Liebert HPC-L

Freecooling and Air Cooled Chillers with Double Screw Compressors

Product Documentation

English, cod. 273510, rev. 14.03.2018

Liebert HPC- L

The water chiller market has met bigger and bigger targets in the years thanks to the industrial society evolution and technological developments, even if it is experiencing a full maturity phase.

The demand is driving the continuous improvement of the chiller technology in terms of **reliability** and **energy saving**. Moreover to meet the most different requirements, depending on the several application places, the modern water chiller must thus be **highly flexible**, so as to suit to the surrounding environment.

Here comes **Liebert HPC-L**, the innovative range of air-cooled and freeccoling water chillers by **Vertiv**, covering a power range from **700** to **1600 kW**.

70 models, 4 sound emission versions, Chiller and Freecooling configurations, environmental friendly refrigerant R134a, electronic expansion valve, a wide range of options and accessories – such as economizer and fast start ramp for the quick restart of the compressors after a mains power failure, just to name two of them. **Liebert HPC-L** can be a leader in the chiller world. The new high capacity range **Liebert HPC-L** allows **Vertiv** to be a leader not only in its natural industry, the technological market where **Vertiv** can count on a recognized brand equity, but also in other industries such as heavy commercial and industrial cooling.

Besides its high flexibility **Liebert HPC-L** – loyal to the tradition by **Vertiv** is featured with **efficiencies** among the highest in the market as well as with the lowest **sound emissions** in its category, above all in the **Quiet** version. High efficiency is a condition to face the challenging energy saving demand of today cooling applications while low sound emissions are required to protect/contribute to a green environment.

Structure **sturdiness** and high **reliability** complete the features of the whole range.

Liebert HPC- L

Solutions Committed to your Business

Contents

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

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

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

1 Features and Benefits

Integration with Indoor Air Conditioners

Supersaver System

A special working mode can be set up in combination with **Vertiv HPAC** indoor units to obtain the ”Supersaver’ system, that enhances the energy saving capabilities and thus optimises 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- L** 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 in the units 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 maximise the energy savings and improve the total operation manage-ment.
The solution is @connectivity, which is a highly sophisticated way to let the system components (the Air-Conditioners as well as the **Liebert HPC- L** 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 @connectivity function to your system, it is simply necessary:
To build up an Hironet connection between the room units and the **Liebert HPC- L** 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 @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 browse and control your system via Internet.

Features and Benefits

Reliability and Low Environmental Impact

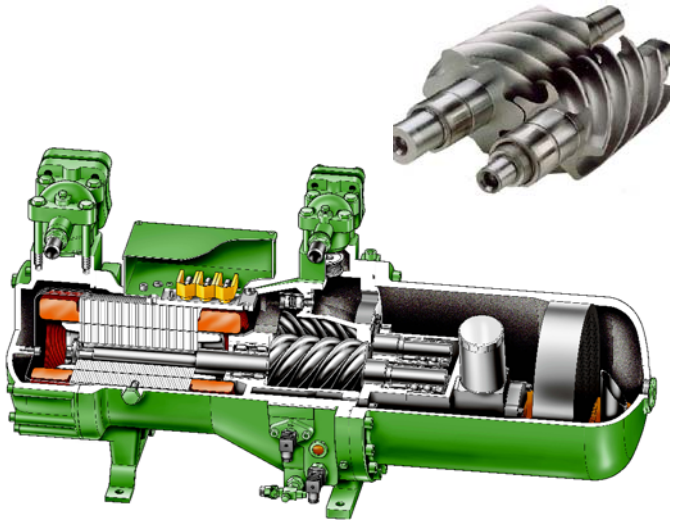
Reliability

The **Liebert HPC- L** series is equipped with two semi- hermetic screw compressors which represent state- of- the- art technology in this sector. They have been designed and optimised for air- cooled water chillers within air conditioning applications.

The high volumetric efficiency ensures excellent performance of the **Liebert HPC- L** units, not only at full load operation but with partial loads too, thanks to the continuous capacity control and to the sliding valves, modifying the delivery gas outlet clearance. 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.
Liebert HPC- L with two independent refrigerating circuits, two electric boards with independent supplies (each one interlocked with its own refrigerating circuit), two microprocessor boards - each one installed on its electric control board and even operating independently of each other - features the highest inner redundancy and thus the highest system reliability.
All **Liebert HPC- L** units are run tested at the factory before shipment.

Fewer moving parts

Unlike reciprocating compressors, screw compressors do not have pistons, connecting rods, suction and discharge valves or a mechanical oil pump. Fewer moving parts lead to greater reliability and a longer life.



High outdoor temperature

The oversizing of heat exchangers and the wide operating range of the screw compressors permit the use of **Liebert HPC- L** units in high temperature environments, up to 46° C at 100% full load.
If the limits are exceeded, the microprocessor reduces the load of the compressor to 50%, thus allowing continuous operation.

Continuous capacity control

Precise and stable control of the supply water temperature over the complete range of operating conditions is granting by the continuous capacity control. As the demand for load increases or decreases the compressor sliding valves modulate the capacity to match the required cooling load. This leads to a drastic reduction of cycling rates in comparison with a step capacity control and therefore, higher reliability.

Features and Benefits

Resistance to liquid slugging

The robust design of the screw compressors can bear/withstand liquid coolant quantities in suction that would severely damage the valves, the connecting rods and the cylinders of the reciprocating compressors.

Start- up management

The specific features of **Liebert HPC- L** screw compressors and the integrated microprocessor control functions permit unloaded start- up management, with pressure equalisation, thus reducing stress and enhancing the overall reliability.

Unequalled efficiency and energy saving

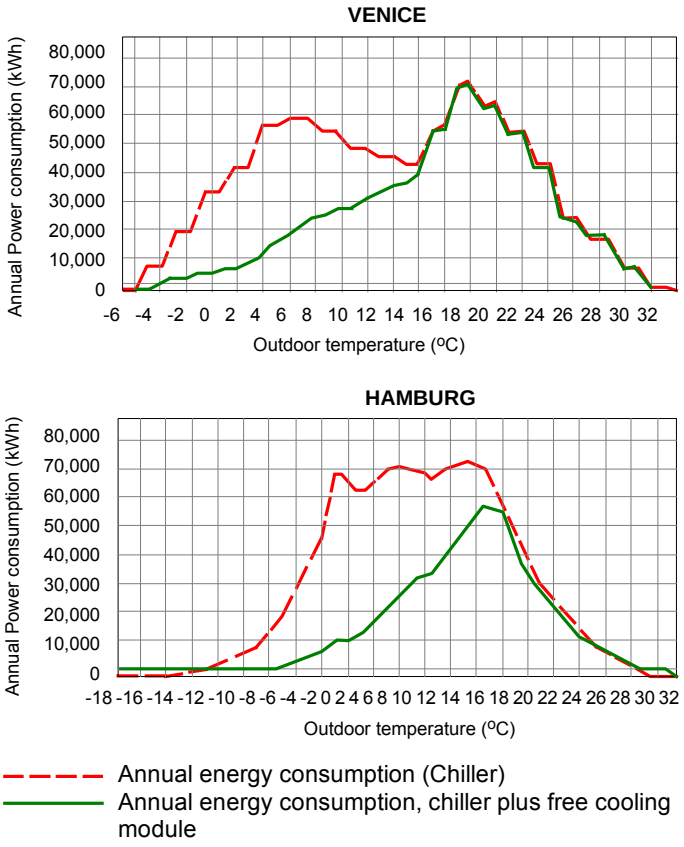
The use of semi- hermetic screw compressors of the latest generation; shell and tube evaporators selected for R134a application; aerodynamic profiled blade fans with high efficiency nozzles and continuous speed regulation; large surface W- shaped condenser coils ensure the achievement of unequalled efficiency figures.

Freecooling module

The execution with built- in free cooling module, allows **Liebert HPC- L** to take advantage of low outdoor air temperatures in the water cooling process in order to save energy, by avoiding compressors running, besides increasing significantly the compressor life.

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.

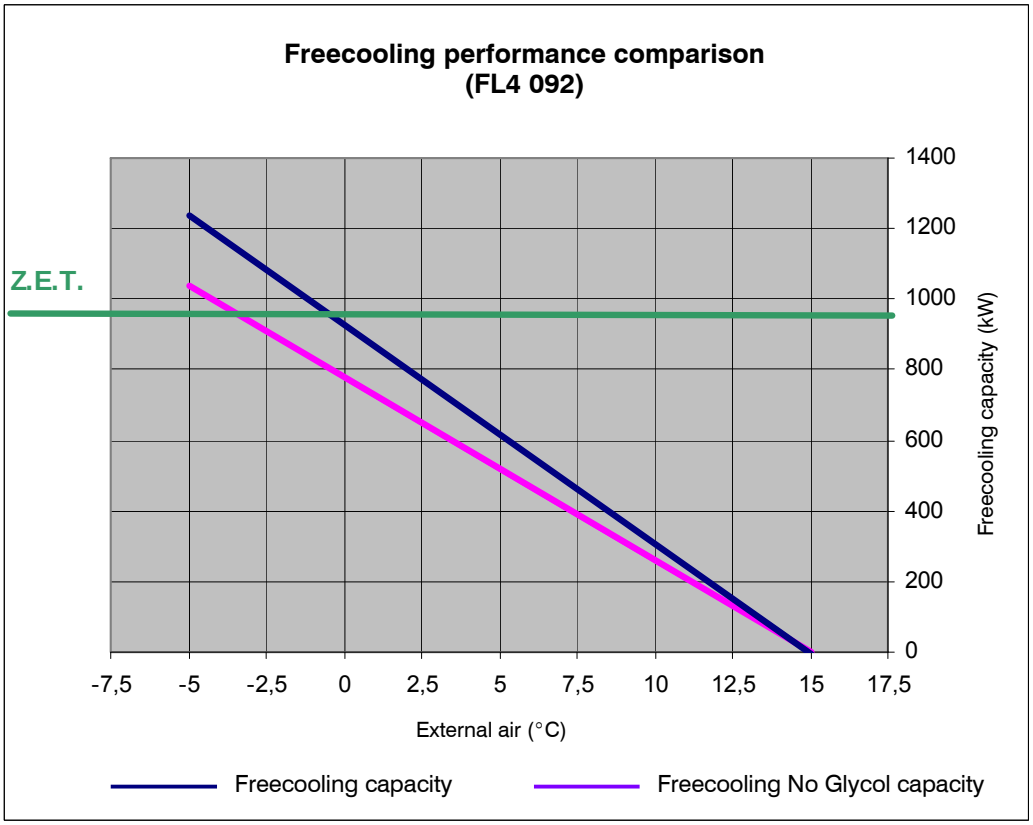
Reduced space requirements in comparison with a conventional chiller plus a dry- cooler, are obtained through the freecooling execution's compact design and the reduction of the compressors working hours offers exceptional saving both in the long and short term.



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' continuous partialisation ensure typical energy savings greater than 30%.

For specific applications and requirements, where the glycol mixture can not be used and circulated inside the building, **Vertiv** has developed a dedicated Freecooling version, defined as "No Glycol, Freecooling", that border the glycol fluid inside the external unit only.
In the No Glycol Freecooling version, a plate heat exchanger is positioned between the glycol fluid of the freecooling coils and the water of the evaporator preventing from the circulation of the glycol in the user hydraulic circuit. The parts and components of the chiller exposed to the external environment involved by the water flow are protected from potential frost by insulation, the heat load of the user circuit and by

the electrical heating driven by the microprocessor control.
The plate exchanger oversizing, the optimized flow between such exchangers thanks to the use of high efficiency pumps, the operating logics managed by the microprocessor control with the same strategies of increased efficiency and reliability research of the standard freecooling versions enable a min. decrease in the freecooling performance while advantageously recovering energy in this No Glycol version freecooling version, too.
The graph below compares the cooling performance of the two freecooling solutions for the machine model FL4 092.E; Z.E.T. means “Zero Equivalent Temperature”, namely the temperature of external air at which the nominal mechanical cooling capacity (i.e. developed in standard summer operating conditions) is obtained from the freecooling system (winter cooling capacity with compressors off).

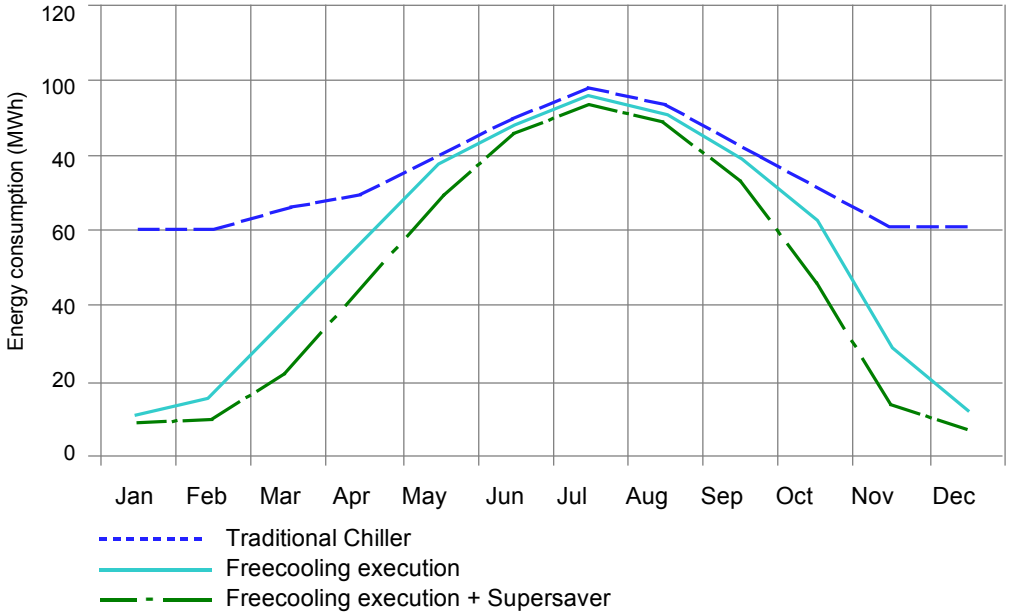


Features and Benefits

Seasonal efficiency

The freecooling execution finds its best application in combination with the Supersaver 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%.

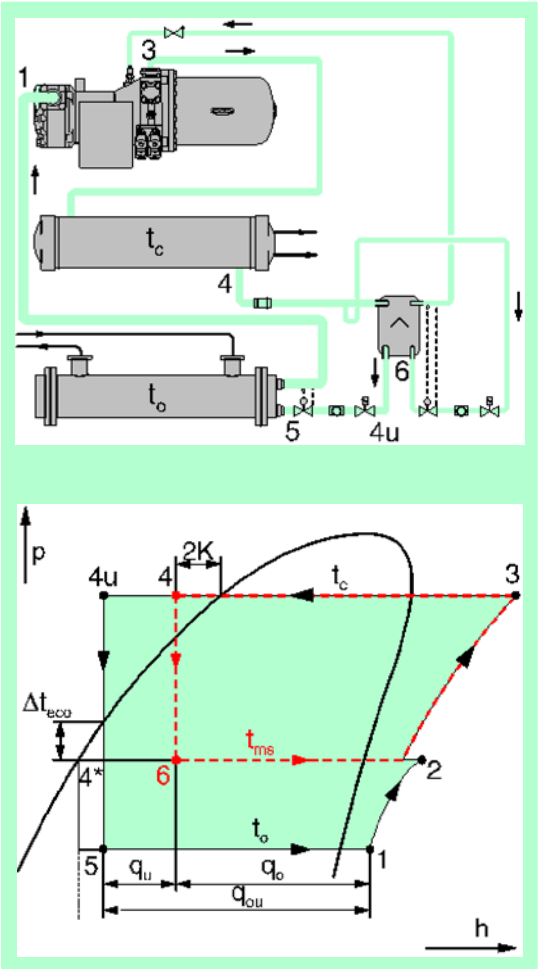
Annual power consumption. Comparison among the systems:



Economiser circuit

The operation with economizer is a convenient and efficient method to increase the cooling capacity and the COP. This device is particularly advisable for the conditioning applications where the condensing temperatures are high or medium.

By this operation system, the liquid refrigerant is cooled by a heat exchanger (sub- cooler). When a sub- cooler is used, some of the refrigerant mass (ECO flow rate) is separated from the condenser mass after the condenser (4). This ECO mass is thus expanded at an intermediate pressure (t ms). The ECO mass evaporates inside the sub- cooler and enters the compressor through the economizer opening.
The evaporator mass flow rate is sub- cooled by the exchanger at a lower liquid temperature (4u). The intermediate pressure at the economizer changes depending on the type of compressor, on the operating conditions (evaporations and condensation temperatures) and on the ECO flow rate. The additional sub- cooling of the liquid involves a significant increase of the cooling capacity. From certain operating conditions, the electric absorption by the compressor increases less proportionally than the cooling capacity (improving the machine efficiency), as the compression process occurs at a better efficiency level due



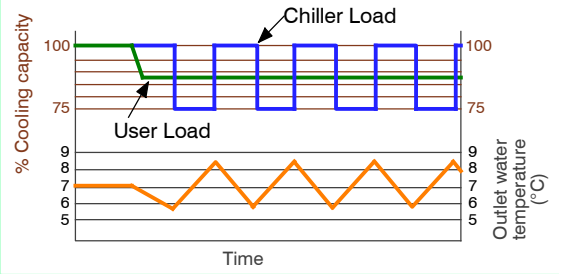
to the positive contribution of the fresh gas portion sucked through the ECO opening.
A further feature of the economizer circuit in the **Liebert HPC- L** units is the slide valve for compressor capacity control, equipped with an integrated economizer channel; this ensure the above described benefits, due to the additional sub- cooling, independently of the machine load conditions and thus of the position of the slide valve for the compressor choking.

Efficient control and adjustment

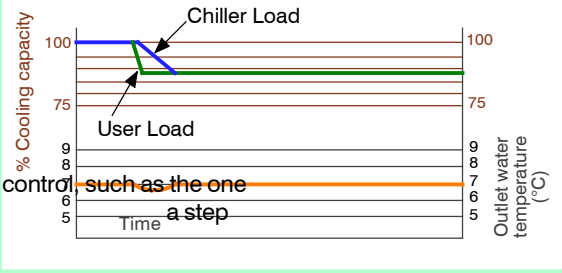
The different strategies of the microprocessor control by **Vertiv** for the compressors - capacity adjustment valves with continuous mod-ulation and different operating modes (economizer, expansion with electronic valve) - ensure energy saving typically over 20%.

The cooling capacity can be changed and modulated continuously thanks to the microprocessor control of the choking slide valve for the compressor capacity. Each unit is equipped with a variable power control without limits from 100% up to 25%. This modulation enables the compressor to perfectly meet the building- cooling load without any change in the outlet temperature from the evaporator. This change in the cooled water temperature is avoided only thanks to a ste-pless control, such as the one offered by **Vertiv**. Indeed, with a step capacity control with partial loads,

each power step would be too high or too low when compared to the building- cooling load, so loosing water temperature control.



Fluctuation with steps capacity control



Stability with stepless capacity control

Thus, the energy costs for the chiller are decreased, above all under conditions of partial load featuring the chiller operation most of the time.

Seasonal efficiency: IPLV- ESEER efficiency ratios

Liebert HPC- L features excellent performance under partial loads. The loads of the air conditioning systems in the standard operating conditions are remarkably lower than the max. rated load conditions for the chiller selection.

Thus, chillers seldom work under full load. The **Liebert HPC- L** chillers can offer significant operation savings.

The operation of the chillers under partial load is usually associated with reduced air temperatures in the condenser and reduced room temperatures.
With the operation under partial load, the heat to be disposed is less than the one under full load. Further, the operation under partial load is typically associated with reduced outdoor temperatures that enable the best performance of the unit.

The operation under partial load associated with reduced room temperatures ensures better performance and efficiency by the chiller. IPLV (Integrated Part Load Value) is a method for measuring the total chiller performance in a defined range of operating conditions under partial load. This method has been studied by ARI and is included in the standard ARI 550/590- 98. As most of the conditioning systems operate for most of the time at a load lower than the max. rated one, IPLV is an excellent method to compare the chiller efficiency under similar conditions.

The formula to calculate IPLV is:

IPLV = 0.01A + 0.42B + 0.45C + 0.12D

Where:

A = EER at 100%, load point at 35.0 °C condenser air inlet
B = EER at 75%, load point at 26.7 °C
C = EER at 50%, load point at 18.3 °C
D = EER at 25%, load point at 12.8 °C

An alternative seasonal efficiency ratio has been defined for Europe, which is more suitable for the load conditions, the outdoor air temperatures and the building principles typical of European countries. It is defined by the acronym ESEER (European Seasonal Energy Efficiency Ratio), as specified here below:

ESEER = 0.03A + 0.33B + 0.41C + 0.23D

Where:

A = EER at 100%, load point at 35.0 °C condenser air inlet
B = EER at 75%, load point at 30.0 °C
C = EER at 50%, load point at 25.0 °C
D = EER at 25%, load point at 20.0 °C

Such ratios are really useful to calculate the energy consumption, when the load distribution required by the chiller in one year of operation follows the same percentage subdivisions considered in the above mentioned formulas.

Absorbed energy = Required energy / Efficiency ratio

Tab. 1a - Efficiency ratios

	HPC- L			
Model	**Size**	**EER**	**IPLV**	**ESEER**
CG4	069	3,40	4,57	4,20
	075	3,31	4,44	4,07
	081	3,23	4,37	4,00
	087	3,15	4,47	4,06
	093	3,12	4,51	4,09
	100	3,08	4,50	4,09
	107	3,25	4,60	4,21
	122	2,93	4,47	3,97
CB4	069	3,28	4,71	4,23
	075	3,18	4,58	4,10
	081	3,09	4,51	4,02
	087	3,00	4,46	4,00
	093	2,97	4,36	3,95
	100	2,92	4,36	3,92
	107	3,10	4,45	4,04
	122	2,86	4,13	3,69
	140	3,07	4,52	4,05
CL4	068	3,29	4,77	4,28
	074	3,17	4,65	4,15
	080	3,28	4,63	4,18
	086	3,19	4,60	4,16
	092	3,29	4,64	4,25
	099	3,26	4,63	4,23
	106	3,24	4,65	4,26
	121	3,08	4,41	3,95
	139	3,02	4,66	4,14
CQ4	068	3,12	4,97	4,38
	074	2,94	4,76	4,17
	080	3,08	4,81	4,26
	086	2,98	4,74	4,21
	092	3,13	4,84	4,38
	099	3,06	4,78	4,28
	106	3,00	4,79	4,29
	121	2,91	4,52	4,00
	139	2,82	4,77	4,18

EER *(Energy Efficiency Ratio)*
IPLV *(Integrated Part Load Value)*
ESEER *(European Seasonal Energy Efficiency Ratio)*

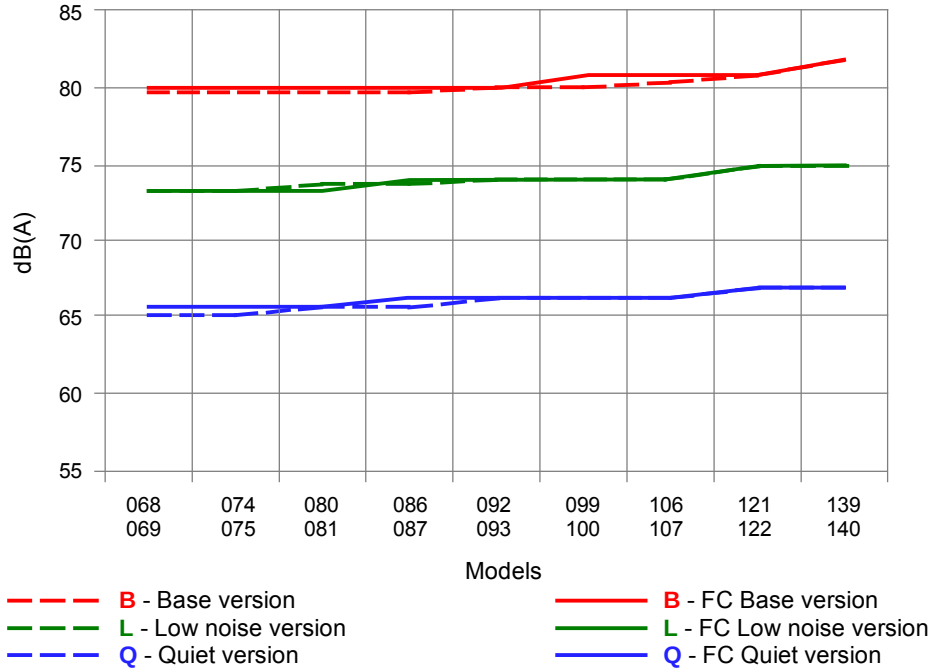
Low sound emission

The **Liebert HPC- L** series is characterised by unrivalled low sound emissions, in particular the models of the version Quiet.
A sound- proofed compressors enclosure, compressor fastening on insulating/anti- vibration supports, fans and speed adjusters specifically designed to reduce sound emission lead to these superior results.

All units are equipped with a modulating fans speed control; controlled by a special algorithm which, while optimising the compressors management, enables to keep the fan speed always to the minimum.

Even lower sound emission levels can be obtained with the EC fans (with integrated electronic switching motor), above all in low speed operation.

Liebert HPC-L series sound emissions at 1 m distance



Tab. 1b - Sound levels

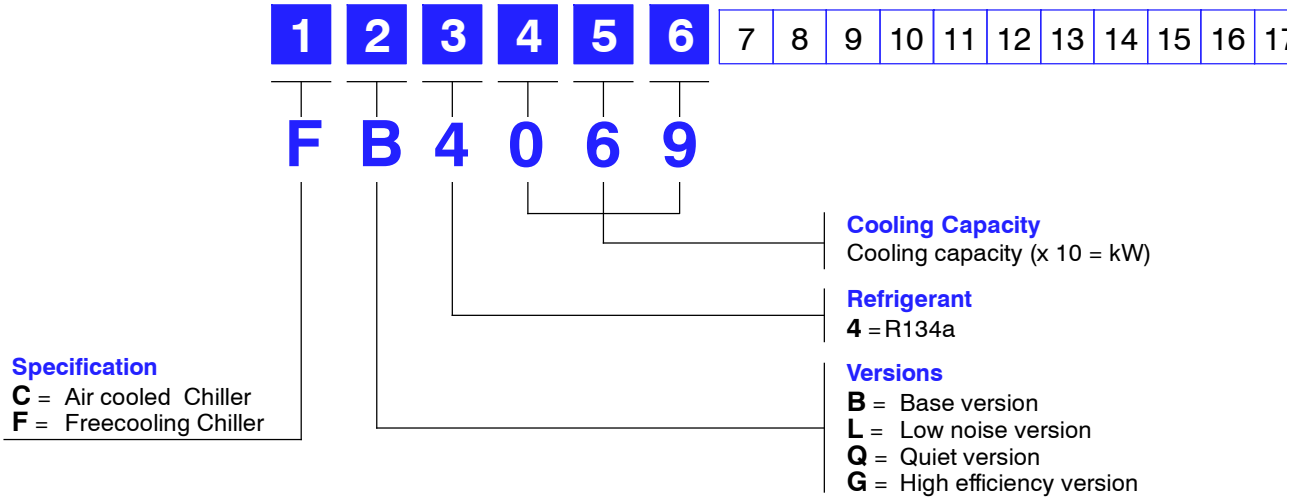
Models	HPC- L (Chiller)			HPC- L (Freecooling)		
	"B" version	"L" version	"Q" version	"B" version	"L" version	"Q" version
068 - 069	79.5	73.0	65.0	80.0	73.0	65.5
074 - 075	79.5	73.0	65.0	80.0	73.0	65.5
080 - 081	79.5	73.5	65.5	80.0	73.0	65.5
086 - 087	79.5	73.5	65.5	80.0	74.0	66.0
092 - 093	80.0	74.0	66.0	80.0	74.0	66.0
099 - 100	80.0	74.0	66.0	81.0	74.0	66.0
106 - 107	80.5	74.0	66.0	81.0	74.0	66.0
121 - 122	81.0	75.0	67.0	81.0	75.0	67.0
139 - 140	82.0	75.0	67.0	82.0	75.0	67.0

The unit sound level in the version "B" and in the version "L" is lowered by 3 dB(A) in standard operating conditions with water 12/7° C at the evaporator and outdoor air less than 30° C by special suitable measures, such as:

- better sound insulation of the compressor compartment;
- automatic fan speed reduction with standard adjustment with phase cutoff (TRIAC) for the "B" versions;
- automatic fan speed reduction with EC fan adjustment for the "L" versions.

2 Model Number Description

Model Nomenclature / Digit Numbers



Liebert HPC- L

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

Base unit main features

- Structure and bearing base in galvanized steel sheet sections, with powder- painting and suitable thickness
- Two indipendent refrigeration circuits
- Semihermetic screw compressors with continuous capacity control
- Electronic expansion valve (EEV)
- Shell & Tube evaporators with direct expansion and independent circuit on the refrigerant side for each compressor
- Axial fans with modulating speed control
- Condensing and freecooling coils (if applicable) with copper pipes and aluminum fins
- International approval 2014/68/EU - PED
- One water circuit with flow switch
- Double electric panel CE compliant and complete with safety equipments, fan motors protection, fuses and protection thermal relays for compressors, power supply 400V / 3Ph / 50Hz (RST + PE)
- Main switch on each electric board
- iCOM board / Display control interlocked to each electric board
- Antiscratch plastic film packaging
- Color Ral 7032 “Grey”

Digit 7 - Display and Switch

B = 2 FTE display + Network switch
F = iCOM Coldfire display + Network switch

Digit 8 - Compressor suction shut- off valve

0 = None
1 = With shut- off valve

Digit 9 - Monitoring

0 = None
1 = IS Housing (no IS Card included)
2 = Web card (IS- WEBL)
3 = Modbus card (IS- 485L)
4 = Sitescan card (IS- 485EXI)
5 = Web card (IS- WEBL) + Modbus card (IS- 485L)
6 = Web card (IS- WEBL) + Sitescan card (IS- 485EXI)
7 = Modbus card (IS- 485L) + Sitescan card (IS- 485EXI)
8 = Bacnet card (Bacnet or Modbus over IP) (IS- IPBML)

Digit 10 - Economiser (ECO)

0 = No ECO
1 = With ECO

Digit 11 - Fan speed control

1 = TRIAC control
3 = EC- Fan

Digit 12 - Pumps group / Hydraulic Kit

Complete chiller / freecooling version
0 = No pumps / no hydraulic Kit
1 = No pumps / with hydraulic Kit
2 = 2 standard head pumps / with hydraulic Kit
3 = 2 high head pumps / with hydraulic Kit
4 = 2 pumps (1 with inverter), standard head / with hyd. Kit
5 = 2 pumps (1 with inverter), high head / with hyd. Kit

No- glycol freecooling version
A = No pumps / no hydraulic Kit
B = No pumps / with hydraulic Kit
C = 2 standard head pumps / with hydraulic Kit
D= 2 high head pumps / with hydraulic Kit
E= 2 pumps (1 with inverter), standard head / with hyd. Kit
F = 2 pumps (1 with inverter), high head / with hyd. Kit

Digit 13 - 20 % Heat recovery

0 = None
1 = 20 % Heat recovery

Digit 14 - Electric panel options

0 = None
1 = With electric heaters
2 = With energy meter
3 = With electric heaters and energy meter
A = Fast start ramp
B = Fast start ramp and electric heaters
C = Fast start ramp and energy meter
D = Fast start ramp, electric heaters and energy meter

Digit 15 - Evaporator electric heaters

(available on chiller / freecooling, no- glycol version)
0 = None
1 = With electric heaters only evaporator
2 = With evaporator, pumps and pipes electric heaters

Digit 16 - Compressor power factor capacitors

0 = None
1 = With compressor power factor capacitors

Digit 17 - Condensing coil filter / Protection grid

0 = None
1 = With condensing coil filter
2 = With protection grids
3 = With condensing coil filters and protection grids

Digit 18 - Special requests

0 = None
X = As Specified

Model Number Description

Unit Options

- Integrated lifting bars, removable after shipment
- Modbus connection kit for the energy meter

Kits / Accessories shipped loose

- Anti- vibration mounts (spring or rubber)
- Remote iCOM Coldfire display on IP40 box
- Water inlet manifolds
- No glycol module (unit must be selected with no- glycol configuration)

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 the Chiller versions only:

For space reasons, the pumps cannot be seated in the machine with 20% heat recovery.

- if digit 13 = 1, than digit 12 must be different from 2, 3, 4 or 5

If heating resistors are needed, the selection shall include heaters for both evaporators and pumps in case that pumps have been selected.

- if digit 15 = 1, than digit 12 must be different from 2, 3, 4 or 5
- if digit 15 = 2, than digit 12 must be different from 0 or 1

Rules valid for the Freecooling versions only:

For space reasons, the pumps cannot be seated in the machine with 20% heat recovery.

- if digit 13 = 1, then digit 12 must be different from 2, 3, 4, 5, C, D, E or F
- if digit 12 = 0 or 1 or 2 or 3 or 4 or 5, then digit 15 must be 0
- if digit 12 = A or B, then digit 15 must be 1
- if digit 12 = C or D or E or F, then digit 15 must be 2

Rules valid for the No- Glycol option:

The No- Glycol Module must be ordered as a separate code.

For No- Glycol version it is necessary to order the water inlet manifolds kit.

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.
Higher flow values may cause corrosions and vibrations inside the shell and tube heat exchanger.
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.
Outlet water temperature from 4 to 15 ° C.
The maximum allowed water return temperature when the unit is in full operation is 20 ° C; return temperatures in excess of 20 ° C are allowed only during start- up.
The “G” versions admit maximum water outlet temperature of 20° C; and maximum return water temperature of 26° C when the units are at full power.

The maximum glycol percentage permitted is 50% (35% with standard pump sets fitted)

The minimum glycol percentage necessary is in relation to the minimum ambient air temperature conditions referred to the place of installation.
The maximum hydraulic working pressure is 6 Barg.
This limit does not depend on the presence or absence of the pumps in the unit.

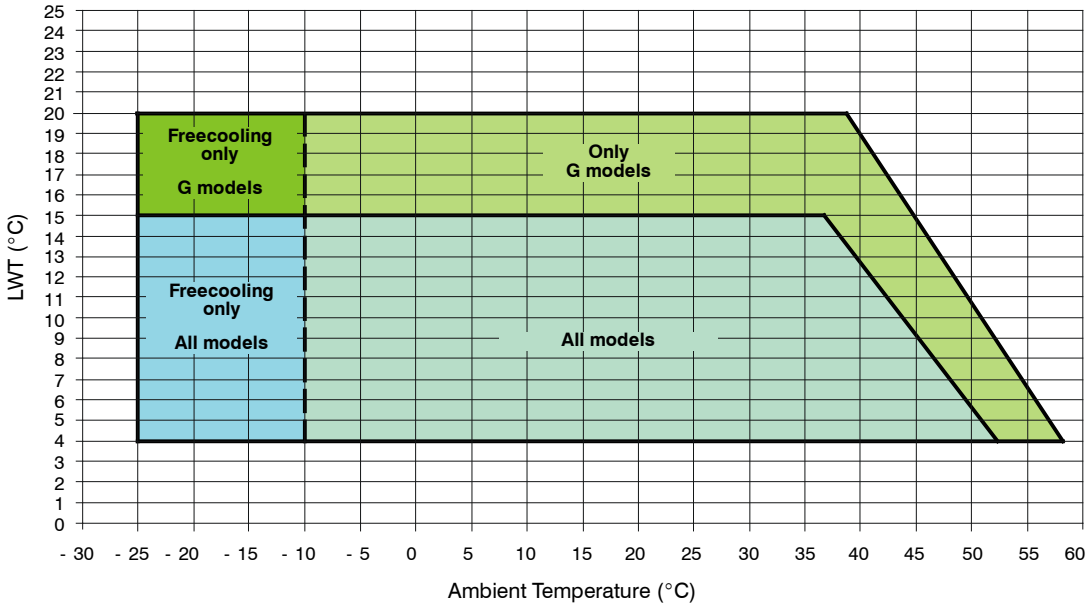
Nominal power supply tolerance: 400V $^{+}/_{-}$ 10%; max. voltage unbalance: 2%.

See operation range Table in which each model’s limits are indicated; for different values ask your agent.

Unit storage conditions:

- Between - 20 ° C and + 45 ° C for all models; humidity 80% R.H.; non condensing.

Average HPC- L Range Working Limits



Operating Range

Tab. 3a - Operating range - HPC- L **R134a**

Models: CG4		069	075	081	087	093	100	107	122
Working range									
Max. outdoor temperature (1)	°C	57.5	57.5/55.5	55.5	55.5/54	54	54/51.5	54.0	55.0
Max. water flow	m^3/h	170	170	230	230	230	230	256	264
Safety devices settings									
High pressure switch (1)	bar	20							
High pressure safety valve	bar	22							
HP safety valves (each circuit)	Nr.	2							3
High pressure safety valve connection	in	1.1/4" G							
Low pressure switch	bar	1.1							
Low pressure safety valve	bar	12							
LP safety valves (each circuit)	Nr.	1							
Low pressure safety valve connection	in	3/4" G							

Models: CB4		069	075	081	087	093	100	107	122	140
Working range										
Max. outdoor temperature (1)	°C	51.5	51.5/48	48.0	48/45.5	47.5	47.5/44.5	47.5	48.5	50.5
Max. water flow	m^3/h	170	170	230	230	230	230	256	264	272
Safety devices settings										
High pressure switch (1)	bar	18								
High pressure safety valve	bar	20								
HP safety valves (each circuit)	Nr.	2								3
High pressure safety valve connection	in	1.1/4" G								
Low pressure switch	bar	1.1								
Low pressure safety valve	bar	12								
LP safety valves (each circuit)	Nr.	1								
Low pressure safety valve connection	in	3/4" G								

Models: CL4		068	074	080	086	092	099	106	121	139
Working range										
Max. outdoor temperature (1)	°C	51.0	51/48	50.5	50.5/48	51.5	51.5/48.5	48.5	51.0	49.0
Max. water flow	m^3/h	170	170	230	230	230	230	256	264	272
Safety devices settings										
High pressure switch (1)	bar	18								
High pressure safety valve	bar	20								
HP safety valves (each circuit)	Nr.	2								3
High pressure safety valve connection	in	1.1/4" G								
Low pressure switch	bar	1.1								
Low pressure safety valve	bar	12								
LP safety valves (each circuit)	Nr.	1								
Low pressure safety valve connection	in	3/4" G								

Models: CQ4		068	074	080	086	092	099	106	121	139
Working range										
Max. outdoor temperature (1)	°C	47.5	47.5/44.5	46.5	46.5/44.5	48.0	48.0/45	44.5	47.5	45.5
Max. water flow	m^3/h	170	170	230	230	230	230	256	264	272
Safety devices settings										
High pressure switch (1)	bar	18								
High pressure safety valve	bar	20								
HP safety valves (each circuit)	Nr.	2								3
High pressure safety valve connection	in	1.1/4" G								
Low pressure switch	bar	1.1								
Low pressure safety valve	bar	12								
LP safety valves (each circuit)	Nr.	1								
Low pressure safety valve connection	in	3/4" G								

(1) - With nominal air flow; water outlet temperature 7° C; full load; R134a refrigerant; standard version and with economiser option.

Notes: *The units are equipped with automatic capacity reduction system to avoid the machine lock before reaching the indicated outdoor air temperature max. limits.*
In the units with economizer option, such device is disabled before reaching the indicated outdoor air temperature max. limits.
In the units with asymmetrical compressors, the indicated outdoor air temperature max. limit are referred to each refrigerating circuit.

Operating Range

Tab. 3b - Operating range - HPC- L with freecooling **R134a**

Models: FG4		**069**	**075**	**081**	**087**	**093**	**100**	**107**	**122**
Working range									
Max. outdoor temperature (1)	°C	54.0	54.0/51.5	51.0	51.0/48.5	48.5	54.0/52	51.5	49.5
Max. fluid flow	m³/h	170	170	230	230	230	230	256	264
Safety devices settings									
High pressure switch (1)	bar	20							
High pressure safety valve	bar	22							
HP safety valves (each circuit)	Nr.	2							3
High pressure safety valve connection	in	1.1/4" G							
Low pressure switch	bar	1.1							
Low pressure safety valve	bar	12							
LP safety valves (each circuit)	Nr.	1							
Low pressure safety valve connection	in	3/4" G							

Models: FB4		**069**	**075**	**081**	**087**	**093**	**100**	**107**	**122**	**140**
Working range										
Max. outdoor temperature (1)	°C	48.0	48/45,5	45.5	45,5/43	43.0	49/46,5	45.5	42.5	45.5
Max. fluid flow	m³/h	170	170	230	230	230	230	256	264	272
Safety devices settings										
High pressure switch (1)	bar	18								
High pressure safety valve	bar	20								
HP safety valves (each circuit)	Nr.	2							3	
High pressure safety valve connection	in	1.1/4" G								
Low pressure switch	bar	1.1								
Low pressure safety valve	bar	12								
LP safety valves (each circuit)	Nr.	1								
Low pressure safety valve connection	in	3/4" G								

Models: FL4		**068**	**074**	**080**	**086**	**092**	**099**	**106**	**121**	**139**
Working range										
Max. outdoor temperature (1)	°C	46.0	46/43,5	43.5	50/47,5	47.5	47,5/44,5	44.5	46.5	44.0
Max. fluid flow	m³/h	170	170	230	230	230	230	256	264	272
Safety devices settings										
High pressure switch (1)	bar	18								
High pressure safety valve	bar	20								
HP safety valves (each circuit)	Nr.	2							3	
High pressure safety valve connection	in	1.1/4" G								
Low pressure switch	bar	1.1								
Low pressure safety valve	bar	12								
LP safety valves (each circuit)	Nr.	1								
Low pressure safety valve connection	in	3/4" G								

Models: FQ4		**068**	**074**	**080**	**086**	**092**	**099**	**106**	**121**	**139**
Working range										
Max. outdoor temperature (1)	°C	42.0	42.0/39.5	39.5	46.0/43.5	43.5	43.5/40.5	40.5	40.5	39.5
Max. fluid flow	m³/h	170	170	230	230	230	230	256	264	272
Safety devices settings										
High pressure switch (1)	bar	18								
High pressure safety valve	bar	20								
HP safety valves (each circuit)	Nr.	2							3	
High pressure safety valve connection	in	1.1/4" G								
Low pressure switch	bar	1.1								
Low pressure safety valve	bar	12								
LP safety valves (each circuit)	Nr.	1								
Low pressure safety valve connection	in	3/4" G								

(1) - With nominal air flow; fluid outlet temperature 10 °C; full load; R134a refrigerant; standard version and with economiser option.

Notes: *The units are equipped with automatic capacity reduction system to avoid the machine lock before reaching the indicated outdoor air temperature max. limits.*
In the units with economizer option, such device is disabled before reaching the indicated outdoor air temperature max. limits.
In the units with asymmetrical compressors, the indicated outdoor air temperature max. limit are referred to each refrigerating circuit.

4 Technical Data

Tab. 4a - Technical Data - CG4 069- 122 **R 134a**

Model CG4		069	075	081	087	093	100	107	122
Performances (1)									
Cooling capacity	kW	745	790	846	881	926	972	1063	1159
Compressors power input	kW	195	215	238	256	269	288	295	359
Total power input	kW	219	239	262	280	297	324	327	396
Compressors COP	-	3.82	3.67	3.55	3.44	3.44	3.38	3.6	3.23
Unit EER	-	3.40	3.31	3.23	3.15	3.12	3.08	3.25	2.93
Water flow	m^3/h	127.9	135.7	145.3	151.4	159.1	167.2	182.8	199.2
Water pressure drop	kPa	44	50	36	39	43	47	44	52
Performances (2)									
Cooling capacity	kW	836	882	937	981	1033	1079	1158	1220
Compressors power input	kW	222	243	265	290	308	327	325	400
Total power input	kW	246	267	289	314	336	355	358	437
Compressors COP	-	3.77	3.63	3.54	3.38	3.25	3.3	3.56	3.05
Unit EER	-	3.40	3.30	3.25	3.13	3.07	3.04	3.24	2.79
Water flow	m^3/h	143.6	151.5	161	168.5	177.5	185.5	198.9	209.7
Water pressure drop	kPa	52	57	41	45	49	54	48	53
Sound levels									
SPL [Sound Pressure Level] (3)	dB(A)	83.5				84.0		84.5	85
PWL [Sound Power Level] (4)	dB(A)	105.5				106.0		106.5	107.5
Refrigeration circuit									
Number of refrigeration circuits	Nr	2							
Refrigerant charge [each circuit]	kg	117		125	125/130	130		146	168
Compressor									
Number of compressors	Nr	2							
Type	-	double screw with integrated oil separator and muffler							
Nominal power [each compressor]	HP	210	210+240	240	240+280	280	280+300	300	320
Capacity control	-	25 ⇒ 100 % stepless							
Fan									
Number of fans	Nr	10				12		14	16
Type	-	axial							
Wheel nominal diameter	mm	900							
Rpm	1/min	900							
Nominal power input [each fan]	kW	2.4							
Fans power input	kW	24				28.8		33.6	38.4
Air flow rate	m^3/h	250000				270000		315000	360000
Evaporator									
Number of evaporators	Nr	1							
Type	-	shell & tube							
Internal volume [each circuit, refrigerant side]	l	93		112				136	153
Condensing coil									
Material tubes / fins	-	copper / aluminium							
Rows / Fins space	Nr/mm	3 / 1.8							
Face area	m^2	33.0						38.5	44
Internal volume [each circuit]	l	186						216	248
Water connections									
Diameters inlet	DN-inch	2 x DN 125-5”				2 x DN 150-6”			
Diameter outlet	DN-inch	1 x DN 150-6”				1 x DN 200-8”			
Unit volume	l	414		372				446	620
Dimensions									
Length	mm	8590						9586	11578
Depth	mm	2308							
Height	mm	2581							
Weights									
Net weight	kg	8686	8694	8815	8892	9074	9105	9836	11291
Operating weight	kg	9100	9108	9187	9264	9446	9477	10282	11911

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) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
(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. 4b - Technical Data - CB4 069- 140 **R 134a**

Model CB4		069	075	081	087	093	100	107	122	140
Performances *(1)*										
Cooling capacity	kW	732	776	829	862	905	950	1041	1143	1287
Compressors power input	kW	200	221	245	264	277	297	304	363	374
Total power input	kW	223	244	268	287	305	325	336	400	420
Compressors COP	-	3.66	3.51	3.38	3.27	3.27	3.20	3.42	3.15	3.44
Unit EER	-	3.28	3.18	3.09	3.00	2.97	2.93	3.10	2.86	3.07
Water flow	m^3/h	125.8	133.3	142.5	148.3	155.6	163.4	179	196.5	221.2
Water pressure drop	kPa	43	48	35	37	41	45	42	50	64
Performances *(2)*										
Cooling capacity	kW	824	869	923	963	1013	1038	1156	1197	1335
Compressors power input	kW	230	252	277	303	321	342	339	406	410
Total power input	kW	253	275	300	326	349	370	371	442	456
Compressors COP	-	3.58	3.45	3.33	3.18	3.16	3.09	3.36	2.95	3.25
Unit EER	-	3.26	3.16	3.08	2.95	2.91	2.86	3.07	2.71	2.93
Water flow	m^3/h	141.6	149.4	158.5	165.4	174.2	181.6	195.5	205.8	229.34
Water pressure drop	kPa	50	56	40	43	47	52	47	51	63
Sound levels										
SPL [Sound Pressure Level] *(3)*	dB(A)	79.5				80.0		80.5	81	82
PWL [Sound Power Level] *(4)*	dB(A)	101.5				102.0		102.5	103.5	105.0
Refrigeration circuit										
Number of refrigeration circuits	Nr	2								
Refrigerant charge [each circuit]	kg	117		125	125/130	130		146	168	202
Compressor										
Number of compressors	Nr	2								
Type	-	double screw with integrated oil separator and muffler								
Nominal power [each compressor]	HP	160	160+180	180	180+210	210	210+240	240	280	320
Capacity control	-	25 ⇒ 100 % stepless								
Fan										
Number of fans	Nr	10				12		14	16	20
Type	-	axial								
Wheel nominal diameter	mm	900								
Rpm	1/min	900								
Nominal power input [each fan]	kW	2.3								
Fans power input	kW	23.0				27.6		32.2	36.8	46.0
Air flow rate	m^3/h	230000				247200		288400	329600	412000
Evaporator										
Number of evaporators	Nr	1								
Type	-	shell & tube								
Internal volume [each circuit, ref. side]	l	93		112				136	153	160
Condensing coil										
Material tubes / fins	-	copper / aluminium								
Rows / Fins space	Nr/mm	3 / 1.8								
Face area	m^2	33.0						38.5	44	55
Internal volume [each circuit]	l	186						216	248	310
Water connections										
Diameters inlet	DN-inch	2 x DN 125-5”				2 x DN 150-6”				
Diameter outlet	DN-inch	1 x DN 150-6”				1 x DN 200-8”				
Unit volume	l	413		369				450	620	606
Dimensions										
Length	mm	8590						9586	11578	13570
Depth	mm	2308								
Height	mm	2571								
Weights										
Net weight	kg	8686	8694	8815	8892	9074	9105	9836	11251	12405
Operating weight	kg	9100	910/8	9187	9264	9446	9477	10282	11911	13011

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) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
(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. 4c - Technical Data - CL4 068- 139 **R 134a**

Model CL4		068	074	080	086	092	099	106	121	139
Performances *(1)*										
Cooling capacity	kW	728	772	851	886	947	995	1054	1178	1262
Compressors power input	kW	201	223	236	254	261	278	298	348	384
Total power input	kW	222	243	260	278	288	306	325	382	418
Compressors COP	-	3.62	3.46	3.61	3.49	3.63	3.58	3.54	3.38	3.29
Unit EER	-	3.29	3.17	3.28	3.19	3.29	3.26	3.24	3.08	3.02
Water flow	m^3/h	125.1	132.7	146.2	152.3	162.6	171.0	181.2	202.4	217.1
Water pressure drop	kPa	43	48	36	39	45	49	43	53	61
Performances *(2)*										
Cooling capacity	kW	819	864	939	983	1051	1096	1147	1230	1312
Compressors power input	kW	234	257	264	288	297	314	333	387	424
Total power input	kW	254	277	288	312	324	341	360	421	458
Compressors COP	-	3.50	3.36	3.56	3.41	3.51	3.49	3.44	3.18	3.10
Unit EER	-	2.22	3.11	3.26	3.15	3.24	3.21	3.18	2.91	2.87
Water flow	m^3/h	140.6	148.4	162.0	168.9	180.6	188.2	197.0	211.4	225.7
Water pressure drop	kPa	50	56	41	45	51	65	47	54	61
Sound levels										
SPL [Sound Pressure Level] *(3)*	dB(A)	73.0		73.5		74.0			75	
PWL [Sound Power Level] *(4)*	dB(A)	95.0		95.5		96.5			98	
Refrigeration circuit										
Number of refrigeration circuits	Nr	2								
Refrigerant charge [each circuit]	kg	117		135	135/140	160		168	202	
Compressor										
Number of compressors	Nr	2								
Type	-	double screw with integrated oil separator and muffler								
Nominal power [each compressor]	HP	160	160+180	180	180+210	210	210+240	240	280	320
Capacity control	-	25 ⇒ 100 % stepless								
Fan										
Number of fans	Nr	12		14		16			20	
Type	-	axial								
Wheel nominal diameter	mm	800								
Rpm	1/min	900								
Nominal power input [each fan]	kW	1.7								
Fans power input	kW	20.4		23.8		27.2			34	
Air flow rate	m^3/h	218400		254800		291200			364000	
Evaporator										
Number of evaporators	Nr	1								
Type	-	shell & tube								
Internal volume [each circuit, ref. side]	l	93		112				136	153	160
Condensing coil										
Material tubes / fins	-	copper / aluminium								
Rows / Fins space	Nr/mm	3 / 1.8								
Face area	m^2	33.0		38.5		44.0			55	
Internal volume [each circuit]	l	186		216		248			310	
Water connections										
Diameters inlet	DN-inch	2 x DN 125-5”				2 x DN 150-6”				
Diameter outlet	DN-inch	1 x DN 150-6”				1 x DN 200-8”				
Unit volume	l	414		372				446	620	606
Dimensions										
Length	mm	8590		9586		11578			13570	
Depth	mm	2308								
Height	mm	2571								
Weights										
Net weight	kg	8672	9684	9302	9374	10260	10288	10474	11969	12085
Operating weight	kg	9086	9098	9674	9746	10632	10660	10920	12604	12706

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) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
(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. 4d - Technical Data - CQ4 068- 139 **R 134a**

Model CQ4		068	074	080	086	092	099	106	121	139
Performances (1)										
Cooling capacity	kW	693	732	812	842	903	948	1001	1124	1201
Compressors power input	kW	214	240	253	272	277	298	322	371	412
Total power input	kW	223	249	264	282	289	310	334	386	426
Compressors COP	-	3.24	3.05	3.21	3.10	3.26	3.18	3.11	3.03	2.92
Unit EER	-	3.12	2.94	3.08	2.98	3.13	3.06	3.00	2.91	2.82
Water flow	m^3/h	119.2	125.9	140.2	144.9	155.2	163.1	172.4	193.4	206.9
Water pressure drop	kPa	39	43	34	36	41	45	39	49	56
Performances (2)										
Cooling capacity	kW	784	825	905	941	1008	1052	1097	1179	1254
Compressors power input	kW	257	285	292	319	324	346	370	416	458
Total power input	kW	266	294	302	329	336	364	382	431	473
Compressors COP	-	3.05	2.89	3.10	2.95	3.11	3.04	2.96	2.83	2.73
Unit EER	-	2.95	2.81	3.00	2.86	3.00	2.94	2.87	2.74	2.65
Water flow	m^3/h	134.7	141.9	155.6	161.7	173.3	181.0	188.6	202.7	215.9
Water pressure drop	kPa	46	50	38	41	47	51	44	50	56
Sound levels										
SPL [Sound Pressure Level] (3)	dB(A)	65.0		65.5			66.0		67	
PWL [Sound Power Level] (4)	dB(A)	87.0		87.5			88.5		90	
Refrigeration circuit										
Number of refrigeration circuits	Nr	2								
Refrigerant charge [each circuit]	kg	117		135	135/140	160		168	202	
Compressor										
Number of compressors	Nr	2								
Type	-	double screw with integrated oil separator and muffler								
Nominal power [each compressor]	HP	160	160+180	180	180+210	210	210+240	240	280	320
Capacity control	-	25 ⇒ 100 % stepless								
Fan										
Number of fans	Nr	12		14			16		20	
Type	-	axial								
Wheel nominal diameter	mm	800								
Rpm	1/min	700								
Nominal power input [each fan]	kW	0.7								
Fans power input	kW	8.4		9.8			11.2		14	
Air flow rate	m^3/h	168000		196000			224000		28000	
Evaporator										
Number of evaporators	Nr	1								
Type	-	shell & tube								
Internal volume [each circuit, ref. side]	l	93		112				136	153	160
Condensing coil										
Material tubes / fins	-	copper / aluminium								
Rows / Fins space	Nr/mm	3 / 1.8								
Face area	m^2	33.0		38.5			44.0		55	
Internal volume [each circuit]	l	186		216			248		310	
Water connections										
Diameters inlet	DN-inch	2 x DN 125-5”				2 x DN 150-6”				
Diameter outlet	DN-inch	1 x DN 150-6”				1 x DN 200-8”				
Unit volume	l	413		369				450	620	606
Dimensions										
Length	mm	8590		9586			11578		13570	
Depth	mm	2308								
Height	mm	2543								
Weights										
Net weight	kg	8672	8684	9302	9374	10260	10288	10474	11969	12085
Operating weight	kg	9086	9098	9674	9746	10632	10660	10920	12604	12706

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) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
(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. 4e - Technical Data - FG4 069- 122 **R 134a**

Model FG4		069	075	081	087	093	100	107	122
Performances (1)									
Cooling capacity	kW	766	810	867	899	929	1046	1107	1165
Freecooling capacity	kW	506	511	515	519	521	689	696	705
Compressors power input	kW	210	233	259	279	299	291	313	401
Total power input	kW	237	260	286	306	326	327	349	437
Compressors COP	-	3.65	3.48	3.35	3.22	3.11	3.59	3.54	2.90
Unit EER	-	3.23	3.12	3.03	2.93	2.85	3.20	3.17	2.66
Coolant fluid flow	m^3/h	144.2	152.6	163.4	169.5	175.4	197.2	208.7	218.8
Hydraulic pressure drop	kPa	169.0	187.4	135.7	145.0	154.0	202.4	205.4	225.4
Performances (2)									
Cooling capacity	kW	784	827	881	918	952	1052	1106	1124
Freecooling capacity	kW	508	513	515	519	522	687	694	697
Compressors power input	kW	229	251	277	301	326	307	326	429
Total power input	kW	256	278	304	328	353	343	362	465
Compressors COP	-	3.42	3.29	3.18	3.05	2.92	3.43	3.39	2.62
Unit EER	-	3.06	2.97	2.90	2.80	2.70	3.07	3.06	2.42
Coolant fluid flow	m^3/h	152.3	160.6	165.7	172.8	179.2	198.0	208.3	211.6
Hydraulic pressure drop	kPa	177.0	195.0	140.0	152.0	161.0	207.0	206.0	214.3
Sound levels									
SPL [Sound Pressure Level] (3)	dB(A)			84.0				85.0	
PWL [Sound Power Level] (4)	dB(A)			106.0				107.5	
Refrigeration circuit									
Number of refrigeration circuits	Nr				2				
Refrigerant charge [each circuit]	kg	120		129	129/136	136	160	164	168
Compressor									
Number of compressors	Nr				2				
Type	-				double screw with integrated oil separator and muffler				
Nominal power [each compressor]	HP	210	210+240	240	240+280	280	280+300	300	320
Capacity control	-				25 ⇒ 100 % stepless				
Fan									
Number of fans	Nr			12				16	
Type	-				axial				
Wheel nominal diameter	mm				900				
Rpm	1/min				900				
Nominal power input [each fan]	kW				2.3				
Fans power input	kW			27.6				36.8	
Air flow rate	m^3/h			252000				336000	
Evaporator									
Number of evaporators	Nr				1				
Type	-				shell & tube				
Internal volume [each circuit, refrigerant side]	l	93			112			136	153
Condensing coil									
Material tubes / fins	-				copper / aluminium				
Rows / Fins space	Nr/mm				3 / 2,1				
Face area	m^2			33				44	
Internal volume [each circuit]	l			186				248	
Freecooling coil									
Material tubes / Fins	-				copper / aluminium				
Rows / Fins space	Nr/mm				3 / 2,5				
Face area	m^2			33				44	
Water connections									
Diameters inlet	DN-inch		2 x DN 125-5"				2 x DN 150-6"		
Diameter outlet	DN-inch		1 x DN 150-6"				1 x DN 200-8"		
Unit volume	l	906		864		924	1048	1122	1391
Dimensions									
Length	mm			9586				11578	
Depth	mm				2308				
Height	mm				2581				
Weights									
Net weight	kg	10630	10640	10763	10836	10974	12404	12591	13200
Operating weight	kg	11627	11639	11718	11790	11991	13544	13808	14591

Notes:

(1) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; coolant inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; coolant inlet temperature 15 °C; ethylene glycol 30%; coolant fluid flow as indicated at (1) conditions.

(2) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; coolant inlet/outlet temperature 12/7 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 2 °C; coolant inlet temperature 12 °C; ethylene glycol 30%; coolant fluid flow as indicated at (2) conditions.

(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 - FB4 069- 140 **R 134a**

Model FB4		069	075	081	087	093	100	107	122	140
Performances (1)										
Cooling capacity	kW	752	795	849	880	908	1028	1089	1148	1308
Freecooling capacity	kW	485	490	494	497	499	661	668	676	818
Compressors power input	kW	215	239	267	288	308	299	322	405	414
Total power input	kW	243	267	295	316	336	337	360	443	461
Compressors COP	-	3.50	3.33	3.18	3.06	2.95	3.44	3.38	2.83	3.16
Unit EER	-	3.09	2.98	2.88	2.78	2.7	3.05	3.03	2.59	2.84
Coolant fluid flow	m^3/h	141.7	150.1	160.1	166.2	171.5	193.8	205.5	215.8	246.6
Hydraulic pressure drop	kPa	163	181	131	140	147	197	199	220	239
Performances (2)										
Cooling capacity	kW	774	816	869	903	934	1038	1092	1102	1243
Freecooling capacity	kW	488	492	494	498	501	660	666	466	557
Compressors power input	kW	236	260	287	312	338	316	337	433	435
Total power input	kW	264	288	315	340	366	354	375	470	482
Compressors COP	-	3.28	3.14	3.03	2.89	2.76	3.28	3.24	2.55	2.86
Unit EER	-	2.93	2.83	2.76	2.65	2.56	2.94	2.92	2.34	2.58
Coolant fluid flow	m^3/h	145.7	153.7	163.6	170.0	175.9	195.3	205.3	207.6	233.8
Hydraulic pressure drop	kPa	174	191	136	147	156	202	202	207	219
Sound levels										
SPL [Sound Pressure Level] (3)	dB(A)			80.0				81.0		82
PWL [Sound Power Level] (4)	dB(A)			102.0				103.5		105.0
Refrigeration circuit										
Number of refrigeration circuits	Nr					2				
Refrigerant charge [each circuit]	kg	120		129	129/136	136	160	168	176	202
Compressor										
Number of compressors	Nr				2					
Type	-				double screw with integrated oil separator and muffler					
Nominal power [each compressor]	HP	160	160 + 180	180	180 + 210	210	210 + 240	240	280	320
Capacity control	-				25 ⇒ 100 % stepless					
Fan										
Number of fans	Nr			12				16		20
Type	-					axial				
Wheel nominal diameter	mm					900				
Rpm	1/min					900				
Nominal power input [each fan]	kW					2.4				
Fans power input	kW			28.2				37.6		47
Air flow rate	m^3/h			235200				313600		392000
Evaporator										
Number of evaporators	Nr				1					
Type	-					shell & tube				
Internal volume [each circuit, ref. side]	l	93		112				136	153	160
Condensing coil										
Material tubes / fins	-				copper / aluminium					
Rows / Fins space	Nr/mm				3 / 2,1					
Face area	m^2			33				44		55
Internal volume [each circuit]	l			186				248		310
Freecooling coil										
Material tubes / Fins	-				copper / aluminium					
Rows / Fins space	Nr/mm				3 / 2,5					
Face area	m^2			33				44		55
Water connections										
Diameters inlet	DN-inch		2 x DN 125-5"					2 x DN 150-6"		
Diameter outlet	DN-inch		1 x DN 150-6"					1 x DN 200-8"		
Unit volume	l	906		864		924	1048	1122	1391	1497
Dimensions										
Length	mm			9586				11578		13570
Depth	mm					2308				
Height	mm					2571				
Weights										
Net weight	kg	10630	10640	10763	10836	10974	12404	12591	13160	14892
Operating weight	kg	11627	11639	11718	11790	11991	13544	13808	14551	15773

Notes:

(1) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; coolant inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; coolant inlet temperature 15 °C; ethylene glycol 30%; coolant fluid flow as indicated at (1) conditions.

(2) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; coolant inlet/outlet temperature 12/7 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 2 °C; coolant inlet temperature 12 °C; ethylene glycol 30%; coolant fluid flow as indicated at (2) conditions.

(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 - FL4 068- 139 **R 134a**

Model FL4		068	074	080	086	092	099	106	121	139
Performances (1)										
Cooling capacity	kW	737	778	830	929	963	1008	1067	1205	1287
Freecooling capacity	kW	460	464	469	611	614	619	624	747	762
Compressors power input	kW	221	247	276	267	286	307	333	381	423
Total power input	kW	243	269	298	296	315	336	362	417	459
Compressors COP	-	3.33	3.15	3.01	3.48	3.37	3.28	3.20	3.16	3.04
Unit EER	-	3.04	2.90	2.79	3.14	3.06	3.00	2.95	2.89	2.80
Coolant fluid flow	m^3/h	138.9	146.8	156.8	175.1	181.4	190.2	201.4	227.1	241.7
Hydraulic pressure drop	kPa	158.0	174.0	166.0	168.0	174.0	190.0	192.0	204.5	230.7
Performances (2)										
Cooling capacity	kW	762	803	854	941	979	1023	1077	1150	1225
Freecooling capacity	kW	463	467	471	611	615	619	624	731	747
Compressors power input	kW	244	270	299	284	307	327	350	405	446
Total power input	kW	266	292	321	313	336	356	379	441	482
Compressors COP	-	3.12	2.97	2.86	3.31	3.19	3.13	3.08	2.84	2.75
Unit EER	-	2.87	2.75	2.66	3.01	2.92	2.88	2.84	2.61	2.54
Coolant fluid flow	m^3/h	143.5	151.2	160.9	177.1	184.2	192.6	202.9	216.4	230.6
Hydraulic pressure drop	kPa	168	186	175	173	181	196	197	190	213
Sound levels										
SPL [Sound Pressure Level] (3)	dB(A)		73.0			74.0			75	
PWL [Sound Power Level] (4)	dB(A)		95.0			96.5			98	
Refrigeration circuit										
Number of refrigeration circuits	Nr					2				
Refrigerant charge [each circuit]	kg	120		129	155/160	160		168	202	
Compressor										
Number of compressors	Nr					2				
Type	-					double screw with integrated oil separator and muffler				
Nominal power [each compressor]	HP	160	160 + 180	180	180 + 210	210	210 + 240	240	280	320
Capacity control	-					25 ⇒ 100 % stepless				
Fan										
Number of fans	Nr		12			16			20	
Type	-					axial				
Wheel nominal diameter	mm					800				
Rpm	1/min					900				
Nominal power input [each fan]	kW					1.8				
Fans power input	kW		21.6			28.8			36	
Air flow rate	m^3/h		208800			278400			348000	
Evaporator										
Number of evaporators	Nr					1				
Type	-					shell & tube				
Internal volume [each circuit, ref. side]	l	93			112			136	153	160
Condensing coil										
Material tubes / fins	-					copper / aluminium				
Rows / Fins space	Nr/mm					3 / 2,1				
Face area	m^2		33			44			55	
Internal volume [each circuit]	l		186			248			310	
Freecooling coil										
Material tubes / Fins	-					copper / aluminium				
Rows / Fins space	Nr/mm					3 / 2,5				
Face area	m^2		33			44			55	
Water connections										
Diameters inlet	DN-inch		2 x DN 125-5”				2 x DN 150-6"			
Diameter outlet	DN-inch		1 x DN 150-6"				1 x DN 200-8"			
Unit volume	l	906		864	988	1048		1122	1511	1497
Dimensions										
Length	mm		9586			11578			13570	
Depth	mm					2308				
Height	mm					2571				
Weights										
Net weight	kg	10510	10520	10643	12018	12154	12184	12371	14776	14892
Operating weight	kg	11508	11517	11595	13104	13300	13328	13588	15671	15773

Notes:

(1) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; coolant inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; coolant inlet temperature 15 °C; ethylene glycol 30%; coolant fluid flow as indicated at (1) conditions.

(2) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; coolant inlet/outlet temperature 12/7 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 2 °C; coolant inlet temperature 12 °C; ethylene glycol 30%; coolant fluid flow as indicated at (2) conditions.

(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 - FQ4 068- 139 **R 134a**

Model FQ4		068	074	080	086	092	099	106	121	139
Performances (1)										
Cooling capacity	kW	695	731	776	882	910	951	1003	1115	1211
Freecooling capacity	kW	389	391	394	518	519	522	525	629	644
Compressors power input	kW	237	268	303	287	307	333	365	420	458
Total power input	kW	246	277	312	299	319	345	277	435	472
Compressors COP	-	2.93	2.73	2.56	3.07	2.96	2.86	2.75	2.65	2.65
Unit EER	-	2.82	2.64	2.49	2.95	2.85	2.76	2.66	2.56	2.56
Coolant fluid flow	m^3/h	131.3	137.5	145.8	166.4	171.7	178.8	188.7	209.5	227.6
Hydraulic pressure drop	kPa	142	154	145	153	158	170	171	177	206
Performances (2)										
Cooling capacity	kW	727	764	796	904	936	975	1024	1072	1161
Freecooling capacity	kW	392	394	396	520	522	524	527	620	634
Compressors power input	kW	270	301	313	311	337	362	392	450	485
Total power input	kW	279	310	322	323	349	374	404	465	500
Compressors COP	-	2.69	2.54	2.55	2.91	2.78	2.69	2.61	2.38	2.40
Unit EER	-	2.61	2.46	2.48	2.80	2.68	2.61	2.53	2.31	2.32
Coolant fluid flow	m^3/h	137.1	144.1	148.3	170.3	176.3	183.7	192.5	202.2	218.1
Hydraulic pressure drop	kPa	155	170	156	161	167	180	180	167	192
Sound levels										
SPL [Sound Pressure Level] (3)	dB(A)		65.5			66.0			67	
PWL [Sound Power Level] (4)	dB(A)		87.5			88.5			90	
Refrigeration circuit										
Number of refrigeration circuits	Nr					2				
Refrigerant charge [each circuit]	kg		120	129	155/160		160	168	202	
Compressor										
Number of compressors	Nr					2				
Type	-					double screw with integrated oil separator and muffler				
Nominal power [each compressor]	HP	160	160+180	180	180+210	210	210+240	240	280	320
Capacity control	-					25 ⇒ 100 % stepless				
Fan										
Number of fans	Nr		12			16			20	
Type	-					axial				
Wheel nominal diameter	mm					800				
Rpm	1/min					700				
Nominal power input [each fan]	kW					0.7				
Fans power input	kW		8.4			11.4			14	
Air flow rate	m^3/h		160800			214400			268000	
Evaporator										
Number of evaporators	Nr					1				
Type	-					shell & tube				
Internal volume [each circuit, ref. side]	l		93			112		136	153	160
Condensing coil										
Material tubes / fins	-					copper / aluminium				
Rows / Fins space	Nr/mm					3 / 2,1				
Face area	m^2		33			44			55	
Internal volume [each circuit]	l		186			248			310	
Freecooling coil										
Material tubes / Fins	-					copper / aluminium				
Rows / Fins space	Nr/mm					3 / 2,5				
Face area	m^2		33			44			55	
Water connections										
Diameters inlet	DN-inch		2 x DN 125-5”				2 x DN 150-6"			
Diameter outlet	DN-inch		1 x DN 150-6"				1 x DN 200-8"			
Unit volume	l		906	864	988		1048	1122	1511	1497
Dimensions										
Length	mm		9586			11578			13570	
Depth	mm					2308				
Height	mm					2543				
Weights										
Net weight	kg	10510	10520	10643	12018	12154	12184	12371	14776	14892
Operating weight	kg	11508	11517	11595	13104	13300	13328	13588	15671	15773

Notes:

(1) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; coolant inlet/outlet temperature 15/10 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 5 °C; coolant inlet temperature 15 °C; ethylene glycol 30%; coolant fluid flow as indicated at (1) conditions.

(2) - Cooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; economizer option; coolant inlet/outlet temperature 12/7 °C; ethylene glycol 30%.
Freecooling capacity at the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 2 °C; coolant inlet temperature 12 °C; ethylene glycol 30%; coolant fluid flow as indicated at (2) conditions.

(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- L** series is designed for outdoor installations, having maximum corrosion protection, with all panels being of heavy gauge, galvanised steel construction.
The base is of 3+4mm gauge galvanised steel channels, polyester powder painted in RAL7032, interconnected using special rivets with elevated mechanical characteristics and the frame hidden inner parts are in galvanized steel.

Holes (ø 56 mm) are drilled on the base, where the unit lifting bars can be fit.
Panels are made of heavy gauge galvanised steel, polyester powder painted in RAL7032 and provided with waterproof gaskets.
Lateral panels are fixed with screws, panels on the front and electrical board are closed by a suitable lock that can be opened by triangle wrench (dedicated/specific tool).

All screws are galvanised or stainless steel type.
The compressor is located at the bottom of the unit and isolated from the airflow to avoid noise transmission and heat dissipation to the air stream.The compartment cooling is anyway ensured by a grid in the side closing panels. The compressor compartment incorporates the electric board as well as the electric and electronic power devices; the latter is complete with closed base.

In the Low Noise and Quiet versions (L & Q), panels are lined with sound- proof material; compressors are mounted on anti- vibration mounts to prevent vibration transmission to the unit casing and Q version compressor compartment is lined with 35mm thick, double layer, polyurethane sound- proof material embedded with one or more high density sound- proof diaphragms.

Refrigeration Circuit

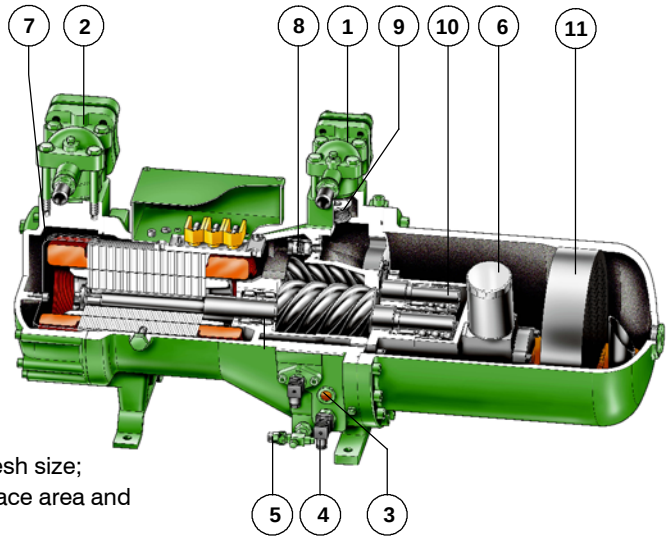
All models are equipped with two compressors configured in independent refrigeration circuits. Each circuit includes double safety pressure switch for high pressure, an electronic safety pressure switch for low pressure, an electronic expansion valve, a filter dryer with disposable anti- acid solid cartridge, a humidity indicator and liquid sight glass, high and low pressure safety valves, charge connections and a manual on- off valve; circuit with economizer exchanger (optional), high and low pressure gauges.

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

Mechanical Specifications

Compressor

The **Liebert HPC- L** series is equipped with two semi- hermetic, screw compressors specifically designed for application in air- cooled refrigeration systems. Each compressor corresponds to an independent refrigerant circuit to allow maximum redundancy and system reliability, and is fitted with:



1 - discharge shut- off valve;
2 - suction shut- off valve (option);
3 - oil sight glass;
4 - oil heater;
5 - oil fill / drain valve;
6 - long- life fine oil filter 10 μm mesh size;
7 - suction gas filter with large surface area and fine mesh;
8 - 28 bar differential pressure relief valve (according to EN 12693 standards);
- direct liquid injection (Special option);
- automatic start unloading.

Each compressor is equipped with a three- phase asynchronous two- pole motor located on the shaft of the male screw rotor and cooled by the suction gas. It is removable for inspection and maintenance. The motor start with reduced load is star/delta type.

The motor is equipped with protection devices having the following functions:

- winding temperature, PTC sensor in the motor windings;
- oil temperature- PTC sensor;
- phase sequence/direction of rotation;
- phase lack monitoring.

The main screw (male, with 5 lobes) is driven directly by the motor and drives the secondary one (female, with 6 cavities). A check valve (12) is incorporated in the discharge chamber to prevent reverse rotation of the screws and to allow/facilitate pressure equalization inside the compressor [unloaded start- up]. Robust axial bearings in tandem configuration (13), a bearing chamber pressure isolated by seal rings, and pressure unloading of axial bearings ensure minimum refrigerant dilution in the oil, oil higher viscosity and thus increased compressor reliability and longer working life.
A three- stage oil separator (14) is integrated in the execution.

The chillers are equipped with infinite slide control with Vi compensation managed by a flanged solenoid valve. This is to ensure precise and stable control of the supply water temperature over the complete range of operating conditions.

Electronic expansion valve

The electronic expansion valve used in the **Liebert HPC- L** range 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 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- L** 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.

Mechanical Specifications

Evaporators

Liebert HPC- L units are equipped with direct expansion, shell and tube type evaporators, designed, constructed, tested (pressure test on both refrigerant and water sides) and documented to comply with PED 2014/68/EU standards.
The "U"- designed tube nest can thermally expand in the shell without mechanical stress and can be removed for maintenance operations.
They incorporate two refrigeration circuits and one water circuit. The shell is fabricated from seamless carbon steel with internally finned copper tubes and tube sheets of heavy gauge carbon steel.
Baffles are of carbon steel; heads are constructed of carbon steel, gaskets of an asbestos free compound and bolts of steel alloys. They are externally insulated with closed cell elastomer with high resistance to UV rays HT- type for outdoor installations.
The evaporators are equipped with drainage and vent connections.

The evaporators are protected against freezing by a paddle- type flow switch and an antifreeze sensor directly managed by the microprocessor.
As an option for chiller and freecooling no-glycol versions, a thermostatically controlled electric heater cable is wrapped around the shell to prevent freezing with outdoor temperatures below 0° C.
Temperature and pressure working limits and pressure test values are indicated below.

Tab. 5a - Evaporator working limits

Design temperature	Design pressure		Test pressure	
Min. / Max.	Refrigerant (R134a)	Water	Refrigerant (R134a)	Water
-10 / +90 °C	16.5 bar	10.0 bar	18.2 bar	11.0 bar

Condensers

The condensing coils are made of copper tubes and aluminium fins and are mounted in double V (W) configuration to provide a larger heat exchange surface.
Copper tubes in staggered rows are mechanical expanded in order to have the best contact with fins; the tubes are grooved type to increase the thermal exchange. The Aluminium fins are manufactured with a special high efficiency surface that increases the thermal exchange.
The condenser coils are tested at a pressure of 30bar.

Hydraulic Circuit

The hydraulic circuit utilises carbon steel pipes connected with grooved- end (Victaulic) fittings and couplings; gaskets are made of EPDM. This arrangement permits compensation for thermal expansion, reduces noise and vibrations propagating through hydraulic pipelines and facilitates ease of maintenance. Insulation of the hydraulic circuit is by closed cell synthetic elastomer with high resistance to UV rays HT type for outdoor installations.

Hydraulic Kit (Option)

It comprises an expansion vessel (charged at 1.5 bar, max. operating pressure 10 bar) and a safety valve set at 6 bar. Their installation positions are indicated in the hydraulic circuit schematic.
The components are installed on the machine but the hydraulic connection as indicated in the hydraulic circuit scheme must be carried out by the installer.

Such kit is always supplied together with the pump option.

Expansion vessel volumes: 2 x 12 lt

It is recommended that the total expansion vessel capacity required is 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.

Mechanical Specifications

Freecooling execution

Liebert HPC- L models in the "Freecooling execution" are designed with an integrated freecooling system consisting of:

- cooling coils with copper tubes and aluminium fins, mounted in double V (W) configuration to provide a larger heat exchange surface
- 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 controls, according to ambient conditions and thermal load:

- direct Expansion with compressor operation only; 100 % coolant flow through the evaporator
- direct Expansion and Freecooling; 100% coolant flow first through the free cooling coils and then the evaporators, with partial compressor operation
- freecooling; 100% coolant flow through the free cooling coils and then the evaporators, without compressor operation

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

Freecooling No Glycol execution

The models **Liebert HPC- L** in the "No Glycol Freecooling version" are designed with a freecooling system composed of two sections: the first inside the chiller, the second in a separated module with independent electric supply.
The following equipment is installed inside the chiller:

- Cooling coils with copper pipes and aluminum fins, installed in W configuration to ensure a large heat exchange surface.
- Vent and unloading valves on the freecooling coils.
- Entirely insulated evaporator water circuit, coated with heaters.
- Arrangement for the hydraulic connection with the separate module.
- Microprocessor control to manage the freecooling mode and the components installed in the separate module (through digital outputs for controlling pump and 3- way valve).
- Temperature probes to be positioned on the suitable cavities in the separated module.

The following equipment is installed inside the separate module (N.G. module):

- Plate exchanger, recovering the freecooling capacity and separating the user water circuit from the freecooling glycol fluid circuit.
- Glycol fluid circulation pump complete with shut- off valves.
- Three- way valve for switching between freecooling and no freecooling operation.
- Hydraulic circuit complete with expansion tank, safety valve, vent valve, loading and unloading valves, tray for accidental glycol spilling collection.
- Heaters (to protect the piping and the heat exchanger) controlled by independent electronic thermostats.
- Electric board complete with switch for the pump, three- way valve, heater control electronic thermostats, terminal board for the connection to the digital outputs for controlling pump and 3- way valve on the machine.
- Electric board preset for auxiliary circuit power supply by UPS.
- Cavities for fitting temperatures probes on the machine.

Three hydraulic modules have been selected to be combined with each unit according to the dimensions of the freecooling coils: the 900 kW module is combined with the 12- fan units, the 1200 kW module with the 16- fan units and the 1400 kW module with the 20- fan units.
The separated module can be installed up to a max. distance of about 10 m from the **Liebert HPC- L** hydraulic connections; beyond this distance, the temperature probes cannot be fitted and the expected performance cannot be ensured.

Connections by the customer:

- Connection for the power supply of the separated module.
- Connection with the terminal board of the separated module of the digital outputs (pump and 3- way valve) on the machine.
- Fitting the temperature probes on the machine in the suitable cavities of the separated module.
- Hydraulic connection between **Liebert HPC- L** and separated module both of the water circuit and of the glycol fluid circuit.
- Protection with heaters of the connection line of the water circuit between **Liebert HPC- L** and separated module.

- Charging (with the correct glycol %, according to the min. external temperature) the glycol fluid circuit arranged in the connection between **Liebert HPC- L** and separated module.

The performances and technical features are described in the table below.

Tab. 5b - Technical features and performance

Vertiv Code	Exchanger model	Capacity (kW)	H_2O flow (m^3/h)	DP H_2O (kPa)	Glycol flow (m^3/h)	DP Glycol (kPa)	Pump (Model)	FLI (kW)	FLA (A)
186795	K460/100	900	155	60	170	90	NB 80- 160/147	11	21.4
186799	K460/148	1200	206	60	228	88	NB 80- 160/161	18.5	34.5
186797	K750/109	1400	241	77	265	107	TPD 100- 360/2	18.5x2	34.5x2

Reference conditions: input/output water: 15/10° C; input/output water- glycol mixture 70- 30%: 6/11° C

Note: expansion tank volume: 25 l; safety valve calibration: 5 bar; max. working pressure: 5 bar

Recirculating pumps (Option)

All the models can be equipped with twin water circulating pumps mounted on- board and factory piped. It is possible to select the pump type (low or high head) on each unit, both in the standard version and in the one with inverter and integrated electronic adjustment. All pumps are dynamically balanced according to ISO 1940 class 6.3. The electronic pump adjustment algorithm enables to modulate the pump speed to keep the delivery steady through the evaporator even if the hydraulic load changes; in this way, a significant energy saving is achieved and varies depending on the applications. In particular, in the Free-cooling units this benefit is obtained above all in summer, when the Freecooling coil is short- circuited. The programming of the adjustment set of the electronic pump can be made in factory or in the installation site thanks to a simple remote control; in case of doubt, contact your dealer. They are suitable for operation with water- ethylene glycol mixture up to 35/65% by weight and coolant fluid temperatures down to 4° C. The Pumps are of the close- coupled centrifugal type, direct driven, with two- pole electric motor having IP54 protection, Class F insulation with IE3 efficiency according Energy using Products (EuP) motor directive (EC640/2009). The motors with this efficiency class (the highest) ensure a higher energy saving than the pump with lower efficiency class; further, they enable a more silent operation of the motor and can reach very high use limits of the room temperature (up to 60° C). Pump casings are in cast iron, impellers in cast iron, shafts in stainless steel and the mechanical seals in silicon carbide/EP-DM with dimensions according to EN12756, suitable for the use of coolant containing ethylene glycol. The Pump hydraulic circuit includes a discharge check valve for each pump. The pump body, the stator body and the fastening bolts and nuts are electrophoretically painted; such pumps can thus be used in outdoor places subject to weather agents without corrosion problems. Each pump also has an automatic circuit breaker. Microprocessor controls manage the pump rotation and stand- by and automatically start the stand- by pump in case of failure of the primary one. In the versions with inverter and integrated electronic adjustment only the first pump is equipped with these devices: the second one is a standard pump operating only if the first one is in alarm. The microprocessor will start the second pump for a short period every week so as to avoid locks and/or deposits on the propeller due to a long inactivity.

Mechanical Specifications

Fan Section

Fans are axial type, with die- cast aluminium blades statically and dynamically balanced, directly coupled to an electric motor with external rotor. They are balanced Q 6,3 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" High efficiency: ..... 6- pole motor, propeller diameter 910 mm, 900 rpm

"B" Base: ..... 6- pole motor, propeller diameter 910 mm, 900 rpm

"L" Low noise: ..... 6- pole motor, propeller diameter 800 mm, 900 rpm

"Q" Quiet: ..... 8- pole motor, propeller diameter 800 mm, 700 rpm

The fans are complete with safety protection grilles and high efficiency nozzles.

Die- cast aluminum blades with sickle- shaped profile have been used to improve the sound deadening. The fan speed control is achieved – as standard – by means of a continuous fan speed regulator. This ensure also to run the compressors always with optium working efficiency.

EC fans

In the G and Q version EC fans are fitted as standard (available also in others versions as option) with possibility of a fan modulating adjustment entirely managed by the microprocessor 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 and Control

The electrical panel is designed, constructed and tested in compliance with IEC standards (EN60204- 1). Each unit includes two symmetric electric boards, each one interlocked to half machine; they both must be electrically power supplied.
The unit is managed by two independent microprocessor boards (Master and Subunit) installed on each electric board and reciprocally connected by Ethernet network. During the standard operation, the Master board exchanges information with the Subunit board; the display connected with the Master board enables to read and set parameters, while the one of the Subunit board enables only to display them. All analog/digital inputs and outputs for ensuring the independent and autonomous operation of half machine in case of alarm, if there is a problem on the outer power supply mains, on a machine component, on an electronic board or on the communication Hirobus network are connected on each microprocessor board.
The main electric board - where the Master board is fited - is on the left side of the hydraulic connection front in machines without pumps, while on the right side of the hydraulic connection front in machines with pumps.

Mechanical Specifications

In the units with asymmetric compressors and/or with electronic pump (if this option is installed) the main electric board - where the Master board is fit - is located in the same machine side as such components.

The position of the Master and Subunit boards can be simply inverted by shifting a dedicated jumper.

The board is installed in a closed technical compartment (compressor compartment), thus it features a protection degree by IP54.

The temperature inside the electric board is adjusted with the forced ventilation controlled by the microprocessor board by a sensor reading the temperature there. For low ambient temperatures (below - 5° C) it is possible to have an electric heater fitted inside (optional) and controlled as well by the microprocessor board.

NOTE: Three-phase electric power

Requirements:

The **Liebert HPC- L** 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 V ±10% / 3 Ph + PE / 50Hz and 230 V ±10% / 2 Ph + PE / 50Hz "Fast start";
- auxiliary power supply circuit, 230 V / 1 Ph / 50 Hz and 24 V / 1 Ph / 50 Hz;
- main switch;
- fuses and thermal relays for protecting the compressors;
- contactors for the compressors with timers for star- delta starting;
- MCB contactors for protecting the pumps (optional);
- MCBs for fans with modulating speed control;
- manual operation through iCOM controller;
- volt- free contacts for remote indication of:
  - compressors in operation;
  - pump(s) in operation;
  - general alarm.

Packing

Units are shipped with plastic film protection.

Warranty Clauses

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

Final Tests and Reference Standards

The units are designed, manufactured and tested in compliance with the European directives 2006/42/EC; 2014/30/EU; 2014/35/EU; 2014/68/EU.
The machine is supplied with a final test certificate and a declaration of conformity with the norms.

All **Liebert HPC- L** units are "CE" marked.

Mechanical Specifications

Accessories

Pumps group

Available head pressure values are declared at the unit's hydraulic connections and are referred to the nominal working conditions of each unit.
Please contact us for different fluid flow rates or head pressures. All pumps can work with up to 35% ethylene glycol percentage by weight

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

Tab. 5c - Standard head pressure (Chiller) **R134a**

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106	122/121	140/139
CG4	Water flow	m^3/h	127.9	135.7	145.3	151.4	159.1	167.2	182.8	199.2	-
	Available pressure head	kPa	133	120	125	116	105	92	79	113	-
CB4	Water flow	m^3/h	125.8	133.3	142.5	148.3	155.6	163.4	179.0	196.5	221.2
	Available pressure head	kPa	137	125	128	122	110	98	85	119	128
CL4	Water flow	m^3/h	125.1	132.7	146.2	152.3	162.6	171.0	181.2	202.4	217.1
	Available pressure head	kPa	137	125	124	115	99	87	82	109	135
CQ4	Water flow	m^3/h	119.2	126.0	140.2	144.9	155.2	163.1	172.4	193.4	206.9
	Available pressure head	kPa	147	136	132	125	110	98	95	124	154
Pump rotor model		-	80- 160/147							80- 160 /151	80- 160 /161
Nominal motor power		kW	11.0							15.0	18.5
Noise level (*)		dB(A)	60							60	60
Each pump weight		kg	178							192	205

(*) - According to ISO 3744

Tab. 5d - High head pressure (Chiller) **R134a**

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106	122/121	140/139
CG4	Water flow	m^3/h	127.9	135.7	145.3	151.4	159.1	167.2	182.8	199.2	-
	Available pressure head	kPa	202	188	193	183	171	157	142	166	-
CB4	Water flow	m^3/h	125.8	133.3	142.5	148.3	155.6	162.4	179.0	196.5	221.2
	Available pressure head	kPa	206	193	196	189	176	163	148	172	166
CL4	Water flow	m^3/h	125.1	132.7	146.2	152.3	162.6	171.0	181.2	202.4	217.1
	Available pressure head	kPa	206	194	192	182	164	151	145	162	174
CQ4	Water flow	m^3/h	119.2	126.0	140.7	144.9	155.2	163.1	172.4	193.4	206.9
	Available pressure head	kPa	216	206	200	193	176	164	159	177	193
Pump rotor model		-	80- 160/151							80- 160/ 161	80- 160/ 167
Nominal motor power		kW	15							18.5	22.0
Noise level (*)		dB(A)	60								66
Each pump weight		kg	192							205	221

(*) - According to ISO 3744

Mechanical Specifications

Tab. 5e - Standard head pressure (Freecooling) **R134a**

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106	122/121	140/139
FG4	Fluid flow	m^3/h	146.5	155.1	166.1	172.3	178.2	200.3	212.1	222.6	-
	Available pressure head	kPa	118	91	132	116	100	88	63	110	-
FB4	Fluid flow	m^3/h	143.9	152.4	162.8	168.9	174.3	196.9	208.7	219.5	250.9
	Available pressure head	kPa	127	99	140	124	111	98	77	116	83
FL4	Fluid flow	m^3/h	141.2	149.2	159.4	178.0	184.4	193.2	204.7	231.0	245.9
	Available pressure head	kPa	133	109	107	85	70	112	86	126	93
FQ4	Fluid flow	m^3/h	133.5	139.7	148.3	169.1	174.6	181.7	191.8	213.1	231.5
	Available pressure head	kPa	156	138	139	110	96	152	131	162	125
Pump rotor model		-	80- 160/161 (1+1)					80- 200/178 (1+1)		80- 160/167 (2)	
Nominal motor power		kW	18.5					30.0		22	
Noise level (*)		dB(A)	60					71		66	
Each pump weight		kg	205					302		221	

(*) - According to ISO 3744

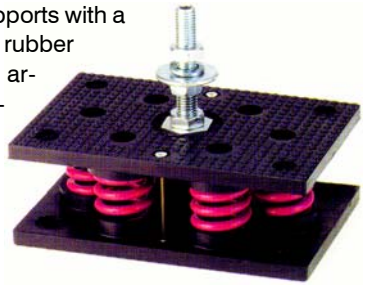
Tab. 5f - High head pressure (Freecooling) **R134a**

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106	122/121	140/139
FG4	Fluid flow	m^3/h	146.5	155.1	166.1	172.3	178.2	200.3	212.1	222.6	-
	Available pressure head	kPa	155	128	169	154	137	152	128	162	-
FB4	Fluid flow	m^3/h	143.9	152.4	162.8	168.9	174.3	196.8	208.7	219.5	250.9
	Available pressure head	kPa	163	136	177	163	148	163	140	168	134
FL4	Fluid flow	m^3/h	141.2	149.2	159.4	178.0	184.4	193.2	204.7	231	245.9
	Available pressure head	kPa	169	145	145	123	108	176	149	178	145
FQ4	Fluid flow	m^3/h	133.5	139.7	148.3	169.1	174.6	181.7	191.8	213.1	231.5
	Available pressure head	kPa	192	174	176	147	134	216	194	213	176
Pump rotor model		-	80- 160/167 (1+1)					80- 200/188 (1+1)		80- 200/178 (2)	
Nominal motor power		kW	22					30			
Noise level (*)		dB(A)	66					71		74	
Each pump weight		kg	221					302			

(*) - According to ISO 3744

Mechanical Specifications

Anti- Vibration mounts



Rubber vibration- damping supports: These are "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: with 6/7 steel springs, UNI 3823 wire, built according to the UNI 7900 norms. The spring surfaces are protected by an anti- corrosion cataphoresis treatment. The two spring containment plates are equipped with holes for ground fixing.

Each plate is composed of a steel sheet, 4- 5 mm thick, coated with elastomer by vulcanisation; this system prevents the high frequency vibrations from being transmitted through the spring turns. The contact surfaces feature anti- slip deformable cylinders so that the support can stand still due to the friction alone. 2 nylon tie rods, with galvanised steel bushes, enable locking of the springs between the bodies. They are suitable for dampening high and medium frequency vibrations > 10Hz, guaranteeing excellent insulation efficiency > 85% from 15Hz.

Heat Recovery

In all system types where chilled water and hot water are needed at the same time, it is energetically recommended to recover the condensation heat, which usually is dissipated in air through the finned coil.

Please note that recovering condensation heat does not mean having a heat pump, namely a machine with refrigerating cycle suitably reversed according to the thermal load demand: the production of hot water, typically at temperatures of 40- 55° C, depends on the production of chilled water and, thus, if no refrigerating load is available and the compressor/s is/are off, if required, a different heat generator must be installed (standard boiler, boiler with electric heaters), anyway requiring a waste of energy.
Depending on the quantity of obtained heat, the following qualifiers can be used for the achieved RECOVERY of **partial heat recovery**, when only the heat from the de- overheating of the compressed gas is recovered (about 20- 25% of the cooling capacity);
All chillers equipped with heat recovery option - either total or partial - are standard equipped with the modulating condensing fan speed control (TRIAC type with phase cut or with EC type fans) driven by the iCOM microprocessor.

Partial Heat Recovery (20%)

It enables to recover up to 20% of the heat discharged by the unit to the condenser.
The system does not have any adjustment and is made up by plate heat exchangers installed on each circuit before the condenser. The exchangers are protected by a suitable anti- freeze heater activated when the system is not working. It is recommended to install a safety valve in the hydraulic circuit to avoid hazards due to over- pressures in case of water flow lack in the recuperator. The temperature of the water entering the recuperator (in steady operating conditions) must always be within the range 25- 45° C, the thermal difference in the range 3.5- 8° C.

WARNING: you must exclude the use of heat recovery for the direct heating of sanitary hot water.

Energy meter

The electronic device is a full system enabling the following functions:

- measuring and monitoring electrical values;
- counting the used electric power;
- protecting the system against electric supply quality problems.

Energy meter

Mechanical Specifications

Water inlet manifolds

Some kits are available as option to aid the connection with the two evaporator inlet connections, thus making a single hydraulic connection point available.
For all Freecooling No- Glycol versions it is necessary to order the manifold kit; heater resistors are included.

Namely:

Cod. 486064 - Manifold kit for Chiller.
Cod. 488445 - Manifold kit for Freecooling No- Glycol and Chiller with the option of electric heater.

Version without pumps from 2 x DN 125 to 1 x DN 150 (evaporator length = 5500 mm)

CG4/CB4 069- 075- 081- 087
CL4/CQ4 068- 074- 080- 086
FG4/FB4 069- 075- 081- 087
FL4/FQ4 068- 074- 080- 086

Cod. 486065 - Manifold kit for Chiller.
Cod. 488446 - Manifold kit for Freecooling No- Glycol and Chiller with the option of electric heater.

Version without pumps from 2 x DN 150 to 1 x DN 200 (evaporator length = 5500 mm)

CG4/CB4 093- 100
CL4/CQ4 092- 099
FG4/FB4 093- 100
FL4/FQ4 092- 099

Cod. 486066 - Manifold kit for Chiller.
Cod. 488447 - Manifold kit for Freecooling No- Glycol and Chiller with the option of electric heater.

Version without pumps from 2 x DN 150 to 1 x DN 200 (evaporator length = 6500 mm)

CG4/CB4 107- 122
CB4 140
CL4/CQ4 106- 121- 139
FG4/FB4 107- 122
FB4 140
FL4/FQ4 106- 121- 139

Cod. 486067 - Manifold kit for Chiller and Freecooling.
Cod. 488448 - Manifold kit for Freecooling No- Glycol and Chiller with the option of electric heater.

Versions with pumps complete with shut- off valves on each pump from 2 x DN 125 to 1 x DN 150

FG4/FB4 069- 075- 081- 087
FL4/FQ4 068- 074- 080- 086
CG4/CB4 069- 075- 081- 087
CL4/CQ4 068- 074- 080- 086

Cod. 486068 - Manifold kit for Chiller and Freecooling.
Cod. 488449 - Manifold kit for Freecooling No- Glycol and Chiller with the option of electric heater.

Versions (Std. and No- Glycol) with pumps complete with shut- off valves on each pump from 2 x DN 150 to 1 x DN 200

FG4/FB4 093- 100- 107- 122
FB4 140
FL4/FQ4 092- 099- 106- 121- 139
CG4/CB4 093- 100- 107- 122
CB4 140

Please note that if the hydraulic connection is carried out without such kits, it is necessary to arrange a symmetrical structure on the water inlet lines, so as to ensure the same water delivery on each connection of the evaporator. Further, if pumps are installed on the machine, without such kits also shut- off valves for each pump must be installed, so as to aid the ”Service” operations.

Other accessories

The following accessories can be installed as options:

- Coil- protecting mechanical filters (recommended to aid the coil maintenance- cleaning).
- Pump/evaporator heaters and lines needed to avoid the frost risk on such components.
- Compressor power factor capacitors: they enable to get a Cosfi value equal to about 0.94 on the compressors, in rated operating conditions.
- Certified integrated lifting bars (removable after shipment).
- Coldfire display (fitted on Master electrical panel).

6 Controls

Microprocessor Controls

iCOM Control

Liebert HPC- L models are controlled by **iCOM Large** (Fig. 6a).

iCOM is the standard on- board control and its advanced features secure system optimisation and energy savings. Full management of the **Liebert HPC- L** 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. All the 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. 6a

- The standard software of the **Liebert HPC- L** 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 local 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 fanspeed control there is a special algorithm which, together with the compressor management, enables to keep the fan speed always to the minimum.
- 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- L** 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- L** units, that will manage its resources (compressors and freecooling) in the most efficient way in order to save additional energy.
- 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 8 **Liebert HPC- L** 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.

Controls

iCOM Technical Data

Technical Data	iCOM Large
E2prom	4 Mbit + 512 kbit
Flash memory	32 Mbit
RAM memory	128 Mbit
Microcontroller	Coldfire 32 Mbit
Analogue Input	4 x 0- 10V, 0- 5V, 4..20mA (selectable) + 2 PTC/NTC + 2 NTC
Digital Input	15 x opto- coupled
Analogue Output	4 x 0- 10V
Digital Output	15 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	2 RJ12 sockets
Hironet connectors	1 RJ10 socket for RS485 (direct connection to proprietary supervision)
RS232 service port	1 db9 socket

CDL Graphic Display
(optional for indoor remote 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).

- Large 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 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 Mbit;
- Time and date: . . . . . Function buffered by LI- battery;
- Ethernet network connectors: . . . . . 1 RJ45 socket;
- CAN bus connectors: . . . . . 2 RJ12 sockets;
- Power supply: . . . . . via CAN bus or external 12 Vdc supply.

Liebert HPC- L 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

represent the communication manager which allow the integration of the **Liebert HPC- L** units into the most diffused Building Management Systems. The most diffused are: MODBUS, LONWORK.

Alarm Board (accessory)

The Alarm Board converts Alarms (high priority) or Warnings (lower priority) from iCOM into Volt- free contacts (up to five, either normally closed or normally open).
In this way, following Warnings/Alarms are separated: High or Low refrigerant pressure; High room Temperature; Low room Temperature; Fan Failure, Clogged Filter alarm (if installed).

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

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

Tab. 7b - Superchiller table

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

We indicate as R0, V0, P0 respectively the unit capacity, volumetric flow rate and compressor power input with 0% ethylene glycol on Chiller models or 30% ethylene glycol on Superchiller 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	1,015	1,005
0,43	1	1
0,88	0,985	0,995
1,76	0,960	0,985
3,52	0,915	0,965

Unit performance reported in the tables are given for the condition exchanger with fouling factor corresponding at 0,43 10^{-4} m^2 ° C / W. For different fouling factor values, performances should be corrected with the correction factors shown above.

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 - CG4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CG4 069	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CG4 075	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CG4 081	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CG4 087	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CG4 093	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
CG4 100	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
CG4 107	74.0	84.0	83.0	81.0	79.0	77.0	75.0	65.0	84.5
CG4 122	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0

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

Tab. 8b - PWL - CG4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CG4 069	95.0	106.0	103.0	101.0	100.0	99.0	96.0	87.0	105.5
CG4 075	95.0	106.0	103.0	101.0	100.0	99.0	96.0	87.0	105.5
CG4 081	95.0	106.0	103.0	101.0	100.0	99.0	96.0	87.0	105.5
CG4 087	95.0	106.0	103.0	101.0	100.0	99.0	96.0	87.0	105.5
CG4 093	95.0	105.0	104.0	102.0	101.0	99.0	96.0	87.0	106.0
CG4 100	95.0	105.0	104.0	102.0	101.0	99.0	96.0	87.0	106.0
CG4 107	96.0	106.0	105.0	103.0	101.0	99.0	97.0	87.0	106.5
CG4 122	97.0	107.0	106.0	105.0	103.0	100.0	98.0	88.0	107.5

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

Sound Levels

Tab. 8c - SPL - CB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CB4 069	71.0	81.0	81.0	79.0	73.0	68.0	60.0	50.0	79.5
CB4 075	71.0	81.0	81.0	79.0	73.0	68.0	60.0	50.0	79.5
CB4 081	71.0	81.0	81.0	79.0	73.0	68.0	60.0	50.0	79.5
CB4 087	71.0	81.0	81.0	79.0	73.0	68.0	60.0	50.0	79.5
CB4 093	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
CB4 100	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
CB4 107	72.0	82.0	82.0	79.0	75.0	70.0	63.0	51.0	80.5
CB4 122	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
CB4 140	73.0	84.0	82.0	81.0	77.0	71.0	65.0	52.0	82.0

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

Tab. 8d - PWL - CB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CB4 069	93.0	103.0	103.0	101.0	95.0	90.0	82.0	72.0	101.5
CB4 075	93.0	103.0	103.0	101.0	95.0	90.0	82.0	72.0	101.5
CB4 081	93.0	103.0	103.0	101.0	95.0	90.0	82.0	72.0	101.5
CB4 087	93.0	103.0	103.0	101.0	95.0	90.0	82.0	72.0	101.5
CB4 093	94.0	103.0	104.0	101.0	96.0	91.0	83.0	73.0	102.0
CB4 100	94.0	103.0	104.0	101.0	96.0	91.0	83.0	73.0	102.0
CB4 107	94.0	104.0	104.0	101.0	97.0	92.0	85.0	73.0	102.5
CB4 122	95.5	105.5	104.5	102.5	97.5	93.5	86.5	74.5	103.5
CB4 140	96.0	107.0	105.0	104.0	100.0	94.0	88.0	75.0	105.0

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

Sound Levels

Tab. 8e - SPL - CL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CL4 068	70.0	76.0	76.0	70.0	68.0	62.0	54.0	47.0	73.0
CL4 074	70.0	76.0	76.0	70.0	68.0	62.0	54.0	47.0	73.0
CL4 080	70.0	77.0	76.0	70.0	69.0	63.0	55.0	47.0	73.5
CL4 086	70.0	77.0	76.0	70.0	69.0	63.0	55.0	47.0	73.5
CL4 092	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
CL4 099	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
CL4 106	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
CL4 121	71.0	79.0	77.0	72.0	70.0	65.0	58.0	49.0	75.0
CL4 139	71.0	79.0	77.0	72.0	70.0	65.0	58.0	49.0	75.0

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

Tab. 8f - PWL - CL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CL4 068	92.0	98.0	98.0	92.0	90.0	84.0	76.0	69.0	95.0
CL4 074	92.0	98.0	98.0	92.0	90.0	84.0	76.0	69.0	95.0
CL4 080	92.0	99.0	98.0	92.0	91.0	85.0	77.0	69.0	95.5
CL4 086	92.0	99.0	98.0	92.0	91.0	85.0	77.0	69.0	95.5
CL4 092	92.5	101.5	98.5	93.5	91.5	86.5	78.5	70.5	96.5
CL4 099	92.5	101.5	98.5	93.5	91.5	86.5	78.5	70.5	96.5
CL4 106	92.5	101.5	98.5	93.5	91.5	86.5	78.5	70.5	96.5
CL4 121	94.0	102.0	100.0	95.0	93.0	88.0	81.0	72.0	98.0
CL4 139	94.0	102.0	100.0	95.0	93.0	88.0	81.0	72.0	98.0

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

Tab. 8g - SPL - CQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CQ4 068	67.0	67.0	65.0	64.0	60.0	54.0	47.0	42.0	65.0
CQ4 074	67.0	67.0	65.0	64.0	60.0	54.0	47.0	42.0	65.0
CQ4 080	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
CQ4 086	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
CQ4 092	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
CQ4 099	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
CQ4 106	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
CQ4 121	68.0	69.0	67.0	66.0	62.0	56.0	48.0	42.0	67.0
CQ4 139	68.0	69.0	67.0	66.0	62.0	56.0	48.0	42.0	67.0

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

Tab. 8h - PWL - CQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CQ4 068	89.0	89.0	87.0	86.0	82.0	76.0	69.0	64.0	87.0
CQ4 074	89.0	89.0	87.0	86.0	82.0	76.0	69.0	64.0	87.0
CQ4 080	89.0	90.0	87.0	87.0	82.0	76.0	69.0	64.0	87.5
CQ4 086	89.0	90.0	87.0	87.0	82.0	76.0	69.0	64.0	87.5
CQ4 092	90.5	90.5	88.5	87.5	83.5	77.5	69.5	64.5	88.5
CQ4 099	90.5	90.5	88.5	87.5	83.5	77.5	69.5	64.5	88.5
CQ4 106	90.5	90.5	88.5	87.5	83.5	77.5	69.5	64.5	88.5
CQ4 121	91.0	92.0	90.0	89.0	85.0	79.0	71.0	65.0	90.0
CQ4 139	91.0	92.0	90.0	89.0	85.0	79.0	71.0	65.0	90.0

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

Sound Levels

Tab. 8i - SPL - FG4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
FG4 069	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FG4 075	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FG4 081	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FG4 087	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FG4 093	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FG4 100	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0
FG4 107	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0
FG4 122	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0

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

Tab. 8j - PWL - FG4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FG4 069	95.0	105.0	104.0	102.0	101.0	99.0	96.0	87.0	106.0
FG4 075	95.0	105.0	104.0	102.0	101.0	99.0	96.0	87.0	106.0
FG4 081	95.0	105.0	104.0	102.0	101.0	99.0	96.0	87.0	106.0
FG4 087	95.0	105.0	104.0	102.0	101.0	99.0	96.0	87.0	106.0
FG4 093	95.0	105.0	104.0	102.0	101.0	99.0	96.0	87.0	106.0
FG4 100	96.5	106.5	105.5	104.5	102.5	99.5	97.5	87.5	107.5
FG4 107	96.5	106.5	105.5	104.5	102.5	99.5	97.5	87.5	107.5
FG4 122	96.5	106.5	105.5	104.5	102.5	99.5	97.5	87.5	107.5

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

Tab. 8k - SPL - FB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
FB4 069	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB4 075	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB4 081	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB4 087	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB4 093	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB4 100	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
FB4 107	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
FB4 122	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
FB4 140	73.0	84.0	82.0	81.0	77.0	71.0	65.0	52.0	82.0

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

Tab. 8l - PWL - FB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FB4 069	94.0	103.0	104.0	101.0	96.0	91.0	83.0	73.0	102.0
FB4 075	94.0	103.0	104.0	101.0	96.0	91.0	83.0	73.0	102.0
FB4 081	94.0	103.0	104.0	101.0	96.0	91.0	83.0	73.0	102.0
FB4 087	94.0	103.0	104.0	101.0	96.0	91.0	83.0	73.0	102.0
FB4 093	94.0	103.0	104.0	101.0	96.0	91.0	83.0	73.0	102.0
FB4 100	95.5	105.5	104.5	102.5	97.5	93.5	86.5	74.5	103.5
FB4 107	95.5	105.5	104.5	102.5	97.5	93.5	86.5	74.5	103.5
FB4 122	95.5	105.5	104.5	102.5	97.5	93.5	86.5	74.5	103.5
FB4 140	96.0	107.0	105.0	104.0	100.0	94.0	88.0	75.0	105.0

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

Sound Levels

Tab. 8m - SPL - FL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
FL4 068	70.0	76.0	76.0	70.0	68.0	62.0	54.0	47.0	73.0
FL4 074	70.0	76.0	76.0	70.0	68.0	62.0	54.0	47.0	73.0
FL4 080	70.0	76.0	76.0	70.0	68.0	62.0	54.0	47.0	73.0
FL4 086	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL4 092	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL4 099	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL4 106	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL4 121	71.0	79.0	77.0	72.0	70.0	65.0	58.0	49.0	75.0
FL4 139	71.0	79.0	77.0	72.0	70.0	65.0	58.0	49.0	75.0

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

Tab. 8n - PWL - FL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FL4 068	92.0	98.0	98.0	92.0	90.0	84.0	76.0	69.0	95.0
FL4 074	92.0	98.0	98.0	92.0	90.0	84.0	76.0	69.0	95.0
FL4 080	92.0	98.0	98.0	92.0	90.0	84.0	76.0	69.0	95.0
FL4 086	92.5	101.5	98.5	93.5	91.5	86.5	78.5	70.5	96.5
FL4 092	92.5	101.5	98.5	93.5	91.5	86.5	78.5	70.5	96.5
FL4 099	92.5	101.5	98.5	93.5	91.5	86.5	78.5	70.5	96.5
FL4 106	92.5	101.5	98.5	93.5	91.5	86.5	78.5	70.5	96.5
FL4 121	94.0	102.0	100.0	95.0	93.0	88.0	81.0	72.0	98.0
FL4 139	94.0	102.0	100.0	95.0	93.0	88.0	81.0	72.0	98.0

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

Tab. 8o - SPL - FQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
FQ4 068	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
FQ4 074	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
FQ4 080	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
FQ4 086	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ4 092	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ4 099	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ4 106	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ4 121	68.0	69.0	67.0	66.0	62.0	56.0	48.0	42.0	67.0
FQ4 139	68.0	69.0	67.0	66.0	62.0	56.0	48.0	42.0	67.0

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

Tab. 8p - PWL - FQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FQ4 068	89.0	90.0	87.0	87.0	82.0	76.0	69.0	64.0	87.5
FQ4 074	89.0	90.0	87.0	87.0	82.0	76.0	69.0	64.0	87.5
FQ4 080	89.0	90.0	87.0	87.0	82.0	76.0	69.0	64.0	87.5
FQ4 086	90.5	90.5	88.5	87.5	83.5	77.5	69.5	64.5	88.5
FQ4 092	90.5	90.5	88.5	87.5	83.5	77.5	69.5	64.5	88.5
FQ4 099	90.5	90.5	88.5	87.5	83.5	77.5	69.5	64.5	88.5
FQ4 106	90.5	90.5	88.5	87.5	83.5	77.5	69.5	64.5	88.5
FQ4 121	91.0	92.0	90.0	89.0	85.0	79.0	71.0	65.0	90.0
FQ4 139	91.0	92.0	90.0	89.0	85.0	79.0	71.0	65.0	90.0

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

The unit sound level in the version "B" and in the version "L" is lowered by 3 dB(A) in standard operating conditions with water 12/7° C at the evaporator and outdoor air at 30° C by suitable measures, such as:

- better sound insulation of the compressor compartment;
- automatic fan speed reduction with standard adjustment with phase cutoff (TRIAC) for the "B" versions;
- automatic fan speed reduction with inverter adjustment for the "L" versions.

9 Electrical Data

Tab. 9a - Electrical data - CG4 069- 122

Models CG4		**069**	**075**	**081**	**087**	**093**	**100**	**107**	**122**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating power input (1) Master + Subunit	kW	219	239	262	280	298	317	329	397
OA (1) (without PFC) Master + Subunit	A	380	410	444	474	506	515	551	665
Max. power input Master	kW	262	271	271	296	299	299	302	376
FLA Master	A	394	444	444	474	479	479	483	604
LRA Master	A	610	674	674	829	834	834	838	955
Max. power input Subunit	kW	262	262	271	271	299	299	302	376
FLA Subunit	A	394	394	444	444	479	479	483	604
LRA Subunit	A	610	610	674	674	834	834	838	955
Compressors - Power input (1) Master + Subunit	kW	195	215	238	256	269	288	295	359
Compressors - Nominal current (1) Master + Subunit	A	342	372	406	436	460	469	498	604
Compressors Master - Max. current	A	370	420	420	450	450	450	450	566
Compressors Master - LRA	A	586	650	650	805	805	805	805	917
Compressors Subunit - Max. current	A	370	370	420	420	450	450	450	566
Compressors Subunit - LRA	A	586	586	650	650	805	805	805	917
Fans number	n.	10				12		14	16
EC fans 900 - Power input	kW	2.4							
EC fans 900 - Nominal current	A	3.8							
EC fans 900 - Max. current	A	4.8							
Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151
Standard head pressure pump - Nominal power P2	kW	11							15
Standard head pressure pump - Max. current	A	19.4							26.3
High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161
High head pressure pump - Nominal power P2	kW	15							18.5
High head pressure pump - Max. current	A	26.3							31.5

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

Electrical Data

Tab. 9b - Electrical data - CB4 069- 140

Models CB4		**069**	**075**	**081**	**087**	**093**	**100**	**107**	**122**	**140**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz								
Operating power input (1) Master + Subunit	kW	223	244	268	287	305	325	336	400	420
OA (1) (without PFC) Master + Subunit	A	380	410	446	482	520	552	572	678	724
Max. power input Master	kW	167	187	187	216	219	237	239	274	302
FLA Master	A	306	336	336	346	351	391	396	454	499
LRA Master	A	462	491	491	612	617	681	686	846	969
Max. power input Subunit	kW	167	167	187	187	219	219	239	274	302
FLA Subunit	A	306	306	336	336	351	351	396	454	499
LRA Subunit	A	462	462	491	491	617	617	686	846	969
Compressors - Power input (1) Master + Subunit	kW	200	221	245	264	277	297	304	363	374
Compressors - Nominal current (1) Master + Subunit	A	330	360	396	432	460	492	502	598	624
Compressors Master - Max. current	A	280	310	310	320	320	360	360	413	447
Compressors Master - LRA	A	436	465	465	586	586	650	650	805	917
Compressors Subunit - Max. current	A	280	280	310	310	320	320	360	413	447
Compressors Subunit - LRA	A	436	436	465	465	586	586	650	805	917
Fans number	n.	10				12		14	16	20
AC fans 900 - Power input	kW	2.3								
AC fans 900 - Nominal current	A	5								
AC fans 900 - Max. current	A	5.2								
EC fans 900 - Power input *(Opt.)*	kW	1.8								
EC fans 900 - Nominal current *(Opt.)*	A	2.9								
EC fans 900 - Max. current *(Opt.)*	A	4.8								
Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151	NB80- 160/161
Standard head pressure pump - Nominal power P2	kW	11							15	18.5
Standard head pressure pump - Max. current	A	19.4							26.3	31.5
High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161	NB80- 160/167
High head pressure pump - Nominal power P2	kW	15							18.5	22
High head pressure pump - Max. current	A	26.3							31.5	38.0

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

Electrical Data

Tab. 9c - Electrical data - CL4 068- 139

Models CL4		**068**	**074**	**080**	**086**	**092**	**099**	**106**	**121**	**139**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz								
Operating power input (1) Master + Subunit	kW	221	243	260	278	288	305	325	382	418
OA (1) (without PFC) Master + Subunit	A	375	406	432	466	494	521	552	648	712
Max. power input Master	kW	167	187	189	218	220	238	238	273	296
FLA Master	A	303	333	337	347	351	391	391	452	486
LRA Master	A	459	488	492	613	617	681	681	844	956
Max. power input Subunit	kW	165	167	189	189	220	220	238	273	296
FLA Subunit	A	300	303	337	337	351	351	391	452	486
LRA Subunit	A	456	459	492	492	617	617	681	844	956
Compressors - Power input (1) Master + Subunit	kW	201	223	236	254	261	278	298	348	384
Compressors - Nominal current (1) Master + Subunit	A	332	363	382	416	436	463	494	576	640
Compressors Master - Max. current	A	280	310	310	320	320	360	360	413	447
Compressors Master - LRA	A	436	465	465	586	586	650	650	805	917
Compressors Subunit - Max. current	A	280	280	310	310	320	320	360	413	447
Compressors Subunit - LRA	A	436	436	465	465	586	586	650	805	917
Fans number	n.	12		14		16			20	
AC fans 900 - Power input	kW	1.7								
AC fans 900 - Nominal current	A	3.6								
AC fans 900 - Max. current	A	3.9								
EC fans 800 - Power input *(Opt.)*	kW	1.4								
EC fans 800 - Nominal current *(Opt.)*	A	2								
EC fans 800 - Max. current *(Opt.)*	A	3.9								
Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151	NB80- 160/161
Standard head pressure pump - Nominal power P2	kW	11							15	18.5
Standard head pressure pump - Max. current	A	19.4							26.3	31.5
High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161	NB80- 160/167
High head pressure pump - Nominal power P2	kW	15							18.5	22
High head pressure pump - Max. current	A	26.3							31.5	38.0

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

Electrical Data

Tab. 9d - Electrical data - CQ4 068- 139

Models CQ4		**068**	**074**	**080**	**086**	**092**	**099**	**106**	**121**	**139**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz								
Operating power input (1) Master + Subunit	kW	222	248	263	282	288	309	333	385	426
OA (1) (without PFC) Master + Subunit	A	364	402	422	458	476	509	546	630	700
Max. power input Master	kW	160	180	181	210	211	229	229	262	285
FLA Master	A	288	318	320	330	331	371	371	427	461
LRA Master	A	444	473	475	596	597	661	661	819	931
Max. power input Subunit	kW	159	160	181	181	211	211	229	262	285
FLA Subunit	A	287	288	320	320	331	331	371	427	461
LRA Subunit	A	443	444	475	475	597	597	661	819	931
Compressors - Power input (1) Master + Subunit	kW	214	240	253	272	277	298	322	371	412
Compressors - Nominal current (1) Master + Subunit	A	352	390	408	444	460	493	530	610	680
Compressors Master - Max. current	A	280	310	310	320	320	360	360	413	447
Compressors Master - LRA	A	436	465	465	586	586	650	650	805	917
Compressors Subunit - Max. current	A	280	280	310	310	320	320	360	413	447
Compressors Subunit - LRA	A	436	436	465	465	586	586	650	805	917
Fans number	n.	12		14		16			20	
EC fans 900 - Power input	kW	0.7								
EC fans 900 - Nominal current	A	1								
EC fans 900 - Max. current	A	1.4								
Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151	NB80- 160/161
Standard head pressure pump - Nominal power P2	kW	11							15	18.5
Standard head pressure pump - Max. current	A	19.4							26.3	31.5
High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161	NB80- 160/167
High head pressure pump - Nominal power P2	kW	15							18.5	22
High head pressure pump - Max. current	A	26.3							31.5	38.0

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

Electrical Data

Tab. 9e - Electrical data - FG4 069- 122

Models FG4		**069**	**075**	**081**	**087**	**093**	**100**	**107**	**122**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating power input (1) Master + Subunit	kW	238	261	287	307	327	328	350	438
OA (1) (without PFC) Master + Subunit	A	407	439	479	513	547	550	582	724
Max. power input Master	kW	265	274	274	299	299	306	306	376
FLA Master	A	399	449	449	479	479	488	488	604
LRA Master	A	615	679	679	834	834	843	843	955
Max. power input Subunit	kW	265	265	274	274	299	306	306	376
FLA Subunit	A	399	399	449	449	479	488	488	604
LRA Subunit	A	615	615	679	679	834	843	843	955
Compressors - Power input (1) Master + Subunit	kW	210	233	259	279	299	291	313	401
Compressors - Nominal current (1) Master + Subunit	A	364	396	436	470	504	492	524	666
Compressors Master - Max. current	A	370	420	420	450	450	450	450	566
Compressors Master - LRA	A	586	650	650	805	805	805	805	917
Compressors Subunit - Max. current	A	370	370	420	420	450	450	450	566
Compressors Subunit - LRA	A	586	586	650	650	805	805	805	917
Fans number	n.	12					16		
EC fans 900 - Power input	kW	2.3							
EC fans 900 - Nominal current	A	3.6							
EC fans 900 - Max. current	A	4.8							
Standard head pressure pump model *(Opt.)*	-	NB80- 160/161					NB80- 200/178		NB80- 160/167
Standard head pressure pump - Nominal power P2	kW	18.5					30		22
Standard head pressure pump - Max. current	A	31.5					52.0		38.0
High head pressure pump model *(Opt.)*	-	NB80- 160/167					NB80- 200/188		NB80- 200/178
High head pressure pump - Nominal power P2	kW	22					30		
High head pressure pump - Max. current	A	38.0					52.0		
NG - Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151
NG - Standard head pressure pump - Nominal power P2	kW	11							15
NG - Standard head pressure pump - Max. current	A	19.4							26.3
NG - High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161
NG - High head pressure pump - Nominal power P2	kW	15							18.5
NG - High head pressure pump - Max. current	A	26.3							31.5

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

Electrical Data

Tab. 9f - Electrical data - FB4 069- 140

Models FB4		**069**	**075**	**081**	**087**	**093**	**100**	**107**	**122**	**140**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz								
Operating power input (1) Master + Subunit	kW	244	268	295	317	337	337	360	443	462
OA (1) (without PFC) Master + Subunit	A	415	449	489	529	569	576	612	744	786
Max. power input Master	kW	170	190	190	219	219	242	242	274	302
FLA Master	A	311	341	341	351	351	401	401	454	499
LRA Master	A	467	496	496	617	617	691	691	846	969
Max. power input Subunit	kW	170	170	190	190	219	224	242	274	302
FLA Subunit	A	311	311	341	341	351	361	401	454	499
LRA Subunit	A	467	467	496	496	617	627	691	846	969
Compressors - Power input (1) Master + Subunit	kW	215	239	266	288	308	299	322	405	414
Compressors - Nominal current (1) Master + Subunit	A	354	388	428	468	508	494	530	662	684
Compressors Master - Max. current	A	280	310	310	320	320	360	360	413	447
Compressors Master - LRA	A	436	465	465	586	586	650	650	805	917
Compressors Subunit - Max. current	A	280	280	310	310	320	320	360	413	447
Compressors Subunit - LRA	A	436	436	465	465	586	586	650	805	917
Fans number	n.	12					16			20
AC fans 900 - Power input	kW	2.4								
AC fans 900 - Nominal current	A	5.1								
AC fans 900 - Max. current	A	5.2								
EC fans 900 - Power input *(Opt.)*	kW	1.9								
EC fans 900 - Nominal current *(Opt.)*	A	3								
EC fans 900 - Max. current *(Opt.)*	A	4.8								
Standard head pressure pump model *(Opt.)*	-	NB80- 160/161					NB80- 200/178		NB80- 160/167	
Standard head pressure pump - Nominal power P2	kW	18.5					30		22	
Standard head pressure pump - Max. current	A	31.5					52.0		38.0	
High head pressure pump model *(Opt.)*	-	NB80- 160/167					NB80- 200/188		NB80- 200/178	
High head pressure pump - Nominal power P2	kW	22					30			
High head pressure pump - Max. current	A	38.0					52.0			
NG - Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151	NB80- 160/161
NG - Standard head pressure pump - Nominal power P2	kW	11							15	18.5
NG - Standard head pressure pump - Max. current	A	19.4							26.3	31.5
NG - High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161	NB80- 160/167
NG - High head pressure pump - Nominal power P2	kW	15							18.5	22
NG - High head pressure pump - Max. current	A	26.3							31.5	38.0

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

Electrical Data

Tab. 9g - Electrical data - FL4 068- 139

Models FL4		**068**	**074**	**080**	**086**	**092**	**099**	**106**	**121**	**139**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz								
Operating power input (1) Master + Subunit	kW	243	269	298	296	315	336	362	417	459
OA (1) (without PFC) Master + Subunit	A	408	446	490	497	535	567	607	700	774
Max. power input Master	kW	170	190	190	224	224	242	242	279	302
FLA Master	A	311	341	341	361	361	401	401	465	499
LRA Master	A	467	496	496	627	627	691	691	857	969
Max. power input Subunit	kW	170	170	190	195	224	224	242	279	302
FLA Subunit	A	311	311	341	351	361	361	401	465	499
LRA Subunit	A	467	467	496	506	627	627	691	857	969
Compressors - Power input (1) Master + Subunit	kW	221	247	276	267	286	307	333	381	423
Compressors - Nominal current (1) Master + Subunit	A	362	400	444	436	474	506	546	624	698
Compressors Master - Max. current	A	280	310	310	320	320	360	360	413	447
Compressors Master - LRA	A	436	465	465	586	586	650	650	805	917
Compressors Subunit - Max. current	A	280	280	310	310	320	320	360	413	447
Compressors Subunit - LRA	A	436	436	465	465	586	586	650	805	917
Fans number	n.	12			16				20	
AC fans 800 - Power input	kW	1.8								
AC fans 800 - Nominal current	A	3.8								
AC fans 800 - Max. current	A	5.2								
EC fans 800 - Power input *(Opt.)*	kW	1.5								
EC fans 800 - Nominal current *(Opt.)*	A	2								
EC fans 800 - Max. current *(Opt.)*	A	4.8								
Standard head pressure pump model *(Opt.)*	-	NB80- 160/161					NB80- 200/178		NB80- 160/167	
Standard head pressure pump - Nominal power P2	kW	18.5					30		22	
Standard head pressure pump - Max. current	A	31.5					52.0		38.0	
High head pressure pump model *(Opt.)*	-	NB80- 160/167					NB80- 200/188		NB80- 200/178	
High head pressure pump - Nominal power P2	kW	22					30			
High head pressure pump - Max. current	A	38.0					52.0			
NG - Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151	NB80- 160/161
NG - Standard head pressure pump - Nominal power P2	kW	11							15	18.5
NG - Standard head pressure pump - Max. current	A	19.4							26.3	31.5
NG - High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161	NB80- 160/167
NG - High head pressure pump - Nominal power P2	kW	15							18.5	22
NG - High head pressure pump - Max. current	A	26.3							31.5	38.0

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

Electrical Data

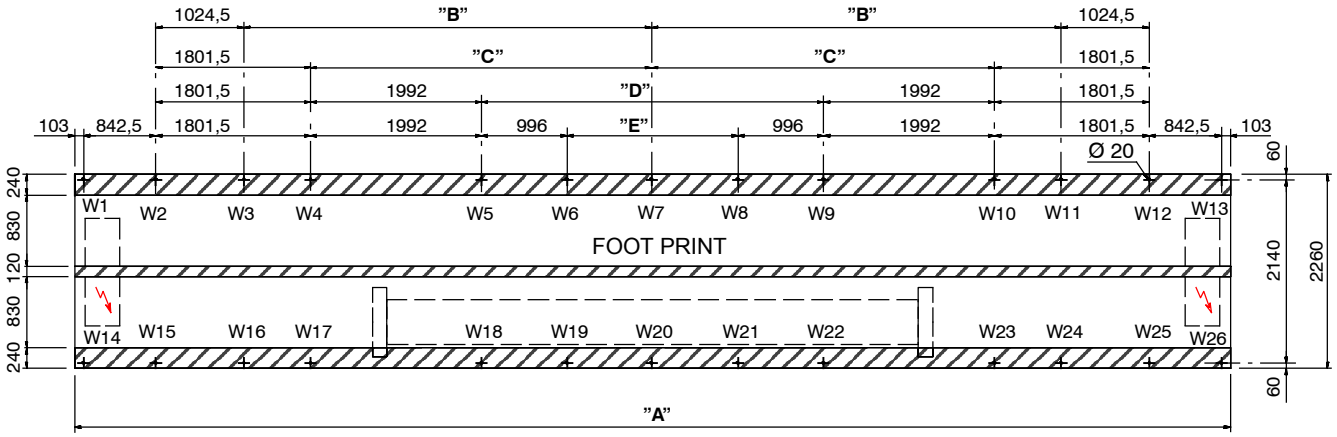
Tab. 9h - Electrical data - FQ4 068- 139

Models FQ4		**068**	**074**	**080**	**086**	**092**	**099**	**106**	**121**	**139**
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz								
Operating power input (1) Master + Subunit	kW	245	276	311	298	318	344	376	434	472
OA (1) (without PFC) Master + Subunit	A	400	444	496	483	522	561	612	704	770
Max. power input Master	kW	174	194	194	230	230	248	248	286	309
FLA Master	A	309	339	339	358	358	398	398	461	495
LRA Master	A	465	494	494	624	624	688	688	853	965
Max. power input Subunit	kW	174	174	194	201	230	230	248	286	309
FLA Subunit	A	309	309	339	348	358	358	398	461	495
LRA Subunit	A	465	465	494	503	624	624	688	853	965
Compressors - Power input (1) Master + Subunit	kW	237	268	303	287	307	333	365	420	458
Compressors - Nominal current (1) Master + Subunit	A	388	432	484	467	506	545	596	684	750
Compressors Master - Max. current	A	280	310	310	320	320	360	360	413	447
Compressors Master - LRA	A	436	465	465	586	586	650	650	805	917
Compressors Subunit - Max. current	A	280	280	310	310	320	320	360	413	447
Compressors Subunit - LRA	A	436	436	465	465	586	586	650	805	917
Fans number	n.	12			16				20	
EC fans 900 - Power input	kW	0.7								
EC fans 900 - Nominal current	A	1								
EC fans 900 - Max. current	A	4.8								
Standard head pressure pump model *(Opt.)*	-	NB80- 160/161					NB80- 200/178		NB80- 160/167	
Standard head pressure pump - Nominal power P2	kW	18.5					30	30	22	
Standard head pressure pump - Max. current	A	31.5					52.0	52.0	38.0	
High head pressure pump model *(Opt.)*	-	NB80- 160/167					NB80- 200/188	NB80- 200/188	NB80- 200/178	
High head pressure pump - Nominal power P2	kW	22					30	30	30	
High head pressure pump - Max. current	A	38.0					52.0	52.0	52.0	
NG - Standard head pressure pump model *(Opt.)*	-	NB80- 160/147							NB80- 160/151	NB80- 160/161
NG - Standard head pressure pump - Nominal power P2	kW	11							15	18.5
NG - Standard head pressure pump - Max. current	A	19.4							26.3	31.5
NG - High head pressure pump model *(Opt.)*	-	NB80- 160/151							NB80- 160/161	NB80- 160/167
NG - High head pressure pump - Nominal power P2	kW	15							18.5	22
NG - High head pressure pump - Max. current	A	26.3							31.5	38.0

(1) - Outdoor temperature 35° C; water inlet/outlet temperature 12/7° C; R134a refrigerant.
OA, FLA and LRA are calculated for unit without pumps and with fans as standard configuration.

10 Application Consideration

Fig. 10a - Support positions and loads



Tab. 10a - Dimensions

Models	Size	Fans nr.	Dimensions (mm)				
			"A"	"B"	"C"	"D"	"E"
CG4 / CB4	069- 075- 081- 087- 093- 100	10 - 12	8482	2271	-	-	-
CL4 / CQ4	068- 074						
CG4 / CB4	107	14	9478	-	1992	-	-
CL4 / CQ4	080- 086						
CG4 / CB4	122	16	11470	-	-	1992	-
CL4 / CQ4	092- 099- 106						
CB4	140	20	13462	-	-	-	1992
CL4 / CQ4	121- 139						
FG4 / FB4	069- 075- 081- 087- 093	12	9478	-	1992	-	-
FL4 / FQ4	068- 074- 080						
FG4 / FB4	100- 107- 122	16	11470	-	-	1992	-
FL4 / FQ4	086- 092- 099- 106						
FB4	140	20	13462	-	-	-	1992
FL4 / FQ4	121- 139						

Tab. 10b - Weight distribution - unit without pumps (Chiller)

Models	Weight distribution (kg)																									Tot.
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	
CG/CB4 069	568	568	568	-	-	-	568	-	-	-	571	571	571	729	729	729	-	-	-	729	-	-	-	733	733	733	9100
CG/CB4 075	569	569	569	-	-	-	569	-	-	-	571	571	571	730	730	730	-	-	-	730	-	-	-	733	733	733	9108
CG/CB4 081	572	572	572	-	-	-	572	-	-	-	575	575	575	737	737	737	-	-	-	737	-	-	-	742	742	742	9187
CG/CB4 087	580	580	580	-	-	-	573	-	-	-	573	573	573	752	752	752	-	-	-	744	-	-	-	744	744	744	9264
CG/CB4 093	585	585	585	-	-	-	585	-	-	-	588	588	588	761	761	761	-	-	-	761	-	-	-	766	766	766	9446
CG/CB4 100	589	589	589	-	-	-	588	-	-	-	588	588	588	766	766	766	-	-	-	765	-	-	-	765	765	765	9477
CG/CB4 107	635	635	-	635	-	-	635	-	-	639	-	639	639	830	830	-	830	-	-	830	-	-	835	-	835	835	10282
CG4 122	637	637	-	637	637	-	-	-	640	640	-	640	640	848	848	-	848	848	-	-	-	852	852	-	852	852	11911
CB4 122	635	635	-	635	635	-	-	-	638	638	-	638	638	846	846	-	846	846	-	-	-	849	849	-	849	849	11871
CB4 140	564	564	-	564	564	564	-	566	566	566	-	566	566	736	736	-	736	736	736	-	739	739	739	-	739	739	13026
CL/CQ4 068	567	567	567	-	-	-	567	-	-	-	570	570	570	728	728	728	-	-	-	728	-	-	-	732	732	732	9086
CL/CQ4 074	568	568	568	-	-	-	568	-	-	-	570	570	570	730	730	730	-	-	-	730	-	-	-	732	732	732	9098
CL/CQ4 080	607	607	-	607	-	-	607	-	-	610	-	610	610	772	772	-	772	-	-	772	-	-	776	-	776	776	9674
CL/CQ4 086	615	615	-	615	-	-	607	-	-	607	-	607	607	787	787	-	787	-	-	778	-	-	778	-	778	778	9746
CL/CQ4 092	586	586	-	586	586	-	-	-	588	588	-	588	588	740	740	-	740	740	-	-	-	744	744	-	744	744	10632
CL/CQ4 099	590	590	-	590	590	-	-	-	588	588	-	588	588	745	745	-	745	745	-	-	-	742	742	-	742	742	10660
CL/CQ4 106	596	596	-	596	596	-	-	-	598	598	-	598	598	766	766	-	766	766	-	-	-	770	770	-	770	770	10920
CL/ CQ4 121	544	544	-	544	544	544	-	546	546	546	-	546	546	714	714	-	714	714	714	-	717	717	717	-	717	717	12604
CL/ CQ4 139	548	548	-	548	548	548	-	550	550	550	-	550	550	720	720	-	720	720	720	-	723	723	723	-	723	723	12706

Tab. 10c - Weight distribution - unit without pumps (Freecooling)

Models	Weight distribution (kg)																									Tot.
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	
FG/FB4 069	753	753	-	753	-	-	753	-	-	756	-	756	756	905	905	-	905	-	-	905	-	-	909	-	909	909	11627
FG/FB4 075	754	754	-	754	-	-	754	-	-	756	-	756	756	907	907	-	907	-	-	907	-	-	909	-	909	909	11639
FG/FB4 081	757	757	-	757	-	-	757	-	-	760	-	760	760	914	914	-	914	-	-	914	-	-	918	-	918	918	11718
FG/FB4 087	765	765	-	765	-	-	757	-	-	757	-	757	757	929	929	-	929	-	-	920	-	-	920	-	920	920	11790
FG/FB4 093	774	774	-	774	-	-	774	-	-	777	-	777	777	936	936	-	936	-	-	936	-	-	940	-	940	940	11991
FG/FB4 100	777	777	-	777	777	-	-	-	774	774	-	774	774	919	919	-	919	919	-	-	-	916	916	-	916	916	13544
FG/FB4 107	782	782	-	782	782	-	-	-	785	785	-	785	785	941	941	-	941	941	-	-	-	944	944	-	944	944	13808
FG4 122	810	810	-	810	810	-	-	-	813	813	-	813	813	1010	1010	-	1010	1010	-	-	-	1014	1014	-	1014	1014	14591
FB4 122	808	808	-	808	808	-	-	-	811	811	-	811	811	1008	1008	-	1008	1008	-	-	-	1011	1011	-	1011	1011	14551
FB4 140	707	707	-	707	707	707	-	709	709	709	-	709	709	868	868	-	868	868	868	-	871	871	871	-	871	871	15773
FL/FQ4 068	744	744	-	744	-	-	744	-	-	747	-	747	747	897	897	-	897	-	-	897	-	-	901	-	901	901	11508
FL/FQ4 074	746	746	-	746	-	-	746	-	-	747	-	747	747	898	898	-	898	-	-	898	-	-	900	-	900	900	11517
FL/FQ4 080	748	748	-	748	-	-	748	-	-	752	-	752	752	905	905	-	905	-	-	905	-	-	909	-	909	909	11595
FL/FQ4 086	751	751	-	751	751	-	-	-	744	744	-	744	744	895	895	-	895	895	-	-	-	886	886	-	886	886	13104
FL/FQ4 092	759	759	-	759	759	-	-	-	761	761	-	761	761	901	901	-	901	901	-	-	-	904	904	-	904	904	13300
FL/FQ4 099	763	763	-	763	763	-	-	-	761	761	-	761	761	905	905	-	905	905	-	-	-	903	903	-	903	903	13328
FL/FQ4 106	769	769	-	769	769	-	-	-	771	771	-	771	771	927	927	-	927	927	-	-	-	930	930	-	930	930	13588
FL/FQ4 121	703	703	-	703	703	703	-	705	705	705	-	705	705	862	862	-	862	862	862	-	865	865	865	-	865	865	15671
FL/FQ4 139	707	707	-	707	707	707	-	709	709	709	-	709	709	868	868	-	868	868	868	-	871	871	871	-	871	871	15773

Tab. 10d - Weight distribution - unit with pumps (Chiller)

Models	Weight distribution (kg)																									Tot.
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	
CG/CB4 069	632	632	632	-	-	-	632	-	-	-	635	635	635	765	765	765	-	-	-	765	-	-	-	769	769	769	9800
CG/CB4 075	633	633	633	-	-	-	633	-	-	-	635	635	635	767	767	767	-	-	-	767	-	-	-	769	769	769	9812
CG/CB4 081	636	636	636	-	-	-	636	-	-	-	639	639	639	773	773	773	-	-	-	773	-	-	-	778	778	778	9887
CG/CB4 087	644	644	644	-	-	-	637	-	-	-	637	637	637	786	786	788	-	-	-	780	-	-	-	780	780	780	9964
CG/CB4 093	655	655	655	-	-	-	655	-	-	-	659	659	659	801	801	801	-	-	-	801	-	-	-	806	806	806	10219
CG/CB4 100	660	660	660	-	-	-	659	-	-	-	659	659	659	807	807	807	-	-	-	805	-	-	-	805	805	805	10257
CG/CB4 107	706	706	-	706	-	-	706	-	-	709	-	709	709	871	871	-	871	-	-	871	-	-	875	-	875	875	11060
CG4 122	704	704	-	704	704	-	-	-	707	707	-	707	707	888	888	-	888	888	-	-	-	892	892	-	892	892	12764
CB4 122	702	702	-	702	702	-	-	-	705	705	-	705	705	886	886	-	886	886	-	-	-	889	889	-	889	889	12724
CB4 140	619	619	-	619	619	619	-	621	621	621	-	621	622	768	768	-	768	768	768	-	771	771	771	-	771	771	13896
CL/CQ4 068	631	631	631	-	-	-	631	-	-	-	634	634	634	764	764	764	-	-	-	764	-	-	-	769	769	769	9789
CL/CQ4 074	632	632	632	-	-	-	632	-	-	-	634	634	634	766	766	766	-	-	-	766	-	-	-	768	768	768	9798
CL/CQ4 080	670	670	-	670	-	-	670	-	-	674	-	674	674	808	808	-	808	-	-	808	-	-	812	-	812	812	10370
CL/CQ4 086	679	679	-	679	-	-	671	-	-	671	-	671	671	823	823	-	823	-	-	814	-	-	814	-	814	814	10446
CL/CQ4 092	648	648	-	648	648	-	-	-	650	650	-	650	650	776	776	-	776	776	-	-	-	779	779	-	779	779	11412
CL/CQ4 099	652	652	-	652	652	-	-	-	650	650	-	650	650	780	780	-	780	780	-	-	-	777	777	-	777	777	11436
CL/CQ4 106	658	658	-	658	658	-	-	-	660	660	-	660	660	802	802	-	802	802	-	-	-	805	805	-	805	805	11700
CL/CQ4 121	598	598	-	598	598	598	-	600	600	600	-	600	600	744	744	-	744	744	744	-	747	747	747	-	747	747	13442
CL/CQ4 139	603	603	-	603	603	603	-	605	605	605	-	605	605	752	752	-	752	752	752	-	755	755	755	-	752	755	13576

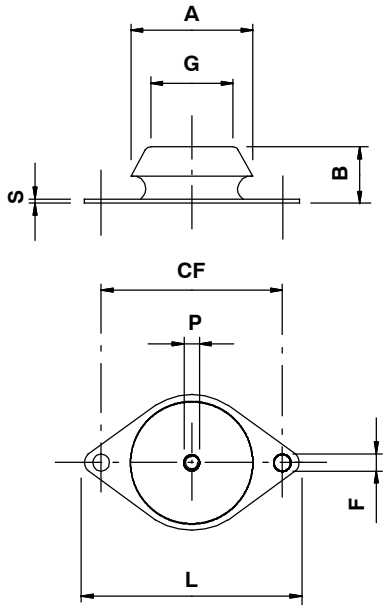
Tab. 10e - Weight distribution - unit with pumps (Freecooling)

Models	Weight distribution (kg)																									Tot.
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	W25	W26	
FG/FB4 069	808	808	-	808	-	-	808	-	-	811	-	811	811	934	934	-	934	-	-	934	-	-	937	-	937	937	12212
FG/FB4 075	809	809	-	809	-	-	809	-	-	811	-	811	811	935	935	-	935	-	-	935	-	-	937	-	937	937	12220
FG/FB4 081	812	812	-	812	-	-	812	-	-	816	-	816	816	942	942	-	942	-	-	942	-	-	946	-	946	946	12302
FG/FB4 087	821	821	-	821	-	-	813	-	-	813	-	813	813	957	957	-	957	-	-	948	-	-	948	-	948	948	12378
FG/FB4 093	823	823	-	823	-	-	823	-	-	827	-	827	827	960	960	-	960	-	-	960	-	-	965	-	965	965	12508
FG/FB4 100	834	834	-	834	834	-	-	-	831	831	-	831	831	953	953	-	953	953	-	-	-	951	951	-	951	951	14276
FG/FB4 107	839	839	-	839	839	-	-	-	842	842	-	842	842	975	975	-	975	975	-	-	-	978	978	-	978	978	14536
FG4 122	868	868	-	868	868	-	-	-	871	871	-	871	871	1040	1040	-	1040	1040	-	-	-	1044	1044	-	1044	1044	15290
FB4 122	866	866	-	866	866	-	-	-	868	868	-	868	868	1038	1038	-	1038	1038	-	-	-	1041	1041	-	1041	1041	15250
FB4 140	752	752	-	752	752	752	-	754	754	754	-	754	754	893	893	-	893	893	893	-	895	895	895	-	895	895	16472
FL/FQ4 068	799	799	-	799	-	-	799	-	-	803	-	803	803	925	925	-	925	-	-	925	-	-	929	-	929	929	12092
FL/FQ4 074	801	801	-	801	-	-	801	-	-	802	-	802	802	927	927	-	927	-	-	927	-	-	928	-	928	928	12102
FL/FQ4 080	804	804	-	804	-	-	804	-	-	807	-	807	807	934	934	-	934	-	-	934	-	-	938	-	938	938	12187
FL/FQ4 086	800	800	-	800	800	-	-	-	792	792	-	792	792	919	919	-	919	919	-	-	-	910	910	-	910	910	13684
FL/FQ4 092	802	802	-	802	802	-	-	-	805	805	-	805	805	922	922	-	922	922	-	-	-	925	925	-	925	925	13816
FL/FQ4 099	820	820	-	820	820	-	-	-	818	818	-	818	818	940	940	-	940	940	-	-	-	937	937	-	937	937	14060
FL/FQ4 106	826	826	-	826	826	-	-	-	828	828	-	828	828	961	961	-	961	961	-	-	-	964	964	-	964	964	14316
FL/FQ4 121	748	748	-	748	748	748	-	750	750	750	-	750	750	886	886	-	886	886	886	-	889	889	889	-	889	889	16370
FL/FQ4 139	752	752	-	752	752	752	-	754	754	754	-	754	754	893	893	-	893	893	893	-	895	895	895	-	895	895	16472

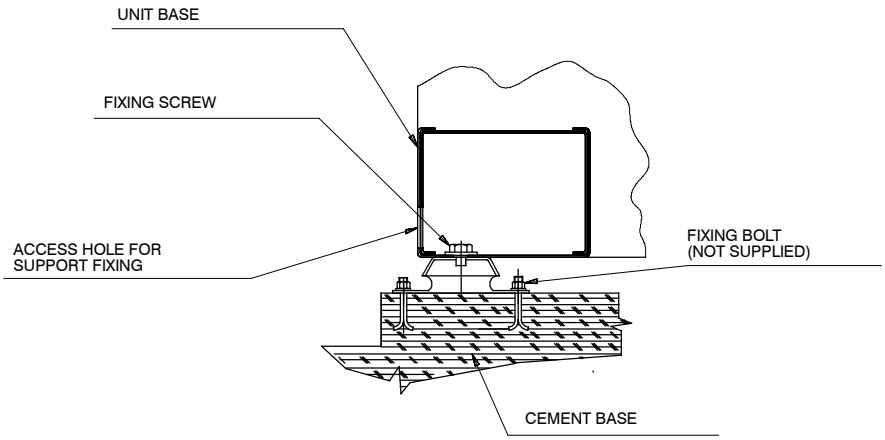
Application Consideration

Fig. 10b - Rubber anti- vibration support

Rubber support dimensions



Rubber support installation



Tab. 10f - Single support code

Code	A (mm)	B (mm)	P (mm)	F (mm)	CF (mm)	G (mm)	L (mm)	S (mm)
270326	108	50	M16	16.5	160	83	190	5

Tab. 10g - Rubber support (Chiller)

Unit	Configuration	N. Fans	Support kit code	Single support code	Kit support pieces
CG4 / CB4 069- 075- 081- 087	With or without pumps	10	489030	270326	14
CG4 / CB4 093- 100		12			
CG4 / CB4 107		14			
CG4 / CB4 122		16			
CB4 140		20			
CL4 / CQ4 068- 074		12			
CL4 / CQ4 080- 086		14			
CL4 / CQ4 092- 099- 106		16	489031		16
CL4 / CQ4 121- 139		20	485772		20

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

Tab. 10h - Rubber support (Freecooling)

Unit	Configuration	N. Fans	Support kit code	Single support code	Kit support pieces
FG4 / FB4 069- 075- 081- 087- 093	With or without pumps	12	489030	270326	14
FG4 / FB4 100- 107- 122		16	489031		16
FB4 140		20	485772		20
FL4 / FQ4 068- 074- 080		12	489030		14
FL4 / FQ4 086- 092- 099- 106		16	489031		16
FL4 / FQ4 121- 139		20	485772		20

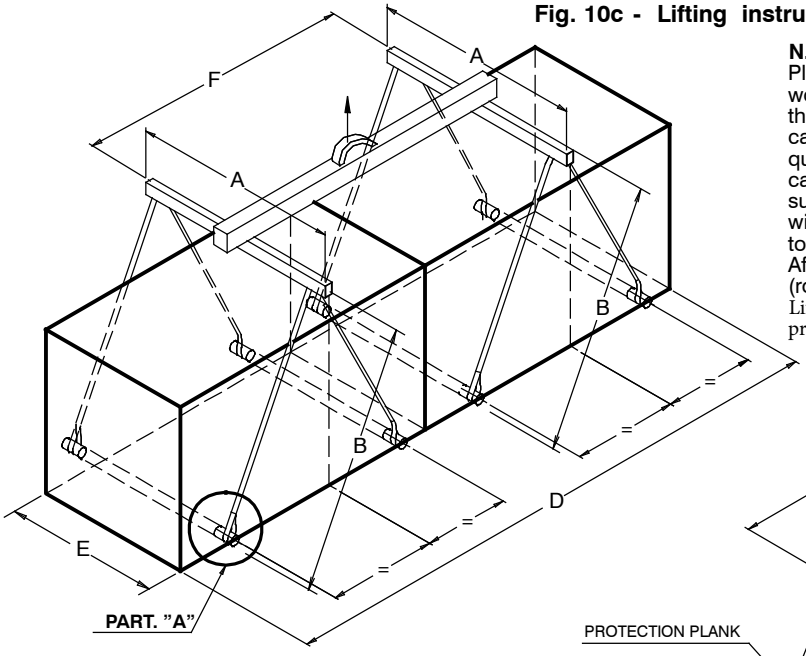
Each kit is complete with stainless steel fixing screws and plain washers for unit assembly.

Tab. 10i - Rubber support (No glycol group)

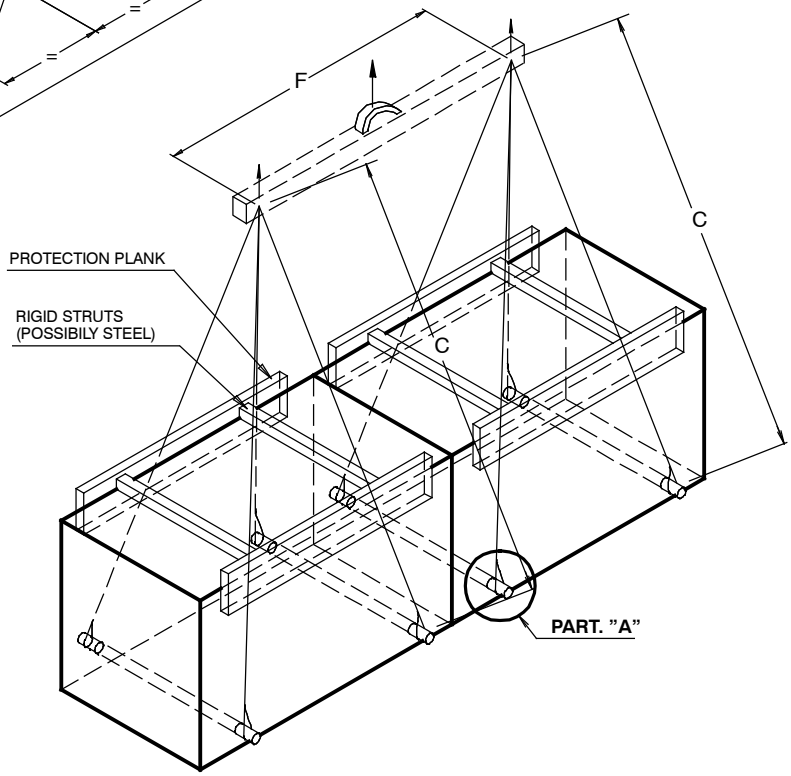
Configuration	Support kit code	Single support code	Kit support pieces
With or without pumps	485649	270326	4

Application Consideration

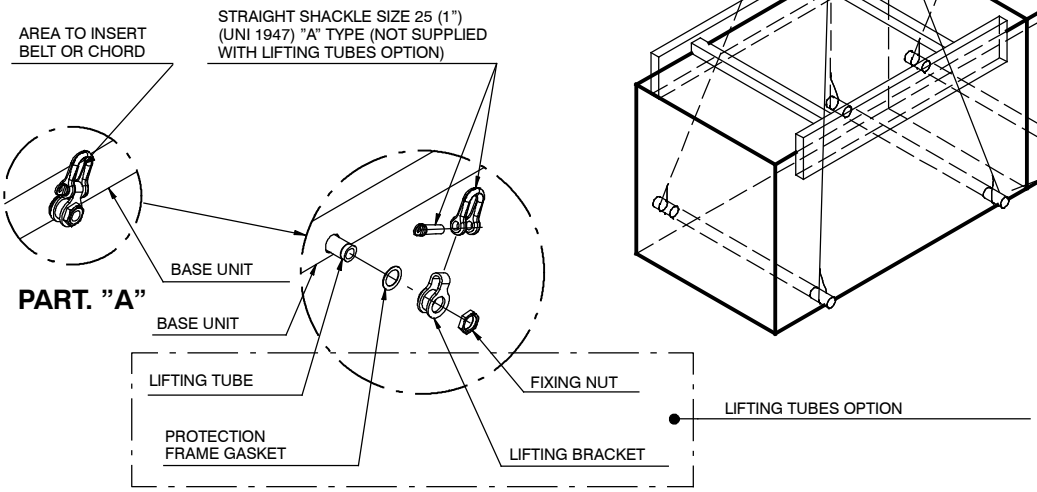
Fig. 10c - Lifting instructions



N.B:
Place the lifting tubes in the holes in the base indicated by the word 'LIFT HERE'. Lock the ends of the tubes in position with the ring nut as shown below, using 60 mm span. The capacity of the lifting gear must be adequate to lift the load in question. Check the weight of the **Liebert HPC- L** units, the capacity of the lifting gear and ropes and the condition and suitability of the aforementioned equipment. Lift the unit with a speed suitable for the load to be moved, so as not to damage the **Liebert HPC- L** structure.
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.



Lifting tubes option

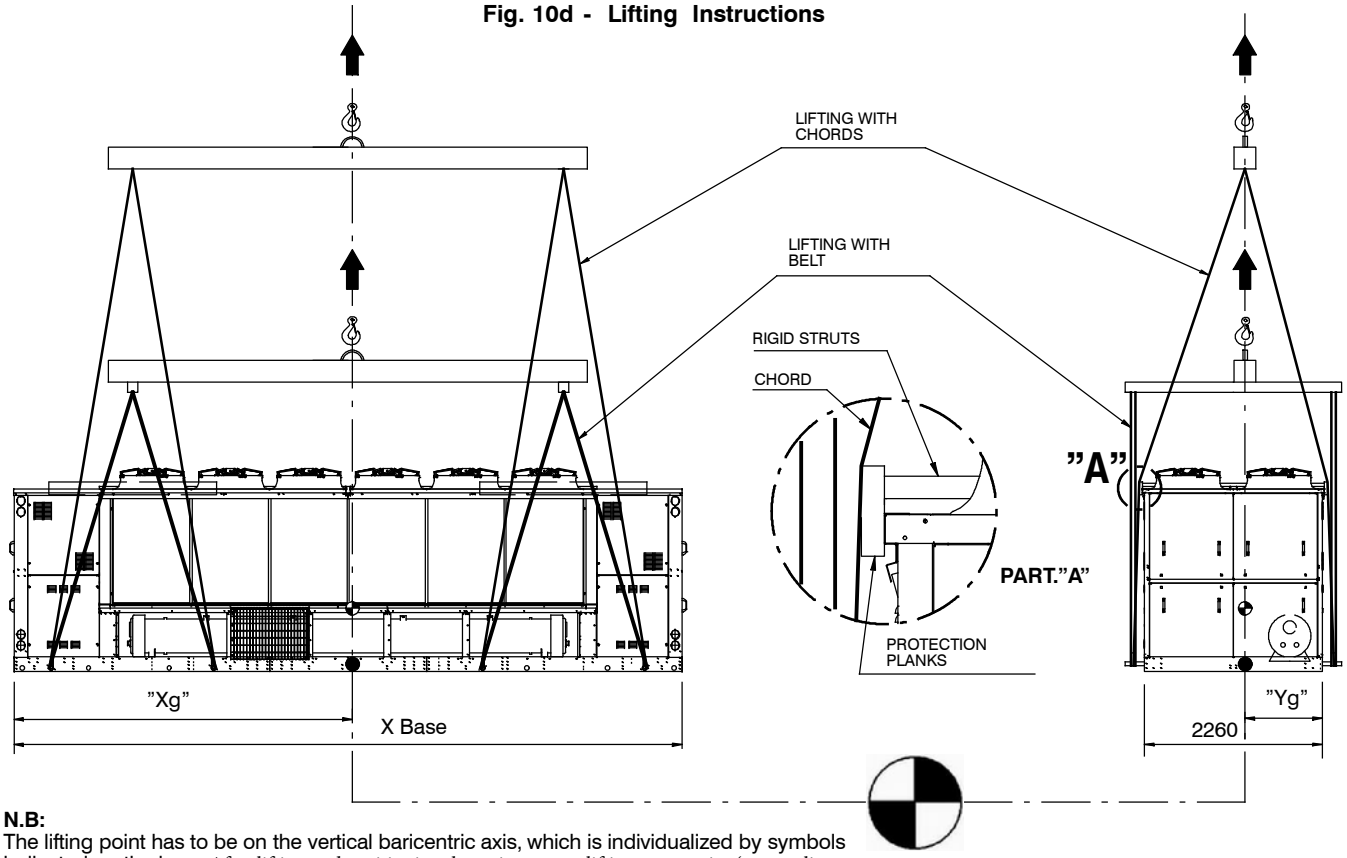


Tab. 10j - Lifting

Models	N. Fans	"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm)	"E" (mm)	"F" (mm)
CG4 / CB4 069- 075- 081- 087- 093- 100 **CL4 / CQ4 068- 074**	10 / 12	2750	≃ 4500	≃ 10000	8482	2260 / 2308	5476
CG4 / CB4 107 **CL4 / CQ4 080- 086**	14				9478		5974
FG4 / FB4 069- 075- 081- 087- 093 **FL4 / FQ4 068- 074- 080**	12						
CG4 / CB4 122 **CL4 / CQ4 092- 099- 106**	16				11470		7100
FG4 / FB4 100- 107- 122 **FL4 / FQ4 086- 092- 099- 106**							
CB4 140 **CL4 / CG 4 121- 139**	20				13462		8056
FB4 140 **FL4 / FG 4 121- 139**							

Application Consideration

Fig. 10d - Lifting Instructions



N.B:
The lifting point has to be on the vertical baricentric axis, which is individualized by symbols indicated on the base.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. 10k - Shipping weight and unit baricentre position (with and without pumps) - Chiller version

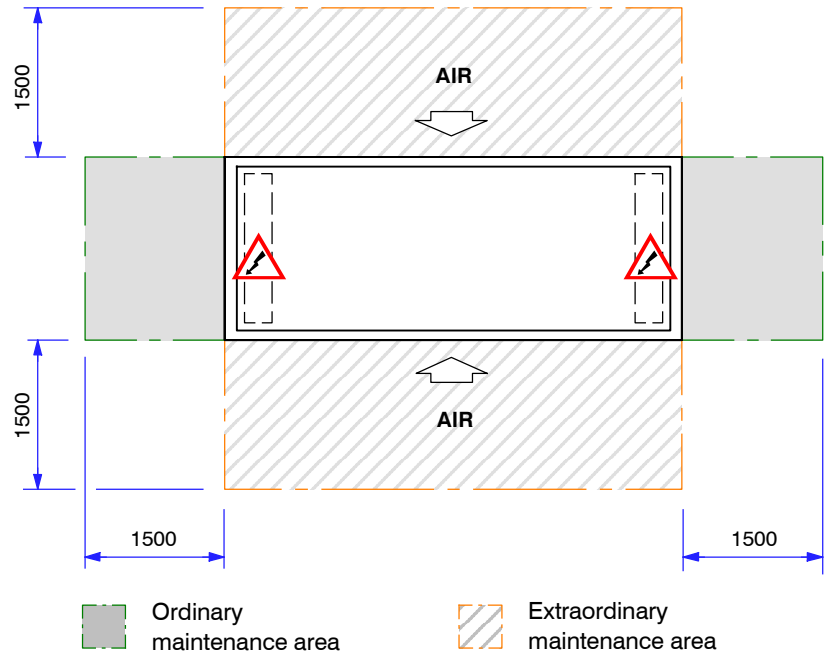
Models	X base (mm)	Unit without pumps			Unit with pumps		
		"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)	"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)
CG4 / CB4 069	8482	4250	1020	8686	4249	1046	9287
CG4 / CB4 075	8482	4246	1020	8694	4245	1046	9297
CG4 / CB4 081	8482	4250	1015	8815	4249	1041	9416
CG4 / CB4 087	8482	4224	1011	8892	4226	1037	9492
CG4 / CB4 093	8482	4250	1009	9074	4249	1036	9721
CG4 / CB4 100	8482	4238	1010	9105	4238	1036	9751
CG4 / CB4 107	9478	4747	1009	9836	4747	1034	10483
CG4 122	11470	5743	1054	11291	5742	1027	12012
CB4 122	11470	5743	1004	11251	5742	1027	11974
CB4 140	13462	6738	1013	12405	6738	1034	13160
CL4 / CQ4 068	8482	4250	1020	8672	4249	1046	9276
CL4 / CQ4 074	8482	4246	1020	8684	4245	1046	9286
CL4 / CQ4 080	9478	4747	1021	9302	4747	1045	9900
CL4 / CQ4 086	9478	4720	1018	9374	4721	1042	9977
CL4 / CQ4 092	11470	5743	1023	10260	5742	1046	10905
CL4 / CQ4 099	11470	5728	1024	10288	5728	1047	10935
CL4 / CQ4 106	11470	5743	1016	10474	5742	1040	11120
CL4 / CQ4 121	13462	6738	1011	11969	6738	1033	12692
CL4 / CQ4 139	13462	6738	1010	12085	6738	1031	12840

Application Consideration

Tab. 10l - Shipping weight and unit baricentre position (with and without pumps) - Freecooling version

Models	X base (mm)	Unit without pumps			Unit with pumps		
		"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)	"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)
FG4 / FB4 069	9478	4746	1045	10630	4746	1064	11135
FG4 / FB4 075	9478	4742	1045	10640	4742	1064	11145
FG4 / FB4 081	9478	4746	1041	10763	4746	1060	11268
FG4 / FB4 087	9478	4723	1037	10836	4723	1057	11341
FG4 / FB4 093	9478	4746	1037	10974	4746	1055	11439
FG4 / FB4 100	11470	5729	1048	12404	5729	1065	13079
FG4 / FB4 107	11470	5742	1042	12591	5741	1059	13266
FG4 122	11470	5742	1027	13200	5741	1047	13844
FB4 122	11470	5742	1027	13160	5741	1047	13804
FB4 140	13462	6737	1037	14892	6737	1051	14920
FL4 / FQ4 068	9478	4746	1044	10510	4746	1064	11015
FL4 / FQ4 074	9478	4742	1044	10520	4742	1064	11025
FL4 / FQ4 080	9478	4746	1040	10643	4746	1059	11148
FL4 / FQ4 086	11470	5715	1047	12018	5716	1064	12523
FL4 / FQ4 092	11470	5742	1046	12154	5741	1062	12619
FL4 / FQ4 099	11470	5729	1047	12184	5729	1064	12859
FL4 / FQ4 106	11470	5742	1040	12371	5741	1058	13046
FL4 / FQ4 121	13462	6737	1038	14776	6737	1052	14804
FL4 / FQ4 139	13462	6737	1037	14892	6737	1051	14920

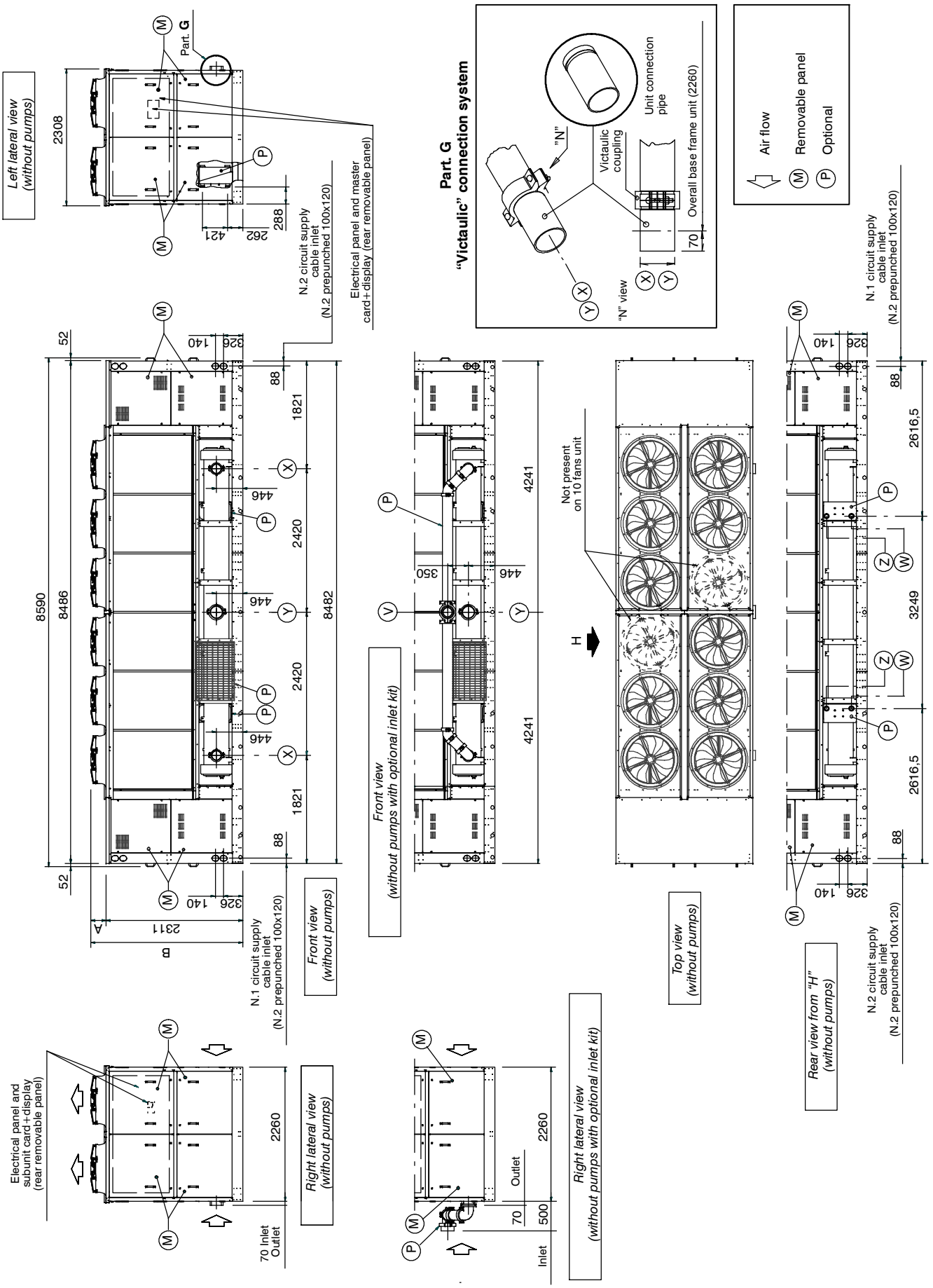
Fig. 10e - Service area (top view)



Notes:
Minimum distance between 2 units from condensing coil side = 3 m
Do not obstruct the air exiting the fans for a minimum distance of 2.5 m

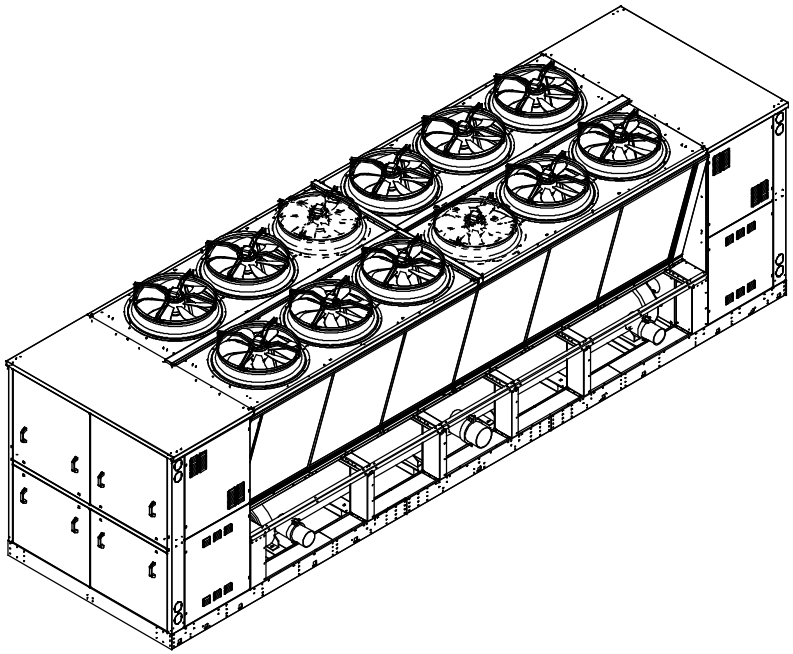
11 Dimensional Data

Fig. 11a - Liebert HPC- L CG4/CB4/CL4/CQ4 without pumps (10- 12 fans)



Tab. 11a - HPC- L CG4/CB4/CL4/CQ4 without pumps (10- 12 fans)

		EC fans		AC fans		Chilled water connections			Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet	**"W"** Inlet	**"Z"** Outlet
CG4 069- 075- 081- 087	10	270	2581	260	2571	2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm	2 x G $2^1/_2$" B (ISO 228/1) Male	2 x G $2^1/_2$" B (ISO 228/1) Male
CG4 093- 100	12					2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm		
CB4 069- 075- 081- 087	10					2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm		
CB4 093- 100	12					2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm		
CL4 068- 074		288	2599			2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm		
CQ4 068- 074		232	2543							



Dimensional Data

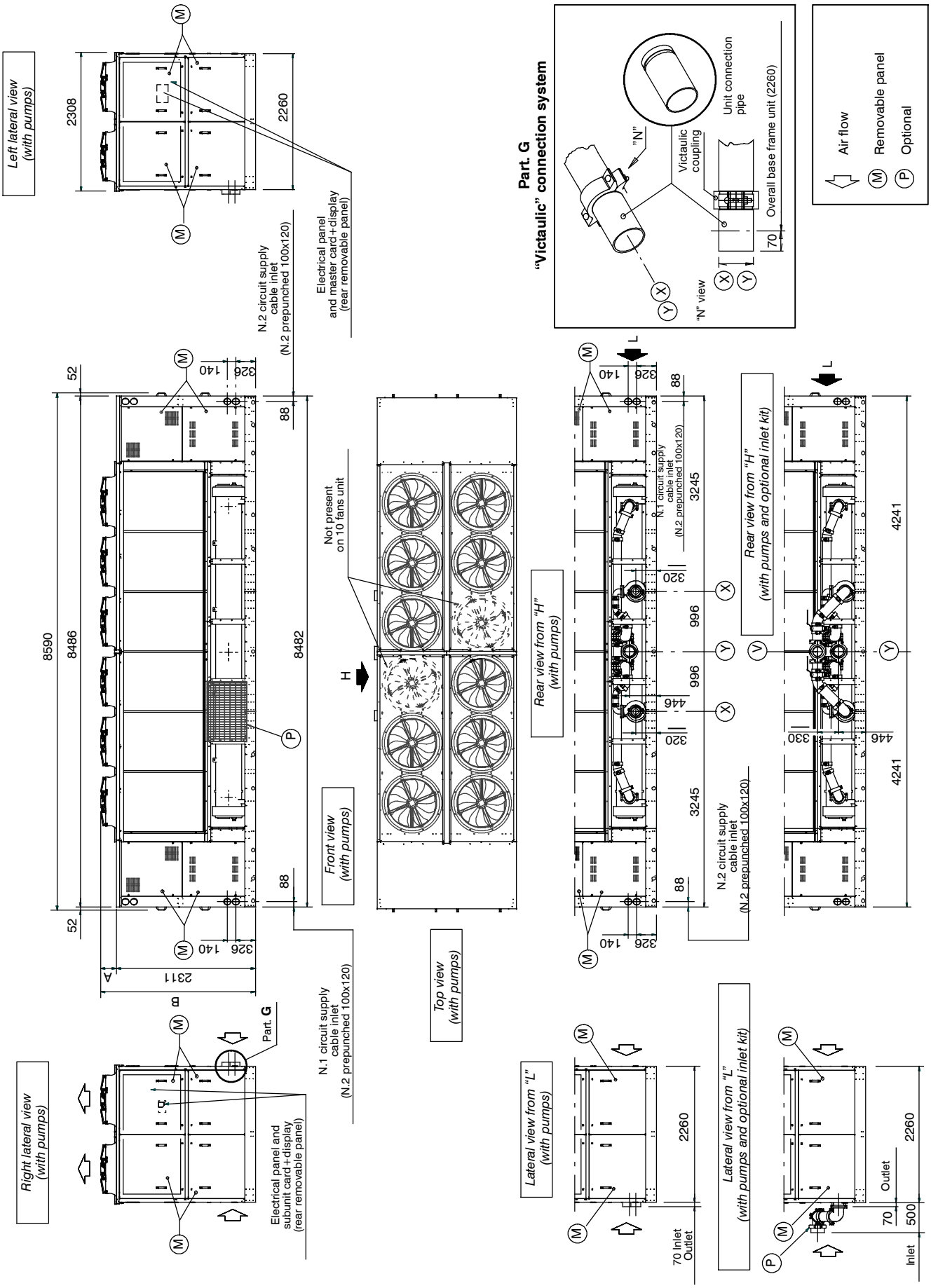


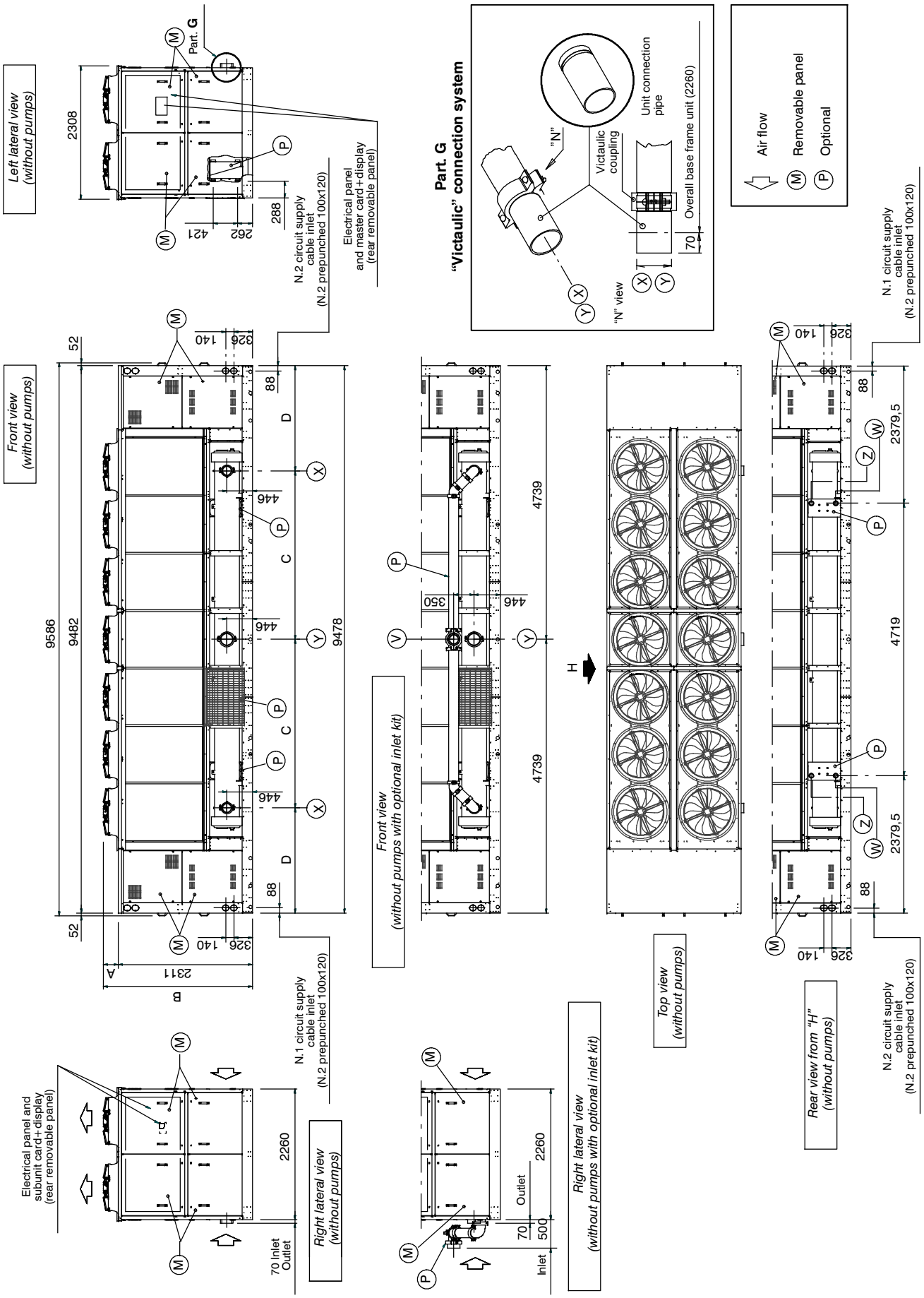
Fig. 11b - Liebert HPC- L CG4/CB4/CL4/CQ4 with pumps (10- 12 fans)

Tab. 11b - HPC- L CG4/CB4/CL4/CQ4 with pumps (10- 12 fans)

		EC fans		AC fans		Chilled water connections		
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet
CG4 069- 075- 081- 087	10	270	2581	260	2571	2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm
CG4 093- 100	12					2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm
CB4 069- 075- 081- 087	10					2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm
CB4 093- 100	12					2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm
CL4 068- 074		288	2599			2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm
CQ4 068- 074		232	2543					

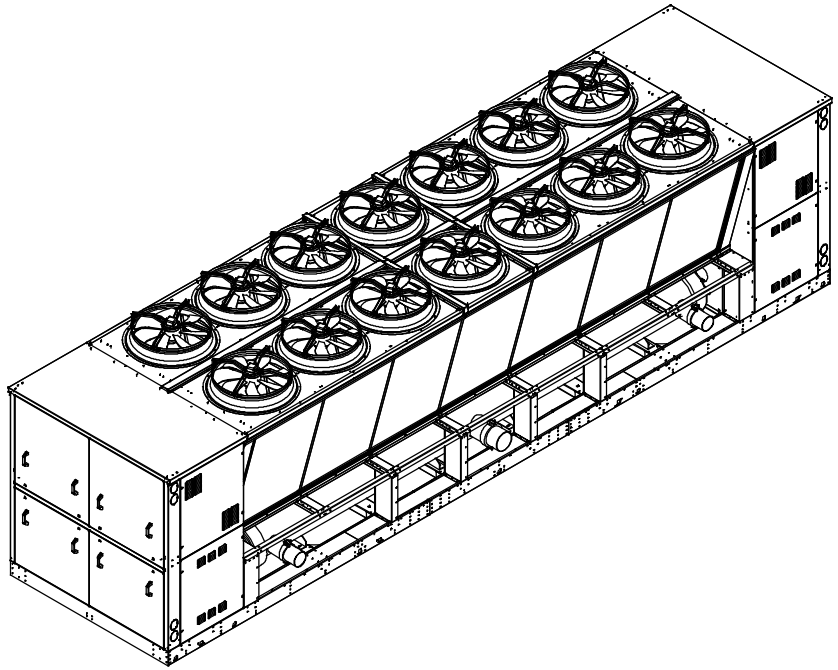
Dimensional Data

Fig. 11c - Liebert HPC- L CG4/CB4/CL4/CQ4 without pumps (14 fans)



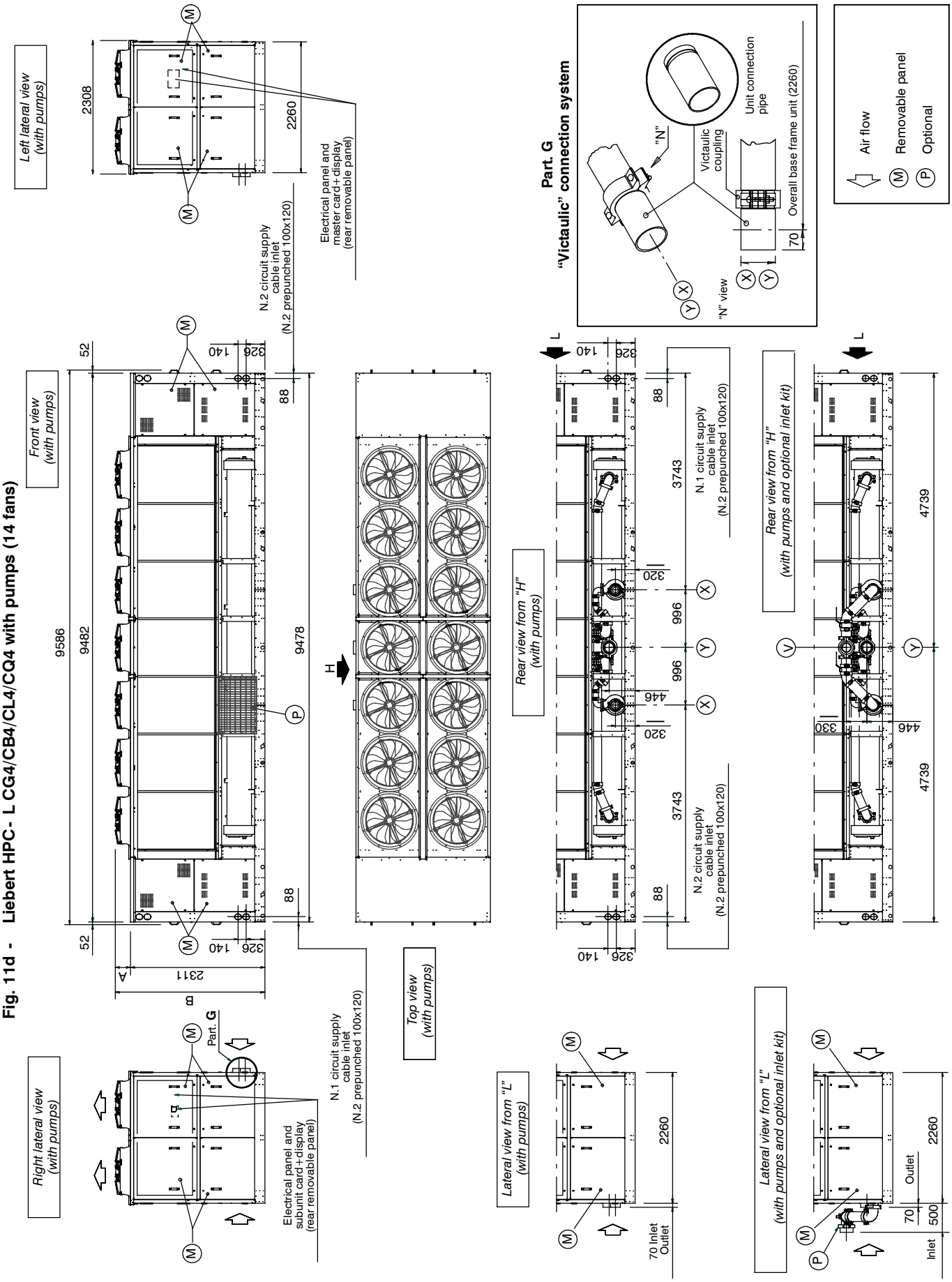
Tab. 11c - HPC- L CG4/CB4/CL4/CQ4 without pumps (14 fans)

		EC fans		AC fans				Chilled water connections			Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"C"** (mm)	**"D"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet Salida	**"W"** Inlet	**"Z"** Outlet
CG4 107	14	270	2581	260	2571	2920	1819	2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm	2 x G $2^1/_2$" B (ISO 228/1) Male	2 x G $2^1/_2$" B (ISO 228/1) Male
CB4 107												
CL4 080- 086		288	2599			2420	2319	2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm		
CQ4 080- 086		232	2543									



Dimensional Data

Fig. 11d - Liebert HPC- L CG4/CB4/CL4/CQ4 with pumps (14 fans)



Tab. 11d - HPC- L CG4/CB4/CL4/CQ4 with pumps (14 fans)

		EC fans		AC fans		Chilled water connections		
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet Salida
CG4 107	14	270	2581	260	2571	2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm
CB4 107								
CL4 080- 086		288	2599			2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm
CQ4 080- 086		232	2543					

Dimensional Data

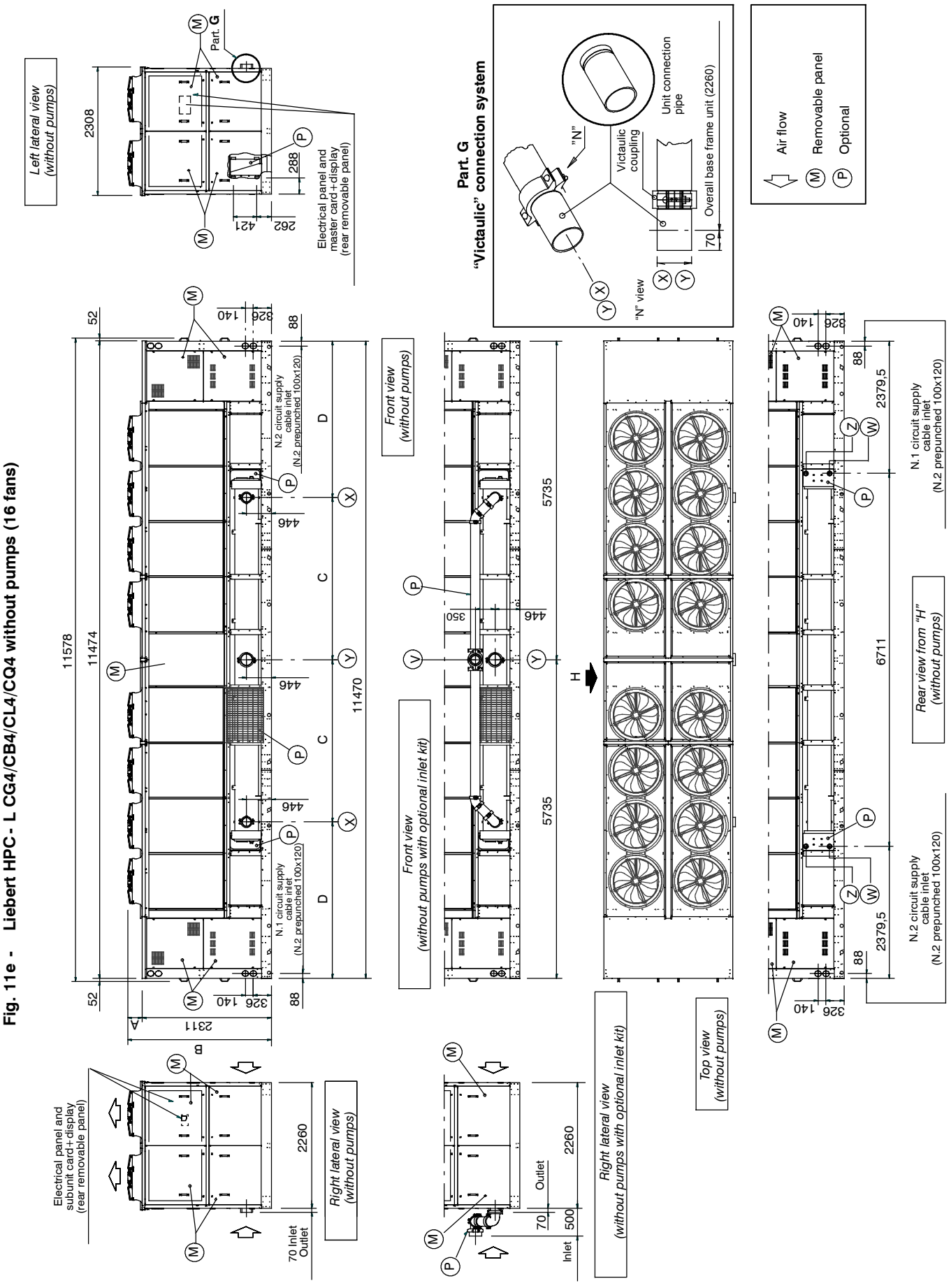
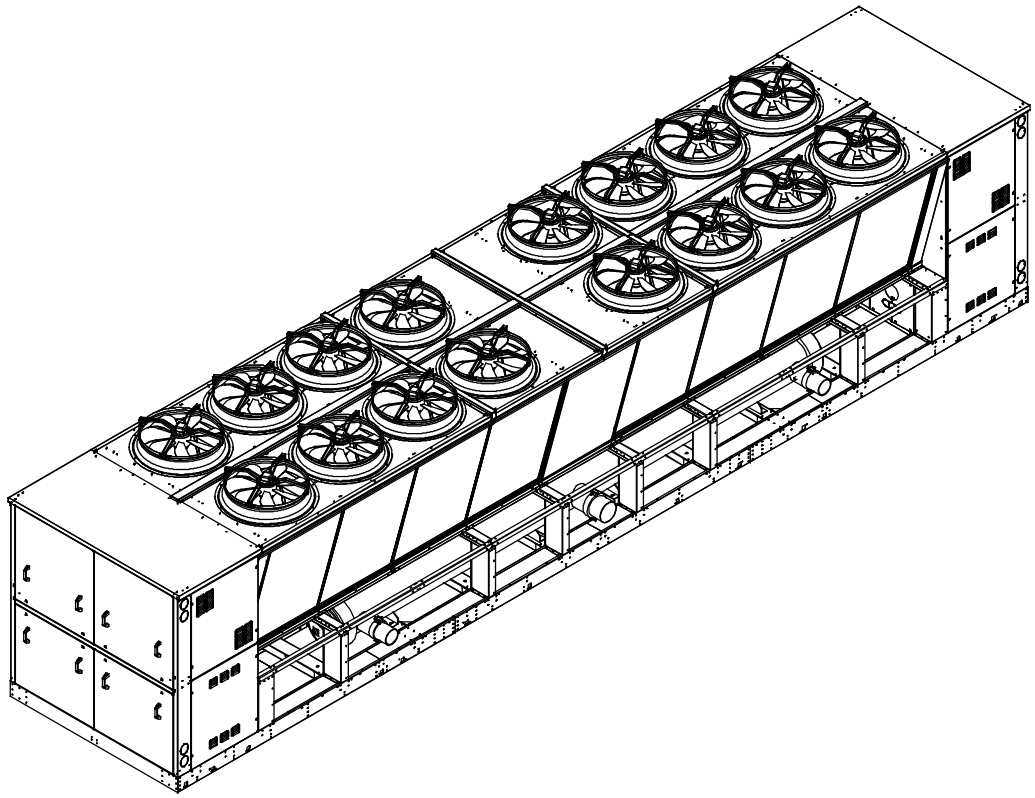


Fig. 11e - Liebert HPC- L CG4/CB4/CL4/CQ4 without pumps (16 fans)

Tab. 11e - HPC- L CG4/CB4/CL4/CQ4 without pumps (16 fans)

		EC fans		AC fans				Chilled water connections			Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**C** (mm)	**D** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet	**"W"** Inlet	**"Z"** Outlet
CG4 122	16	270	2581	260	2571	2920	2815	2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm	2 x G $2^1/_2$" B (ISO 228/1) Male	2 x G $2^1/_2$" B (ISO 228/1) Male
CB4 122												
CL4 092- 099		288	2599			2420	3315					
CQ4 092- 099												
CL4 106						2920	2815					
CQ4 106												



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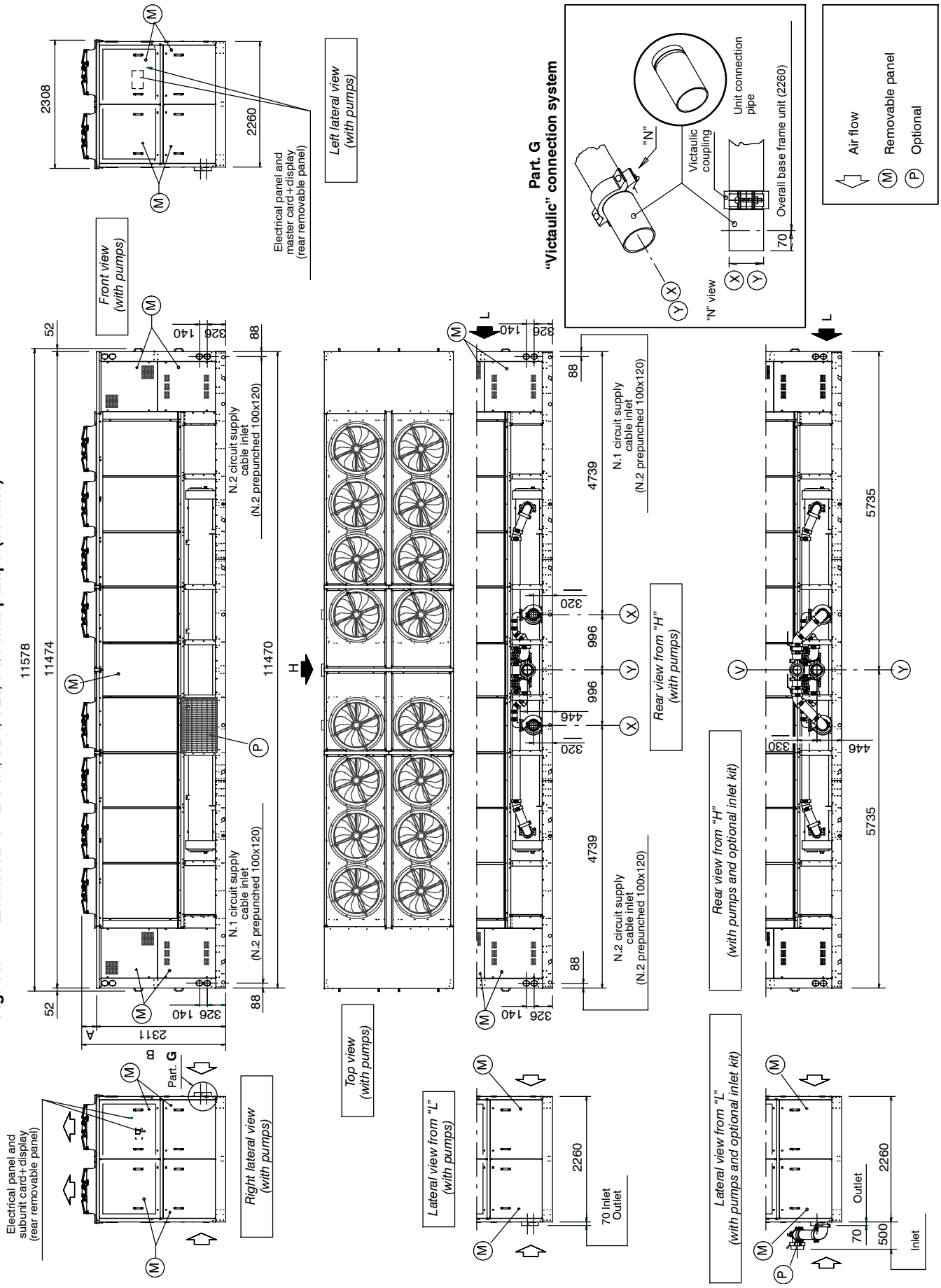


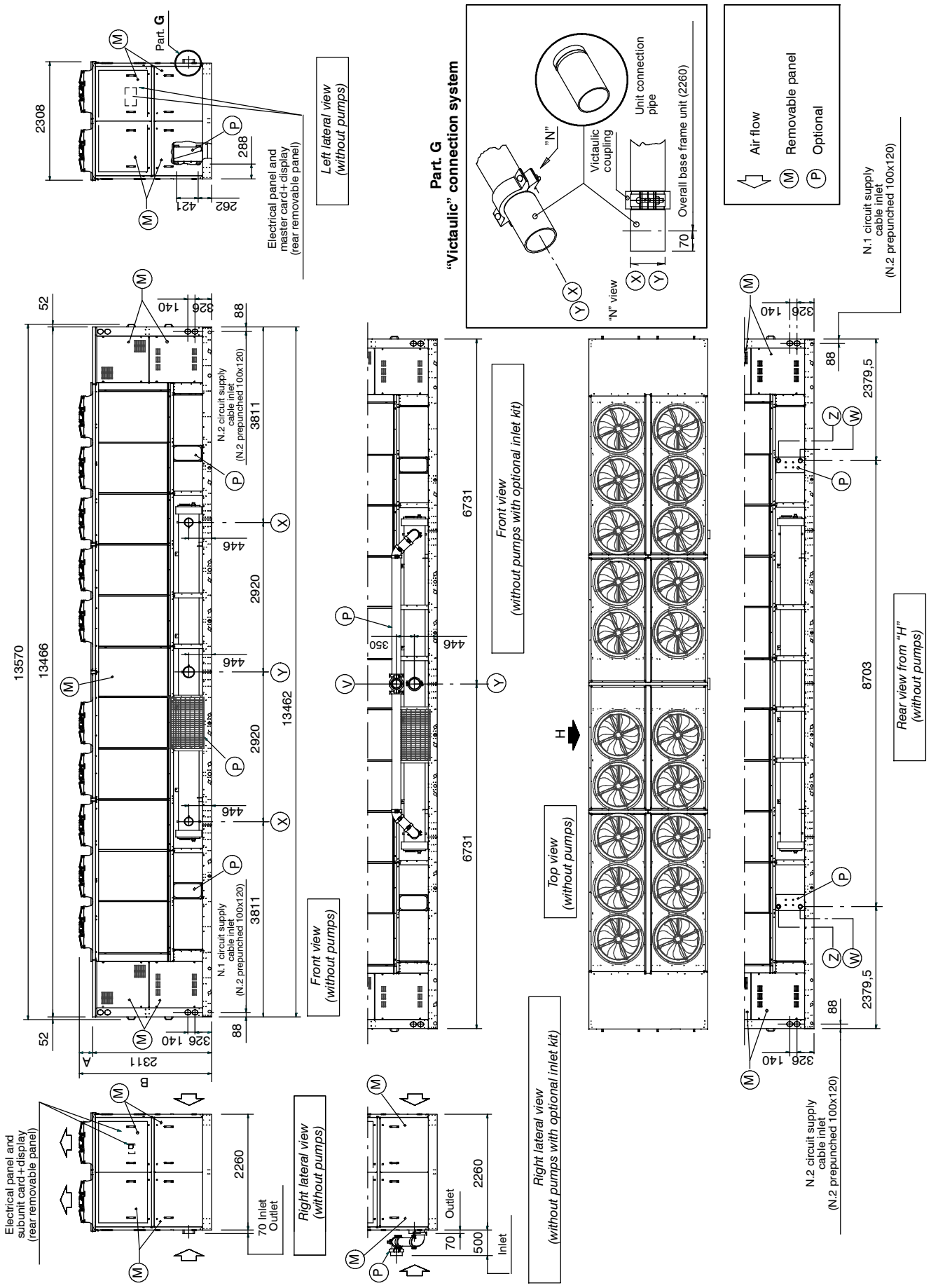
Fig. 11f - Liebert HPC- L CG4/CB4/CL4/CQ4 with pumps (16 fans)

Tab. 11f - HPC - L CG4/CB4/CL4/CQ4 with pumps (16 fans)

		EC fans		AC fans		Chilled water connections		
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet
CG4 122	16	270	2581	260	2571	2 x DN150 - 6" - 168.3mm	1 x DN200 - 8" - 219.1mm	1 x DN200 - 8" - 219.1mm
CB4 122								
CL4 092 - 099		288	2599					
CQ4 092 - 099								
CL4 106								
CQ4 106								

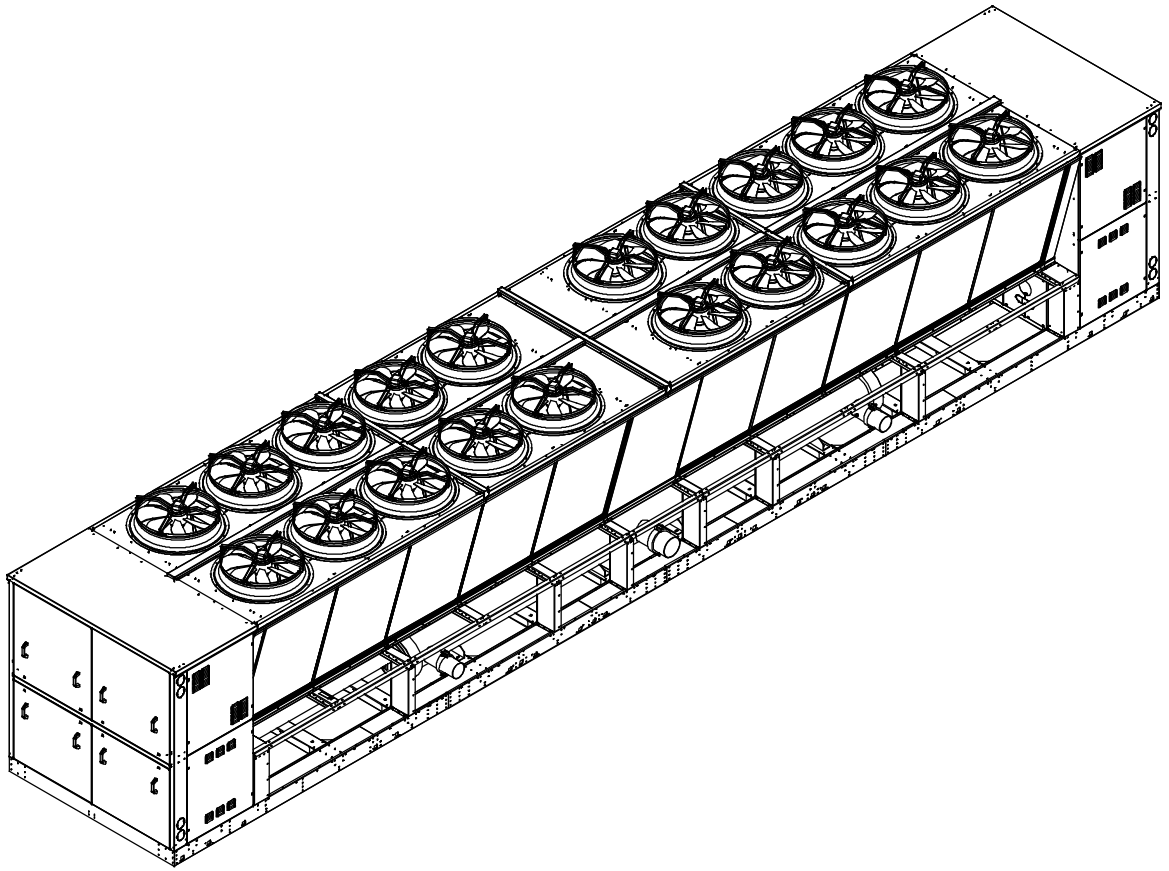
Dimensional Data

Fig. 11g - Liebert HPC- L CG4/CB4/CL4/CQ4 without pumps (20 fans)



Tab. 11g - HPC - L CG4/CB4/CL4/CQ4 without pumps (20 fans)

		EC fans		AC fans		Chilled water connections			Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet	**"W"** Inlet	**"Z"** Outlet
CB4 140	20	270	2581	260	2571	2 x DN150 - 6" - 168.3mm	1 x DN200 - 8" - 219.1mm	1 x DN200 - 8" - 219.1mm	2 x G $2^1/_2$" B (ISO 228/1) Male	2 x G $2^1/_2$" B (ISO 228/1) Male
CL4 121 - 139		288	2599							
CQ4 121 - 139		232	2543							



Dimensional Data

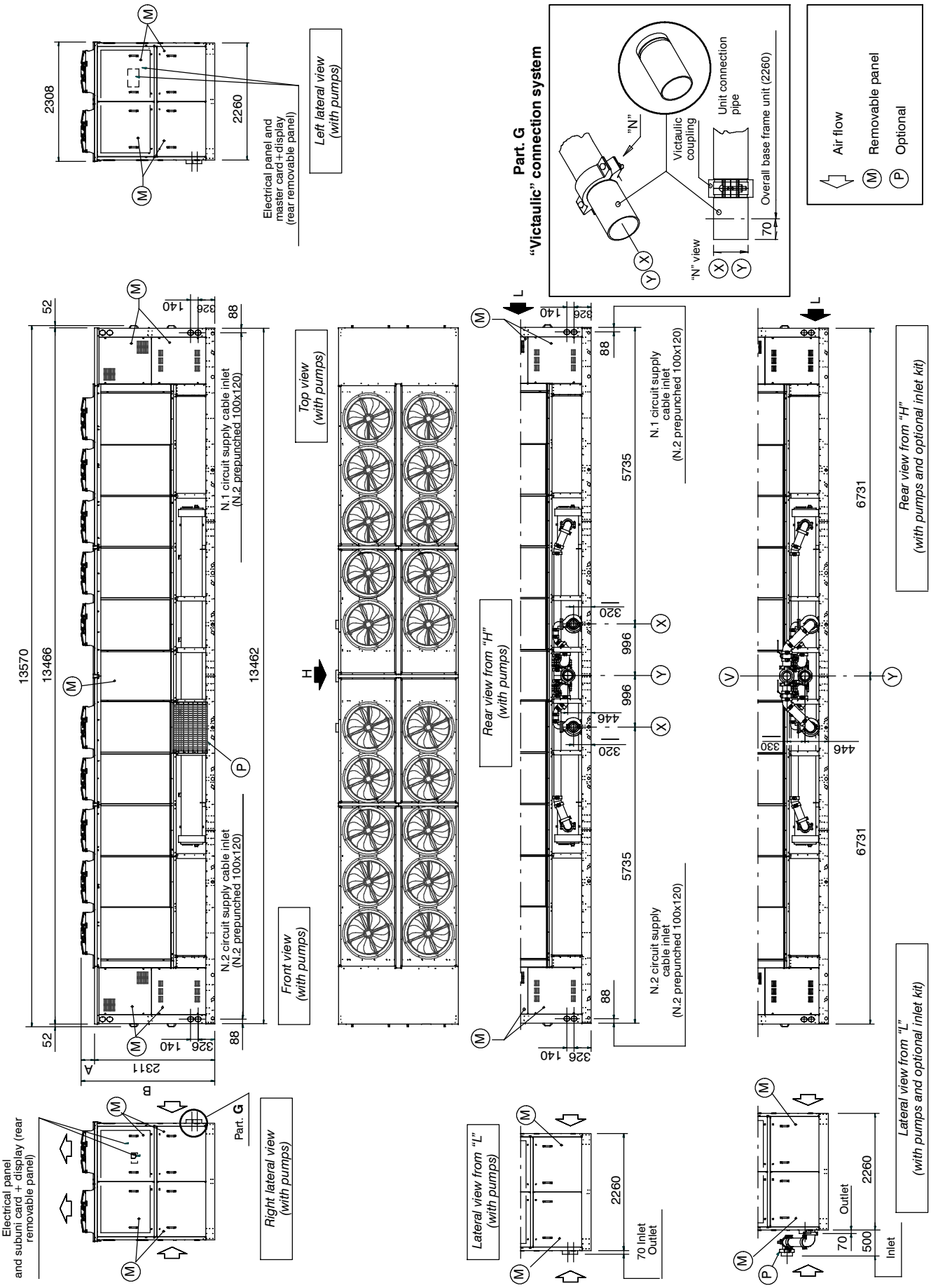


Fig. 11h - Liebert HPC- L CG4/CB4/CL4/CQ4 with pumps (20 fans)

Tab. 11h - HPC - L CG4/CB4/CL4/CQ4 with pumps (20 fans)

		EC fans		AC fans		Chilled water connections		
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet
CB4 140	20	270	2581	260	2571	2 x DN150 - 6" - 168.3mm	1 x DN200 - 8" - 219.1mm	1 x DN200 - 8" - 219.1mm
CL4 121 - 139		288	2599					
CQ4 121 - 139		232	2543					

Dimensional Data

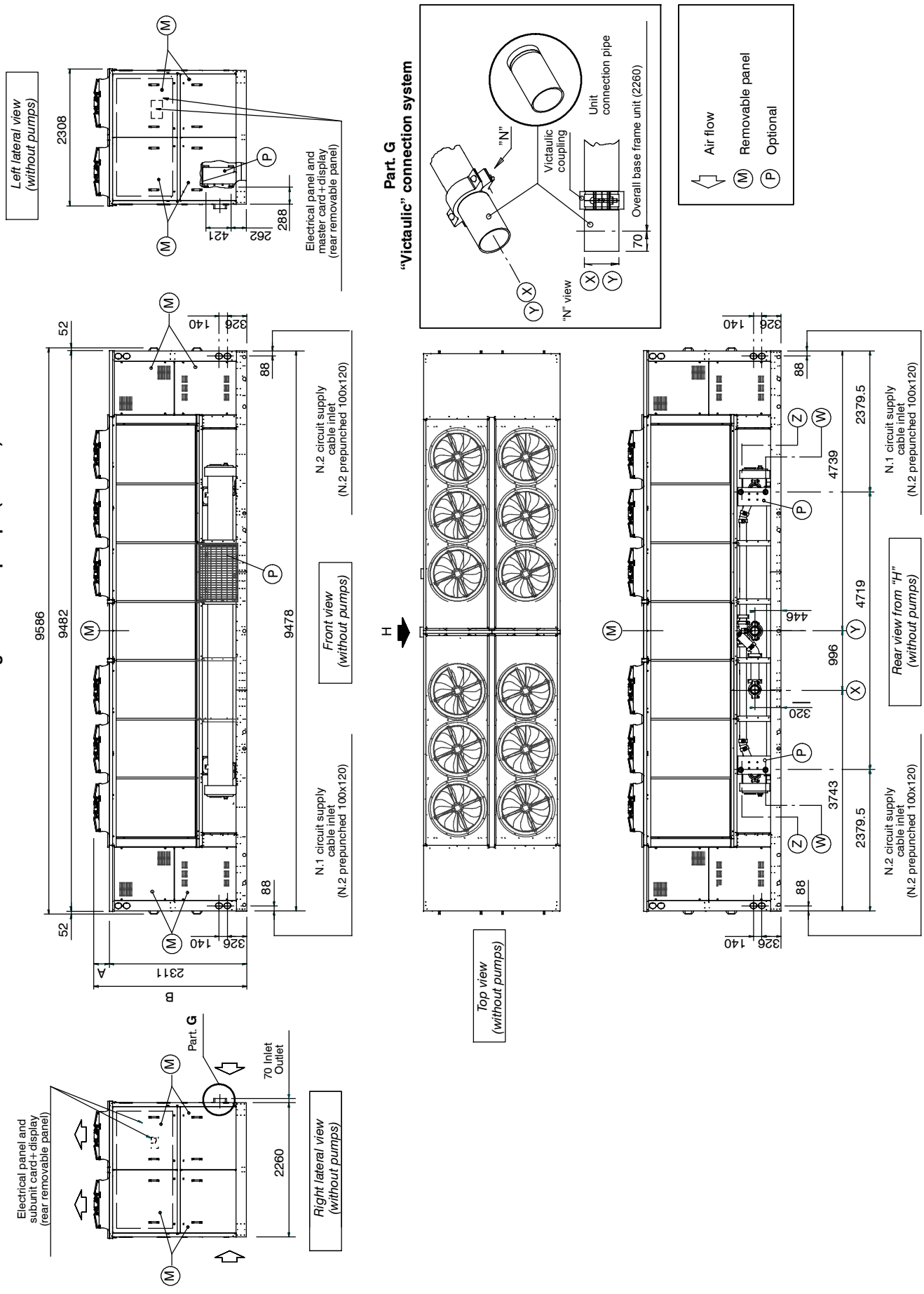
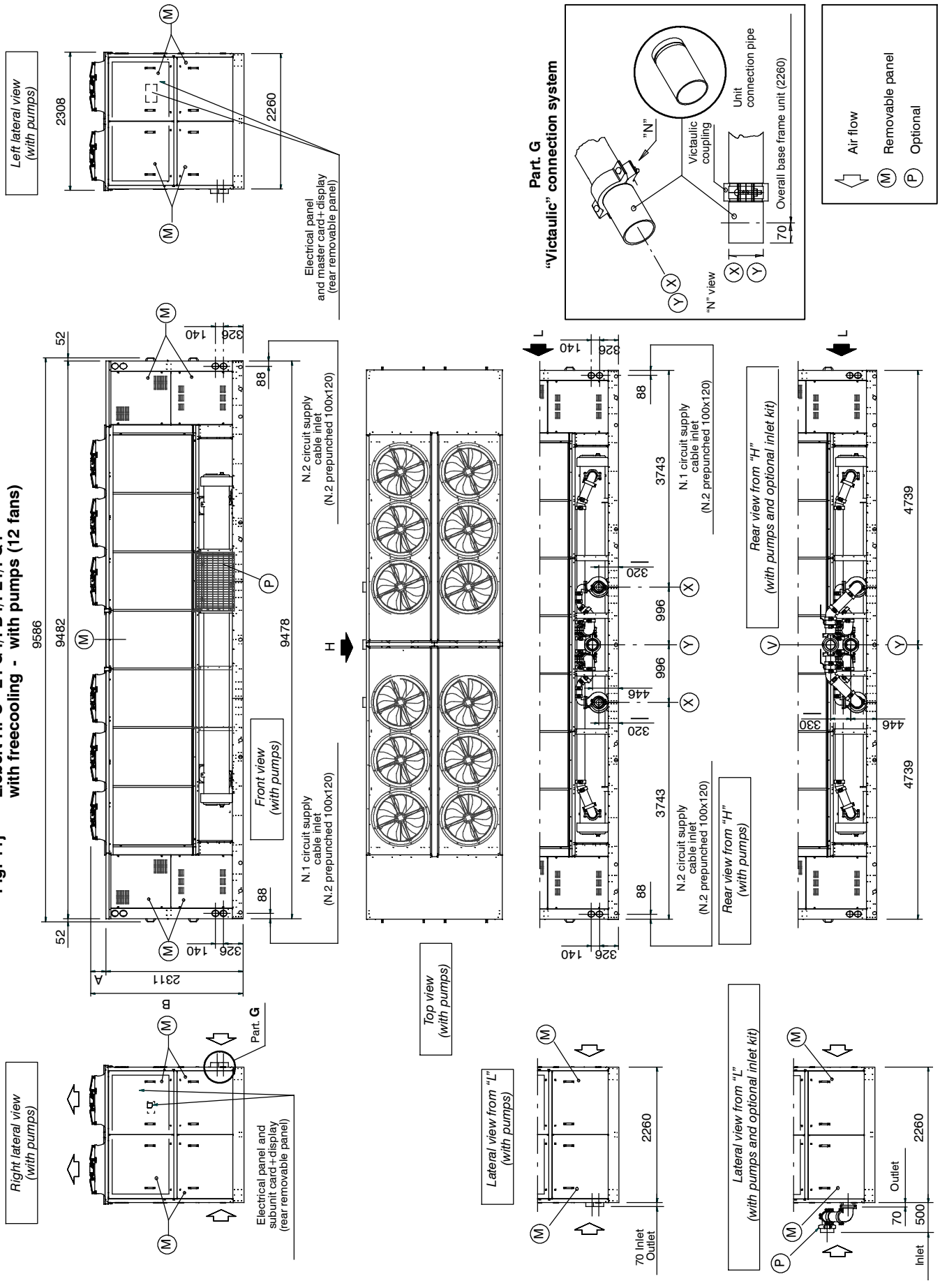


Fig. 11i - Liebert HPC- L FG4/FB4/FL4/FQ4 with freecooling - without pumps (12 fans)

Tab. 11i - HPC - L FG4/FB4/FL4/FQ4 with freecooling - without pumps (12 fans)

		EC fans		AC fans		Chilled water connections		Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"Y"** Outlet	**"W"** Inlet	**"Z"** Outlet
FG4 069- 075- 081- 087	12	270	2581	260	2571	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm	2 x G $2^{1}/_{2}$" B (ISO 228/1) Male	2 x G $2^{1}/_{2}$" B (ISO 228/1) Male
FB4 069- 075- 081- 087									
FG4 093						1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm		
FB4 093									
FL4 068- 074- 080		288	2599			1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm		
FQ4 068- 074- 080		232	2543						

Dimensional Data



Tab. 11j - HPC- L FG4/FB4/FL4/FQ4 with freecooling - with pumps (12 fans)

		EC fans		AC fans		Chilled water connections		
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet
FG4 069- 075- 081- 087	12	270	2581	260	2571	2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm
FB4 069- 075- 081- 087								
FG4 093						2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm
FB4 093								
FL4 068- 074- 080		288	2599			2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm
FQ4 068- 074- 080		232	2543					

Dimensional Data

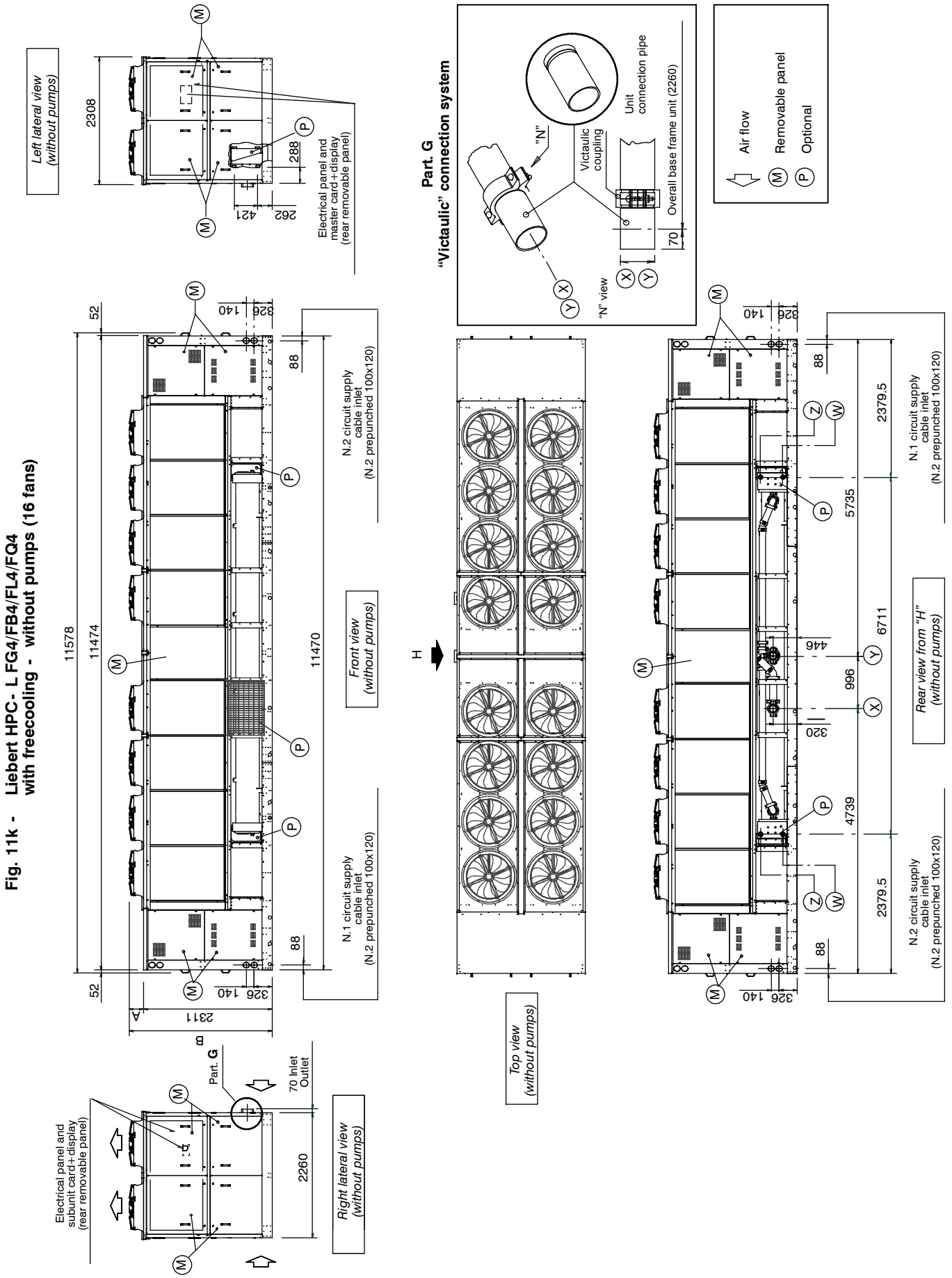


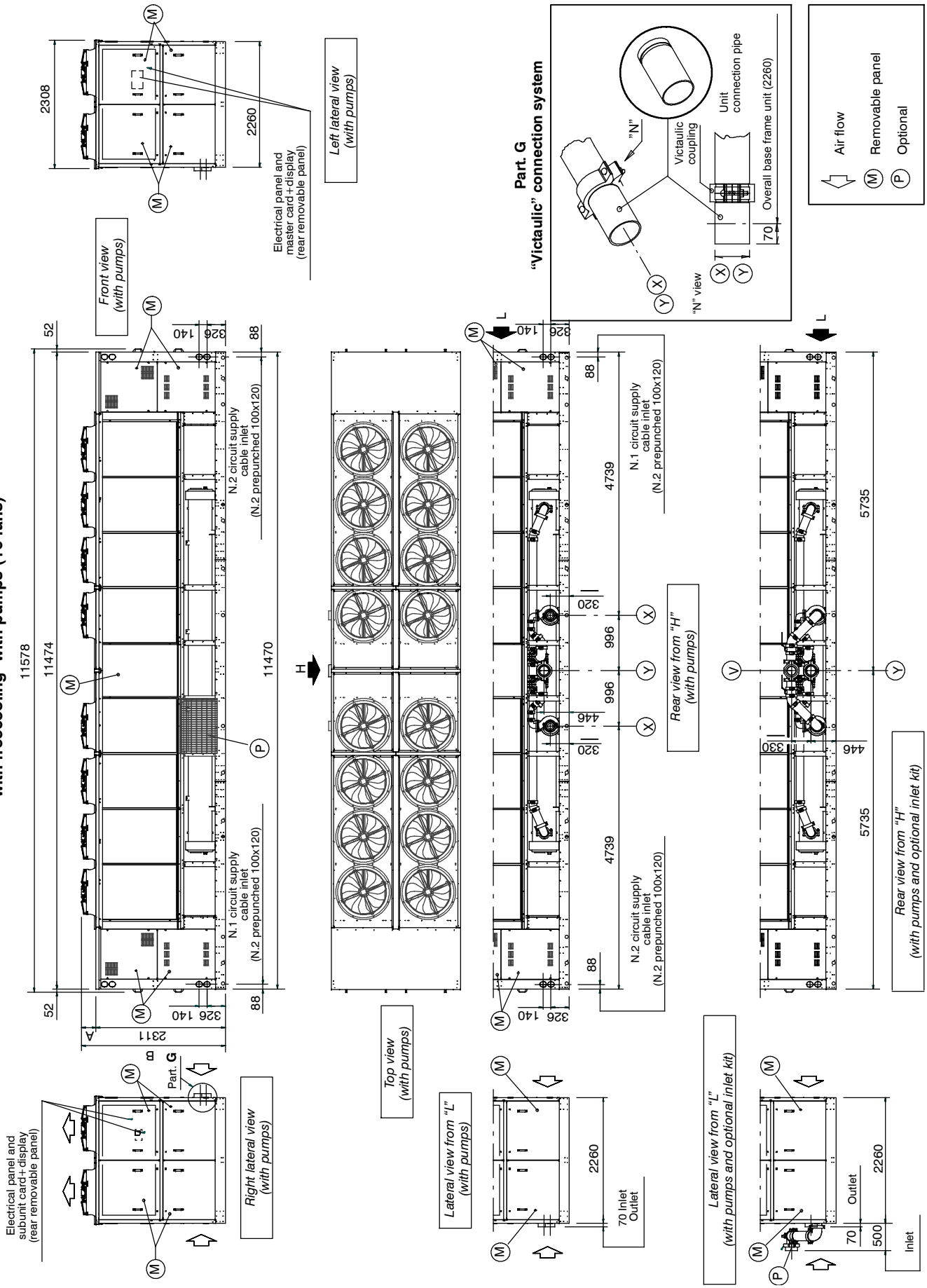
Fig. 11k - Liebert HPC- L FG4/FB4/FL4/FQ4 with freecooling - without pumps (16 fans)

Tab. 11k - HPC- L FG4/FB4/FL4/FQ4 with freecooling - without pumps (16 fans)

		EC fans		AC fans		Chilled water connections		Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"Y"** Outlet	**"W"** Inlet	**"Z"** Outlet
FG4 100- 107- 122	16	270	2581	260	2571	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm	2 x G $2^{1}/_{2}$" B (ISO 228/1) Male	2 x G $2^{1}/_{2}$" B (ISO 228/1) Male
FB4 100- 107- 122									
FL4 086		288	2599			1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm		
FQQ 086		232	2543						
FL4 092- 099- 106		288	2599			1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm		
FQ4 092- 099- 106		232	2543						

Dimensional Data

Fig. 111 - Liebert HPC- L FG4/FB4/FL4/FQ4 with freecooling with pumps (16 fans)



Tab. 11l - HPC - L FG4/FB4/FL4/FQ4 with freecooling - with pumps (16 fans)

		EC fans		AC fans		Chilled water connections		
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet
FG4 100- 107- 122	16	270	2581	260	2571	2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm
FB4 100- 107- 122								
FL4 086		288	2599			2 x DN125- 5"- 139.7mm	1 x DN150- 6"- 168.3mm	1 x DN150- 6"- 168.3mm
FQ4 086		232	2543					
FL4 092- 099- 106		288	2599			2 x DN150- 6"- 168.3mm	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm
FQ4 092- 099- 106		232	2543					

Dimensional Data

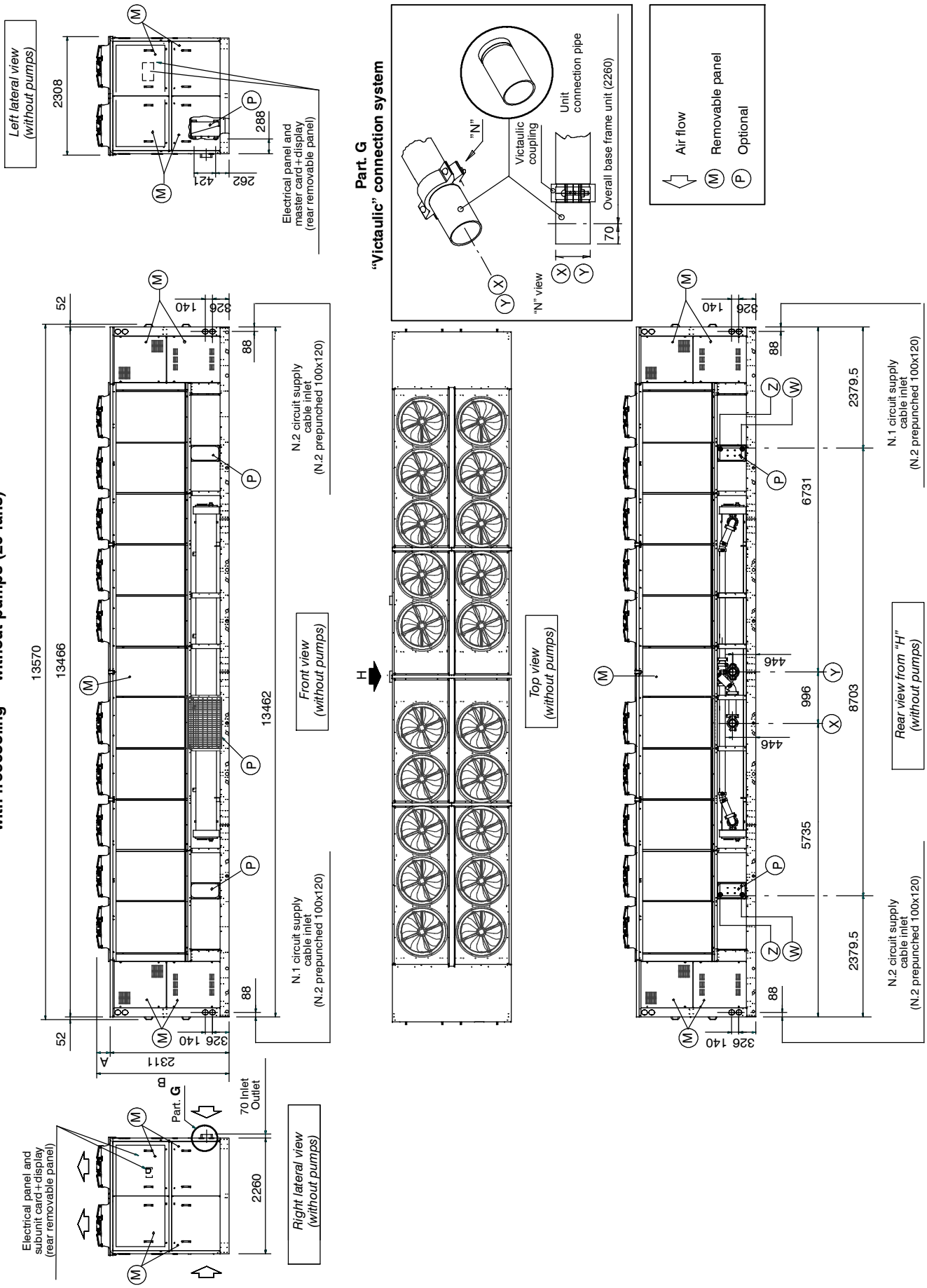
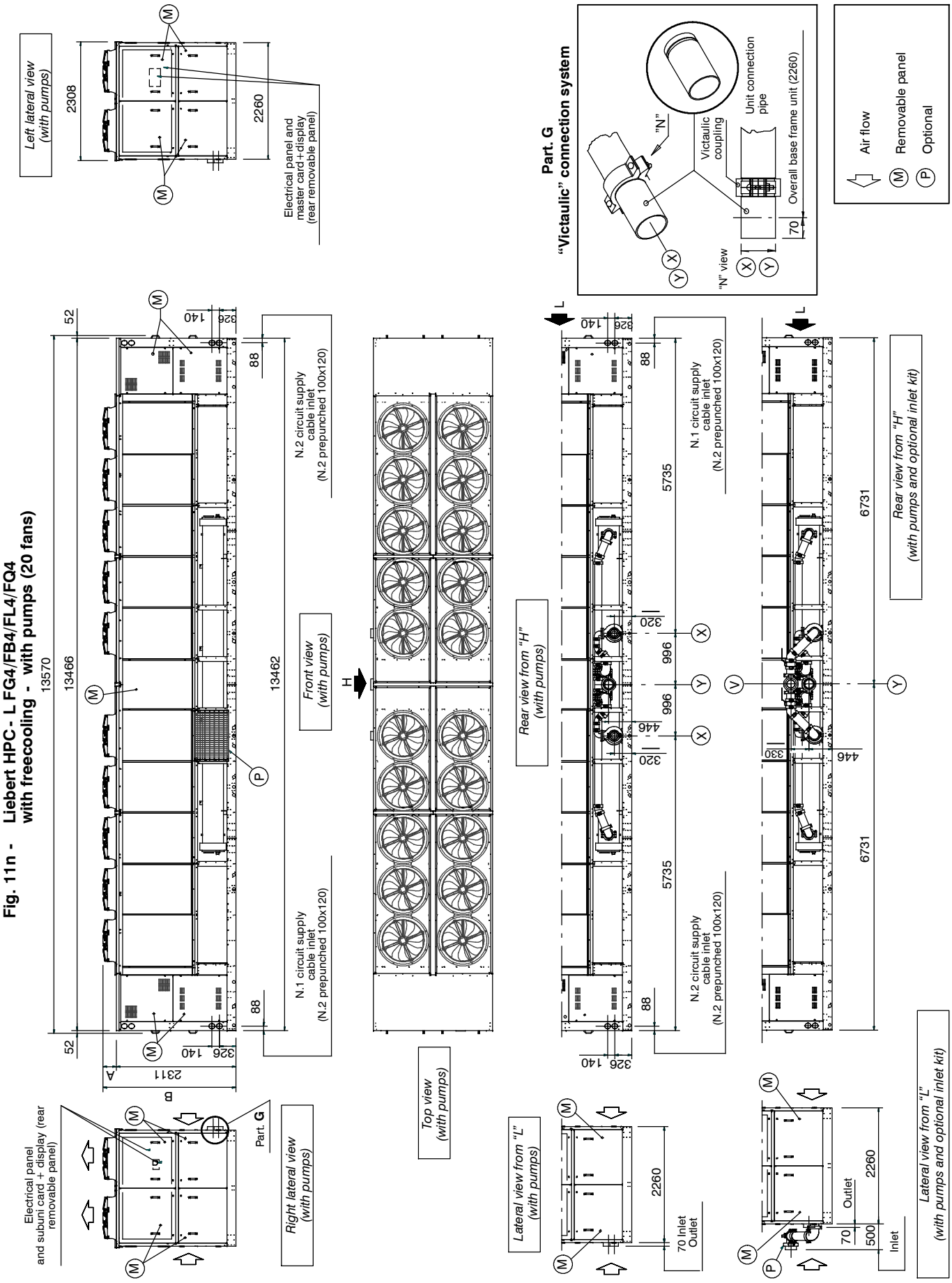


Fig. 11m - Liebert HPC- L FG4/FB4/FL4/FQ4 with freecooling - without pumps (20 fans)

Tab. 11m - HPC - L FG4/FB4/FL4/FQ4 with freecooling - without pumps (20 fans)

		EC fans		AC fans		Chilled water connections		Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"Y"** Outlet	**"W"** Inlet	**"Z"** Outlet
FB4 140	20	270	2581	260	2571	1 x DN200- 8"- 219.1mm	1 x DN200- 8"- 219.1mm	2 x G $2^{1}/_{2}$" B (ISO 228/1) Male	2 x G $2^{1}/_{2}$" B (ISO 228/1) Male
FL4 121 - 139		288	2599						
FQ4 121 - 139		232	2543						

Dimensional Data



Tab. 11n - HPC - L FG4/FB4/FL4/FQ4 with freecooling - with pumps (20 fans)

		EC fans		AC fans		Chilled water connections		
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**"X"** Inlet (Standard)	**"V"** Inlet (Optional)	**"Y"** Outlet
FB4 140	20	270	2581	260	2571	2 x DN150 - 6" - 168.3mm	1 x DN200 - 8" - 219.1mm	1 x DN200 - 8" - 219.1mm
FL4 121 - 139		288	2599					
FQ4 121 - 139		232	2543					

Dimensional Data

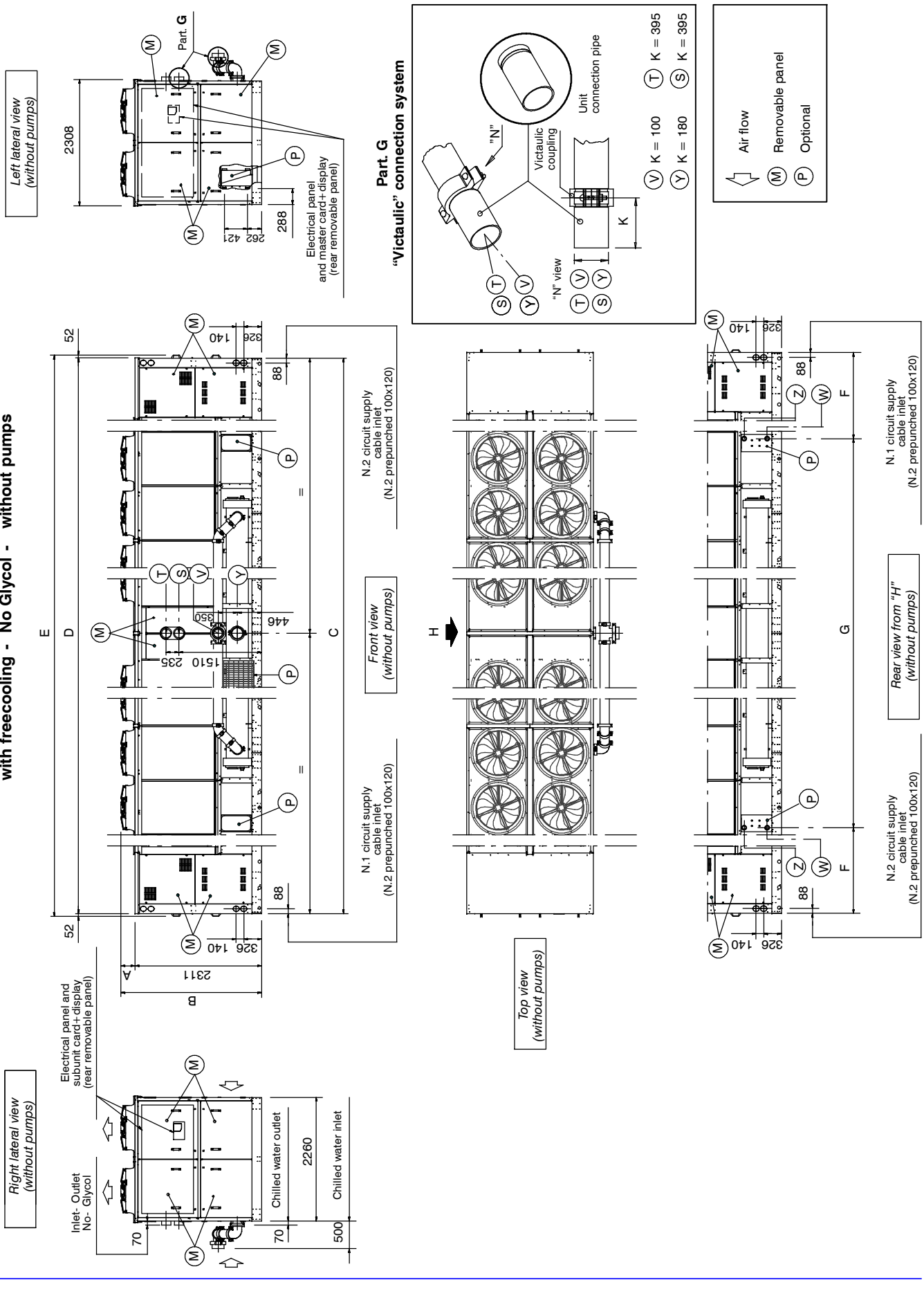


Fig. 11o - Liebert HPC- L FG4/FB4/FL4/FQ4 with freecooling - No Glycol - without pumps

Tab. 11o - HPC - L FG4/FB4/FL4/FQ4 with freecooling - No Glycol - without pumps

		EC fans		AC fans							Chilled water connections		No Glycol connections		Partial heat recovery water connections (opt. not available with pumps)	
Model	**N. Fans**	**"A"** (mm)	**"B"** (mm)	**"A"** (mm)	**"B"** (mm)	**C** (mm)	**D** (mm)	**E** (mm)	**F** (mm)	**G** (mm)	**"V"** Inlet	**"Y"** Outlet	**"T"** Inlet	**"S"** Outlet	**"W"** Inlet	**"Z"** Outlet
FG4 069- 075- 081- 087	12	270	2581	260	2571	9478	9482	9586	2379.5	4719	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm	2 x G $2^1/_2$" B (ISO 228/1) Male	2 x G $2^1/_2$" B (ISO 228/1) Male
FG4 093											1 x DN200- 8" - 219.1mm	1 x DN200- 8" - 219.1mm				
FG4 100- 107- 122	16					11470	11474	11578		6711						
FB4 069- 075- 081- 087	12					9478	9482	9586		4719	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm				
FB4 093											1 x DN200- 8" - 219.1mm	1 x DN200- 8" - 219.1mm				
FB4 100- 107- 122	16					11470	11474	11578		6711						
FB4 140	20					13462	13466	13570		8703						
FL4 068- 074- 080	12	288	2599			9478	9482	9586		4719	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm				
FQ4 068- 074- 080		232	2543													
FL4 086	16	288	2599			11470	11474	11578		6711						
FQ4 086		232	2543													
FL4 092- 099- 106		288	2599								1 x DN200- 8" - 219.1mm	1 x DN200- 8" - 219.1mm				
FQ4 092- 099- 106		232	2543													
FL4 121- 139	20	288	2599			13462	13466	13570		8703						
FQ4 121- 139		232	2543													

Dimensional Data

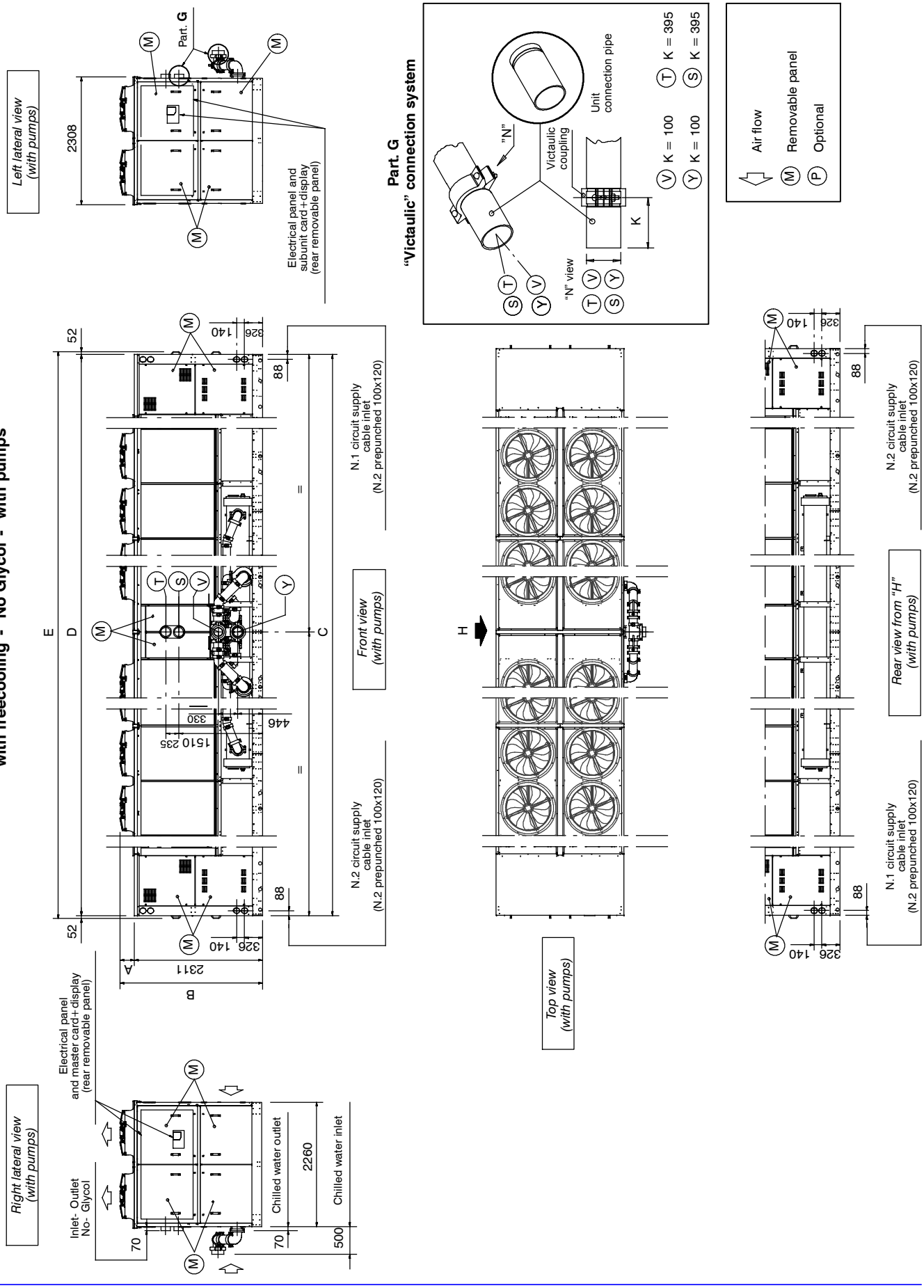
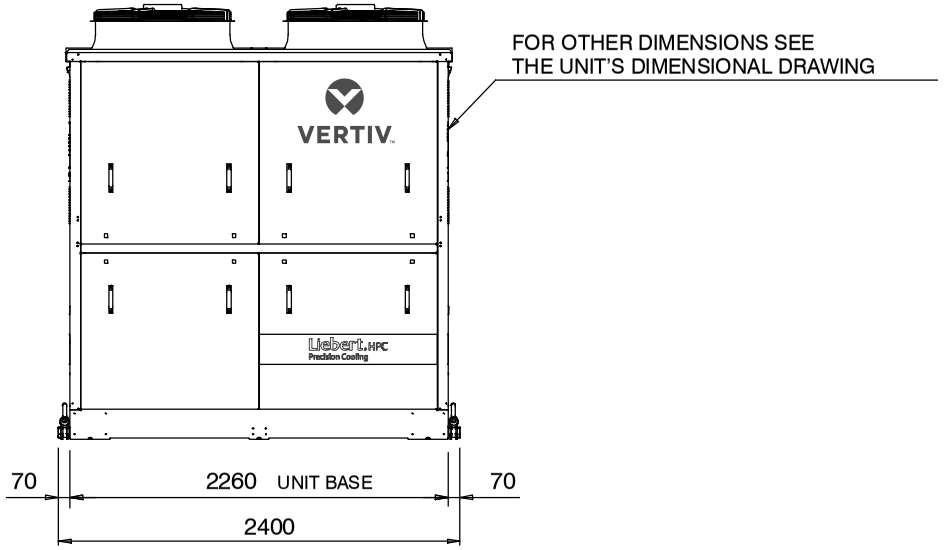


Fig. 11p - Liebert HPC- L FG4/FB4/FL4/FQ4 with freecooling - No Glycol - with pumps

Tab. 11p - HPC - L FG4/FB4/FL4/FQ4 with freecooling - No Glycol - with pumps

		EC fans		AC fans							Chilled water connections		No Glycol connections		Partial heat recovery water connections (opt. not available with pumps)	
Model	N. Fans	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	"V" Inlet	"Y" Outlet	"T" Inlet	"S" Outlet	"W" Inlet	"Z" Outlet
FG4 069- 075- 081- 087	12	270	2581	260	2571	9478	9482	9586	2379.5	4719	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm	2 x G $2^1/_2$" B (ISO 228/1) Male	2 x G $2^1/_2$" B (ISO 228/1) Male
FG4 093											1 x DN200- 8" - 219.1mm	1 x DN200- 8" - 219.1mm				
FG4 100- 107- 122	16					11470	11474	11578		6711						
FB4 069- 075- 081- 087	12					9478	9482	9586		4719	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm				
FB4 093											1 x DN200- 8" - 219.1mm	1 x DN200- 8" - 219.1mm				
FB4 100- 107- 122	16					11470	11474	11578		6711						
FB4 140	20					13462	13466	13570		8703						
FL4 068- 074- 080	12	288	2599			9478	9482	9586		4719	1 x DN150- 6" - 168.3mm	1 x DN150- 6" - 168.3mm				
FQ4 068- 074- 080		232	2543													
FL4 086	16	288	2599			11470	11474	11578		6711						
FQ4 086		232	2543													
FL4 092- 099- 106		288	2599								1 x DN200- 8" - 219.1mm	1 x DN200- 8" - 219.1mm				
FQ4 092- 099- 106		232	2543													
FL4 121- 139	20	288	2599			13462	13466	13570		8703						
FQ4 121- 139		232	2543													

Fig. 11q - Overall unit dimensions with lifting tubes option



Dimensional Data

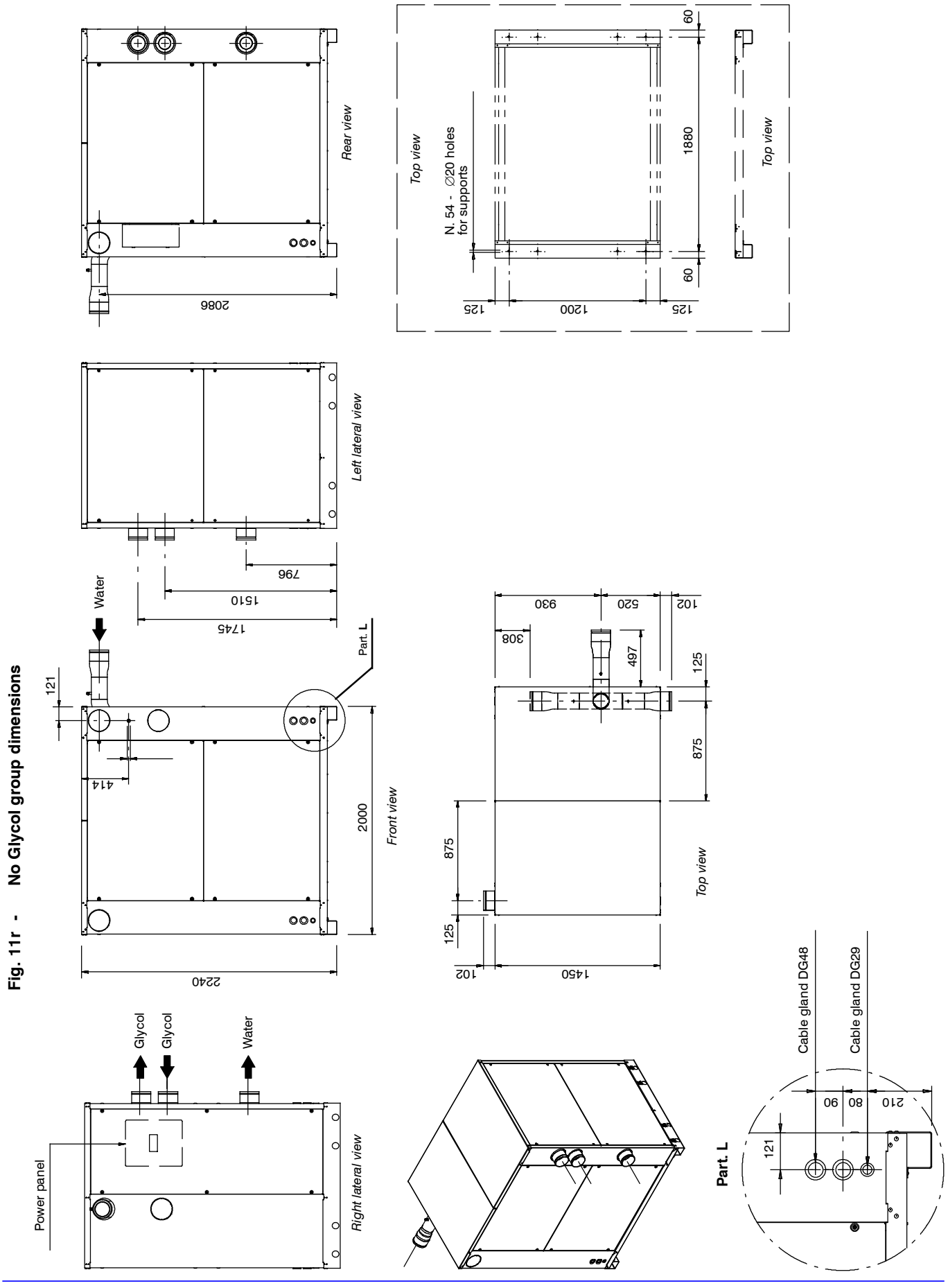
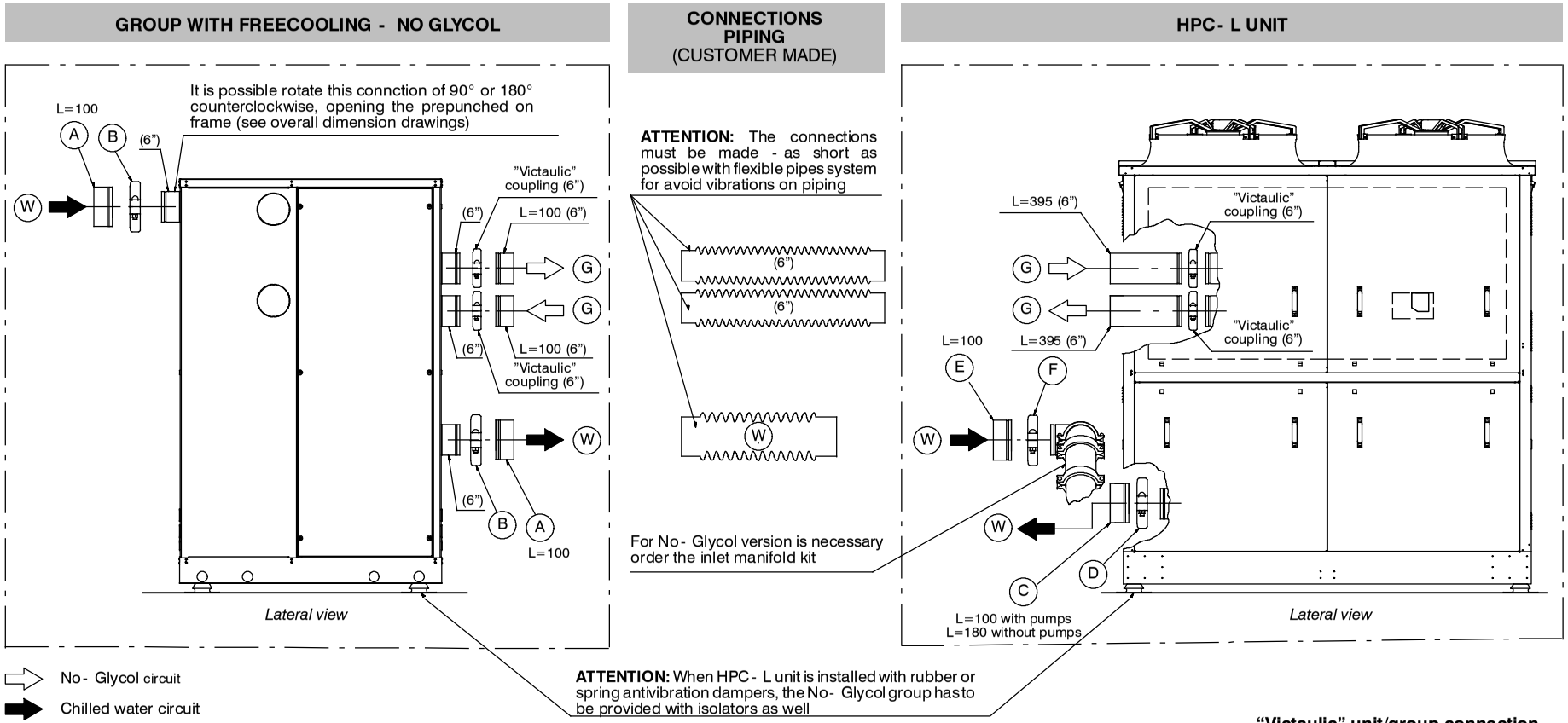


Fig. 11r - No Glycol group dimensions



Tab. 11r - HPC- L unit connections with freecooling / No Glycol group

HPC- L	N. Fan	(A)	(B)	(C)	(D) With pumps	(D) Without pumps	(E)	(F)	Chilled water connctions (W)	No Glycol connection (G)
FG4 / FB4 069- 075- 081- 087	12	6"	Victaulic coupling 6"	6"	Victaulic riduc. coupling 5"- 6"	Victaulic riduc. coupling 6"- 8"	6"	Victaulic riduc. coupling 5"- 6"	DN150- 6" - 168.3mm	DN150- 6" - 168.3mm
FG4 / FB4 093	12	8"	Victaulic riduc. coupling 6"- 8"	8"	Victaulic riduc. coupling 6"- 8"	Victaulic coupling 8"	8"	Victaulic riduc. coupling 6"- 8"	DN200- 8" - 219.1mm	
FG4 / FB4 100- 107- 122	16									
FB4 140	20									
FL4 / FQ4 068- 074- 080	12	6"	Victaulic coupling 6"	6"	Victaulic riduc. coupling 5"- 6"	Victaulic riduc. coupling 6"- 8"	6"	Victaulic riduc. coupling 5"- 6"	DN150- 6" - 168.3mm	
FL4 / FQ4 086	16									
FL4 / FQ4 092- 099- 106	16	8"	Victaulic riduc. coupling 6"- 8"	8"	Victaulic riduc. coupling 6"- 8"	Victaulic coupling 8"	8"	Victaulic riduc. coupling 6"- 8"	DN200- 8" - 219.1mm	
FL4 / FQ4 121- 139	20									

"Victaulic" unit/group connection system

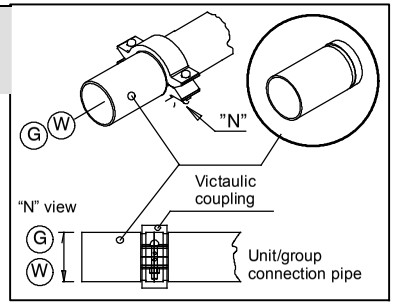
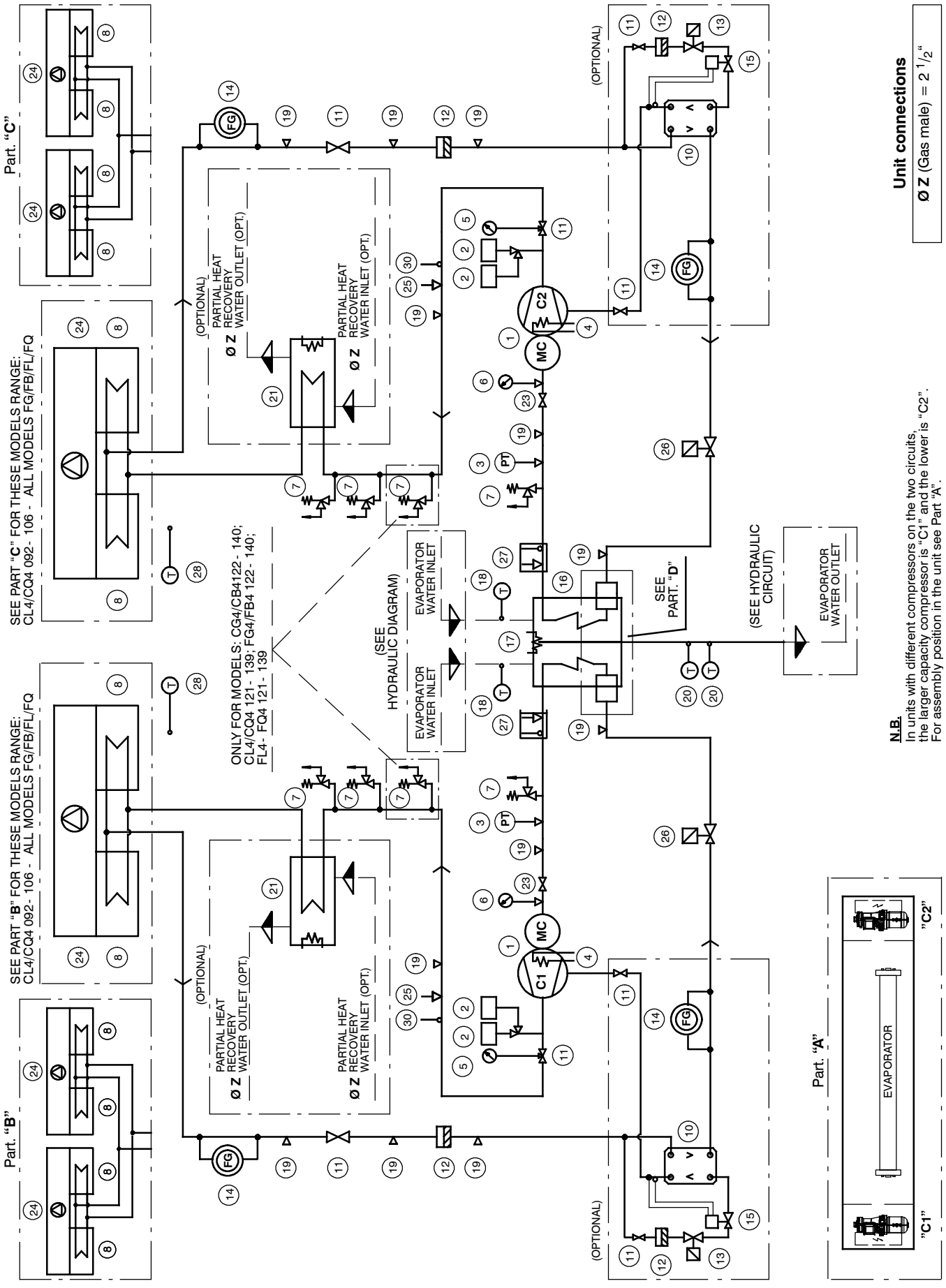


Fig. 11s - Instructions for HPC- L unit / No Glycol group piping

12 Refrigerant Circuit



Tab. 12a - Refrigerant components

Pos.	Description	Pos.	Description
1	Compressor	17	Antifreeze heater *(Optional)*
2	High pressure switch *(HP)*	18	Service thermostat sensor
3	Transducer pressure sensor LP control	19	Charge connection
4	Crankcase heater	20	Antifreeze / Capacity sensor control
5	High pressure manometer	21	Partial heat recovery with heater *(Optional)*
6	Low pressure manometer	22	-
7	Safety valve	23	Suction valve *(Optional - Not available on mod. CG/CB/FG/FB4 087- 140; CL/CQ/FL/FQ4 086- 139)*
8	Condenser		
9	-	24	Fans
10	Economizer	25	Transducer sensor
11	Shut- off valve	26	Electronic thermostatic expansion valve
12	Filter dryer	27	Kit pressure trasducer + Temperature sensor
13	Shut- off solenoid valve	28	External air temperature sensor
14	Sight glass		
15	Thermostatic expansion valve		
16	Evaporator		

13 Hydraulic Circuit

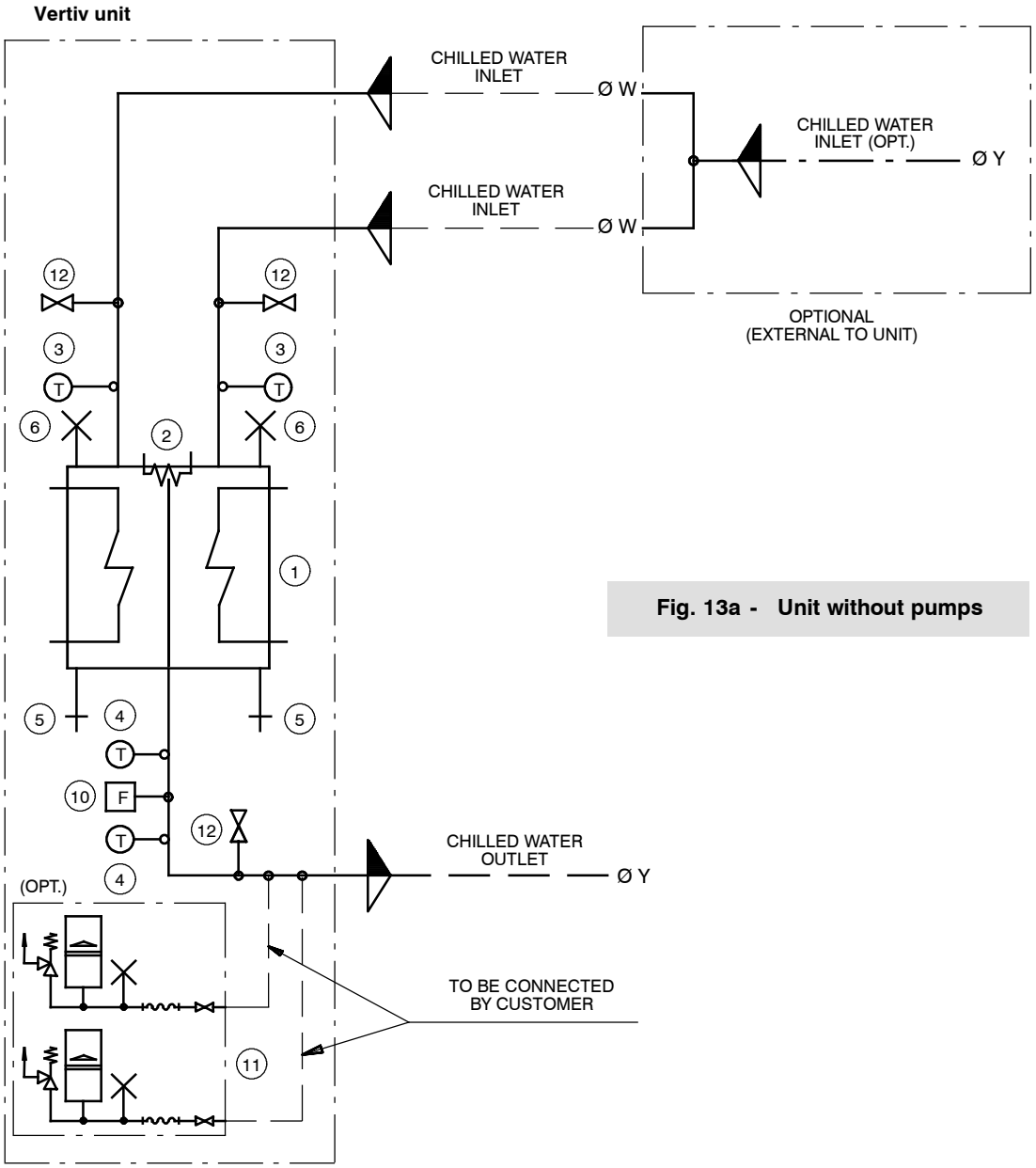


Fig. 13a - Unit without pumps

Tab. 13a - Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	8	-
2	Evaporator antifreeze heater *(Optional)*	9	-
3	Service thermostat sensor	10	Flow switch
4	Antifreeze / Capacity sensor control	11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Optional without pumps)*
5	Discharge valve		
6	Manual air valve	12	Service valve with cap
7	-	13	-

Tab. 13b - Unit connections

HPC- L	Ø W (Victaulic coupling)	Ø Y (Victaulic coupling)
CG4 / CB4 069- 075- 081- 087	(2x) DN125 - 5" - 139.7 mm	(1x) DN150 - 6" - 168.3 mm
CG4 / CB4 093- 100- 107- 122	(2x) DN150 - 6" - 168.3 mm	(1x) DN200 - 8" - 219.1 mm
CL4 / CQ4 068- 074- 080- 086	(2x) DN125 - 5" - 139.7 mm	(1x) DN150 - 6" - 168.3 mm
CL4 / CQ4 092- 099- 106- 121- 139	(2x) DN150 - 6" - 168.3 mm	(1x) DN200 - 8" - 219.1 mm

Hydraulic Circuit

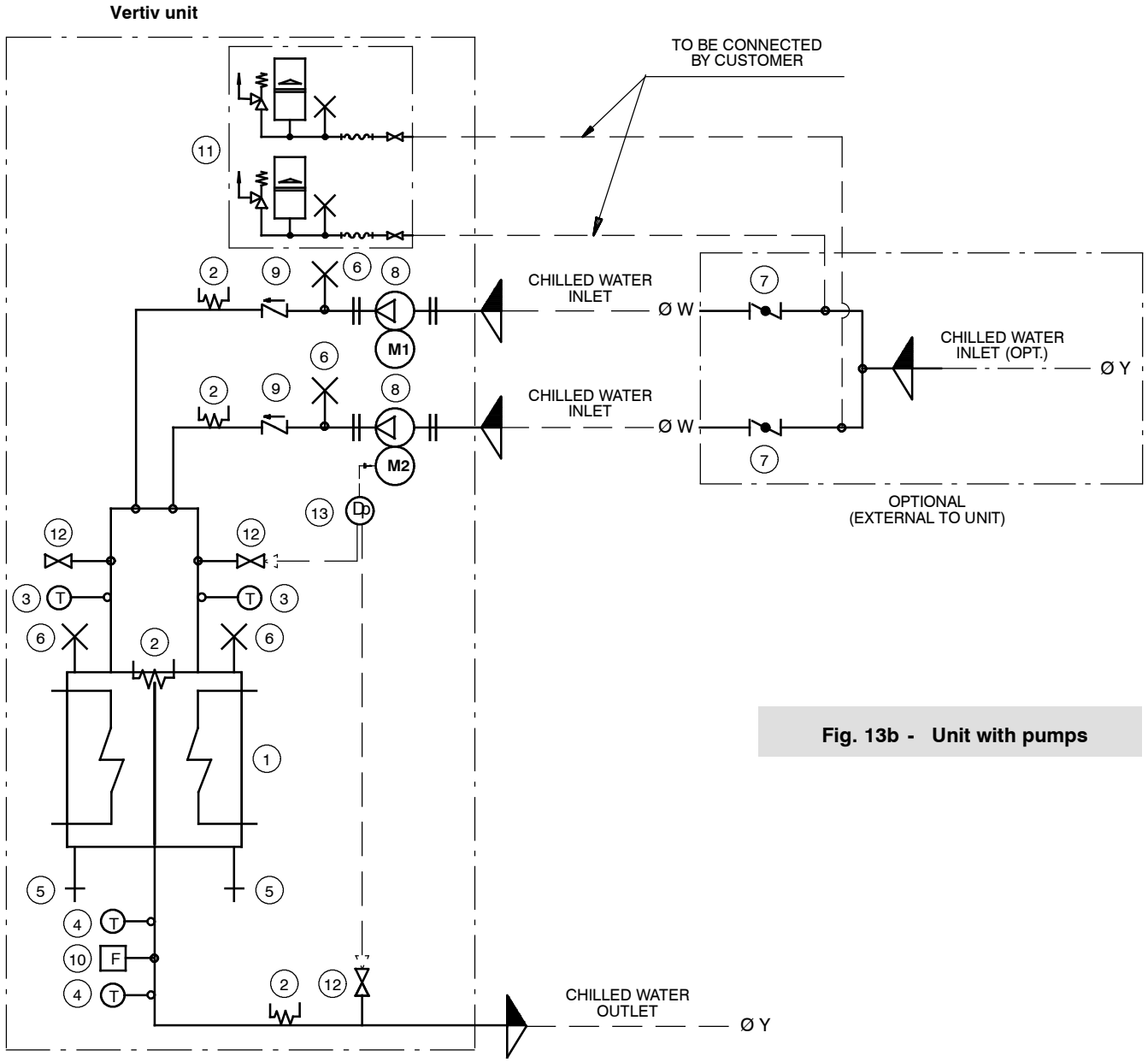


Fig. 13b - Unit with pumps

Tab. 13c - Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	8	Pump
2	Evaporator antifreeze heater + Piping *(Opt.)*	9	Non return valve
3	Service thermostat sensor	10	Flow switch
4	Antifreeze / Capacity sensor control	11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Optional without pumps)*
5	Discharge valve		
6	Manual air valve	12	Service valve with cap
7	Gate valve	13	Differential transducer *(Only with electronic pump)*

Tab. 13d - Unit connections

HPC- L	Ø W (Victaulic coupling)	Ø Y (Victaulic coupling)
CG4 / CB4 069- 075- 081- 087	(2x) DN125 - 5" - 139.7 mm	(1x) DN150 - 6" - 168.3 mm
CG4 / CB4 093- 100- 107- 122	(2x) DN150 - 6" - 168.3 mm	(1x) DN200 - 8" - 219.1 mm
CL4 / CQ4 068- 074- 080- 086	(2x) DN125 - 5" - 139.7 mm	(1x) DN150 - 6" - 168.3 mm
CL4 / CQ4 092- 099- 106- 121- 139	(2x) DN150 - 6" - 168.3 mm	(1x) DN200 - 8" - 219.1 mm

Hydraulic Circuit

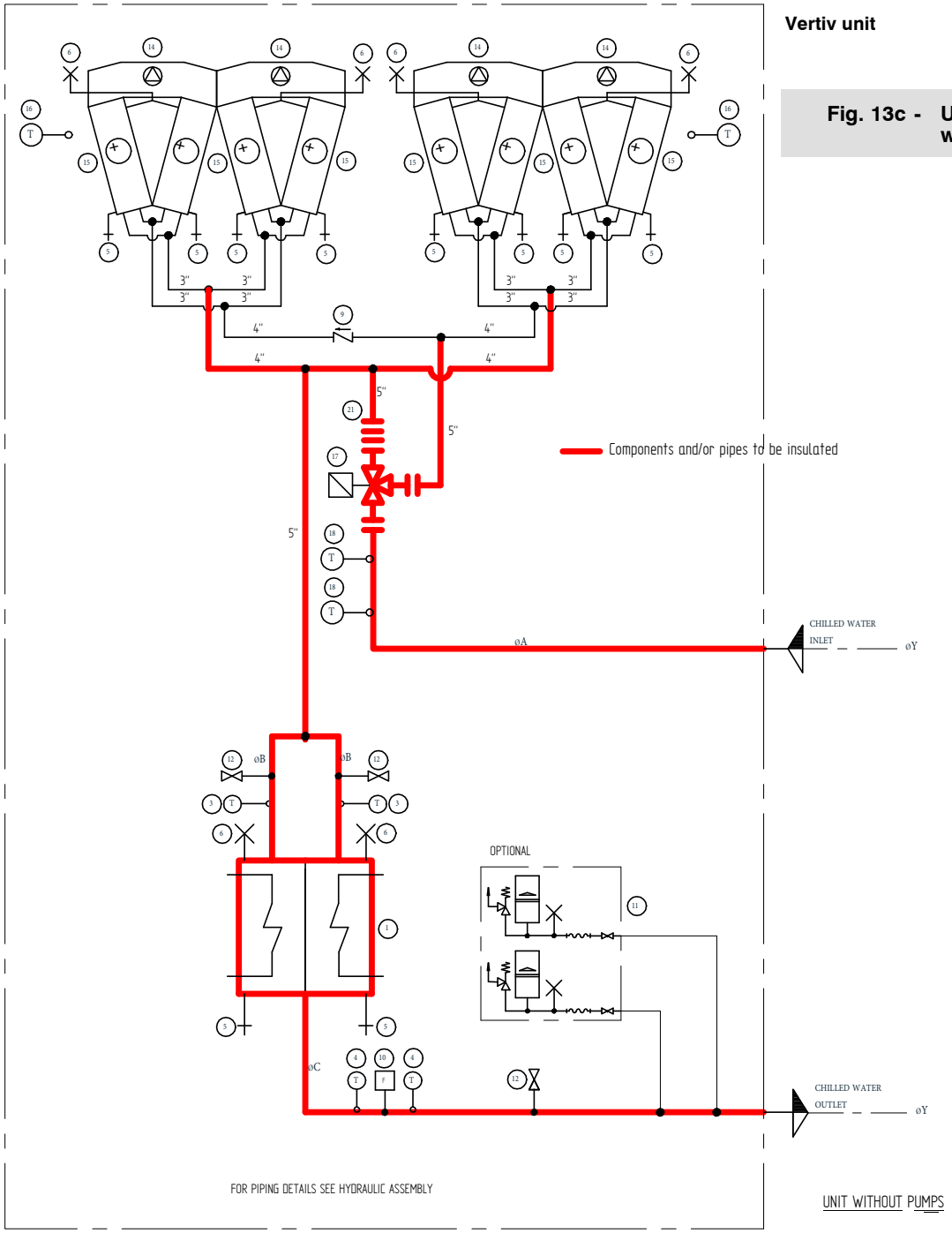


Fig. 13c - Unit with freecooling, without pumps

Tab. 13e - Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
2	-	13	Differential trasducer (only with electron.pump available on 068-069-074-075-080-081-086-087-092-093 MOD.)
3	Service thermostat sensor		
4	Antifreeze / Capacity sensor control	14	Fans
5	Discharge valve	15	Freecooling coil
6	Manual air valve	16	Air temperature sensor
7	Gate valve	17	3 way valve
8	Pump	18	Control freecooling thermostat sensor
9	Non return valve	19	Diff. press. switch (on 115-122-114-121-122-139-140 Mod.)
10	Flow switch	20	Flow switch
11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Optional without pumps)*	21	Balanced flange (only with STD pumps, no with electronic pumps)

Hydraulic Circuit

Tab. 13f - Unit connections (Iron tubes)

HPC- L	Ø Y (*) (Victaulic coupling)
FG4 / FB4 069	(1x) DN150 - 6” - 168.3 mm
FG4 / FB4 075	(1x) DN150 - 6” - 168.3 mm
FG4 / FB4 081	(1x) DN150 - 6” - 168.3 mm
FG4 / FB4 087	(1x) DN150 - 6” - 168.3 mm
FG4 / FB4 093	(1x) DN200 - 8” - 219.1 mm
FG4 / FB4 100	(1x) DN200 - 8” - 219.1 mm
FG4 / FB4 107	(1x) DN200 - 8” - 219.1 mm
FG4 / FB4 122	(1x) DN200 - 8” - 219.1 mm
FB4 140	(1x) DN200 - 8” - 219.1 mm
FL4 / FQ4 068	(1x) DN150 - 6” - 168.3 mm
FL4 / FQ4 074	(1x) DN150 - 6” - 168.3 mm
FL4 / FQ4 080	(1x) DN150 - 6” - 168.3 mm
FL4 / FQ4 086	(1x) DN150 - 6” - 168.3 mm
FL4 / FQ4 092	(1x) DN200 - 8” - 219.1 mm
FL4 / FQ4 099	(1x) DN200 - 8” - 219.1 mm
FL4 / FQ4 106	(1x) DN200 - 8” - 219.1 mm
FL4 / FQ4 121	(1x) DN200 - 8” - 219.1 mm
FL4 / FQ4 139	(1x) DN200 - 8” - 219.1 mm

Hydraulic Circuit

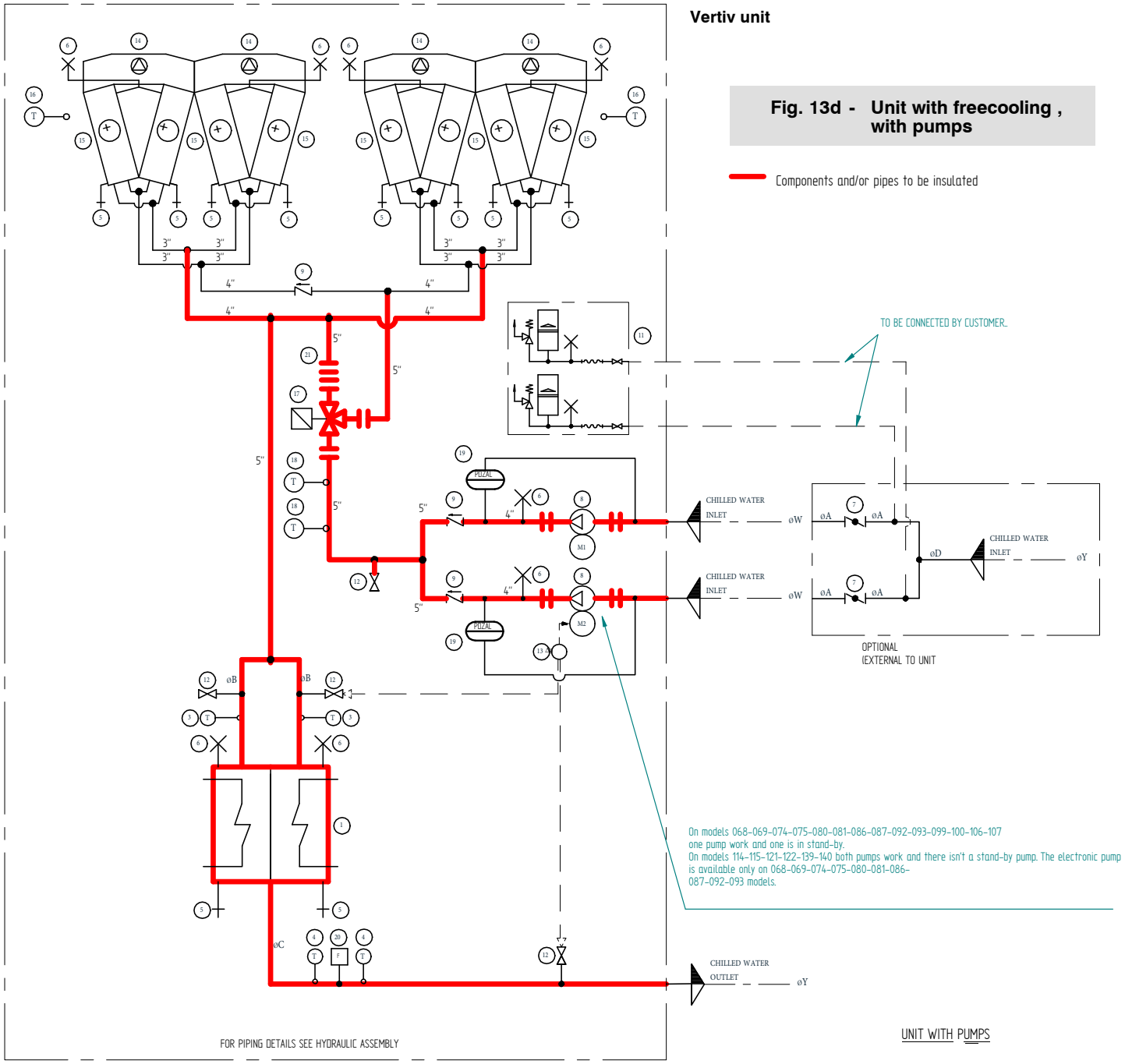


Fig. 13d - Unit with freecooling , with pumps

Tab. 13g - Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
2	-	13	Differential transducer *(only with elect. pump available in Mod. 068- 069- 074- 075- 080- 081- 086- 087- 092- 093)*
3	Service thermostat sensor		
4	Antifreeze / Capacity sensor control	14	Fans
5	Discharge valve	15	Freecooling coil
6	Manual air valve	16	Air temperature sensor
7	Gate valve	17	3 way valve
8	Pump	18	Control freecooling thermostat sensor
9	Non return valve	19	Diff. pressure switch *(in Mod. 115- 122; 114- 121- 122- 139- 140)*
10	Flow switch		
11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Optional without pumps)*	20	Flow switch
		21	Balanced flange *(only with std. pumps, no with electronic pumps)*

Hydraulic Circuit

Tab. 13h - Unit connections (Iron tubes)

HPC- L	Ø Y (*) (Victaulic coupling)	Ø W (*) (Victaulic coupling)
FG4 / FB4 069	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FG4 / FB4 075	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FG4 / FB4 081	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FG4 / FB4 087	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FG4 / FB4 093	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FG4 / FB4 100	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FG4 / FB4 107	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FG4 / FB4 122	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FB4 140	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FL4 / FQ4 068	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FL4 / FQ4 074	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FL4 / FQ4 080	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FL4 / FQ4 086	(1x) DN150 - 6” - 168.3 mm	(2x) DN125 - 5” - 139.7 mm
FL4 / FQ4 092	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FL4 / FQ4 099	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FL4 / FQ4 106	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FL4 / FQ4 121	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm
FL4 / FQ4 139	(1x) DN200 - 8” - 219.1 mm	(2x) DN150 - 6” - 168.3 mm

Hydraulic Circuit

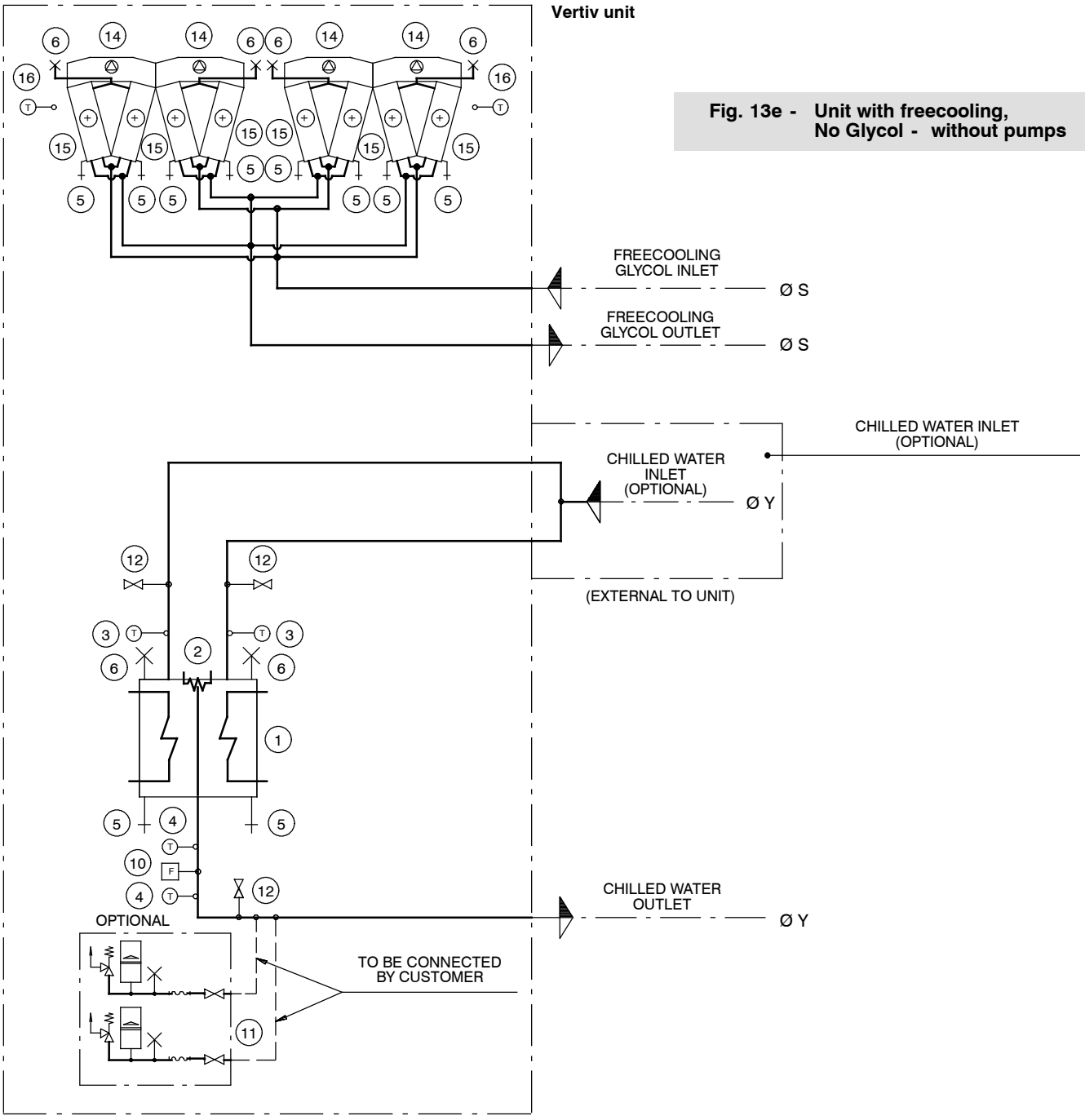


Fig. 13e - Unit with freecooling, No Glycol - without pumps

Tab. 13i - Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
2	Evaporator + Piping antifreeze heater *(Optional)*	13	-
3	Service thermostat sensor	14	Fans
4	Antifreeze / Capacity sensor control	15	Freecooling coil
5	Discharge valve	16	Air temperature sensor
6	Manual air valve		
7	-		
8	-		
9	-		
10	Flow switch		
11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Optional without pumps)*		

Hydraulic Circuit

Tab. 13j - Unit connections (Iron tubes)

HPC- L	Ø S (*) (Victaulic coupling)	Ø Y (*) (Victaulic coupling)
FG4 / FB4 069	DN150 - 6” - 168.3 mm	DN150 - 6” - 168.3 mm
FG4 / FB4 075		DN150 - 6” - 168.3 mm
FG4 / FB4 081		DN150 - 6” - 168.3 mm
FG4 / FB4 087		DN150 - 6” - 168.3 mm
FG4 / FB4 093		DN200 - 8” - 219.1 mm
FG4 / FB4 100		DN200 - 8” - 219.1 mm
FG4 / FB4 107		DN200 - 8” - 219.1 mm
FG4 / FB4 122		DN200 - 8” - 219.1 mm
FB4 140		DN200 - 8” - 219.1 mm
FL4 / FQ4 068		DN150 - 6” - 168.3 mm
FL4 / FQ4 074		DN150 - 6” - 168.3 mm
FL4 / FQ4 080		DN150 - 6” - 168.3 mm
FL4 / FQ4 086		DN150 - 6” - 168.3 mm
FL4 / FQ4 092		DN200 - 8” - 219.1 mm
FL4 / FQ4 099		DN200 - 8” - 219.1 mm
FL4 / FQ4 106		DN200 - 8” - 219.1 mm
FL4 / FQ4 121		DN200 - 8” - 219.1 mm
FL4 / FQ4 139		DN200 - 8” - 219.1 mm

Hydraulic Circuit

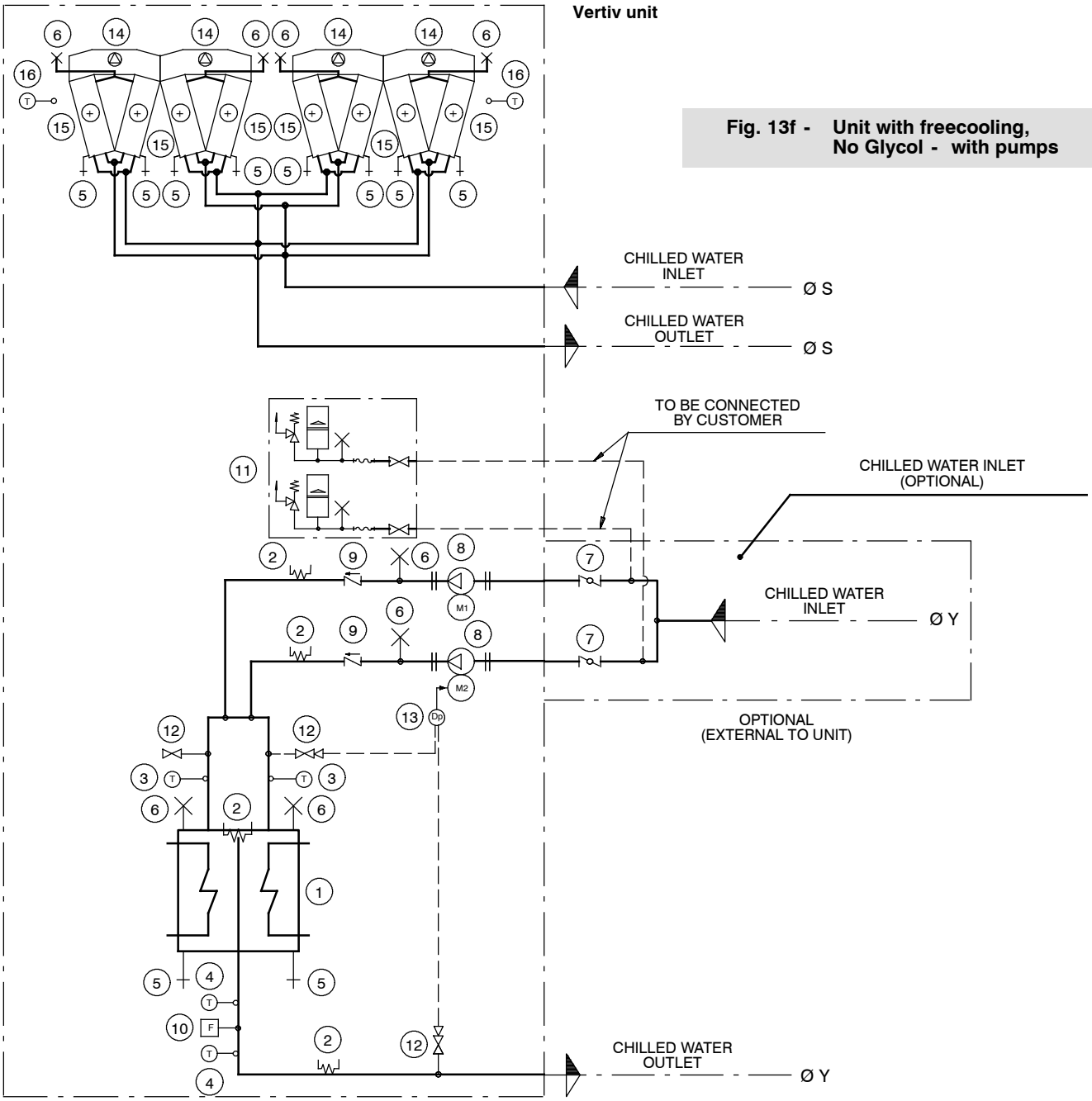


Fig. 13f - Unit with freecooling, No Glycol - with pumps

Tab. 13k - Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
2	Evaporator + Piping antifreeze heater *(Optional)*	13	Differential transducer *(only with electronic pump)*
3	Service thermostat sensor	14	Fans
4	Antifreeze / Capacity sensor control	15	Freecooling coil
5	Discharge valve	16	Air temperature sensor
6	Manual air valve		
7	Gate valve		
8	Pump		
9	Non return valve		
10	Flow switch		
11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Optional without pumps)*		

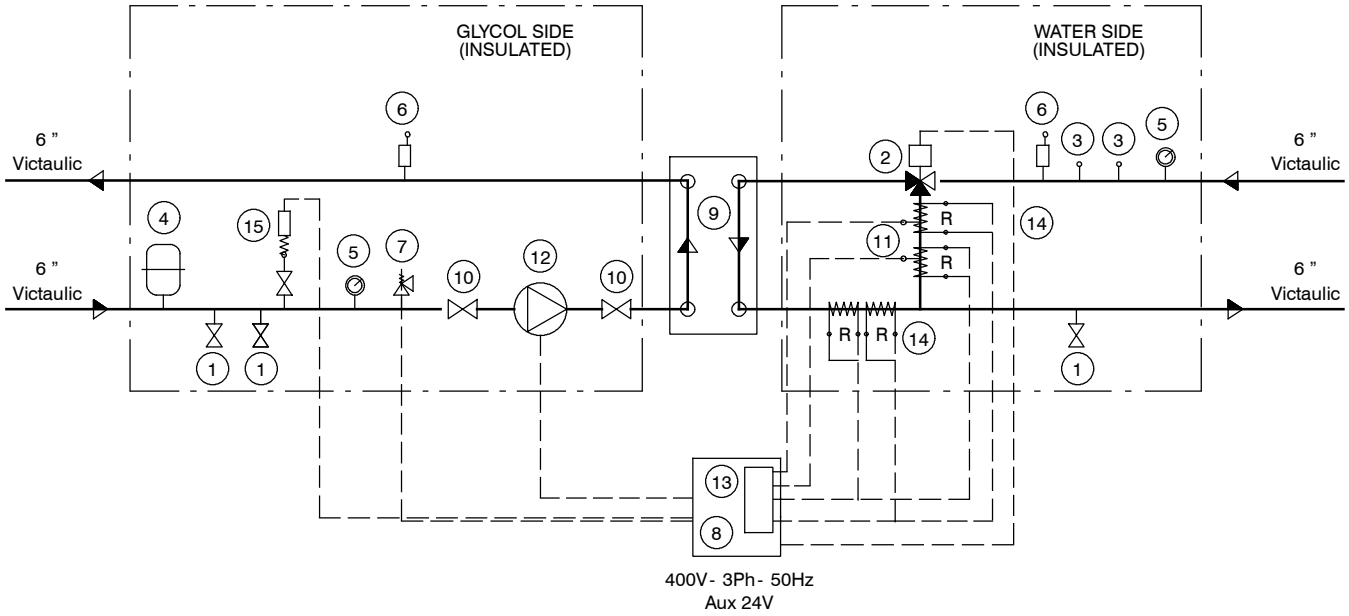
Hydraulic Circuit

Tab. 13I - Unit connections (Iron tubes)

HPC- L	Ø S (*) (Victaulic coupling)	Ø Y (*) (Victaulic coupling)
FG4 / FB4 069	DN150 - 6” - 168.3 mm	DN150 - 6” - 168.3 mm
FG4 / FB4 075		DN150 - 6” - 168.3 mm
FG4 / FB4 081		DN150 - 6” - 168.3 mm
FG4 / FB4 087		DN150 - 6” - 168.3 mm
FG4 / FB4 093		DN200 - 8” - 219.1 mm
FG4 / FB4 100		DN200 - 8” - 219.1 mm
FG4 / FB4 107		DN200 - 8” - 219.1 mm
FG4 / FB4 122		DN200 - 8” - 219.1 mm
FB4 140		DN200 - 8” - 219.1 mm
FL4 / FQ4 068		DN150 - 6” - 168.3 mm
FL4 / FQ4 074		DN150 - 6” - 168.3 mm
FL4 / FQ4 080		DN150 - 6” - 168.3 mm
FL4 / FQ4 086		DN150 - 6” - 168.3 mm
FL4 / FQ4 092		DN200 - 8” - 219.1 mm
FL4 / FQ4 099		DN200 - 8” - 219.1 mm
FL4 / FQ4 106		DN200 - 8” - 219.1 mm
FL4 / FQ4 121		DN200 - 8” - 219.1 mm
FL4 / FQ4 139		DN200 - 8” - 219.1 mm

Hydraulic Circuit

Fig. 13g - No Glycol unit



Tab. 13m - Hydraulic components

Pos.	Description	Pos.	Description
1	In- Out valve	10	Valve
2	3 way valve	11	Electric heater sensor
3	Probe trap	12	Pump
4	Expansion tank *(25 liters)*	13	Thermostat *(Carel)*
5	Thermometer	14	Electric heater
6	Air discharge valve	15	Pressure transducer
7	Safety valve *(5 bar)*		
8	Switch box		
9	Heat exchanger *(K460)*		

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2006/42/EC; 2014/30/EU; 2014/35/EU; 2014/68/EU

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