)	“Yg“ (mm)	Shipping weight (kg)
CB0	006	2000	851	598	722
	007	2000	848	598	738
	009	3000	1237	598	895
	011	3000	1166	567	1035
	014	3000	1095	577	1152
	015	3000	1083	576	1170
	018	4000	1450	578	1392
	019	4000	1440	578	1404
	022	4000	1438	578	1444
CG0	006	2000	837	598	723
	007	3000	1211	598	888
	009	3000	1231	597	934
	011	3000	1150	567	1049
	014	4000	1461	579	1357
	015	4000	1446	579	1375
	018	4000	1439	578	1418
FB0	006	2000	938	598	860
	007	2000	934	598	876
	009	3000	1364	598	1062
	011	3000	1306	572	1248
	014	3000	1236	580	1369
	015	3000	1224	579	1387
	018	4000	1640	582	1678
	019	4000	1630	581	1690
	022	4000	1623	581	1728
FG0	006	2000	925	598	861
	007	3000	1343	598	1055
	009	3000	1372	597	1147
	011	3000	1293	572	1266
	014	4000	1653	582	1643
	015	4000	1638	582	1661
	018	4000	1626	581	1702

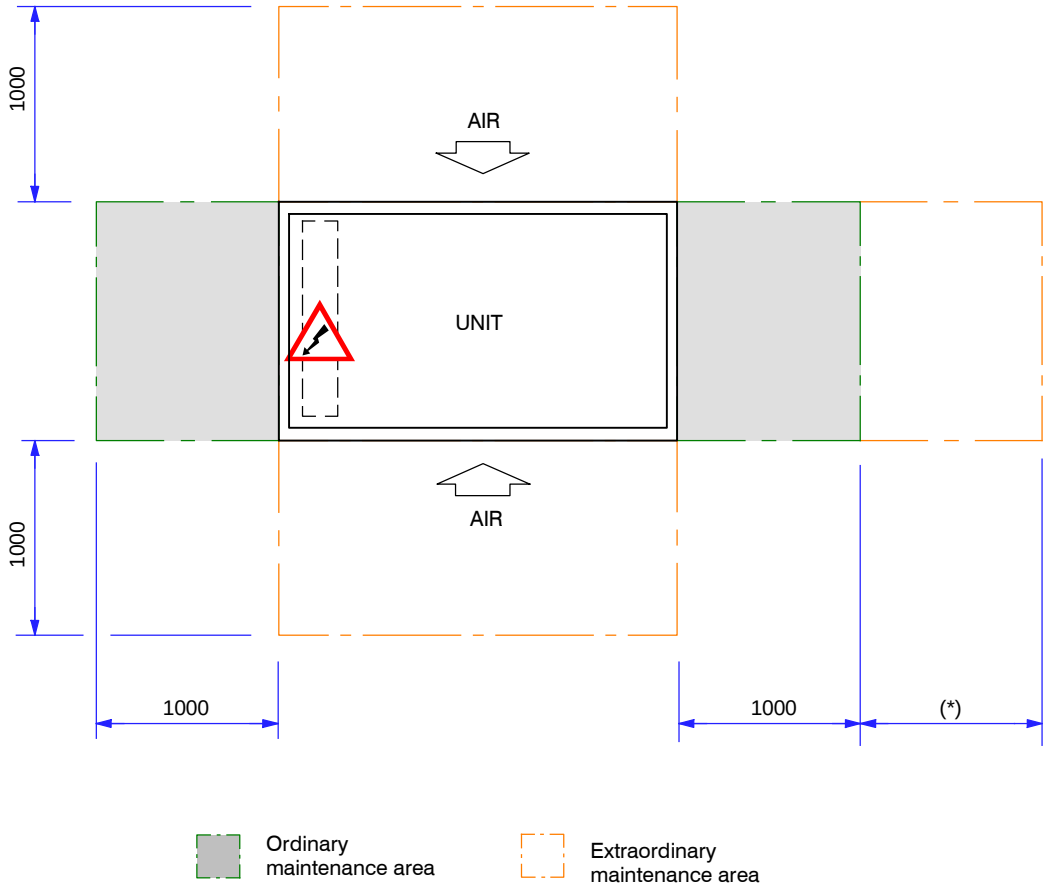
Application Consideration

Tab. 10h - Shipping weight and unit baricentre position ("G") - Unit with tank and 2 pumps

Models	Size	"X base" (mm)	Unit with tank and 2 pumps		
			"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)
CB0	006	2000	941	595	842
	007	2000	937	595	858
	009	3000	1480	593	1140
	011	3000	1396	569	1280
	014	3000	1319	577	1397
	015	3000	1306	576	1415
	018	4000	1819	582	1727
	019	4000	1808	582	1739
	022	4000	1798	581	1779
CG0	006	2000	928	595	843
	007	3000	1462	593	1133
	009	3000	1468	593	1179
	011	3000	1381	569	1294
	014	4000	1835	583	1692
	015	4000	1819	582	1710
	018	4000	1804	582	1753
FB0	006	2000	1004	596	980
	007	2000	1000	596	996
	009	3000	1553	594	1307
	011	3000	1481	573	1493
	014	3000	1408	579	1614
	015	3000	1396	579	1632
	018	4000	1924	584	2013
	019	4000	1915	584	2025
	022	4000	1903	584	2063
FG0	006	2000	993	595	981
	007	3000	1537	594	1300
	009	3000	1548	593	1392
	011	3000	1467	573	1511
	014	4000	1940	585	1978
	015	4000	1926	584	1996
	018	4000	1910	584	2037

ATTENTION: *Never use a forklift to move the unit to the installation site.*
It is mandatory to use lifting tubes or straight shackles.

Fig. 10f - Service areas (top view)

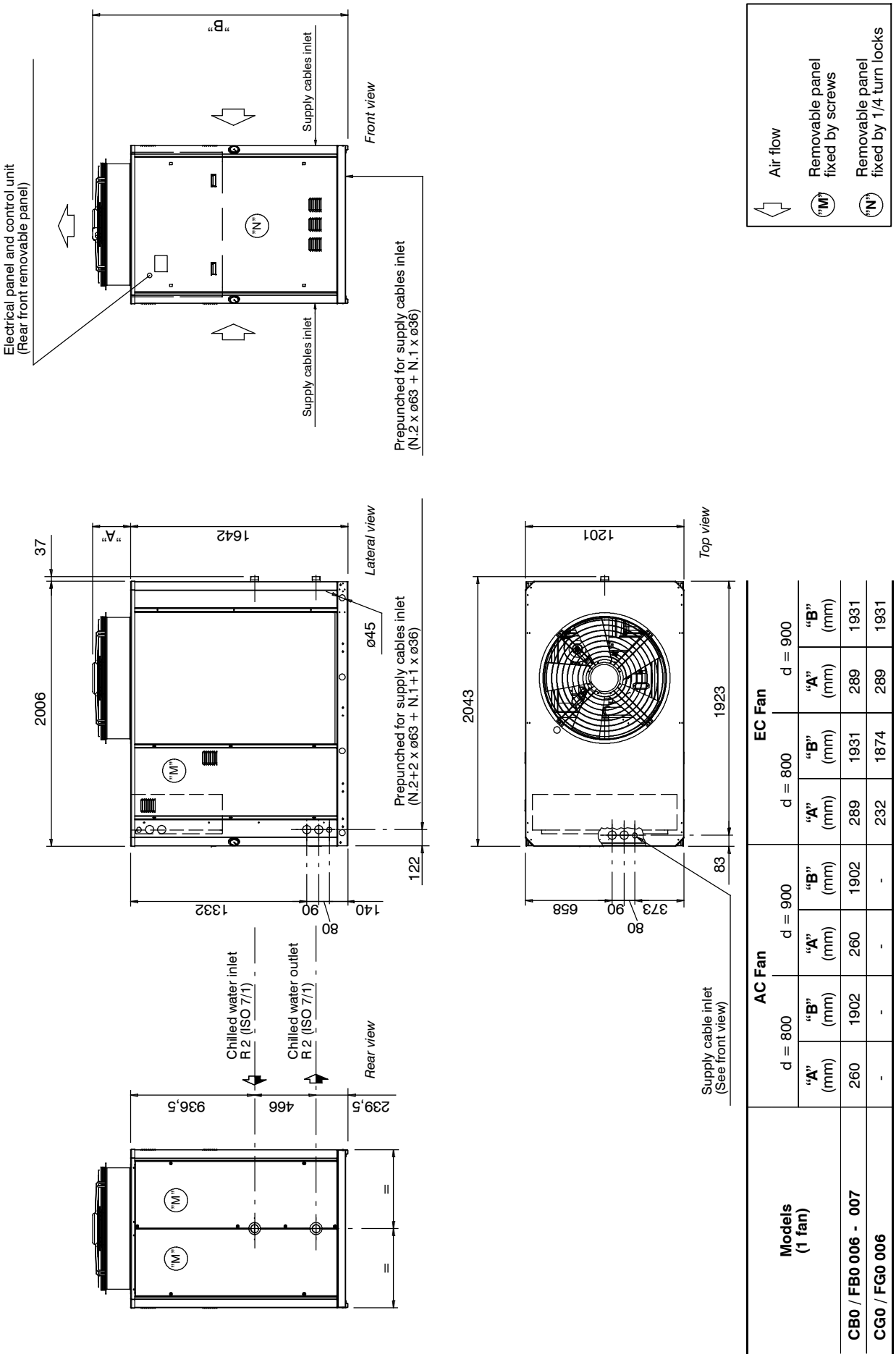


Notes:
Minimum distance between 2 units from condensing coil side = 2 m.
Do not obstruct the air exiting the fans for a minimum distance of 2.5 m.

(*) Extraordinary maintenence area for unit with tank: 1000 mm.

11 Dimensional Data

Fig. 11a - Liebert HPC- S 006- 022 (1 Fan)

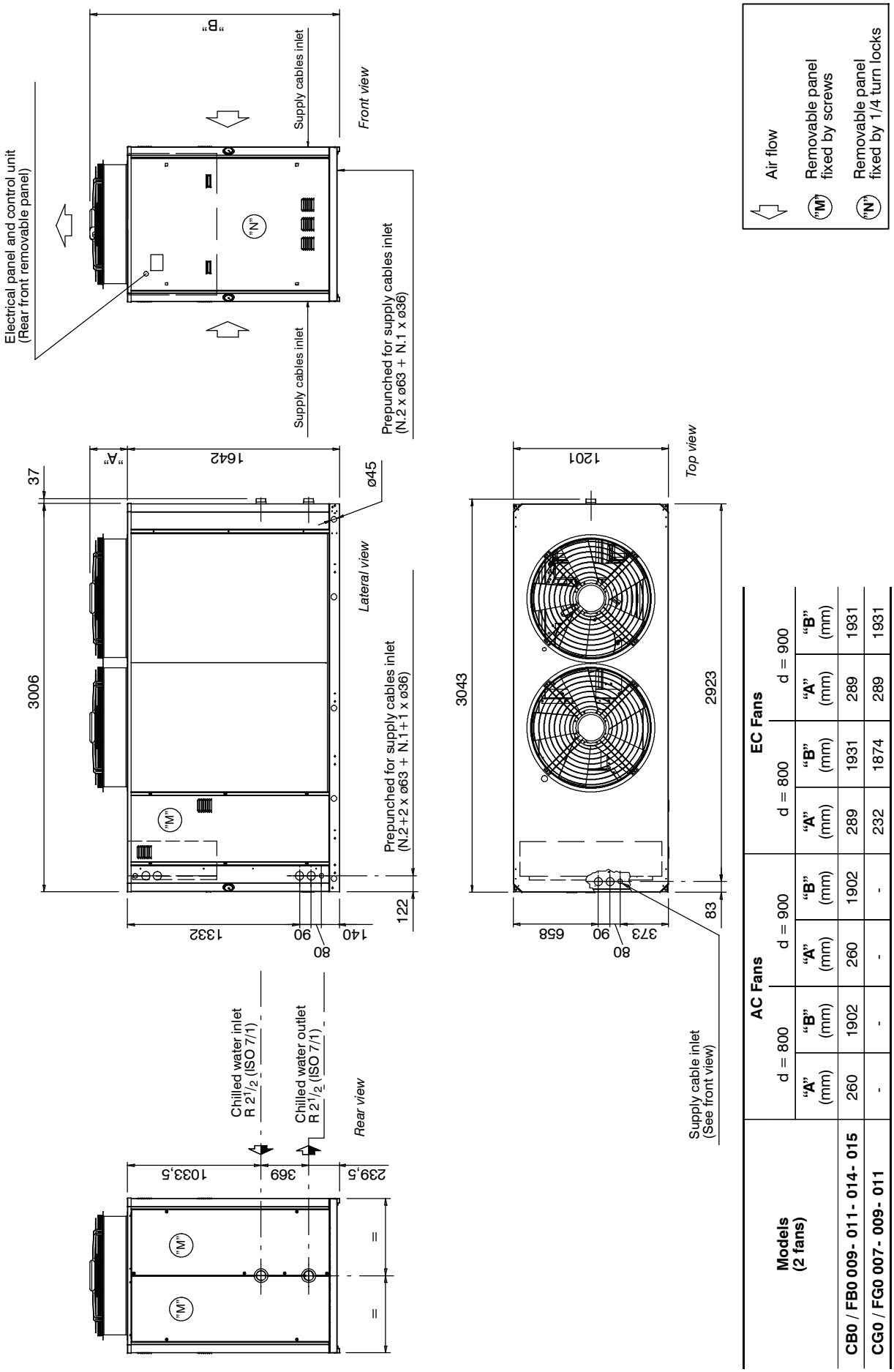


Models (1 fan)	AC Fan				EC Fan			
	d = 800		d = 900		d = 800		d = 900	
	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)
CB0 / FB0 006 - 007	260	1902	260	1902	289	1931	289	1931
CG0 / FG0 006	-	-	-	-	232	1874	289	1931

NOTE: Dimensions do not include the pallet size.

Dimensional Data

Fig. 11b - Liebert HPC- S 006- 022 (2 Fans)

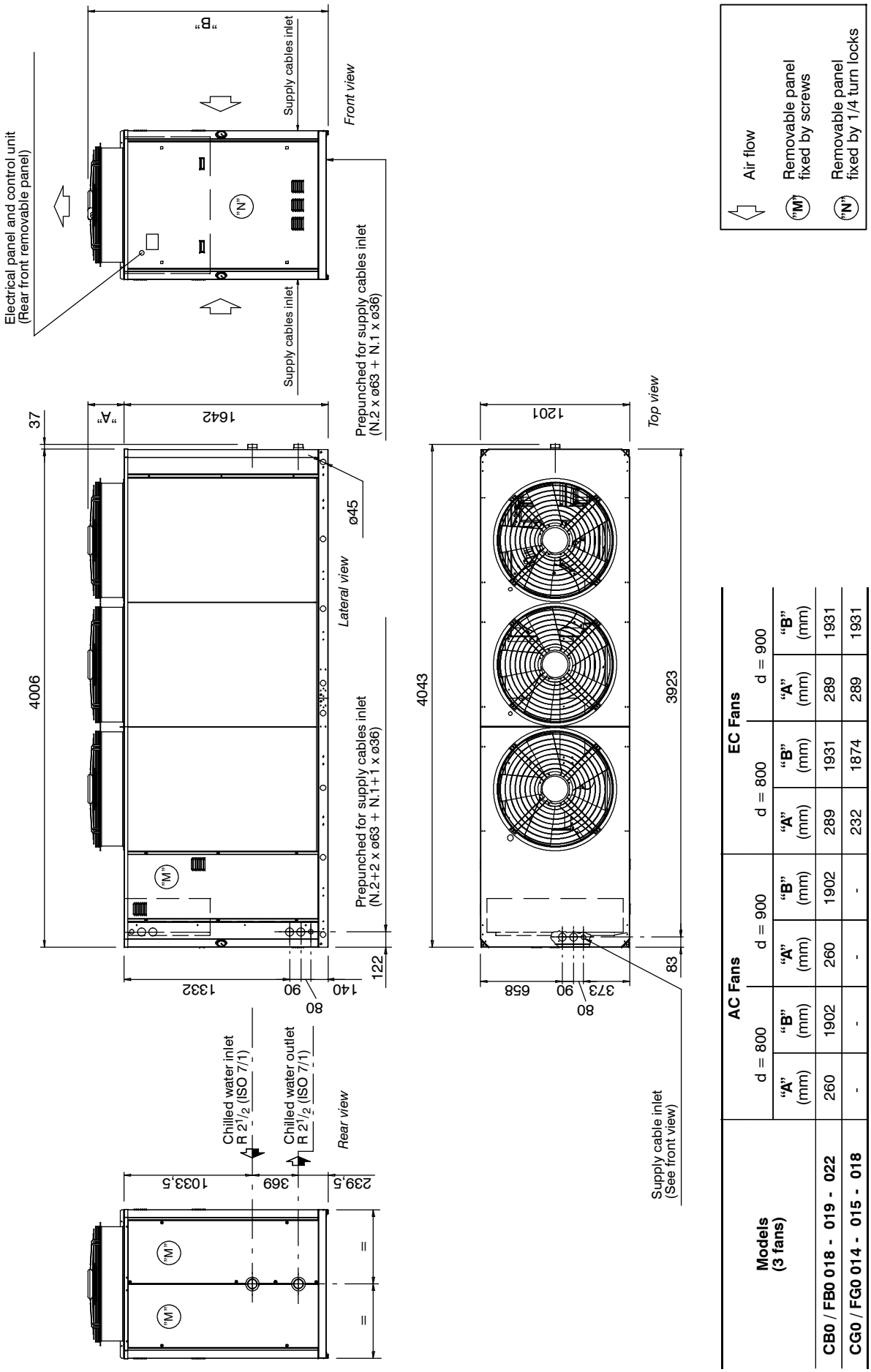


Models (2 fans)	AC Fans				EC Fans			
	d = 800		d = 900		d = 800		d = 900	
	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)
CB0 / FB0 009- 011- 014- 015	260	1902	260	1902	289	1931	289	1931
CG0 / FG0 007- 009- 011	-	-	-	-	232	1874	289	1931

NOTE: Dimensions do not include the pallet size.

Dimensional Data

Fig. 11c - Liebert HPC- S 006- 022 (3 Fans)



Models (3 fans)	AC Fans				EC Fans			
	d = 800		d = 900		d = 800		d = 900	
	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)
CB0 / FB0 018 - 019 - 022	260	1902	260	1902	289	1931	289	1931
CG0 / FG0 014 - 015 - 018	-	-	-	-	232	1874	289	1931

NOTE: Dimensions do not include the pallet size.

Dimensional Data

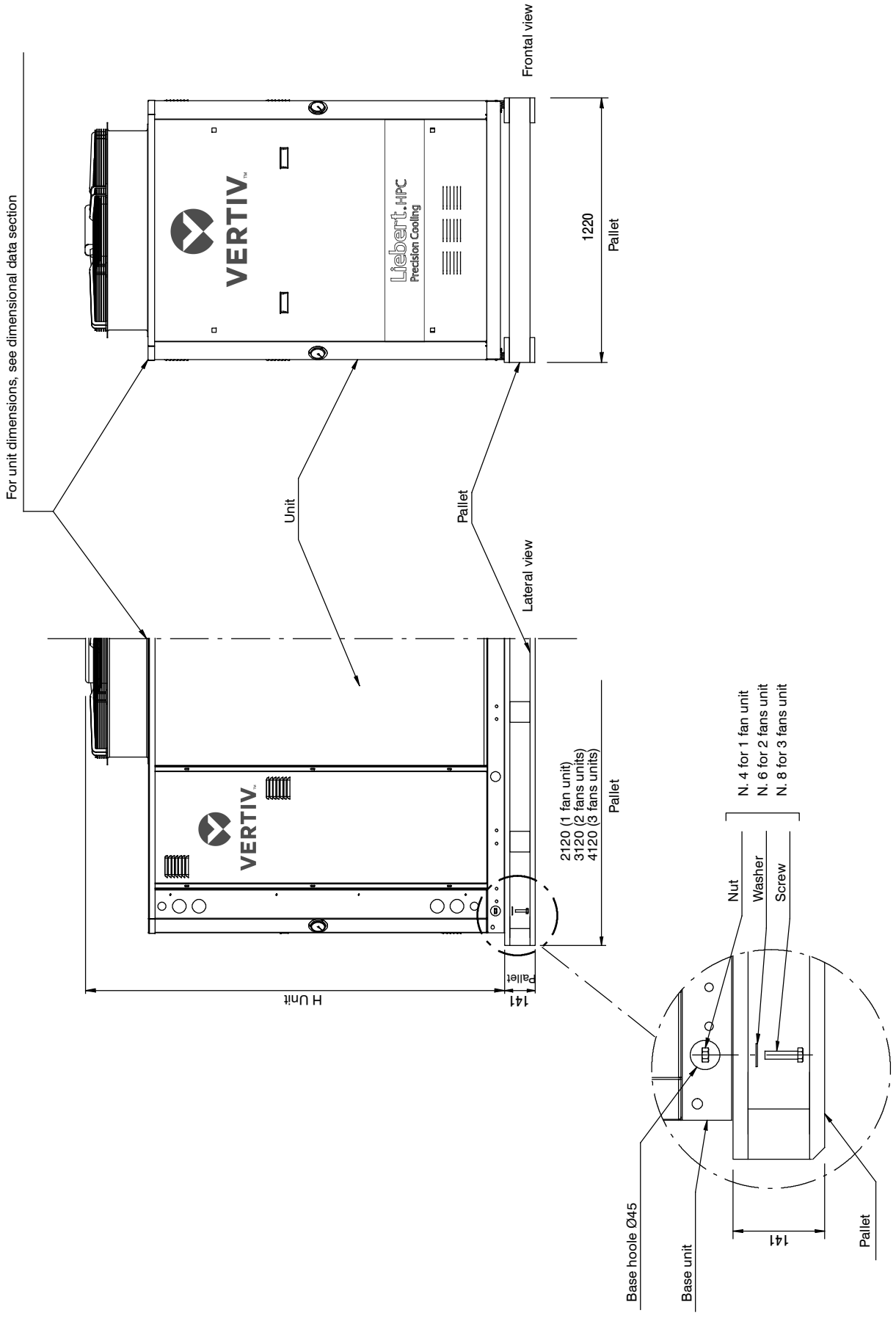
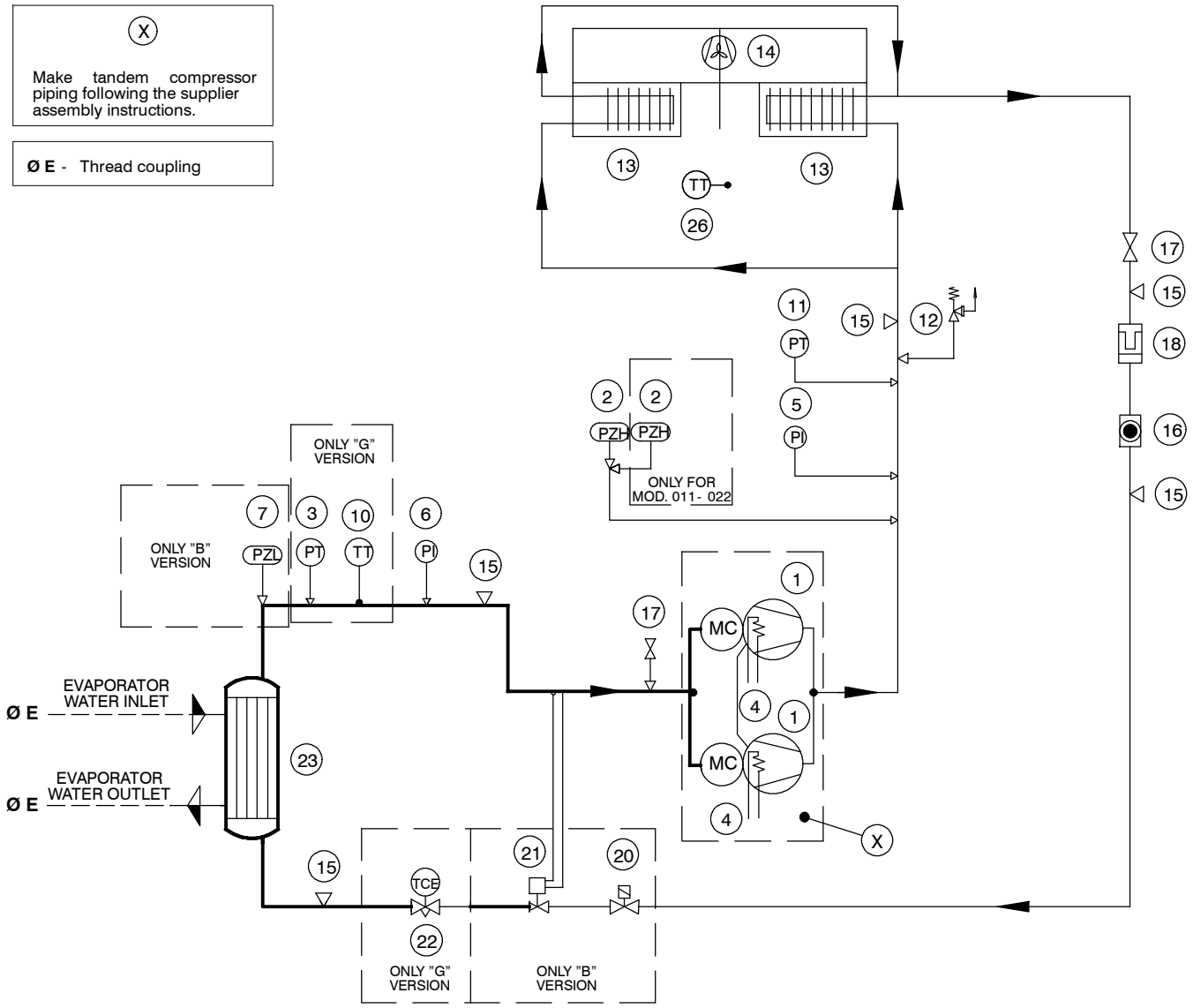


Fig. 11d - Unit + Pallet

12 Refrigerant Circuit

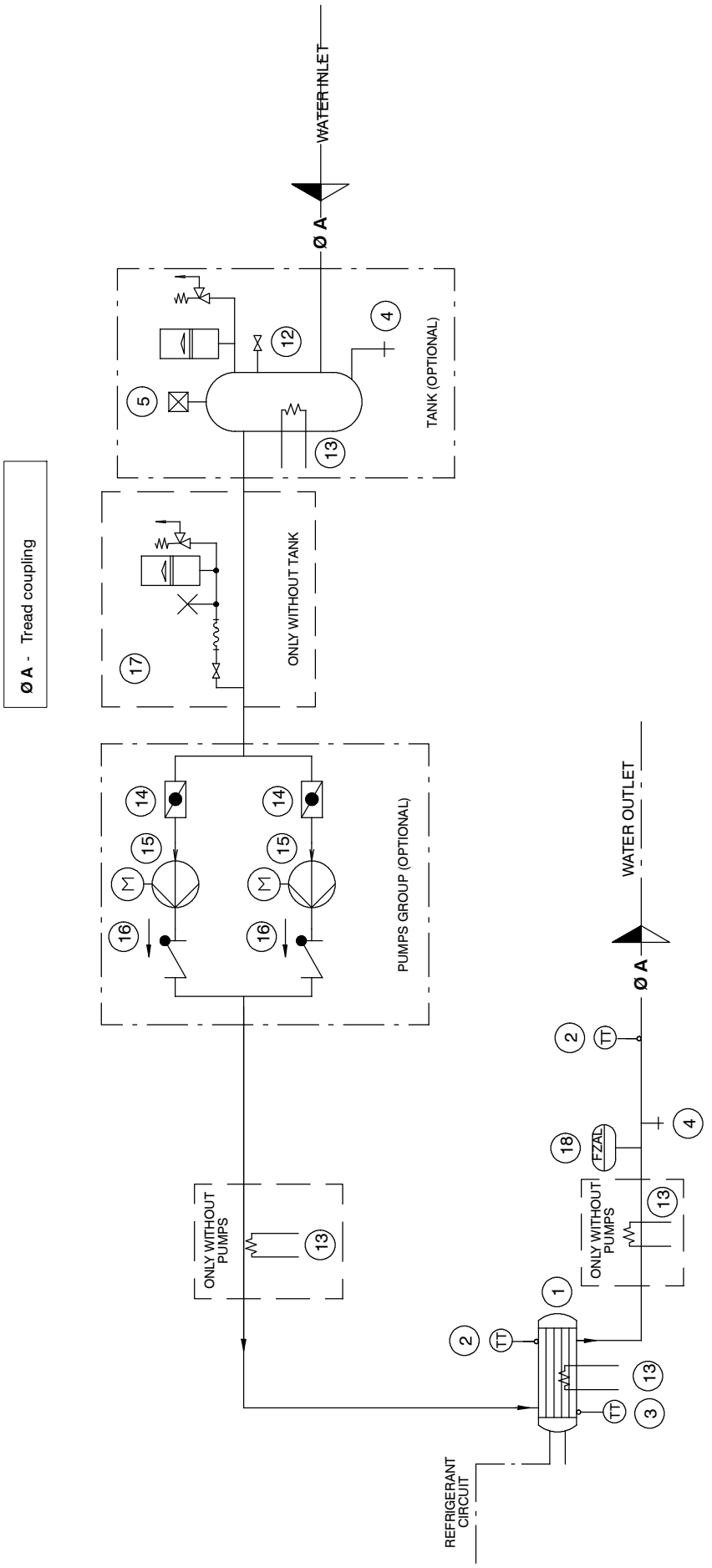


Tab. 12 - Refrigerant circuit components - Liebert HPC- S 006- 022 (R410A)

Pos.	Description	Pos.	Description
1	Compressor	15	Service connection
2	High pressure switch	16	Sight glass
3	Transducer pressure sensor *(Low pressure control)*	17	Shut- Off valve
4	Crankcase heater	18	Filter dryer
5	High pressure manometer	19	-
6	Low pressure manometer	20	Solenoid valve
7	Low pressure switch	21	Mechanical expansion valve
8	-	22	Electronic expansion valve
9	-	23	Evaporator
10	EEV temperature sensor	24	-
11	Transducer pressure sensor *(High pressure control)*	25	-
12	Safety valve	26	External air temperature sensor
13	Condenser	27	-
14	Condenser fans	28	-

13 Hydraulic Circuit

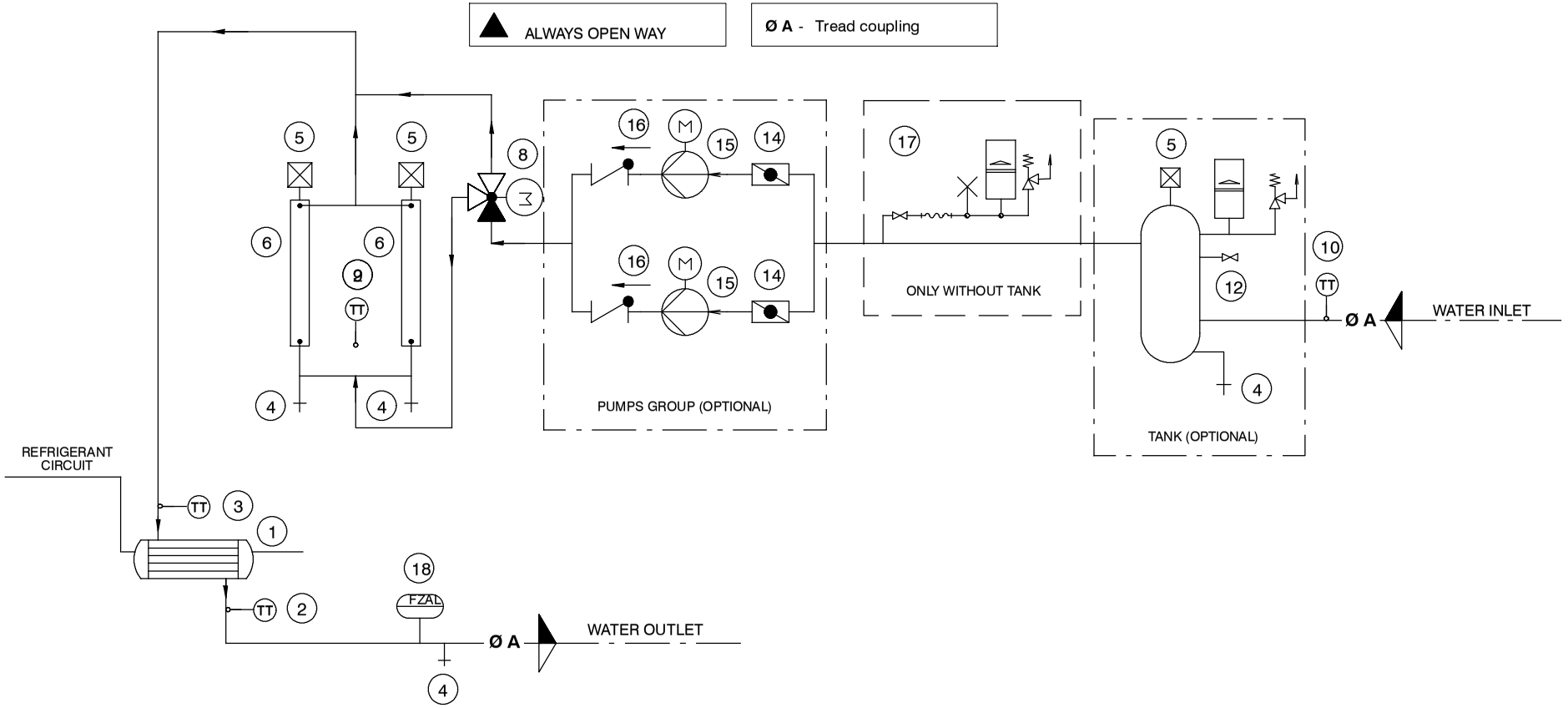
Fig. 13a - CHILLER HYDRAULIC DIAGRAM



Tab. 13a - Chiller hydraulic components - HPC- S 006- 022 (R410A)

Pos.	Description	Pos.	Description
1	Evaporator	10	-
2	Evaporator water outlet sensor / antifreeze	11	-
3	Evaporator water inlet sensor	12	Service valve with cap
4	Discharge valve	13	Antifreeze heaters (optional)
5	Manual air valve	14	Butterfly valve
6	-	15	Pump
7	-	16	No return valve
8	-	17	Kit expansion vassel - Safety valve - Manual air valve - Flex. Pipe - Valve
9	Air temperature sensor	18	Flow switch

Fig. 13b - FREECOOLING HYDRAULIC DIAGRAM



Tab. 13b - Freecooling hydraulic components - Liebert HPC- S 006- 022 (R410A)

Pos.	Description	Pos.	Description
1	Evaporator	10	Control freecooling thermostat sensor
2	Evaporator water outlet sensor / antifreeze	11	-
3	Evaporator water inlet sensor	12	Service valve with cap
4	Discharge valve	13	-
5	Manual air valve	14	Butterfly valve
6	Freecooling coil	15	Pump
7	-	16	No return valve
8	3 way valve	17	Kit expansion vassel - Safety valve - Manual air valve - Flex. Pipe - Valve
9	Air temperature sensor	18	Flow switch

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