Precision Cooling for
Business-Critical Continuity

Liebert HPC-L

Air Cooled Chillers with Double Screw Compressors

PRODUCT DOCUMENTATION

Liebert HPC-L - PD - 273510 - 14.02.2008

Liebert

EMERSON
Network Power

Liebert HPC–L

The water chiller market has met in the latest years stricter and stricter challenges due to the industrial society evolution and to technological developments, even if it is experiencing a full maturity phase.
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 water chillers by **Emerson Network Power**, covering a power range from 700 to 1600 kW.

Over 60 models, 4 sound emission versions, one chiller and one freecooling configurations, two types of environment–friendly refrigerants, a wide range of options and accessories – such as economizer and electronic expansion valve, just to name two – **Liebert HPC–L** can be a leader in the chiller world, both in its natural position for brand belonging – the technological market – and in other sectors such as high power commercial and industrial sectors.
Besides its high flexibility **Liebert HPC–L** – loyal to the tradition by **Emerson Network Power** – is featured by **efficiencies** among the highest on the market, which are more and more needed to face the challenges of energy saving and environment protection of today, as well as by the lowest **sound emissions** in its category, above all in the **Quiet** version.
Structure **sturdiness** and high **reliability** complete the features of the whole range.

Liebert HPC–L

Solutions Committed to your Business

Contents

The Quality Management System of Emerson Network Power S.r.l. High Performance Air Conditioning has been approved by Lloyd's Register Quality Assurance to the quality management system standard ISO 9001:2000

The product conforms to European Union directives 98/37/CE (89/392/CEE; 91/368/CEE; 93/68/CEE), 89/336/CEE; 73/23/CEE; 97/23/CE.

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 **Emerson Network Power 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.

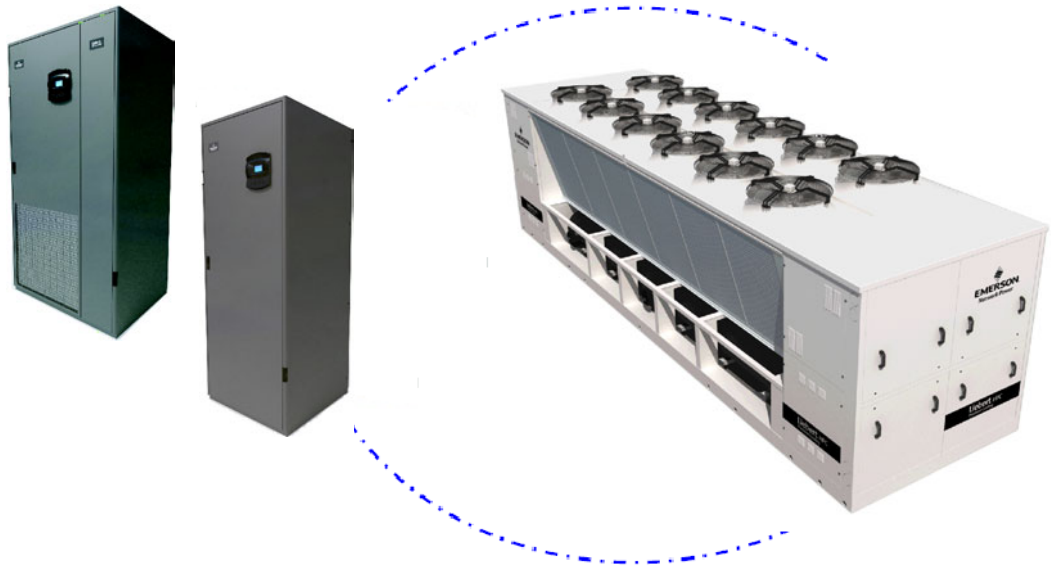
The information on the cooling needs of the air conditioners is available to the **Liebert HPC–L** units, that will manage their resources (compressors and free cooling) in the most efficient way in order to save additional energy.
This solution does not require any modification, mechanical or electrical 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 **Emerson Network Power** (Microface and Hiromatic Evolution), it is possible to maximise the energy savings and improve the total operation management.
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!

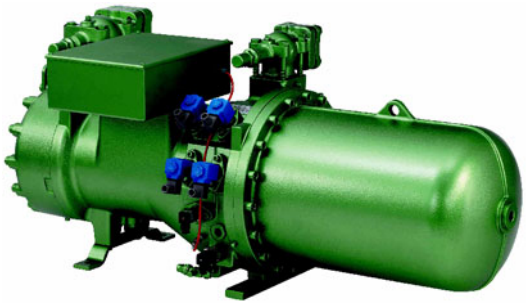
To add @connectivity function to your system, it is simply necessary:
To build up an Hironet connection between the room units and the **Liebert HPC–L** units. The network can be only 1 (if the distance and the number of units allow this) or it can be split in several networks. Each Hironet needs to be connected to one Hirolink.
Hirolink can be connected directly to the computer where @connectivity is installed. As alternative it can be connected, with a special interface, via your company network (Local Area Network).
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

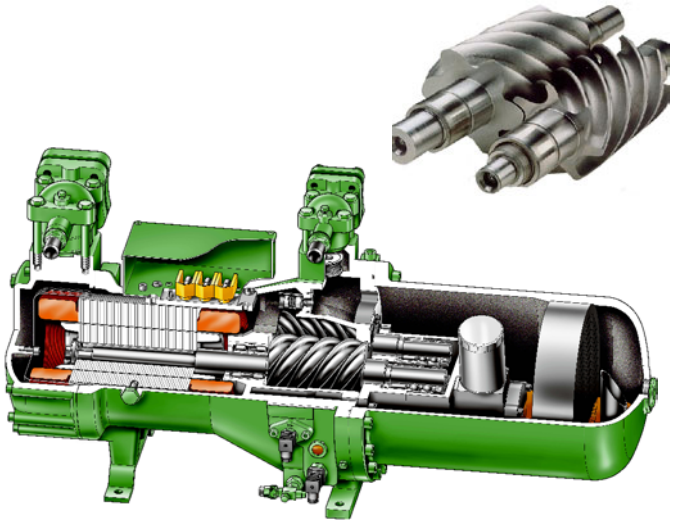
Reliability



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 axchangers and the wide operating range of the screw compressors permit the use of **Liebert HPC–L** units in high temperature environments as well, up to 46°C at 100% full load.
In the version with R407C, only, the device HTD (High Temperature Device), keeping the oil temperature within a safe range, allows each compressor to operate up to its limits without affecting either its reliability or its internal components (bearings).
In all versions, both with R407C and R134a, 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

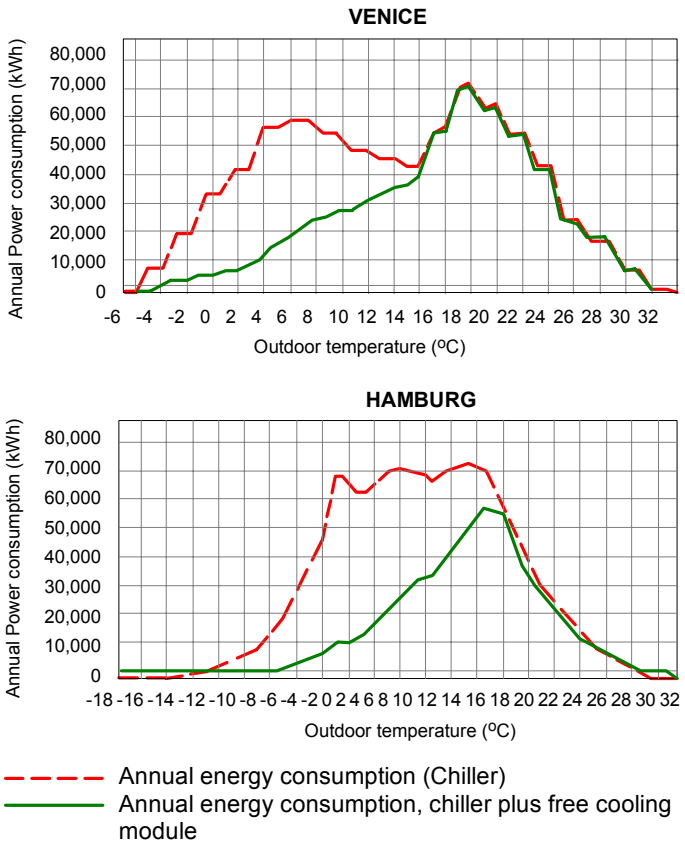
The use of semi–hermetic screw compressors of the latest generation; shell and tube evaporators selected for R134a and R407C application; aerodynamic profiled blade fans with high efficiency nozzles and continuous speed regulation; large surface W–shaped condenser coils ensure the achievement of unequalled 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.

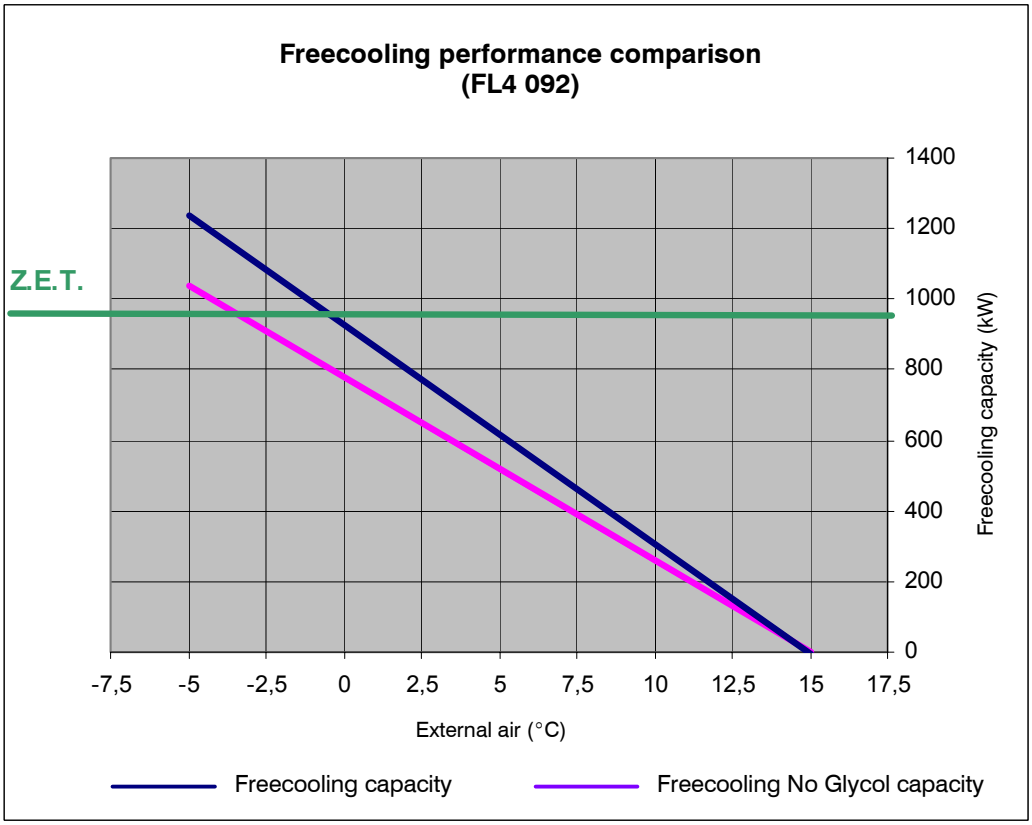
Reduced space requirements in comparison with a conventional chiller plus a dry–cooler, are obtained through the freecooling execution's compact design and the reduction of the compressors working hours offers exceptional saving both in the long and short term.



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't be used and circulated inside the building, **Emerson Network Power** 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 FL4092; 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).

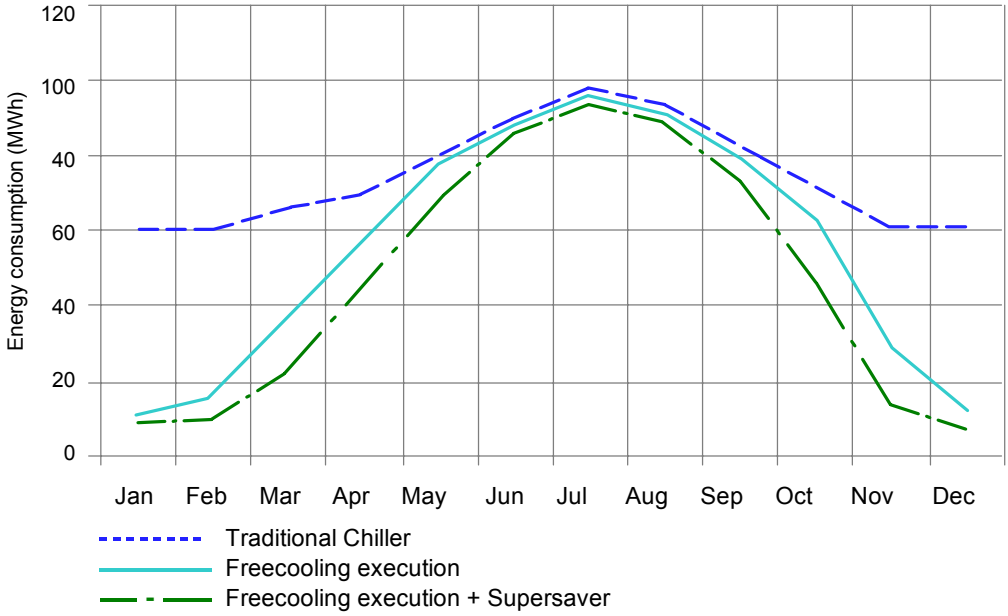


Features and Benefits

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%.

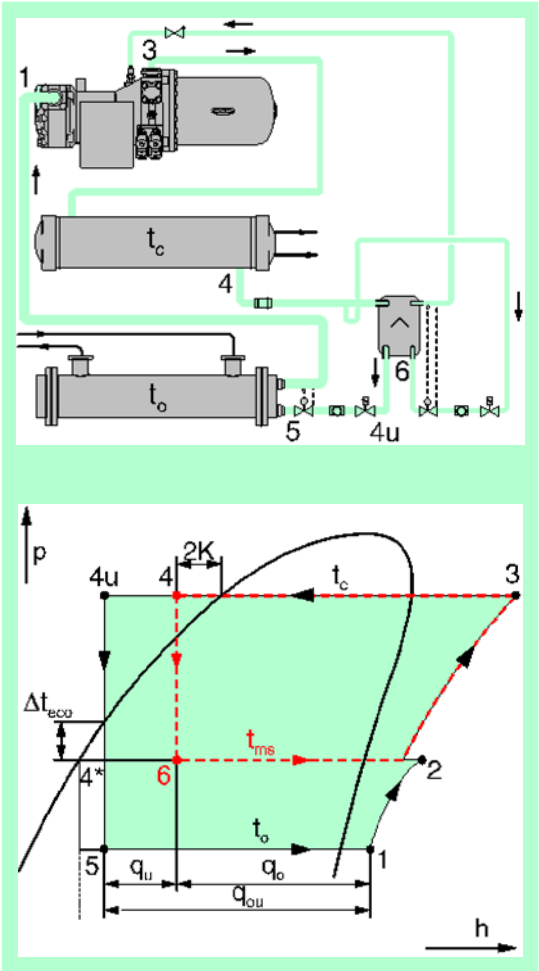
Annual power consumption. Comparison among the systems:



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 throu-

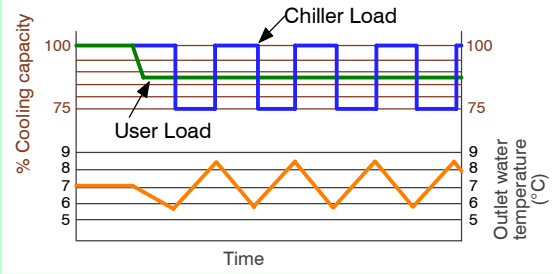


gh the ECO opening.
A further feature of the economizer circuit in the **Liebert HPC–L** units is the slide valve for choking the compressor, equipped with an integrated economizer channel; this ensure the above described benefits, due to the additional sub–cooling, independently of the machine load conditions and thus of the position of the slide valve for the compressor choking.

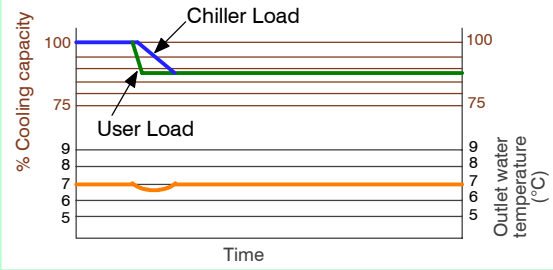
Efficient control and adjustment

The different strategies of the microprocessor control by **Emerson Network Power** for the compressors – capacity adjustment valves with continuous modulation 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 stepless control, such as the one offered by **Emerson Network Power**. 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 °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**	**Model**	**Size**	**EER**	**IPLV**	**ESEER**
CA7	081	2.67	4.20	3.70	**CA4**	069	3.31	4.33	3.99
	087	2.59	4.10	3.60		075	3.22	4.45	4.06
	093	2.57	3.97	3.51		081	3.16	4.58	4.15
	100	2.49	4.01	3.53		087	3.08	4.39	3.96
	107	2.62	4.20	3.71		093	3.04	4.09	3.75
	115	2.54	4.06	3.57		100	3.00	4.26	3.85
	122	2.67	4.03	3.59		107	3.15	4.46	4.04
	131	2.85	4.18	3.75		–	–	–	–
	140	2.78	4.24	3.78		–	–	–	–
CB7	081	2.59	4.27	3.72	**CB4**	069	3.28	4.49	4.09
	087	2.49	4.12	3.59		075	3.18	4.59	4.15
	093	2.48	4.01	3.51		081	3.09	4.73	4.23
	100	2.38	4.07	3.54		087	3.00	4.46	4.02
	107	2.52	4.24	3.73		093	2.97	4.19	3.80
	115	2.44	4.09	3.57		100	3.93	4.35	3.92
	122	2.58	4.07	3.60		107	3.10	4.61	4.14
	131	2.79	4.28	3.82		–	–	–	–
	140	2.71	4.33	3.84		–	–	–	–
CL7	080	2.77	4.40	3.88	**CL4**	068	3.29	4.56	4.16
	086	2.68	4.27	3.77		074	3.17	4.67	4.20
	092	2.79	4.29	3.82		080	3.28	4.82	4.36
	099	2.70	4.35	3.85		086	3.19	4.58	4.15
	106	2.62	4.43	3.88		092	3.29	4.40	4.05
	114	2.54	4.24	3.72		099	3.26	4.58	4.18
	121	2.81	4.34	3.85		106	3.24	4.81	4.33
	130	2.72	4.37	3.86		–	–	–	–
	139	2.63	4.40	3.88		–	–	–	–
CQ7	080	2.46	4.31	3.71	**CQ4**	068	3.05	4.59	4.13
	086	2.36	4.14	3.57		074	2.89	4.63	4.15
	092	2.49	4.21	3.66		080	3.03	4.88	4.35
	099	2.38	4.25	3.67		086	2.93	4.57	4.13
	106	2.26	4.31	3.70		092	3.07	4.46	4.05
	114	2.17	4.09	3.49		099	3.00	4.60	4.16
	121	2.50	4.22	3.67		106	2.95	4.79	4.29

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

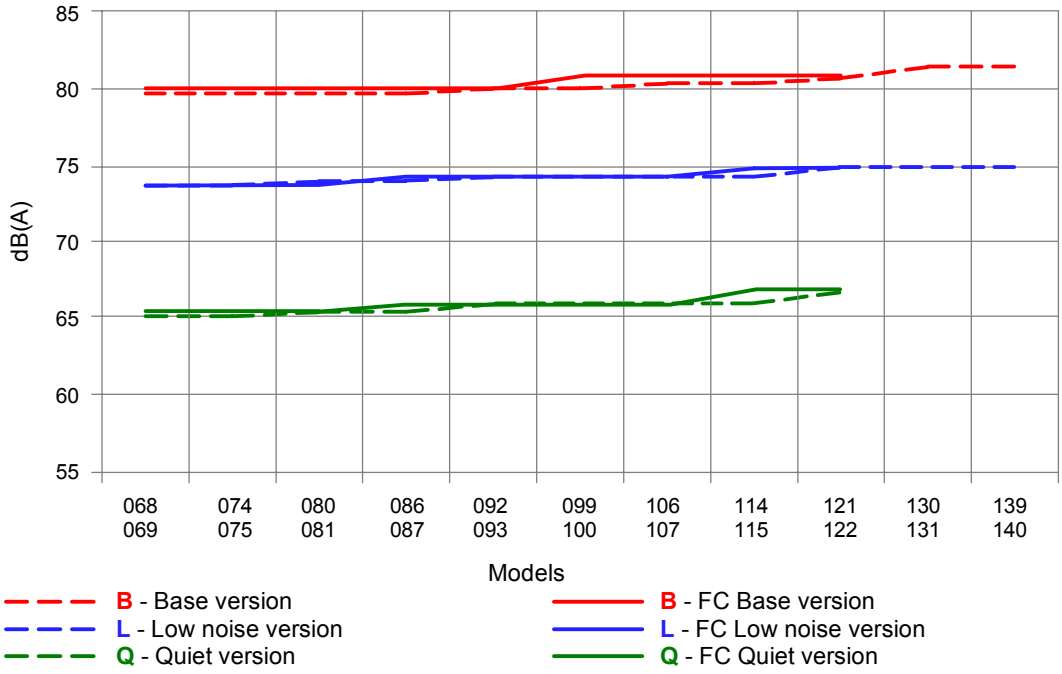
Low sound emission

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, "Muffler"–type pulsation dampers integrated in the compressor oil separator, compressor fastening on insulating/anti–vibration supports, inlet and outlet hoses, 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

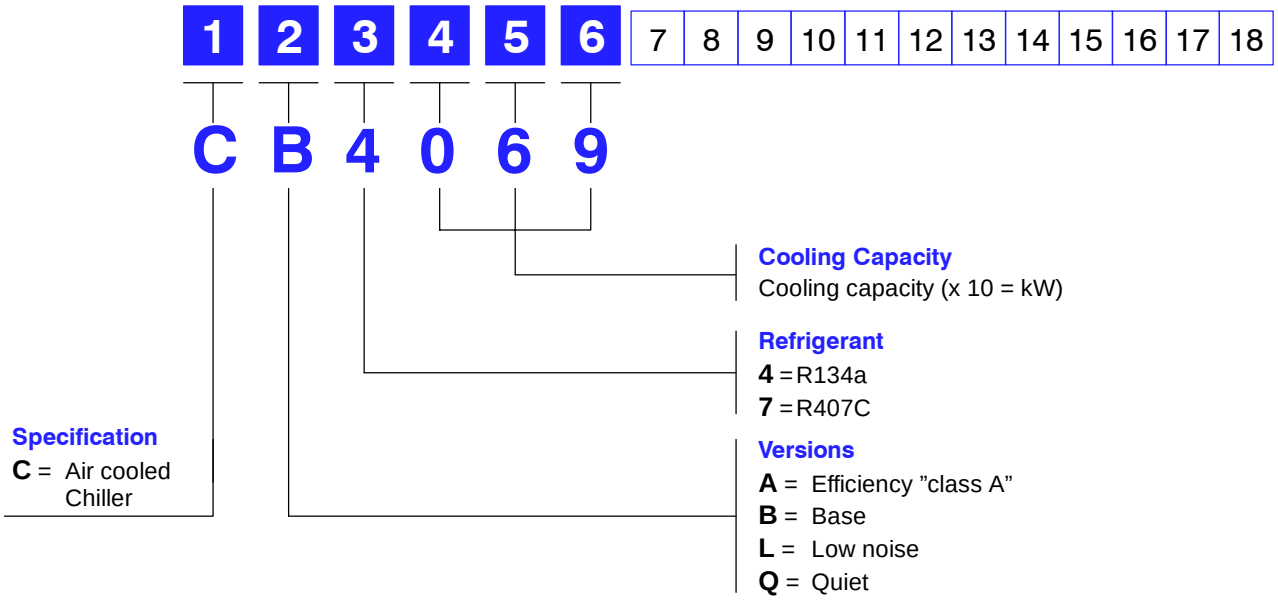
Models	HPC–L (Chiller)			HPC–L (Freecooling)		
	"B" version	"L" version	"Q" version	"B" version	"L" version	"Q" version
068 – 069	79.5	73.0	65.0	80.0	73.0	65.5
074 – 075	79.5	73.0	65.0	80.0	73.0	65.5
080 – 081	79.5	73.5	65.5	80.0	73.0	65.5
086 – 087	79.5	73.5	65.5	80.0	74.0	66.0
092 – 093	80.0	74.0	66.0	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
114 – 115	80.5	74.0	66.0	81.0	75.0	67.0
121 – 122	81.0	75.0	67.0	81.0	75.0	67.0
130 – 131	82.0	75.0	–	–	–	–
139 – 140	82.0	75.0	–	–	–	–

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 inverter 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
- Shell & Tube evaporators with direct expansion and independent circuit on the refrigerant side for each compressor
- Axial fans with modulating speed control
- Condensing coils with copper pipes and aluminum fins
- International approval 97/23 EC – PED
- Microface board / Display control interlocked to each electric board
- Double electric panel CE compliant and complete with safety equipments, fan motors protection, fuses and protection thermal relays for compressors, power supply 400 V / 3 Ph / 50 Hz (RST + PE)
- Main switch on each electric board
- Antiscratch plastic film packaging
- Colour Ral 7032 "Grey"

Digit 7 – Electronic expansion valve (EEV)

0 = Standard mechanic valve
1 = Electronic valve

Digit 8 – Compressor suction shut–off valve

0 = None
1 = With shut–off valve

Digit 9 – Refrigerant gauges

0 = None
1 = With HP/LP gauges

Digit 10 – Economiser (ECO) / Liquid injection

0 = No ECO / no liquid injection
1 = With ECO
2 = With liquid injection

Digit 11 – Fan speed control

1 = TRIAC control
2 = Inverter control
3 = EC–Fan

Digit 12 – Pumps group / Hydraulic Kit

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

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

Digit 15 – Evaporator electric heaters

0 = None
1 = With electric heaters only evaporator
2 = With evaporator electric heaters, pumps and pipes

Digit 16 – Compressor power factor capacitors

0 = None
1 = With compressor power factor capacitors

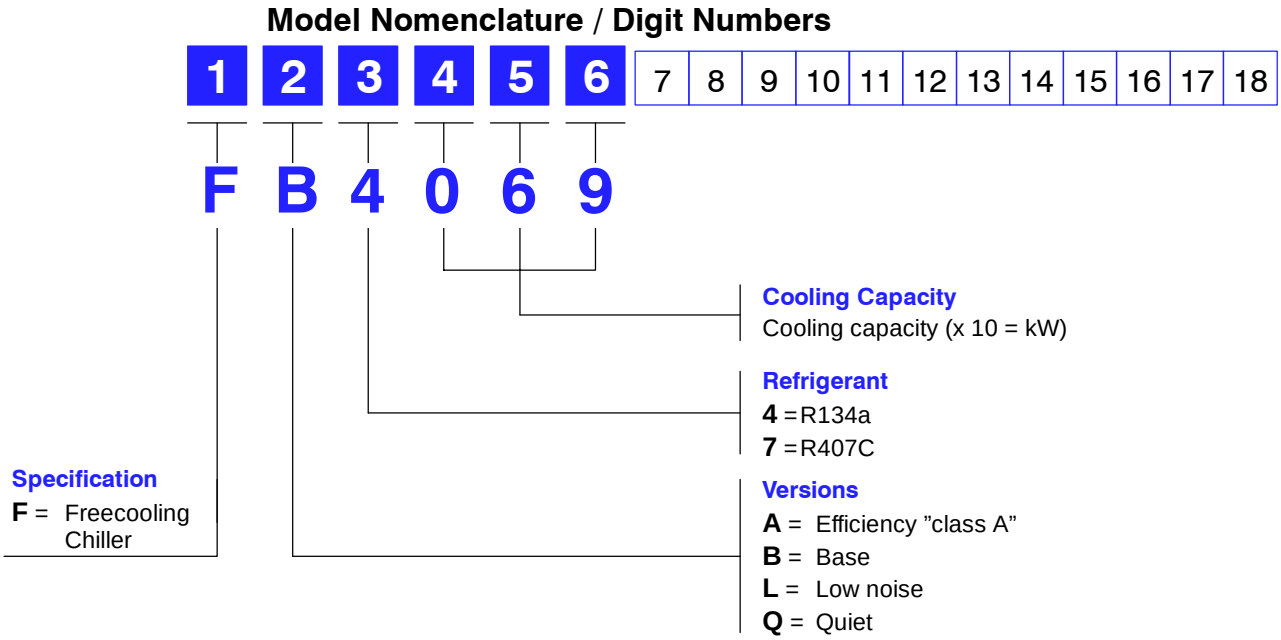
Digit 17 – Condensing coil filter / Protection grid

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



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
- Shell & Tube evaporators with direct expansion and independent circuit on the refrigerant side for each compressor
- Axial fans with modulating speed control
- Freecooling coils with copper pipes and aluminum fins
- Condensing coils with copper pipes and aluminum fins
- International approval 97/23 EC – PED
- Microface board / Display control interlocked to each electric board
- Double electric panel CE compliant and complete with safety equipments, fan motors protection, fuses and protection thermal relays for compressors, power supply 400 V / 3 Ph / 50 Hz (RST + PE)
- Main switch on each electric board
- Antiscratch plastic film packaging
- Colour Ral 7032 "Grey"

Digit 7 – Electronic expansion valve (EEV)

0 = Standard mechanic valve
1 = Electronic valve

Digit 8 – Compressor suction shut–off valve

0 = None
1 = With shut–off valve

Digit 9 – Refrigerant gauges

0 = None
1 = With HP/LP gauges

Digit 10 – Economiser (ECO) / Liquid injection

0 = No ECO / no liquid injection
1 = With ECO
2 = With liquid injection

Digit 11 – Fan speed control

1 = TRIAC control
2 = Inverter control
3 = EC–Fan

Digit 12 – Pumps group / Hydraulic Kit

Complete 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 headF/ 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

Digit 15 – Evaporator electric heaters

0 = None
1 = With electric heaters only evaporator
2 = With evaporator electric heaters, pumps and pipes

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

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. In any case outdoor temperatures over 46°C are not admitted; such limits are determined by electrical and electronic components fitted on units. Maximum flow rates are 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 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 (Safety valve setting is 5 Barg with the optional hydraulic kit).
Nominal power supply tolerance: 400V $^{+}/_{-}$ 10%; max. voltage drop: 3%.
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.

Operating Range

Tab. 3a – Operating range – HPC–L **R407C**

Models: CA7		081	087	093	100	107	115	122	131	140
Operating range										
Max. outdoor temperature (1)	°C	41.0	41/39	39.5	39.5/37.5	39.5	39.5/37.5	40.0	43/38	38.0
Max. outdoor temperature (2)	°C	44.5	44.5/42.5	43.0	43/41	43.0	43/41	43.5	46.5/38	38.0
Max. water flow	m^3/h	234	234	234	234	258	258	316	316	316
Safety devices settings										
High pressure switch (1)	bar					24				
High pressure switch (2)	bar					26				
High pressure safety valve	bar					29				
Low pressure switch	bar					2.8				
Low pressure safety valve	bar					17.3				

Models: CB7		081	087	093	100	107	115	122	131	140
Operating range										
Max. outdoor temperature (1)	°C	40.0	40/38	38.5	38.5/36.5	38.5	38.5/36.5	39.0	42.5/37	37.0
Max. outdoor temperature (2)	°C	43.5	43.5/41.5	42.0	42/40	42.0	42/40	42.5	46/37	37.0
Max. water flow	m^3/h	234	234	234	234	258	258	316	316	316
Safety devices settings										
High pressure switch (1)	bar					24				
High pressure switch (2)	bar					26				
High pressure safety valve	bar					29				
Low pressure switch	bar					2.8				
Low pressure safety valve	bar					17.3				

Models: CL7		080	086	092	099	106	114	121	130	139
Operating range										
Max. outdoor temperature (1)	°C	42.0	42/40	42.0	42/40	39.0	39/37	41.0	41.0/35.5	35.5
Max. outdoor temperature (2)	°C	45.5	45.5/43.5	45.5	45.5/43.5	42.5	42.5/40.5	44.5	44.5/35.5	35.5
Max. water flow	m^3/h	234	234	234	234	258	258	316	316	316
Safety devices settings										
High pressure switch (1)	bar					24				
High pressure switch (2)	bar					26				
High pressure safety valve	bar					29				
Low pressure switch	bar					2.8				
Low pressure safety valve	bar					17.3				

Models: CQ7		080	086	092	099	106	114	121
Operating range								
Max. outdoor temperature (1)	°C	38	38/36	38	38/36	35	35/33	37
Max. outdoor temperature (2)	°C	41.5	41.5/39.5	41.5	41.5/39.5	38.5	38.5/36.5	40.5
Max. water flow	m^3/h	234	234	234	234	258	258	316
Safety devices settings								
High pressure switch (1)	bar				24			
High pressure switch (2)	bar				26			
High pressure safety valve	bar				29			
Low pressure switch	bar				2.8			
Low pressure safety valve	bar				17.3			

(1) – With nominal air flow; water outlet temperature 7°C; full load; R407C refrigerant; standard version and with economiser option.
(2) – With nominal air flow; water outlet temperature 7°C; full load; R407C refrigerant; version with liquid injection 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 **R134a**

Models: CA4		069	075	081	087	093	100	107
Operating range								
Max. outdoor temperature (1)	°C	52.5	52.5/49.5	49.5	49.5/47	49.0	49/46	48.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

Models: CB4		069	075	081	087	093	100	107
Operating range								
Max. outdoor temperature (1)	°C	51.5	51.5/48	48.0	48/45.5	47.5	47.5/44.5	47.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

Models: CL4		068	074	080	086	092	099	106
Operating range								
Max. outdoor temperature (1)	°C	51.0	51/48	50.5	50.5/48	51.5	51.5/48.5	48.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

Models: CQ4		068	074	080	086	092	099	106
Operating range								
Max. outdoor temperature (1)	°C	47.5	47.5/44.5	46.5	46.5/44.5	48.0	48/45	44.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

(1) – With nominal air flow; water outlet temperature 7°C; full load; R134a refrigerant; standard version and with economiser option.
For indicated temperatures over 46°C, the limits are to be referred to special units in tropicalized version.

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. 3c – Operating range – HPC–L with freecooling **R407C**

Models: FA7		081	087	093	100	107	115	122
Operating range								
Max. outdoor temperature (1)	°C	38.5	38,5/36	36.0	41/38,5	38.5	38,5/36	36.0
Max. outdoor temperature (2)	°C	41.5	41,5/39	39.0	44/41,5	41.5	41,5/39	39.0
Max. water flow	m^3/h	234	234	234	234	258	258	316
Safety devices settings								
High pressure switch (1)	bar				24			
High pressure switch (2)	bar				26			
High pressure safety valve	bar				29			
Low pressure switch	bar				2.8			
Low pressure safety valve	bar				17.3			

Models: FB7		081	087	093	100	107	115	122
Operating range								
Max. outdoor temperature (1)	°C	37.5	37,5/35	35.0	40/37,5	37.5	37,5/35	35.0
Max. outdoor temperature (2)	°C	40.5	40,5/38	38.0	43/40,5	40.5	40,5/38	38.0
Max. water flow	m^3/h	234	234	234	234	258	258	316
Safety devices settings								
High pressure switch (1)	bar				24			
High pressure switch (2)	bar				26			
High pressure safety valve	bar				29			
Low pressure switch	bar				2.8			
Low pressure safety valve	bar				17.3			

Models: FL7		080	086	092	099	106	114	121
Operating range								
Max. outdoor temperature (1)	°C	36.0	41/38,5	38.5	38,5/36	36.0	40/37,5	37.5
Max. outdoor temperature (2)	°C	38.5	43,5/41	41.0	41/38,5	38.5	42,5/40	40.0
Max. water flow	m^3/h	234	234	234	234	258	258	316
Safety devices settings								
High pressure switch (1)	bar				24			
High pressure switch (2)	bar				26			
High pressure safety valve	bar				29			
Low pressure switch	bar				2.8			
Low pressure safety valve	bar				17.3			

Models: FQ7		080	086	092	099	106	114	121
Operating range								
Max. outdoor temperature (2)	°C	35.0	39,5/37	37.0	37/35	35.0	38,5/36	36.0
Max. water flow	m^3/h	234	234	234	234	258	258	316
Safety devices settings								
High pressure switch (1)	bar				24			
High pressure switch (2)	bar				26			
High pressure safety valve	bar				29			
Low pressure switch	bar				2.8			
Low pressure safety valve	bar				17.3			

(1) – With nominal air flow; fluid outlet temperature 10 °C; full load; R407C refrigerant; standard version and with economiser option.
(2) – With nominal air flow; fluid outlet temperature 10 °C; full load; R407C refrigerant; version with liquid injection 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. 3d – Operating range – HPC–L with freecooling **R134a**

Models: FA4		069	075	081	087	093	100	107
Operating range								
Max. outdoor temperature (1)	°C	49.0	49/46,5	46.5	46,5/44	44.0	50/47,5	47.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

Models: FB4		069	075	081	087	093	100	107
Operating range								
Max. outdoor temperature (1)	°C	48.0	48/45,5	45.5	45,5/43	43.0	49/46,5	46.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

Models: FL4		068	074	080	086	092	099	106
Operating range								
Max. outdoor temperature (1)	°C	46.0	46/43,5	43.5	50/47,5	47.5	47,5/44,5	44.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

Models: FQ4		068	074	080	086	092	099	106
Operating range								
Max. outdoor temperature (1)	°C	42.0	42/39,5	39.5	46/43,5	43.5	43,5/40,5	40.5
Max. water flow	m^3/h	170	170	230	230	230	230	256
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			

(1) – With nominal air flow; fluid outlet temperature 10°C; full load; R134a refrigerant; standard version and with economiser option.
For indicated temperatures over 46°C, the limits are to be referred to special units in tropicalized version.

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 – CA7 081–140 **R 407C**

Model CA7		081	087	093	100	107	115	122	131	140
Performance (1)										
Cooling capacity	kW	885	928	996	1045	1157	1211	1322	1462	1529
Compressors power input	kW	301	328	351	384	399	434	447	453	490
Total power input	kW	331	358	387	420	441	476	495	513	550
Compressors COP	-	2.94	2.83	2.84	2.72	2.90	2.79	2.96	3.23	3.12
Unit EER	-	2.67	2.59	2.57	2.49	2.62	2.54	2.67	2.85	2.78
Water flow	m^3/h	152.2	159.6	171.3	179.7	199.0	208.3	227.4	251.5	263.0
Water pressure drop	kPa	42	46	51	56	47	52	42	51	55
Performance (2)										
Cooling capacity	kW	980	1016	1080	1126	1238	1297	1415	1550	1613
Compressors power input	kW	372	402	422	455	458	507	524	511	545
Total power input	kW	402	432	458	491	500	549	572	571	605
Compressors COP	-	2.63	2.53	2.56	2.47	2.70	2.56	2.70	3.03	2.96
Unit EER	-	2.44	2.35	2.36	2.29	2.48	2.36	2.47	2.71	2.67
Water flow	m^3/h	168.6	174.8	185.8	193.7	212.9	223.1	243.4	266.6	277.4
Water pressure drop	kPa	51	55	59	64	54	59	48	57	61
Sound level										
SPL [Sound Pressure Level] (3)	dB(A)	83.5		84		84.5		85	86	
PWL [Sound Power Level] (4)	dB(A)	104.5		105		105.5		106.5	108	
Refrigeration circuits										
Number of refrigeration circuits	No	2								
Refrigerant charge [each circuit]	kg	123		129	129/134	153		182	202	
Compressors										
Number of compressors	No	2								
Type	-	double screw with integrated oil separator and muffler								
Nominal power [each compressor]	HP	180	180+210	210	210+240	240	240+280	280	280+300	300
Capacity control	-	25 ⇒ 100 % stepless								
Fans										
Number of fans	No	10		12		14		16	20	
Type	-	axial								
Wheel nominal diameter	mm	900								
Rpm	1/min	900								
Nominal power input [each fan]	kW	3.0								
Fans power input	kW	30.0		36.0		42.0		48.0	60.0	
Air flow rate	m^3/h	250000		270000		315000		360000	450000	
Evaporator										
Number of evaporators	No	1								
Type	-	shell & tube								
Internal volume [each circuit, ref. side]	l	80		93		111		132		
Condensing coil										
Material tubes / fins	-	copper / aluminium								
Rows / Fins space	no/mm	3 / 1.8								
Face area	m^2	33.0				38.5		44.0	55.0	
Internal volume [each circuit]	l	186				216		248	308	
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	444		414		506		446		
Dimensions										
Length	mm	8590				9586		11578	13570	
Depth	mm	2308								
Height	mm	2563								
Weights										
Net weight	kg	8690	8712	8902	8922	9637	9698	10730	11784	11809
Operating weight	kg	9134	9156	9316	9336	10143	10204	11176	12230	12255

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 – CB7 081–140 **R 407C**

Model CB7		081	087	093	100	107	115	122	131	140
Performance (1)										
Cooling capacity	kW	862	901	966	1011	1125	1175	1286	1431	1495
Compressors power input	kW	310	339	362	397	414	449	461	466	505
Total power input	kW	333	362	390	425	446	481	498	512	551
Compressors COP	-	2.78	2.66	2.67	2.55	2.72	2.62	2.79	3.07	2.96
Unit EER	-	2.59	2.49	2.48	2.38	2.52	2.44	2.58	2.79	2.71
Water flow	m^3/h	148.3	155.0	166.2	173.9	193.5	202.1	221.2	246.1	257.1
Water pressure drop	kPa	40	44	48	52	45	49	40	49	53
Performance (2)										
Cooling capacity	kW	954	987	1047	1090	1206	1259	1377	-	-
Compressors power input	kW	390	421	441	477	481	532	547	-	-
Total power input	kW	413	444	469	505	513	564	584	-	-
Compressors COP	-	2.45	2.34	2.37	2.29	2.51	2.37	2.52	-	-
Unit EER	-	2.31	2.22	2.23	2.16	2.35	2.23	2.36	-	-
Water flow	m^3/h	164.1	179.8	180.1	187.5	207.4	216.5	236.8	-	-
Water pressure drop	kPa	49	52	56	60	51	56	45	-	-
Sound level										
SPL [Sound Pressure Level] (3)	dB(A)	79.5		80		80.5		81	82	
PWL [Sound Power Level] (4)	dB(A)	100.5		101		101.5		102.5	104	
Refrigeration circuits										
Number of refrigeration circuits	No	2								
Refrigerant charge [each circuit]	kg	123		129	129/134	153		182	202	
Compressors										
Number of compressors	No	2								
Type	-	double screw with integrated oil separator and muffler								
Nominal power [each compressor]	HP	180	180+210	210	210+240	240	240+280	280	280+300	300
Capacity control	-	25 ⇒ 100 % stepless								
Fans										
Number of fans	No	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	46.0
Air flow rate	m^3/h	230000		247200		288400		329600	512000	412000
Evaporator										
Number of evaporators	No	1								
Type	-	shell & tube								
Internal volume [each circuit, ref. side]	l	80		93		111		132		
Condensing coil										
Material tubes / fins	-	copper / aluminium								
Rows / Fins space	no/mm	3 / 1.8								
Face area	m^2	33.0				38.5		44.0	55.0	
Internal volume [each circuit]	l	186				216		248	308	
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	444		414		506		446		
Dimensions										
Length	mm	8590				9586		11578	13570	
Depth	mm	2308								
Height	mm	2571								
Weights										
Net weight	kg	8690	8712	8902	8922	9637	9698	10730	11784	11809
Operating weight	kg	9134	9156	9316	9336	10143	10204	11176	12230	12255

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 – CL7 080–139 **R 407C**

Model CL7		080	086	092	099	106	114	121	130	139
Performance (1)										
Cooling capacity	kW	892	935	1025	1076	1139	1190	1336	1399	1461
Compressors power input	kW	298	325	340	371	408	442	441	480	521
Total power input	kW	322	349	367	398	435	469	475	514	555
Compressors COP	-	2.99	2.88	3.01	2.90	2.79	2.69	3.03	2.91	2.80
Unit EER	-	2.77	2.68	2.79	2.70	2.62	2.54	2.81	2.72	2.63
Water flow	m^3/h	153.4	160.8	176.3	185.1	195.9	204.7	229.8	240.6	251.3
Water pressure drop	kPa	43	47	54	59	46	50	43	47	51
Performance (2)										
Cooling capacity	kW	987	1024	1109	1158	1218	1274	1424	-	-
Compressors power input	kW	370	399	406	436	472	522	515	-	-
Total power input	kW	394	423	433	463	499	549	549	-	-
Compressors COP	-	2.67	2.57	2.73	2.66	2.58	2.44	2.77	-	-
Unit EER	-	2.51	2.42	2.56	2.50	2.44	2.32	2.59	-	-
Water flow	m^3/h	169.8	176.1	190.7	199.2	209.5	219.1	244.9	-	-
Water pressure drop	kPa	52	56	62	68	52	57	48	-	-
Sound level										
SPL [Sound Pressure Level] (3)	dB(A)	73.5			74				75	
PWL [Sound Power Level] (4)	dB(A)	94.5			95.5				97	
Refrigeration circuits										
Number of refrigeration circuits	No	2								
Refrigerant charge [each circuit]	kg	131		155	155/160	173			202	
Compressors										
Number of compressors	No	2								
Type	-	double screw with integrated oil separator and muffler								
Nominal power [each compressor]	HP	180	180+210	210	210+240	240	240+280	280	280+300	300
Capacity control	-	25 ⇒ 100 % stepless								
Fans										
Number of fans	No	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	23.8			27.2				34.0	
Air flow rate	m^3/h	254800			291200				364000	
Evaporator										
Number of evaporators	No	1								
Type	-	shell & tube								
Internal volume [each circuit, ref. side]	l	80		93		111			132	
Condensing coil										
Material tubes / fins	-	copper / aluminium								
Rows / Fins space	no/mm	3 / 1.8								
Face area	m^2	38.5			44.0				55.0	
Internal volume [each circuit]	l	216			248				308	
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	444		414		506			446	
Dimensions										
Length	mm	9586			11578				13570	
Depth	mm	2308								
Height	mm	2571								
Weights										
Net weight	kg	9174	9194	10078	10094	10270	10334	11449	11464	11489
Operating weight	kg	9618	9638	10492	10508	10776	10840	11895	11910	11935

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 – CQ7 080–121 **R 407C**

Model CQ7		080	086	092	099	106	114	121
Performance (1)								
Cooling capacity	kW	831	866	955	999	1051	1093	1246
Compressors power input	kW	323	352	366	403	448	485	477
Total power input	kW	338	367	384	421	466	503	499
Compressors COP	-	2.57	2.46	2.61	2.48	2.35	2.25	2.61
Unit EER	-	2.46	2.36	2.49	2.38	2.26	2.17	2.50
Water flow	m^3/h	142.9	149.0	164.3	171.8	180.8	188.0	214.3
Water pressure drop	kPa	37	40	47	51	40	42	37
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)	65.5		66				67
PWL [Sound Power Level] (4)	dB(A)	86.5		87.5				89
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge [each circuit]	kg	131		155	155/160	173		202
Compressors								
Number of compressors	No	2						
Type	-	double screw with integrated oil separator and muffler						
Nominal power [each compressor]	HP	180	180+210	210	210+240	240	240+280	280
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	14		16				20
Type	-	axial						
Wheel nominal diameter	mm	800						
Rpm	1/min	700						
Nominal power input [each fan]	kW	1.1						
Fans power input	kW	15.4		17.6				22.0
Air flow rate	m^3/h	196000		224000				280000
Evaporator								
Number of evaporators	No	1						
Type	-	shell & tube						
Int. volume [each circuit, refrigerant side]	l	80		93		111		132
Condensing coil								
Material tubes / fins	-	copper / aluminium						
Rows / Fins space	no/mm	3 / 1.8						
Face area	m^2	38.5		44.0				55.0
Internal volume [each circuit]	l	216		248				308
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	444		414		506		446
Dimensions								
Length	mm	9586		11578				13570
Depth	mm	2308						
Height	mm	2571						
Weights								
Net weight	kg	9174	9194	10078	10094	10270	10334	11449
Operating weight	kg	9618	9638	10492	10508	10776	10840	11895

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%.
(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 – CA4 069–107 **R 134a**

Model CA4		069	075	081	087	093	100	107
Performance (1)								
Cooling capacity	kW	745	790	846	881	926	972	1063
Compressors power input	kW	195	215	238	256	269	288	295
Total power input	kW	225	245	268	286	305	324	337
Compressors COP	-	3.82	3.67	3.55	3.44	3.44	3.38	3.60
Unit EER	-	3.31	3.22	3.16	3.08	3.04	3.00	3.15
Water flow	m^3/h	128.1	135.9	145.5	151.5	159.3	167.2	182.8
Water pressure drop	kPa	44	50	36	39	43	47	44
Performance (2)								
Cooling capacity	kW	836	882	937	981	1033	1079	1158
Compressors power input	kW	222	243	265	290	308	327	325
Total power input	kW	252	273	295	320	344	363	367
Compressors COP	-	3.77	3.63	3.54	3.38	3.35	3.30	3.56
Unit EER	-	3.32	3.23	3.18	3.07	3.00	2.97	3.16
Water flow	m^3/h	143.8	151.7	161.2	168.7	177.7	185.6	199.2
Water pressure drop	kPa	52	57	41	45	49	54	48
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)	83.5				84		84.5
PWL [Sound Power Level] (4)	dB(A)	104.5				105		105.5
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge [each circuit]	kg	117		125	125/130	130		146
Compressors								
Number of compressors	No	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
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	10				12		14
Type	-	axial						
Wheel nominal diameter	mm	900						
Rpm	1/min	900						
Nominal power input [each fan]	kW	3.0						
Fans power input	kW	30.0				36.0		42.0
Air flow rate	m^3/h	250000				270000		315000
Evaporator								
Number of evaporators	No	1						
Type	-	shell & tube						
Internal volume [each circuit, refrigerant side]	l	93		112				132
Condensing coil								
Material tubes / fins	-	copper / aluminium						
Rows / Fins space	no/mm	3 / 1.8						
Face area	m^2	33.0						38.5
Internal volume [each circuit]	l	186						216
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
Dimensions								
Length	mm	8590						9586
Depth	mm	2308						
Height	mm	2563						
Weights								
Net weight	kg	8686	8694	8815	8892	9074	9105	9836
Operating weight	kg	9100	9108	9187	9264	9446	9477	10282

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. 4f – Technical Data – CB4 069–107 **R 134a**

Model CB4		069	075	081	087	093	100	107
Performance (1)								
Cooling capacity	kW	732	776	829	862	905	950	1041
Compressors power input	kW	200	221	245	264	277	297	304
Total power input	kW	223	244	268	287	305	325	336
Compressors COP	-	3.66	3.51	3.38	3.27	3.27	3.20	3.42
Unit EER	-	3.28	3.18	3.09	3.00	2.97	2.93	3.10
Water flow	m^3/h	125.9	133.5	142.6	148.3	155.7	163.4	179.1
Water pressure drop	kPa	43	48	35	37	41	45	42
Performance (2)								
Cooling capacity	kW	824	869	923	963	1013	1056	1138
Compressors power input	kW	230	252	277	303	321	342	339
Total power input	kW	253	275	300	326	349	370	371
Compressors COP	-	3.58	3.45	3.33	3.18	3.16	3.09	3.36
Unit EER	-	3.26	3.16	3.08	2.95	2.91	2.86	3.07
Water flow	m^3/h	141.7	149.5	158.8	165.6	174.2	181.6	195.7
Water pressure drop	kPa	50	56	40	43	47	52	47
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)	79.5				80		80.5
PWL [Sound Power Level] (4)	dB(A)	100.5				101		101.5
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge [each circuit]	kg	117		125	125/130	130		146
Compressors								
Number of compressors	No	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
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	10				12		14
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
Air flow rate	m^3/h	230000				247200		288400
Evaporator								
Number of evaporators	No	1						
Type	-	shell & tube						
Internal volume [each circuit, refrigerant side]	l	93		112				132
Condensing coil								
Material tubes / fins	-	copper / aluminium						
Rows / Fins space	no/mm	3 / 1.8						
Face area	m^2	33.0						38.5
Internal volume [each circuit]	l	186						216
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
Dimensions								
Length	mm	8590						9586
Depth	mm	2308						
Height	mm	2571						
Weights								
Net weight	kg	8686	8694	8815	8892	9074	9105	9836
Operating weight	kg	9100	9108	9187	9264	9446	9477	10282

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. 4g – Technical Data – CL4 068–106 **R 134a**

Model CL4		068	074	080	086	092	099	106
Performance (1)								
Cooling capacity	kW	728	772	851	886	947	995	1054
Compressors power input	kW	201	223	236	254	261	278	298
Total power input	kW	221	243	260	278	288	305	325
Compressors COP	-	3.62	3.46	3.61	3.49	3.63	3.58	3.54
Unit EER	-	3.29	3.17	3.28	3.19	3.29	3.26	3.24
Water flow	m^3/h	125.2	132.8	146.4	152.4	162.9	171.1	181.3
Water pressure drop	kPa	43	48	36	39	45	49	43
Performance (2)								
Cooling capacity	kW	819	863	939	983	1051	1096	1147
Compressors power input	kW	234	257	264	288	297	314	333
Total power input	kW	254	277	288	312	324	341	360
Compressors COP	-	3.50	3.36	3.56	3.41	3.54	3.49	3.44
Unit EER	-	3.22	3.11	3.26	3.15	3.24	3.21	3.18
Water flow	m^3/h	140.9	148.4	161.5	169.1	180.8	188.5	197.3
Water pressure drop	kPa	50	55	41	45	51	55	47
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)	73		73.5		74		
PWL [Sound Power Level] (4)	dB(A)	94		94.5		95.5		
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge [each circuit]	kg	117		135	135/140	160		168
Compressors								
Number of compressors	No	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
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	12		14		16		
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		
Air flow rate	m^3/h	218400		254800		291200		
Evaporator								
Number of evaporators	No	1						
Type	-	shell & tube						
Internal volume [each circuit, refrigerant side]	l	93		112				132
Condensing coil								
Material tubes / fins	-	copper / aluminium						
Rows / Fins space	no/mm	3 / 1.8						
Face area	m^2	33.0		38.5		44.0		
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
Dimensions								
Length	mm	8590		9586		11578		
Depth	mm	2308						
Height	mm	2571						
Weights								
Net weight	kg	8672	9684	9302	9374	10260	10288	10474
Operating weight	kg	9086	9098	9674	9746	10632	10660	10920

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. 4h – Technical Data – CQ4 068–106 **R 134a**

Model CQ4		068	074	080	086	092	099	106
Performance (1)								
Cooling capacity	kW	693	732	812	842	903	948	1001
Compressors power input	kW	214	240	253	272	277	298	322
Total power input	kW	227	253	268	287	295	316	340
Compressors COP	-	3.24	3.05	3.21	3.10	3.26	3.18	3.11
Unit EER	-	3.05	2.89	3.03	2.93	3.07	3.00	2.95
Water flow	m^3/h	119.2	125.9	139.7	144.8	155.3	163.1	172.2
Water pressure drop	kPa	39	43	34	36	41	45	39
Performance (2)								
Cooling capacity	kW	784	825	905	941	1008	1052	1097
Compressors power input	kW	257	285	292	319	324	346	370
Total power input	kW	270	298	307	334	342	364	388
Compressors COP	-	3.05	2.89	3.10	2.95	3.11	3.04	2.96
Unit EER	-	2.90	2.77	2.94	2.81	2.95	2.89	2.83
Water flow	m^3/h	134.8	141.9	155.7	161.9	173.4	180.9	188.7
Water pressure drop	kPa	46	50	38	41	47	51	44
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)	65	65	65.5		66		
PWL [Sound Power Level] (4)	dB(A)	89	86	86.5		87.5		
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge [each circuit]	kg	117		135	135/140	160		168
Compressors								
Number of compressors	No	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
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	12		14		16		
Type	-	axial						
Wheel nominal diameter	mm	800						
Rpm	1/min	700						
Nominal power input [each fan]	kW	1.1						
Fans power input	kW	13.2		15.4		17.6		
Air flow rate	m^3/h	168000		196000		224000		
Evaporator								
Number of evaporators	No	1						
Type	-	shell & tube						
Internal volume [each circuit, refrigerant side]	l	93		112				132
Condensing coil								
Material tubes / fins	-	copper / aluminium						
Rows / Fins space	no/mm	3 / 1.8						
Face area	m^2	33.0		38.5		44.0		
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
Dimensions								
Length	mm	8590		9586		11578		
Depth	mm	2308						
Height	mm	2571						
Weights								
Net weight	kg	8672	8684	9302	9374	10260	10288	10474
Operating weight	kg	9086	9098	9674	9746	10632	10660	10920

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. 4i – Technical Data – FA7 081–122 **R 407C**

Model FA7		081	087	093	100	107	115	122
Performance (1)								
Cooling capacity	kW	904	943	993	1140	1215	1271	1328
Freecooling capacity	kW	520	524	529	702	710	713	716
Compressors power input	kW	320	350	382	379	417	453	490
Total power input	kW	358	388	420	430	468	504	541
Compressors COP	-	2.83	2.69	2.60	3.01	2.91	2.81	2.71
Unit EER	-	2.52	2.43	2.36	2.65	2.60	2.52	2.45
Coolant fluid flow	m^3/h	173.5	181.0	190.6	218.8	233.2	244.0	254.9
Hydraulic pressure drop	kPa	152	164	178	241	237	257	249
Performance (2)								
Cooling capacity	kW	910	944	989	1117	1191	1247	1303
Freecooling capacity	kW	518	521	526	696	704	708	711
Compressors power input	kW	373	402	435	412	445	492	540
Total power input	kW	411	440	473	463	496	543	591
Compressors COP	-	2.44	2.35	2.27	2.71	2.68	2.53	2.41
Unit EER	-	2.21	2.14	2.09	2.41	2.40	2.30	2.20
Coolant fluid flow	m^3/h	173.9	180.4	189.0	213.5	227.6	238.3	249.0
Hydraulic pressure drop	kPa	155	165	176	233	230	249	242
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)		84				85	
PWL [Sound Power Level] (4)	dB(A)		105				106.5	
Refrigeration circuits								
Number of refrigeration circuits	No				2			
Refrigerant charge [each circuit]	kg		129	135	155/160		173	182
Compressors								
Number of compressors	No				2			
Type	-				double screw with integrated oil separator and muffler			
Nominal power [each compressor]	HP	180	180+210	210	210+240	240	240+280	280
Capacity control	-				25 ⇒ 100 % stepless			
Fans								
Number of fans	No		12				16	
Type	-				axial			
Wheel nominal diameter	mm				900			
Rpm	1/min				900			
Nominal power input [each fan]	kW				3.2			
Fans power input	kW		38.4				51.2	
Air flow rate	m^3/h		252000				336000	
Evaporator								
Number of evaporators	No				1			
Type	-				shell & tube			
Internal volume [each circuit, refrigerant side]	l		80		93		111	132
Condensing coil								
Material tubes / fins	-				copper / aluminium			
Rows / Fins space	no/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	no/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		936	966	1090		1182	1122
Dimensions								
Length	mm		9586				11578	
Depth	mm				2308			
Height	mm				2563			
Weights								
Net weight	kg	10618	10638	10785	12192	12371	12439	12623
Operating weight	kg	11648	11665	11844	13376	13644	13712	13840

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. 4j – Technical Data – FB7 081–122 **R 407C**

Model FB7		081	087	093	100	107	115	122
Performance (1)								
Cooling capacity	kW	876	912	957	1109	1180	1232	1285
Freecooling capacity	kW	496	499	503	671	678	680	682
Compressors power input	kW	332	362	395	392	433	470	508
Total power input	kW	360	390	423	430	471	508	546
Compressors COP	-	2.64	2.52	2.42	2.83	2.73	2.62	2.53
Unit EER	-	2.43	2.34	2.26	2.58	2.51	2.43	2.36
Coolant fluid flow	m^3/h	168.2	175.1	183.7	212.9	226.5	236.5	246.7
Hydraulic pressure drop	kPa	143	153	164	229	225	242	233
Performance (2)								
Cooling capacity	kW	886	916	957	1093	1164	1215	1268
Freecooling capacity	kW	496	498	502	666	674	677	680
Compressors power input	kW	390	420	454	428	465	514	562
Total power input	kW	418	448	482	466	503	552	600
Compressors COP	-	2.27	2.18	2.11	2.55	2.50	2.36	2.26
Unit EER	-	2.12	2.04	1.98	2.35	2.32	2.20	2.11
Coolant fluid flow	m^3/h	169.3	175.1	182.9	208.9	222.5	232.2	242.3
Hydraulic pressure drop	kPa	148	157	167	224	220	239	232
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)		80			81		
PWL [Sound Power Level] (4)	dB(A)		101			102.5		
Refrigeration circuits								
Number of refrigeration circuits	No				2			
Refrigerant charge [each circuit]	kg	129		135	155/160	173		182
Compressors								
Number of compressors	No				2			
Type	-				double screw with integrated oil separator and muffler			
Nominal power [each compressor]	HP	180	180+210	210	210+240	240	240+280	280
Capacity control	-				25 ⇒ 100 % stepless			
Fans								
Number of fans	No		12			16		
Type	-				axial			
Wheel nominal diameter	mm				900			
Rpm	1/min				900			
Nominal power input [each fan]	kW				2.35			
Fans power input	kW		28.2			37.6		
Air flow rate	m^3/h		235200			313600		
Evaporator								
Number of evaporators	No				1			
Type	-				shell & tube			
Internal volume [each circuit, refrigerant side]	l	80		93		111		132
Condensing coil								
Material tubes / fins	-				copper / aluminium			
Rows / Fins space	no/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	no/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	936		966	1090	1182		1122
Dimensions								
Length	mm		9586			11578		
Depth	mm				2308			
Height	mm				2571			
Weights								
Net weight	kg	10618	10638	10785	12192	12371	12439	12623
Operating weight	kg	11648	11665	11844	13376	13644	13712	13840

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. 4k – Technical Data – FL7 080–121 **R 407C**

Model FL7		080	086	092	099	106	114	121
Performance (1)								
Cooling capacity	kW	848	976	1031	1078	1145	1289	1348
Freecooling capacity	kW	471	617	622	626	632	767	773
Compressors power input	kW	341	337	368	404	446	446	482
Total power input	kW	363	366	397	433	475	482	518
Compressors COP	-	2.49	2.90	2.80	2.67	2.57	2.89	2.80
Unit EER	-	2.34	2.67	2.60	2.49	2.41	2.67	2.60
Coolant fluid flow	m^3/h	162.8	187.4	197.9	206.9	219.8	247.4	258.8
Hydraulic pressure drop	kPa	177	185	201	218	213	223	212
Performance (2)								
Cooling capacity	kW	859	972	1022	1067	1132	1261	1320
Freecooling capacity	kW	472	614	619	623	629	758	765
Compressors power input	kW	405	383	414	447	485	482	529
Total power input	kW	427	412	443	476	514	518	565
Compressors COP	-	2.12	2.54	2.47	2.39	2.33	2.62	2.50
Unit EER	-	2.01	2.36	2.31	2.24	2.20	2.43	2.34
Coolant fluid flow	m^3/h	164.2	185.8	195.3	203.9	216.3	241.0	252.3
Hydraulic pressure drop	kPa	182	185	199	215	210	216	206
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)	73	74				75	
PWL [Sound Power Level] (4)	dB(A)	94	95.5				97	
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge [each circuit]	kg	129	150	155	155/160	173	174	202
Compressors								
Number of compressors	No	2						
Type	-	double screw with integrated oil separator and muffler						
Nominal power [each compressor]	HP	180	180 + 210	210	210 + 240	240	240 + 280	280
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	12	16				20	
Type	-	axial						
Wheel nominal diameter	mm	800						
Rpm	1/min	900						
Nominal power input [each fan]	kW	1.80						
Fans power input	kW	21.6	28.8				36.0	
Air flow rate	m^3/h	208800	278400				348000	
Evaporator								
Number of evaporators	No	1						
Type	-	shell & tube						
Internal volume [each circuit, refrigerant side]	l	80		93		111		132
Condensing coil								
Material tubes / fins	-	copper / aluminium						
Rows / Fins space	no/mm	3 / 2,1						
Face area	m^2	33	44				55	
Internal volume [each circuit]	l	186	248				308	
Freecooling coil								
Material tubes / Fins	-	copper / aluminium						
Rows / Fins space	no/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	936	1060	1090		1182	1302	1242
Dimensions								
Length	mm	9586	11578				13570	
Depth	mm	2308						
Height	mm	2571						
Weights								
Net weight	kg	10498	11812	11957	11972	12151	13441	13623
Operating weight	kg	11525	12968	13140	13160	13432	14840	14960

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. 4l – Technical Data – FQ7 080–121 **R 407C**

Model FQ7		080	086	092	099	106	114	121
Performance (1)								
Cooling capacity	kW	768	908	952	990	1046	1199	1247
Freecooling capacity	kW	393	519	522	524	527	645	649
Compressors power input	kW	376	364	397	441	494	485	523
Total power input	kW	390	382	415	459	512	508	546
Compressors COP	-	2.04	2.49	2.40	2.24	2.12	2.47	2.38
Unit EER	-	1.97	2.37	2.29	2.15	2.04	2.36	2.28
Coolant fluid flow	m^3/h	147.4	174.3	182.8	190.0	200.8	230.2	239.4
Hydraulic pressure drop	kPa	146	161	172	185	179	195	182
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)	65.5	66				67	
PWL [Sound Power Level] (4)	dB(A)	86.5	87.5				89	
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge [each circuit]	kg	129	150	155	155/160	173	194	202
Compressors								
Number of compressors	No	2						
Type	-	double screw with integrated oil separator and muffler						
Nominal power [each compressor]	HP	180	180 + 210	210	210 + 240	240	240 + 280	280
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	12	16				20	
Type	-	axial						
Wheel nominal diameter	mm	800						
Rpm	1/min	700						
Nominal power input [each fan]	kW	1.15						
Fans power input	kW	13.8	18.4				23.0	
Air flow rate	m^3/h	160800	214400				268000	
Evaporator								
Number of evaporators	No	1						
Type	-	shell & tube						
Internal volume [each circuit, refrigerant side]	l	80		93		111		132
Condensing coil								
Material tubes / Fins	-	copper / aluminium						
Rows / Fins space	no/mm	3 / 2,1						
Face area	m^2	33	44				55	
Internal volume [each circuit]	l	186	248				308	
Freecooling coil								
Material tubes / fins	-	copper / aluminium						
Rows / Fins space	no/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	936	1060	1090		1182	1302	1242
Dimensions								
Length	mm	9586	11578				13570	
Depth	mm	2308						
Height	mm	2571						
Weights								
Net weight	kg	10498	11812	11957	11972	12151	13441	13623
Operating weight	kg	11525	12968	13140	13160	13432	14840	14960

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.
(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. 4m – Technical Data – FA4 069–107 **R 134a**

Model FA4		069	075	081	087	093	100	107
Performance (1)								
Cooling capacity	kW	766	810	867	899	929	1046	1107
Freecooling capacity	kW	506	511	515	519	521	689	696
Compressors power input	kW	210	233	259	279	299	291	313
Total power input	kW	248	271	297	317	337	342	364
Compressors COP	-	3.65	3.48	3.35	3.22	3.11	3.59	3.54
Unit EER	-	3.08	2.98	2.92	2.83	2.75	3.06	3.04
Coolant fluid flow	m^3/h	147.0	155.5	166.4	172.6	178.3	200.8	212.5
Hydraulic pressure drop	kPa	168	187	136	145	154	203	206
Performance (2)								
Cooling capacity	kW	784	827	881	918	952	1052	1106
Freecooling capacity	kW	508	513	515	519	522	687	694
Compressors power input	kW	229	251	277	301	326	307	326
Total power input	kW	267	289	315	339	364	358	377
Compressors COP	-	3.42	3.29	3.18	3.05	2.92	3.43	3.39
Unit EER	-	2.93	2.86	2.79	2.70	2.61	2.94	2.93
Coolant fluid flow	m^3/h	149.8	158.0	168.4	175.4	181.9	201.0	211.4
Hydraulic pressure drop	kPa	177	195	140	152	161	206	206
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)			84			85	
PWL [Sound Power Level] (4)	dB(A)			105			106.5	
Refrigeration circuits								
Number of refrigeration circuits	No				2			
Refrigerant charge [each circuit]	kg	120		129	129/136	136	160	168
Compressors								
Number of compressors	No				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
Capacity control	-				25 ⇒ 100 % stepless			
Fans								
Number of fans	No			12			16	
Type	-				axial			
Wheel nominal diameter	mm				900			
Rpm	1/min				900			
Nominal power input [each fan]	kW				3.2			
Fans power input	kW			38.4			51.2	
Air flow rate	m^3/h			252000			336000	
Evaporator								
Number of evaporators	No				1			
Type	-				shell & tube			
Internal volume [each circuit, refrigerant side]	l	93		112				132
Condensing coil								
Material tubes / fins	-				copper / aluminium			
Rows / Fins space	no/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	no/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
Dimensions								
Length	mm			9586			11578	
Depth	mm				2308			
Height	mm				2563			
Weights								
Net weight	kg	10630	10640	10763	10836	10974	12404	12591
Operating weight	kg	11627	11639	11718	11790	11991	13544	13808

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. 4n – Technical Data – FB4 069–107 **R 134a**

Model FB4		069	075	081	087	093	100	107
Performance (1)								
Cooling capacity	kW	752	795	849	880	908	1028	1089
Freecooling capacity	kW	486	490	494	497	499	661	668
Compressors power input	kW	215	239	267	288	308	299	322
Total power input	kW	243	267	295	316	336	337	360
Compressors COP	-	3.50	3.33	3.18	3.06	2.95	3.44	3.38
Unit EER	-	3.09	2.98	2.88	2.78	2.70	3.05	3.03
Coolant fluid flow	m^3/h	144.4	152.6	163.0	168.9	174.3	197.3	209.0
Hydraulic pressure drop	kPa	163	181	131	140	147	197	199
Performance (2)								
Cooling capacity	kW	774	816	869	903	934	1038	1092
Freecooling capacity	kW	488	492	494	498	501	660	666
Compressors power input	kW	236	260	287	312	338	316	337
Total power input	kW	264	288	315	340	366	354	375
Compressors COP	-	3.28	3.14	3.03	2.89	2.76	3.28	3.24
Unit EER	-	2.93	2.83	2.76	2.65	2.55	2.94	2.92
Coolant fluid flow	m^3/h	147.9	155.9	166.1	172.6	178.5	198.4	208.7
Hydraulic pressure drop	kPa	173	191	136	147	156	202	202
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)			80			81	
PWL [Sound Power Level] (4)	dB(A)			101			102.5	
Refrigeration circuits								
Number of refrigeration circuits	No				2			
Refrigerant charge [each circuit]	kg	120		129	129/136	136	160	168
Compressors								
Number of compressors	No				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
Capacity control	-				25 ⇒ 100 % stepless			
Fans								
Number of fans	No			12			16	
Type	-				axial			
Wheel nominal diameter	mm				900			
Rpm	1/min				900			
Nominal power input [each fan]	kW				2.35			
Fans power input	kW			28.2			37.6	
Air flow rate	m^3/h			235200			313600	
Evaporator								
Number of evaporators	No				1			
Type	-				shell & tube			
Internal volume [each circuit, refrigerant side]	l	93		112				132
Condensing coil								
Material tubes / fins	-				copper / aluminium			
Rows / Fins space	no/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	no/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
Dimensions								
Length	mm			9586			11578	
Depth	mm				2308			
Height	mm				2571			
Weights								
Net weight	kg	10630	10640	10763	10836	10974	12404	12591
Operating weight	kg	11627	11639	11718	11790	11991	13544	13808

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. 4o – Technical Data – FL4 068–106 **R 134a**

Model FL4		068	074	080	086	092	099	106
Performance (1)								
Cooling capacity	kW	737	778	830	929	963	1008	1067
Freecooling capacity	kW	460	464	469	611	614	619	624
Compressors power input	kW	221	247	276	267	286	307	333
Total power input	kW	243	269	298	296	315	336	362
Compressors COP	-	3.33	3.15	3.01	3.48	3.37	3.28	3.20
Unit EER	-	3.04	2.90	2.79	3.14	3.06	3.00	2.95
Coolant fluid flow	m^3/h	141.5	149.3	159.3	178.3	184.9	193.5	204.8
Hydraulic pressure drop	kPa	158	174	165	167	174	190	191
Performance (2)								
Cooling capacity	kW	762	803	854	941	979	1023	1077
Freecooling capacity	kW	463	467	471	611	615	619	624
Compressors power input	kW	244	270	299	284	307	327	350
Total power input	kW	266	292	321	313	336	356	379
Compressors COP	-	3.12	2.97	2.86	3.31	3.19	3.13	3.08
Unit EER	-	2.87	2.75	2.66	3.01	2.92	2.88	2.84
Coolant fluid flow	m^3/h	145.6	153.5	163.2	179.8	187.1	195.5	205.8
Hydraulic pressure drop	kPa	168	186	175	173	181	196	197
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)		73			74		
PWL [Sound Power Level] (4)	dB(A)		94			95.5		
Refrigeration circuits								
Number of refrigeration circuits	No				2			
Refrigerant charge [each circuit]	kg	120		129	155/160	160		168
Compressors								
Number of compressors	No				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
Capacity control	-				25 ⇒ 100 % stepless			
Fans								
Number of fans	No		12			16		
Type	-				axial			
Wheel nominal diameter	mm				800			
Rpm	1/min				900			
Nominal power input [each fan]	kW				1.80			
Fans power input	kW		21.6			28.8		
Air flow rate	m^3/h		208800			278400		
Evaporator								
Number of evaporators	No				1			
Type	-				shell & tube			
Internal volume [each circuit, refrigerant side]	l	93			112			132
Condensing coil								
Material tubes / fins	-				copper / aluminium			
Rows / Fins space	no/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	no/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	988	1048		1122
Dimensions								
Length	mm		9586			11578		
Depth	mm				2308			
Height	mm				2571			
Weights								
Net weight	kg	10510	10520	10643	12018	12154	12184	12371
Operating weight	kg	11508	11517	11595	13104	13300	13328	13588

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. 4p – Technical Data – FQ4 068–106 **R 134a**

Model FQ4		068	074	080	086	092	099	106
Performance (1)								
Cooling capacity	kW	695	731	776	882	910	951	1003
Freecooling capacity	kW	389	391	394	518	519	522	525
Compressors power input	kW	237	268	303	287	307	333	365
Total power input	kW	251	282	317	305	325	351	383
Compressors COP	-	2.93	2.73	2.56	3.07	2.96	2.86	2.75
Unit EER	-	2.77	2.59	2.45	2.89	2.80	2.71	2.62
Coolant fluid flow	m^3/h	133.4	140.3	149.0	169.3	174.7	182.6	192.5
Hydraulic pressure drop	kPa	142	154	145	153	158	170	171
Performance (2)								
Cooling capacity	kW	727	764	-	904	936	975	1024
Freecooling capacity	kW	392	394	-	520	522	524	527
Compressors power input	kW	270	301	-	311	337	362	392
Total power input	kW	284	315	-	329	355	380	410
Compressors COP	-	2.69	2.54	-	2.91	2.78	2.69	2.61
Unit EER	-	2.56	2.43	-	2.74	2.63	2.56	2.50
Coolant fluid flow	m^3/h	138.9	146.0	-	172.8	178.9	186.3	195.7
Hydraulic pressure drop	kPa	154	170	-	161	166	180	179
Sound level								
SPL [Sound Pressure Level] (3)	dB(A)		65.5				66	
PWL [Sound Power Level] (4)	dB(A)		86.5				87.5	
Refrigeration circuits								
Number of refrigeration circuits	No				2			
Refrigerant charge [each circuit]	kg		120	129	155/160		160	168
Compressors								
Number of compressors	No				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
Capacity control	-				25 ⇒ 100 % stepless			
Fans								
Number of fans	No		12				16	
Type	-				axial			
Wheel nominal diameter	mm				800			
Rpm	1/min				700			
Nominal power input [each fan]	kW				1.15			
Fans power input	kW		13.8				18.4	
Air flow rate	m^3/h		160800				214400	
Evaporator								
Number of evaporators	No				1			
Type	-				shell & tube			
Internal volume [each circuit, refrigerant side]	l		93		112			132
Condensing coil								
Material tubes / fins	-				copper / aluminium			
Rows / Fins space	no/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	no/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	988		1048	1122
Dimensions								
Length	mm		9586				11578	
Depth	mm				2308			
Height	mm				2571			
Weights								
Net weight	kg	10510	10520	10643	12018	12154	12184	12371
Operating weight	kg	11508	11517	11595	13104	13300	13328	13588

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 Dacromet – 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 the 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, a safety pressure switch for low pressure, a thermal expansion valve with equalizer, a filter dryer with disposable anti – acid solid cartridge, a humidity indicator lamp, high and low pressure safety valves, charge connections, a three – way solenoid valve enabling the thermal expansion valve to shut off the liquid in the piping and a manual on – off valve; circuit with economizer exchanger (optional), circuit with liquid injection in the compressor (optional), high and low pressure switches (optional) and inlet and outlet flexible hoses (only in the ”Q” versions).

The units are supplied charged with refrigerants R134a or R407C (depending on the versions) and oil as determined in the factory for the operating conditions within the indicated limits.

Mechanical Specifications

Refrigerant

The units are arranged for using the refrigerant R134a or R407C depending on the chosen models.

Technical notes R407C

Attention: The differences between units operating with refrigerant fluid R407C and those operating with fluid R22 are described below.

ATTENTION

The differences between the units operating with the fluid R407C and those operating with the fluid R22 are described below.

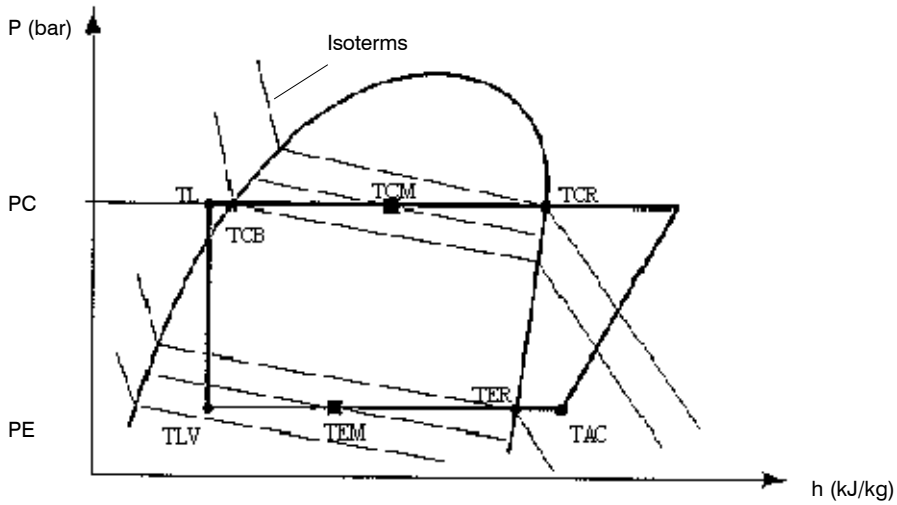
It has been proven that the chlorine inside some refrigerants (HCFC and above all CFC) is harmful for the atmosphere ozone layer.
The Montreal protocol, with the following amendments and the new European regulation no. 2037/2000, in force since 1st October 2000, limit in time, with several expiry dates, the production and use of the HCFC refrigerants, among which R22. The refrigerant R407C (HFC) does not contain chlorine and is thus absolutely suitable for the use in air conditioning systems, without damaging the ozone layer.

Its main features are:

- Non–azeotropic mixture made of R32/R125/R134a in which the percentage weight composition is, in ratio, 23/25/52.
- Thermophysical features similar to R22.
- ODP (Ozone Depletion Potential) equal to 0.
- Not flammable in the air.
- Low toxicity.

The new HFC fluids are essentially incompatible with the mineral oils which are usually used with R12 and R22.
Therefore, new synthetic lubricants based on polyester molecules have been developed for their use.

Note:
Considering the unique thermophysical properties of RC407C the refrigeration cycle is illustrated in the diagram below.



High pressure side

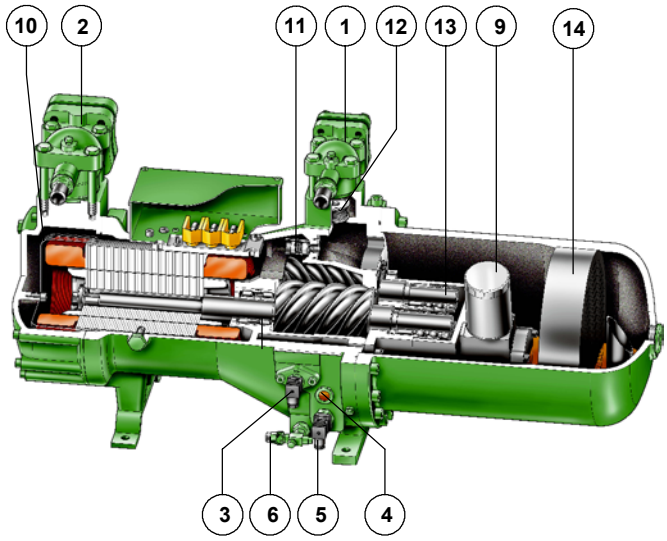
TCB: Condensation temperature bubble point (Liquid)
TCR: Condensation temperature dew point (Vapor)
TCM: Average condensation temperature (TCB+TCM)/2
TL: Temperature of the refrigerant at the expansion valve inlet Overheating = TAC - TER

Low pressure side

TLV: Liquid-steam temperature
TER: Evaporation temperature dew point (Vapor)
TEM: Average evaporation temperature (TLV+TER)/2
TAC: Temperature of the overheated vapour at the compressor inlet Sub-cooling = TCB -TL

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 level safety switch;
4 – oil sight glass;
5 – oil heater;
6 – oil fill/drain valve;
7 – direct liquid injection (option, standard on Q version);
8 – automatic start unloading;
9 – long–life fine oil filter 10 ìm mesh size;
10 – suction gas filter with large surface area and fine mesh;
11 – 28 bar differential pressure relief valve (according to PrEN 12693 standards).

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.

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 97/23/CE 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, 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 (R407C)	Water	Refrigerant (R407C)	Water
-10 / +90 °C	30.0 bar	10.0 bar	33.0 bar	11.0 bar

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 (KME Crossfin) to increase the thermal exchange. The Aluminium fins are manufactured with a special high efficiency rusticate surface that increases the thermal exchange.
The condenser coils are tested at a pressure of 30bar.

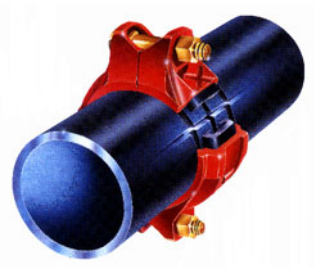
"HTD" High outdoor temperature device: liquid injection (versions R407C only)

The over–sizing of the heat exchangers and the wide operating range of the new generation screw compressors enable use in very hot climates, too. The compressor liquid injection device is available as an option (HTD) as an alternative to the economizer; this options keeps the oil temperature within largely tolerated temperature values, and enables the compressor to run up its operating limits without jeopardising its reliability or the life of its components (bearings).

The machine's continuity of service is even ensured when exceeding the maximum operating limits, as the microprocessor limits the compressor load (before locking it out), reducing its capacity to 50%.
Such device is not recommended in the units with R134a; only if the unit it operating under very hard conditions (e.g brine operation) such option can be actually used; for this reason, in case of doubt get in touch with your dealer.

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)

Il comprises an expansion vessel (charged at 1.5 bar, max. operating pressure 10 bar) and a safety valve set at 5 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

Superchiller 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.

Superchiller 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.
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 and electric connection with the separate module.
- Transducers and microprocessor control to manage the freecooling mode and the components installed in the separate 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.
- Electric board complete with switch for the pump, three–way valve, heater control thermostats, terminal board for the connection of the transducers and for the connection with the machine control electric board.

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 performances and technical features are described in the table below.

Tab. 5b – Technical features and performance

EMERSON 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

Mechanical Specifications

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 Freecooling 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 and efficiency class 1 (according to CEMEP). 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/EPDM 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.

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:

"A" 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" silent: . . . . . 8–pole motor, propeller diameter 800 mm, 700 rpm

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

Except the "A" versions, die–cast aluminum blades with sickle–shaped profile have been used to improve the sound deadening. The fan speed control, except in the "Q" versions, is carried out by an adjuster with speed continuous modulation, phase cutoff type (TRIAC). In the "Q" versions, the fan speed is controlled by an adjuster with speed continuous modulation, inverter type, to get the max. sound reduction even while modulating (such adjustment is available as option on the "L" versions, too).

EC fans (Option)

Only in the "L" and "Q" versions, as alternative to the standard modulating adjustment, it is possible to choose fans with electronic switching motor, with the same aeraulic performance as those installed in the selected unit, as well as the possibility of a fan modulating adjustment entirely managed by the 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 adjusted by two independent microprocessor boards (Master and Subunit) installed on each electric board and reciprocally connected by Hirobus 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.

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.

Main features:

- power supply, 400 V ±10% / 3 Ph + PE / 50Hz;
- 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;
- fuses, contactors and thermal relays for protecting the pumps (optional);
- MCBs for fans with modulating speed control;
- manual operation through Microface 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 98/37/CE (89/392/CEE; 91/368/CEE; 93/68/CEE), 89/336/CEE; 73/23/CEE; 97/23/CE. The Quality management system of the HPAC division is approved by LRQA in conformity with the norms ISO 9001:2000 and the product is the result of the activities performed according to the provisions in the processes, procedures and plans for the quality.

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) **R407C**

Model			081/080	087/086	093/092	100/099	107/106	115/114	122/121	131/130	140/139
CA7	Water flow	m^3/h	152.2	159.6	171.3	179.7	199	208.3	227.4	251.5	263
	Available pressure head	kPa	112	101	84	70	59	44	106	74	107
CB7	Water flow	m^3/h	148.3	155	166.2	173.9	193.5	202.1	221.2	246.1	257.1
	Available pressure head	kPa	119	107	92	80	66	54	115	81	114
CL7	Water flow	m^3/h	153.4	160.8	176.3	185.1	195.9	204.7	229.8	240.6	251.3
	Available pressure head	kPa	111	99	76	61	63	50	103	88	123
CQ7	Water flow	m3/h	142.9	149	164.3	171.8	180.8	188	214.3	–	–
	Available pressure head	kPa	126	117	95	83	85	76	125	–	–
Pump rotor model		–	80–160/147 (1+1)						80–160/151 (1+1)		80–160/161 (1+1)
Nominal motor power		kW	11						15		18.5
Noise level (*)		dB(A)	65								66
Each pump weight		kg	175						183		206

(*) – According to ISO 3744

Tab. 5d - High head pressure (Chiller) **R407C**

Model			081/080	087/086	093/092	100/099	107/106	115/114	122/121	131/130	140/139
CA7	Water flow	m^3/h	152.2	159.6	171.3	179.7	199	208.3	227.4	251.5	263
	Available pressure head	kPa	179	167	148	133	118	102	159	123	131
CB7	Water flow	m^3/h	148.3	155	166.2	173.9	193.5	202.1	221.2	246.1	257.1
	Available pressure head	kPa	186	173	157	143	127	113	168	131	142
CL7	Water flow	m^3/h	153.4	160.8	176.3	185.1	195.9	204.7	229.8	240.6	251.3
	Available pressure head	kPa	177	165	139	123	123	108	155	139	153
CQ7	Water flow	m3/h	142.9	149	164.3	171.8	180.8	188	214.3	–	–
	Available pressure head	kPa	194	184	160	148	147	138	177	–	–
Pump rotor model		–	80–160/151 (1+1)						80–160/161 (1+1)		80–160/167 (1+1)
Nominal motor power		kW	15						18.5		22
Noise level (*)		dB(A)	65						66		68
Each pump weight		kg	183						206		243

(*) – According to ISO 3744

Mechanical Specifications

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

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106
CA4	Water flow	m^3/h	128.1	135.9	145.5	151.5	159.3	167.2	182.8
	Available pressure head	kPa	133	120	125	116	105	92	80
CB4	Water flow	m^3/h	125.9	133.5	142.6	148.3	155.7	163.4	179.1
	Available pressure head	kPa	137	125	128	122	110	98	85
CL4	Water flow	m^3/h	125.2	132.8	146.4	152.4	162.9	171.1	181.3
	Available pressure head	kPa	137	125	124	115	99	87	82
CQ4	Water flow	m3/h	119.2	125.9	139.7	144.8	155.3	163.1	172.2
	Available pressure head	kPa	147	136	132	125	110	98	95
Pump rotor model		–	80–160/147 (1+1)						
Nominal motor power		kW	11						
Noise level (*)		dB(A)	65						
Each pump weight		kg	175						

(*) – According to ISO 3744

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

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106
CA4	Water flow	m^3/h	128.1	135.9	145.5	151.5	159.3	167.2	182.8
	Available pressure head	kPa	202	188	193	183	171	157	142
CB4	Water flow	m^3/h	125.9	133.5	142.6	148.3	155.7	163.4	179.1
	Available pressure head	kPa	206	193	196	189	176	163	148
CL4	Water flow	m^3/h	125.2	132.8	146.4	152.4	162.9	171.1	181.3
	Available pressure head	kPa	206	194	192	182	164	151	145
CQ4	Water flow	m3/h	119.2	125.9	139.7	144.8	155.3	163.1	172.2
	Available pressure head	kPa	216	206	201	193	176	164	159
Pump rotor model		–	80–160/151 (1+1)						
Nominal motor power		kW	15						
Noise level (*)		dB(A)	65						
Each pump weight		kg	183						

(*) – According to ISO 3744

Mechanical Specifications

Tab. 5g - Standard head pressure (Freecooling) **R407C**

Model			081/080	087/086	093/092	100/099	107/106	115/114	122/121
FA7	Fluid glycol flow	m^3/h	173.5	181.0	190.6	218.8	233.2	244.0	254.9
	Available pressure head	kPa	114	94	71	31	21	91	95
FB7	Fluid glycol flow	m^3/h	168.2	175.1	183.7	212.9	226.5	236.5	246.7
	Available pressure head	kPa	127	112	93	54	46	108	114
FL7	Fluid glycol flow	m^3/h	162.8	187.4	197.9	206.9	219.8	247.4	258.8
	Available pressure head	kPa	96	60	34	70	57	124	130
FQ7	Fluid glycol flow	m3/h	147.4	174.3	182.8	190.0	200.8	230.2	239.4
	Available pressure head	kPa	142	99	79	134	128	157	168
Pump rotor model		–	80–160/161 (1+1)			80–200/178 (1+1)		80–160/167 (2)	
Nominal motor power		kW	18.5			30		22 + 22	
Noise level (*)		dB(A)	66			69		68	
Each pump weight		kg	206			377		243	

(*) – According to ISO 3744

Tab. 5h - High head pressure (Freecooling) **R407C**

Model			081/080	087/086	093/092	100/099	107/106	115/114	122/121
FA7	Fluid glycol flow	m^3/h	173.5	181.0	190.6	218.8	233.2	244.0	254.9
	Available pressure head	kPa	152	132	110	95	87	148	152
FB7	Fluid glycol flow	m^3/h	168.2	175.1	183.7	212.9	226.5	236.5	246.7
	Available pressure head	kPa	165	150	132	117	112	165	171
FL7	Fluid glycol flow	m^3/h	162.8	187.4	197.9	206.9	219.8	247.4	258.8
	Available pressure head	kPa	133	97	73	135	123	174	179
FQ7	Fluid glycol flow	m3/h	147.4	174.3	182.8	190.0	200.8	230.2	239.4
	Available pressure head	kPa	177	136	120	199	194	208	217
Pump rotor model		–	80–160/167 (1+1)			80–200/188 (1+1)		80–200/178 (2)	
Nominal motor power		kW	22			30		30 + 30	
Noise level (*)		dB(A)	68			69		69	
Each pump weight		kg	243			377		377	

(*) – According to ISO 3744

Mechanical Specifications

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

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106
FA4	Fluid glycol flow	m^3/h	147.0	155.5	166.4	172.6	178.3	200.8	212.5
	Available pressure head	kPa	119	91	132	116	100	87	63
FB4	Fluid glycol flow	m^3/h	144.4	152.6	163.0	168.9	174.3	197.3	209.0
	Available pressure head	kPa	127	99	140	124	111	98	77
FL4	Fluid glycol flow	m^3/h	141.5	149.3	159.3	178.3	184.9	193.5	204.8
	Available pressure head	kPa	133	109	107	85	70	112	88
FQ4	Fluid glycol flow	m3/h	133.4	140.3	149.0	169.3	174.7	182.6	192.5
	Available pressure head	kPa	156	138	139	110	96	152	131
Pump rotor model		–	80–160/161 (1+1)					80–200/178 (1+1)	
Nominal motor power		kW	18.5					30	
Noise level (*)		dB(A)	66					69	
Each pump weight		kg	206					377	

(*) – According to ISO 3744

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

Model			069/068	075/074	081/080	087/086	093/092	100/099	107/106
FA4	Fluid glycol flow	m^3/h	147.0	155.5	166.4	172.6	178.3	200.8	212.5
	Available pressure head	kPa	156	128	169	154	137	151	128
FB4	Fluid glycol flow	m^3/h	144.4	152.6	163.0	168.9	174.3	197.3	209.0
	Available pressure head	kPa	163	136	177	163	148	163	140
FL4	Fluid glycol flow	m^3/h	141.5	149.3	159.3	178.3	184.9	193.5	204.8
	Available pressure head	kPa	169	145	145	123	108	176	152
FQ4	Fluid glycol flow	m3/h	133.4	140.3	149.0	169.3	174.7	182.6	192.5
	Available pressure head	kPa	192	173	176	147	134	216	194
Pump rotor model		–	80–160/167 (1+1)					80–200/188 (1+1)	
Nominal motor power		kW	22					30	
Noise level (*)		dB(A)	68					69	
Each pump weight		kg	243					377	

(*) – According to ISO 3744

Mechanical Specifications

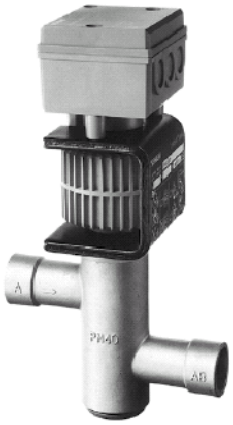
Anti–Vibration mounts

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 to dampen the high frequencies and to limit the 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 to dampen high and medium frequencies > 6 Hz, guaranteeing excellent efficiency.

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 high compressor choking. 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 magnetic motor of the expansion valve guarantees superior advantages on the adjustment quality that cannot be obtained with other technologies used for this types of valves /stepped motors), such as:

- continuous adjustment with unlimited adjustment positions;
- extremely high positioning speed (< 1.0 sec for an adjustment 0–100%);
- very accurate control on overheating;
- microprocessor – algorithms highly adjustable and adaptable for the most different load variations (transients).

The final result of the application of the electro–magnetic 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.

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, with EC type fans or inverter) driven by the Microface 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.

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

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.

Namely:

Cod. 486064 . . . . . manifold kit for chiller and freecooling in no–glycol version without pumps from 2 x DN 125 to 1 x DN 150 (c/c distance 5500 mm)

Cod. 486065 . . . . . manifold kit for chiller and freecooling in no–glycol without pumps from 2 x DN 150 to 1 x DN 200 (c/c distance 5500 mm)

Cod. 486066 . . . . . manifold kit for chiller and freecooling in no–glycol without pumps from 2 x DN 150 to 1 x DN 200 (c/c distance 6500 mm)

Cod. 486067 . . . . . manifold kit for chiller anf freecooling with pumps complete with shut–off valves on each pump: from 2 x DN 125 to 1 x DN 150

Cod. 486068 . . . . . manifold kit for chiller and freecooling with pumps complete with shut–off valves on each pump: from 2 x DN 150 to 1 x DN 200

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.
- High and low pressure gauges located in the compressor compartment (recommended to aid the unit control and maintenance).
- Compressor power factor capacitors: they enable to get a Cosfi value equal to about 0.94 on the compressors, in rated operating conditions.
- Certified lifting bars.

6 Controls

Microprocessor Controls

Microface Evolution

MICROFACE & HIROMATIC

Microface 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 Microface Evolution, which allows the programming of temperature and pressure thresholds as well as the teamwork functionality through the proprietary Hirobus system. 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.

- 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 Microface 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 via Hirobus, within the whole of the **Liebert HPC–L** Units system.
- A special working mode can be established in combination with **Emerson Network Power HPAC** Units to obtain the so called "Supersaver" system, that enhances the energy saving capabilities. Through a simple 2–wires connection 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 16 **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.

Technical data Microface Evolution

- E2prom: . . . . . 64 Kbit;
- Eprom/Flash memory: . . . . . 1, 2 or 4 Mbit;
- RAM memory space: . . . . . 256 Kbit;
- Analog Input: . . . . . 3 x Analog 0–10V;
- Digital Input: . . . . . 8 x Flexible Analog multi input;
- Analog Output: . . . . . 2 x Analog 0–10V;
- Digital output: . . . . . 7 triacs output and 2+1 relay output;
- Time and date function buffered by an LI–battery;
- Hirobus LAN connectors: . . . . . 3 RJ45 sockets (to Microface and Hiromatic LAN and Slave–Board and Microface Display);
- Hironet connectors: . . . . . 1 RJ9 socket for RS485 (direct connection to **Emerson Network Power** supervision systems).

Hiromatic Evolution for Liebert HPC–L Line

All **Emerson Network Power Liebert HPC–L** units are equipped with the latest electronic technology; one of the highlights is the new Hiromatic Evolution, with 32 Kbyte of buffered RAM to store data and with an integrated RS–422/485 for the Hirolink communication manager connection.
The new ergonomic design allows its use also as portable device, to be used for start–up and "flying connections "by service personnel. Hiromatic Evolution can locally manage up to 16 air units (or up to 8 when linked to supervision systems) connected via the high speed communication Hirobus cable. A multi–language menu with on–the–fly language selection is available.
Hiromatic Evolution offers the possibility to access all the connected units of the Microface LAN system from one point.

- Hiromatic System Window: it allows to have the system operation status at a glance.
- Self–explanatory Icons: they are used for the Menu–Layout of the Hiromatic Evolution.
- Online Help: every single parameter has its own multi–page explanation.
- Status Report: of the latest 200 event–messages are stored for the system (which represent the summary of the reports of all the connected units) and 200 event–messages are available for each single unit. The unit status report is stored into the Microface memory and even if Hiromatic it is not connected, connecting one Hiromatic equipped with **Liebert HPC–L** units SW it is possible to upload into the Hiromatic all the information present into each single Microface.
- Four different Graphic Data Records: they are provided for each single unit: the temperature and humidity trends referring to the last 24 hours and 8 days.(Each unit's record remains stored in Microface E and is uploaded by Hiromatic E).Hiromatic Evolution creates and saves its own Graphic Data Record with the average of all the units connected.
- Timer Mode (electronic timer included in the Software) to select the time–related functionality of the system.
- Semi or Full Manual Mode software management including all safety devices.
- A 4–Level Passwords system: it safely protects all the settings.

Technical data Hiromatic Evolution

- Eprom/Flash memory: . . . . . 2 or 4 Mbit;
- RAM memory space: . . . . . 256 Kbit;
- Time and date function buffered by an LI–battery;
- Hirobus Lan connectors: . . . . . 2 RJ45 sockets (to Microface);
- Hironet connectors: . . . . . 2 RJ9 socket for RS422/485
  (Hirolink connection versus Supervision Systems).

Liebert HPC–L Connectivity

Microface and Hiromatic Graphic allow Connectivity with superior levels of control and supervision systems:

Hirolink SMM:

can send SMS messages of Microface and system alarms, indicating also the number of units connected in network. On message request the unit will answer in one sms–message with the most important values, such as: actual temperatures, setpoints, number of compressors in operation, condensing pressure, alarm status . . .

Hirovisor IP 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.

CONNECTIVITY

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, SNMP.

7 Cooling Capacity Performance

Tab. 7a – CA7 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	958	239	49	5
	1019	246	55	7
	1081	254	61	9
	1146	263	69	11
	1213	272	77	13
30	897	264	43	5
	955	272	48	7
	1014	280	54	9
	1076	289	61	11
	1139	299	68	13
35	830	292	37	5
	885	300	42	7
	941	310	47	9
	999	319	53	11
	1059	329	59	13
40	757	323	31	5
	808	332	35	7
	861	342	40	9
	916	353	45	11
	972	363	51	13

Tab. 7b – CA7 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1012	263	54	5
	1075	272	61	7
	1139	281	68	9
	1206	292	76	11
	1274	302	85	13
30	945	289	48	5
	1004	299	53	7
	1065	309	60	9
	1128	320	67	11
	1192	331	75	13
35	872	318	41	5
	928	328	46	7
	985	339	52	9
	1044	350	58	11
	1105	362	65	13
40	793	349	34	5
	845	360	39	7
	899	372	44	9
	954	384	49	11

Tab. 7c – CA7 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1090	284	60	5
	1157	294	68	7
	1226	304	75	9
	1296	316	84	11
	1369	328	94	13
30	1016	310	53	5
	1079	321	59	7
	1144	332	66	9
	1211	344	74	11
	1279	357	82	13
35	937	339	45	5
	996	351	51	7
	1057	362	57	9
	1119	375	64	11
	1183	388	71	13
40	853	370	38	5
	908	382	43	7
	965	395	48	9
	1023	408	54	11

Tab. 7d – CA7 100

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1143	308	66	5
	1212	319	74	7
	1282	331	82	9
	1355	343	92	11
	1429	357	–	13
30	1066	338	58	5
	1131	349	65	7
	1197	362	72	9
	1265	375	81	11
	1334	390	89	13
35	984	371	50	5
	1044	384	56	7
	1106	397	62	9
	1170	411	69	11
	1235	426	77	13
40	896	408	42	5
	953	422	47	7
	1010	436	52	9

Tab. 7e – CA7 107

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1253	318	55	5
	1329	330	61	7
	1407	342	69	9
	1487	355	77	11
	1569	368	–	13
30	1174	350	49	5
	1246	362	54	7
	1319	375	61	9
	1394	388	68	11
	1471	403	75	13
35	1090	387	42	5
	1157	399	47	7
	1226	413	53	9
	1296	427	59	11
	1368	442	66	13
40	1000	429	36	5
	1062	442	40	7
	1126	457	45	9
	1192	472	50	11

Tab. 7f – CA7 115

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1314	347	60	5
	1393	359	68	7
	1475	373	75	9
	1558	386	–	11
	1644	401	–	13
30	1230	381	53	5
	1305	394	60	7
	1382	408	67	9
	1461	423	74	11
	1542	439	–	13
35	1140	419	46	5
	1211	433	52	7
	1283	448	58	9
	1357	464	65	11
	1433	481	72	13
40	1044	461	39	5
	1110	477	44	7
	1178	493	49	9

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Water
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7g – CA7 122

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1426	360	48	5
	1514	372	54	7
	1605	385	61	9
	1699	398	68	11
	1796	413	76	13
30	1337	394	43	5
	1421	408	48	7
	1508	422	54	9
	1597	436	60	11
	1689	451	67	13
35	1242	432	37	5
	1322	447	42	7
	1404	462	47	9
	1488	478	53	11
	1575	494	59	13
40	1140	473	31	5
	1215	489	36	7
	1292	505	40	9
	1372	523	45	11

Tab. 7h – CA7 131

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1556	363	57	5
	1654	375	64	7
	1755	387	72	9
	1860	400	–	11
	1968	414	–	13
30	1468	400	51	5
	1561	412	57	7
	1657	425	65	9
	1757	439	72	11
	1860	453	–	13
35	1373	440	45	5
	1462	453	51	7
	1553	467	57	9
	1648	482	64	11

Tab. 7i – CA7 140

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1626	390	62	5
	1727	403	70	7
	1832	417	78	9
	1939	431	–	11
	2050	446	–	13
30	1535	430	56	5
	1631	444	63	7
	1730	458	70	9
	1832	473	79	11
	1938	489	–	13
35	1437	475	49	5
	1528	489	55	7
	1622	504	62	9
	1720	520	70	11

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Water
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7j – CB7 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	939	246	47	5
	998	254	53	7
	1059	263	59	9
	1121	272	66	11
	1186	281	74	13
30	877	272	41	5
	933	281	46	7
	990	290	52	9
	1049	300	58	11
	1110	310	65	13
35	809	301	35	5
	861	310	40	7
	915	320	45	9
	971	330	50	11
	1028	341	56	13
40	734	332	29	5
	784	343	33	7
	834	353	38	9
	886	365	42	11

Tab. 7k – CB7 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	990	271	52	5
	1051	281	58	7
	1113	291	65	9
	1177	302	72	11
	1242	313	81	13
30	922	298	45	5
	979	309	51	7
	1037	319	57	9
	1097	331	64	11
	1159	343	71	13
35	848	328	39	5
	901	339	44	7
	956	350	49	9
	1012	362	55	11
	1069	375	61	13
40	768	359	32	5
	817	371	36	7
	868	383	41	9

Tab. 7l – CB7 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1065	293	58	5
	1129	303	64	7
	1195	315	72	9
	1262	327	80	11
	1331	340	89	13
30	990	320	50	5
	1050	331	56	7
	1112	343	63	9
	1175	356	70	11
	1240	370	78	13
35	910	349	43	5
	966	361	48	7
	1024	374	54	9
	1083	387	60	11
	1143	402	66	13
40	824	381	35	5
	877	393	40	7
	931	407	45	9

Tab. 7m – CB7 100

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1115	318	63	5
	1181	330	70	7
	1248	343	78	9
	1317	357	87	11
	1387	371	–	13
30	1037	349	55	5
	1099	362	61	7
	1162	375	68	9
	1226	390	76	11
	1292	405	84	13
35	954	384	47	5
	1011	397	52	7
	1070	412	58	9
	1130	427	65	11
	1191	443	72	13
40	865	422	39	5
	918	436	44	7

Tab. 7n – CB7 107

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1227	329	53	5
	1300	341	59	7
	1374	354	66	9
	1451	367	73	11
	1529	382	–	13
30	1147	362	46	5
	1215	375	52	7
	1285	388	58	9
	1357	403	64	11
	1430	418	71	13
35	1061	400	40	5
	1125	414	45	7
	1190	428	50	9
	1257	443	56	11
	1325	460	62	13
40	970	444	34	5
	1029	459	38	7
	1090	474	42	9

Tab. 7o – CB7 115

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1284	359	58	5
	1360	372	65	7
	1438	386	72	9
	1518	401	–	11
	1600	417	–	13
30	1199	394	51	5
	1270	408	57	7
	1344	424	63	9
	1419	440	70	11
	1496	456	78	13
35	1107	433	44	5
	1175	449	49	7
	1243	465	55	9
	1314	482	61	11
	1386	500	67	13
40	1010	477	37	5
	1072	493	41	7

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 407C*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7p – CB7 122

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1396	371	47	5
	1482	384	52	7
	1570	398	58	9
	1660	413	65	11
	1753	428	72	13
30	1307	407	41	5
	1387	421	46	7
	1471	436	51	9
	1556	452	57	11
	1644	468	64	13
35	1210	445	35	5
	1286	461	40	7
	1365	477	45	9
	1445	494	50	11
	1528	512	56	13
40	1106	487	30	5
	1178	504	34	7
	1252	521	38	9
	1328	540	42	11

Tab. 7q – CB7 131

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1531	373	55	5
	1626	386	62	7
	1724	399	70	9
	1825	413	78	11
	1930	428	–	13
30	1441	411	49	5
	1531	424	55	7
	1625	438	62	9
	1721	453	70	11
	1821	468	78	13
35	1345	452	43	5
	1431	466	49	7
	1519	481	55	9

Tab. 7r – CB7 140

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1599	402	60	5
	1697	416	68	7
	1798	430	76	9
	1902	445	–	11
	2009	462	–	13
30	1506	443	54	5
	1599	458	60	7
	1695	473	68	9
	1793	489	75	11
	1895	506	–	13
35	1407	490	47	5
	1495	505	53	7
	1586	521	60	9

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 407C*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7s – CL7 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	963	236	49	5
	1024	244	55	7
	1088	252	62	9
	1154	260	70	11
	1222	269	78	13
30	903	261	44	5
	961	269	49	7
	1021	277	55	9
	1084	286	62	11
	1148	295	69	13
35	836	289	38	5
	891	298	43	7
	948	307	48	9
	1007	316	54	11
	1068	326	60	13
40	763	320	32	5
	815	329	36	7
	869	339	41	9
	924	349	46	11
	982	360	51	13

Tab. 7t – CL7 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1018	261	55	5
	1082	269	62	7
	1147	279	69	9
	1215	288	77	11
	1284	299	86	13
30	951	287	48	5
	1011	296	54	7
	1073	306	61	9
	1137	316	68	11
	1202	327	76	13
35	879	315	41	5
	935	325	47	7
	993	336	53	9
	1053	347	59	11
	1115	359	66	13
40	800	346	35	5
	853	357	39	7
	908	368	44	9
	964	380	50	11

Tab. 7u – CL7 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1115	275	63	5
	1184	284	71	7
	1256	294	79	9
	1330	305	88	11
	1407	316	–	13
30	1042	301	55	5
	1108	311	62	7
	1175	321	70	9
	1245	333	78	11
	1317	345	87	13
35	963	330	48	5
	1025	340	54	7
	1089	351	60	9
	1155	363	67	11
	1222	376	75	13
40	879	361	40	5
	937	372	45	7
	997	383	51	9
	1058	396	57	11
	1121	409	64	13

Tab. 7v – CL7 099

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1170	297	69	5
	1242	308	77	7
	1316	319	87	9
	1393	331	97	11
	1471	343	–	13
30	1094	327	61	5
	1162	338	68	7
	1232	349	76	9
	1303	362	85	11
	1377	375	–	13
35	1013	359	52	5
	1076	371	59	7
	1142	383	66	9
	1209	396	74	11
	1277	410	82	13
40	926	396	44	5
	985	408	50	7
	1046	421	56	9
	1108	435	63	11

Tab. 7w – CL7 106

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1239	324	54	5
	1313	336	60	7
	1390	348	67	9
	1468	361	75	11
	1548	375	–	13
30	1159	357	47	5
	1229	369	53	7
	1300	382	59	9
	1374	396	66	11
	1449	411	73	13
35	1073	394	41	5
	1138	408	46	7
	1205	421	51	9
	1274	436	57	11
	1344	452	63	13
40	982	438	35	5
	1043	452	39	7
	1105	467	43	9

Tab. 7x – CL7 114

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1298	353	59	5
	1376	366	66	7
	1455	380	74	9
	1537	394	–	11
	1621	410	–	13
30	1213	388	52	5
	1286	402	58	7
	1361	417	65	9
	1438	432	72	11
	1517	448	–	13
35	1121	427	45	5
	1190	442	50	7
	1260	458	56	9
	1332	475	62	11
	1407	492	69	13
40	1024	471	38	5
	1088	487	42	7

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Water
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7y – CL7 121

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1438	355	49	5
	1527	367	55	7
	1619	380	62	9
	1715	393	69	11
	1813	407	77	13
30	1350	390	43	5
	1435	402	49	7
	1523	416	55	9
	1613	430	61	11
	1707	445	68	13
35	1255	427	38	5
	1336	441	43	7
	1419	456	48	9
	1505	471	54	11
	1593	488	60	13
40	1153	468	32	5
	1229	483	36	7
	1308	499	41	9
	1389	516	46	11
	1472	534	52	13

Tab. 7z – CL7 130

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1505	384	54	5
	1597	397	60	7
	1692	411	67	9
	1790	426	75	11
	1891	442	–	13
30	1414	422	48	5
	1501	437	53	7
	1591	451	60	9
	1684	467	67	11
	1780	484	74	13
35	1316	465	41	5
	1399	480	47	7

Tab. 7aa – CL7 139

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1571	414	58	5
	1666	429	65	7
	1763	444	73	9
	1863	461	–	11
	1966	478	–	13
30	1476	457	52	5
	1566	472	58	7
	1658	489	65	9
	1753	506	72	11
	1851	524	80	13
35	1376	505	45	5
	1460	521	51	7

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 407C*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7ab – CQ7 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	916	256	45	5
	972	265	50	7
	1030	274	56	9
	1089	284	62	11
	1150	295	69	13
30	852	283	39	5
	904	292	44	7
	959	302	49	9
	1015	313	55	11
	1072	324	61	13
35	781	312	33	5
	831	323	37	7
	882	334	42	9
	934	345	47	11
	987	357	52	13
40	704	345	27	5
	751	356	31	7
	798	368	35	9

Tab. 7ac – CQ7 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	963	282	49	5
	1020	293	55	7
	1079	304	61	9
	1139	315	68	11
	1201	328	76	13
30	892	310	43	5
	946	321	48	7
	1001	333	53	9
	1057	345	59	11
	1115	359	66	13
35	816	340	36	5
	866	352	40	7
	917	365	45	9
	970	378	50	11
	1023	392	55	13
40	734	373	30	5
	780	385	33	7

Tab. 7ad – CQ7 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1057	295	57	5
	1120	306	63	7
	1185	318	71	9
	1252	331	79	11
	1320	345	87	13
30	981	323	49	5
	1040	335	55	7
	1101	347	62	9
	1163	360	68	11
	1226	374	76	13
35	899	353	42	5
	955	365	47	7
	1011	378	52	9
	1069	392	58	11
	1128	407	65	13
40	813	385	35	5
	864	398	39	7
	917	411	44	9

Tab. 7ae – CQ7 099

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1107	322	62	5
	1172	334	69	7
	1238	347	77	9
	1306	361	86	11
	1375	376	–	13
30	1027	353	54	5
	1088	366	60	7
	1150	380	67	9
	1213	395	74	11
	1277	410	82	13
35	942	389	46	5
	999	402	51	7
	1056	417	57	9
	1114	433	63	11
	1174	449	70	13
40	853	428	38	5
	904	442	43	7

Tab. 7af – CQ7 106

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1168	353	48	5
	1234	367	53	7
	1302	382	59	9
	1370	397	66	11
	1440	414	72	13
30	1084	390	42	5
	1145	404	46	7
	1208	420	52	9
	1272	437	57	11
	1337	455	63	13
35	994	432	35	5
	1051	448	40	7
	1109	465	44	9
	1168	483	48	11

Tab. 7ag – CQ7 114

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1218	386	52	5
	1287	402	58	7
	1357	418	65	9
	1429	436	71	11
	1502	454	79	13
30	1128	424	45	5
	1193	441	50	7
	1258	459	56	9
	1325	478	61	11
	1393	498	67	13
35	1033	467	38	5
	1093	485	42	7
	1153	504	47	9

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 407C*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7ah – CQ7 121

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1365	383	44	5
	1447	398	50	7
	1531	413	55	9
	1617	429	62	11
	1705	446	68	13
30	1273	420	39	5
	1350	436	44	7
	1429	452	49	9
	1510	469	54	11
	1593	487	60	13
35	1174	460	33	5
	1246	477	37	7
	1320	494	42	9
	1397	513	47	11
	1475	533	51	13
40	1068	502	28	5
	1136	520	31	7

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 407C*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7ai – CA4 069

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	778	161	48	5
	831	165	55	7
	887	170	62	9
	943	175	70	11
	1002	181	78	13
30	738	174	44	5
	789	179	50	7
	843	185	56	9
	898	190	63	11
	953	196	71	13
35	696	190	39	5
	745	195	44	7
	795	201	50	9
	848	206	57	11
	903	213	64	13
40	651	207	34	5
	697	213	39	7
	745	218	45	9
	795	225	50	11
	847	231	57	13

Tab. 7aj – CA4 075

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	825	175	54	5
	881	180	61	7
	937	185	69	9
	996	190	78	11
	1058	196	–	13
30	784	191	49	5
	837	196	56	7
	892	202	63	9
	948	207	70	11
	1007	214	–	13
35	740	210	44	5
	790	215	50	7
	843	221	56	9
	898	227	64	11
	953	233	71	13
40	693	230	39	5
	741	236	44	7
	791	242	50	9
	843	249	57	11
	897	256	64	13

Tab. 7ak – CA4 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	884	191	39	5
	943	196	44	7
	1004	202	50	9
	1067	208	56	11
	1130	214	63	13
30	840	210	35	5
	896	216	40	7
	954	222	45	9
	1015	228	51	11
	1077	235	57	13
35	792	232	32	5
	846	238	36	7
	901	244	41	9
	959	251	46	11
	1019	258	52	13
40	742	256	28	5
	793	262	32	7
	846	269	36	9
	901	276	41	11
	958	284	46	13

Tab. 7al – CA4 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	925	208	43	5
	986	215	48	7
	1049	222	54	9
	1113	230	61	11
	1181	238	68	13
30	876	227	38	5
	935	234	44	7
	995	242	49	9
	1058	250	55	11
	1122	258	62	13
35	825	248	34	5
	881	256	39	7
	939	264	44	9
	999	272	50	11
	1061	281	56	13
40	770	272	30	5
	824	280	34	7
	879	288	39	9
	936	297	44	11
	995	307	49	13

Tab. 7am – CA4 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	973	222	47	5
	1038	230	53	7
	1103	238	60	9
	1172	247	67	11
	1244	256	76	13
30	922	240	42	5
	984	248	48	7
	1048	257	54	9
	1112	266	61	11
	1181	275	69	13
35	867	260	38	5
	926	269	43	7
	987	278	49	9
	1051	287	55	11
	1115	297	62	13
40	808	283	33	5
	865	292	38	7
	924	302	43	9
	984	312	48	11
	1047	323	55	13

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7an – CA4 100

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1023	235	52	5
	1090	244	58	7
	1157	252	66	9
	1228	261	74	11
	1302	270	83	13
30	969	255	46	5
	1033	264	53	7
	1097	273	60	9
	1165	282	67	11
	1236	292	75	13
35	911	278	42	5
	972	288	47	7
	1035	297	53	9
	1099	307	60	11
	1166	318	67	13
40	851	305	37	5
	909	315	42	7
	969	326	47	9
	1031	337	53	11
	1093	348	59	13

Tab. 7ao – CA4 107

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1109	240	48	5
	1181	248	54	7
	1257	255	61	9
	1335	264	68	11
	1415	272	76	13
30	1055	261	43	5
	1122	269	49	7
	1194	277	55	9
	1269	286	62	11
	1346	295	69	13
35	996	286	39	5
	1062	294	44	7
	1129	303	49	9
	1200	313	56	11
	1273	323	63	13
40	934	315	34	5
	997	324	39	7
	1063	334	44	9
	1128	344	50	11
	1197	355	56	13

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 134a
7) Fluid: Water
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7ap – CB4 069

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	767	164	47	5
	819	169	53	7
	873	175	60	9
	928	180	67	11
	986	186	76	13
30	727	178	42	5
	777	184	48	7
	828	189	54	9
	882	195	62	11
	936	201	69	13
35	684	194	38	5
	732	200	43	7
	781	206	49	9
	832	212	55	11
	885	218	62	13
40	638	212	33	5
	684	218	38	7
	730	224	43	9
	779	231	48	11
	829	237	55	13

Tab. 7aq – CB4 075

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	814	179	53	5
	868	185	59	7
	922	190	67	9
	980	196	75	11
	1040	202	–	13
30	771	196	48	5
	823	202	54	7
	877	208	61	9
	931	214	68	11
	988	220	77	13
35	726	215	42	5
	776	221	48	7
	827	227	54	9
	880	234	61	11
	933	241	69	13
40	679	236	37	5
	726	243	42	7
	774	249	48	9
	825	256	54	11
	877	264	61	13

Tab. 7ar – CB4 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	871	197	38	5
	928	203	43	7
	987	209	48	9
	1048	215	54	11
	1110	221	61	13
30	825	217	34	5
	880	223	39	7
	936	229	44	9
	995	236	49	11
	1055	243	55	13
35	777	239	31	5
	829	245	35	7
	883	252	39	9
	939	259	44	11
	996	267	49	13
40	727	263	27	5
	776	270	31	7
	827	278	35	9
	880	286	39	11
	935	294	44	13

Tab. 7as – CB4 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	909	214	41	5
	968	221	47	7
	1030	229	53	9
	1092	237	59	11
	1157	246	66	13
30	860	234	37	5
	916	241	42	7
	975	249	47	9
	1036	258	53	11
	1097	267	60	13
35	807	256	33	5
	862	264	37	7
	918	272	42	9
	976	281	48	11
	1036	291	53	13
40	753	280	29	5
	804	289	33	7
	857	298	37	9
	912	307	42	11
	969	318	47	13

Tab. 7at – CB4 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	956	228	45	5
	1019	236	51	7
	1084	245	58	9
	1149	254	65	11
	1218	264	73	13
30	903	246	41	5
	963	255	46	7
	1026	264	52	9
	1090	274	59	11
	1154	284	66	13
35	848	267	36	5
	905	277	41	7
	964	286	46	9
	1026	297	52	11
	1088	307	59	13
40	789	291	32	5
	844	301	36	7
	900	312	41	9
	958	323	46	11
	1019	334	51	13

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7au – CB4 100

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1004	242	50	5
	1069	251	56	7
	1133	260	63	9
	1202	269	71	11
	1273	280	79	13
30	947	263	45	5
	1010	272	51	7
	1074	282	57	9
	1138	292	64	11
	1206	303	72	13
35	891	287	40	5
	949	297	45	7
	1010	308	51	9
	1073	319	57	11
	1136	330	64	13
40	830	315	35	5
	886	326	40	7
	943	337	45	9
	1002	350	50	11
	1064	362	56	13

Tab. 7av – CB4 107

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1091	247	46	5
	1161	255	52	7
	1234	263	59	9
	1309	272	66	11
	1387	281	74	13
30	1036	269	42	5
	1101	277	47	7
	1171	286	53	9
	1243	296	59	11
	1317	306	67	13
35	976	295	37	5
	1041	304	42	7
	1105	313	48	9
	1173	324	53	11
	1243	335	60	13
40	914	325	33	5
	975	335	37	7
	1038	346	42	9
	1100	357	47	11
	1167	369	53	13

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 134a
7) Fluid: Water
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7aw – CL4 068

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	764	165	47	5
	816	170	53	7
	870	176	60	9
	924	181	67	11
	981	187	75	13
30	724	180	42	5
	773	185	48	7
	825	191	54	9
	878	197	61	11
	931	203	68	13
35	681	195	38	5
	728	201	43	7
	777	207	48	9
	827	213	54	11
	879	220	61	13
40	635	213	33	5
	680	219	38	7
	726	226	42	9
	774	232	48	11
	823	239	54	13

Tab. 7ax – CL4 074

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	810	181	52	5
	864	186	59	7
	918	192	66	9
	975	198	74	11
	1035	204	–	13
30	768	198	47	5
	819	203	53	7
	872	209	60	9
	926	216	67	11
	983	222	76	13
35	723	217	42	5
	772	223	48	7
	822	229	54	9
	875	236	61	11
	927	243	68	13
40	675	238	37	5
	721	245	42	7
	769	251	47	9
	819	259	54	11
	870	266	60	13

Tab. 7ay – CL4 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	889	189	40	5
	948	194	45	7
	1009	200	50	9
	1073	205	57	11
	1137	211	64	13
30	844	208	36	5
	901	214	41	7
	960	219	46	9
	1021	225	52	11
	1084	232	58	13
35	796	230	32	5
	851	236	36	7
	907	242	41	9
	965	248	46	11
	1026	255	52	13
40	747	254	28	5
	798	260	32	7
	852	266	37	9
	907	273	41	11
	965	281	46	13

Tab. 7az – CL4 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	930	207	43	5
	991	213	49	7
	1055	220	55	9
	1120	227	62	11
	1188	235	69	13
30	881	225	39	5
	940	232	44	7
	1002	239	50	9
	1065	247	56	11
	1129	255	63	13
35	830	246	35	5
	886	253	39	7
	945	261	45	9
	1006	269	50	11
	1069	278	57	13
40	775	270	30	5
	829	278	35	7
	885	286	39	9
	943	294	45	11
	1003	304	50	13

Tab. 7ba – CL4 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	991	216	49	5
	1058	223	55	7
	1125	231	62	9
	1197	240	70	11
	1272	249	79	13
30	940	233	44	5
	1004	241	50	7
	1071	249	57	9
	1138	257	64	11
	1210	266	72	13
35	885	253	39	5
	947	261	45	7
	1011	269	51	9
	1077	278	57	11
	1144	288	65	13
40	827	276	35	5
	886	284	39	7
	947	293	45	9
	1010	302	51	11
	1076	312	58	13

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7bb – CL4 099

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1043	228	54	5
	1111	236	61	7
	1183	244	69	9
	1257	252	77	11
	1334	261	87	13
30	989	248	49	5
	1056	255	55	7
	1122	263	62	9
	1194	272	70	11
	1268	281	79	13
35	932	270	43	5
	995	278	49	7
	1061	287	56	9
	1128	296	63	11
	1198	306	71	13
40	872	296	38	5
	932	305	44	7
	995	314	49	9
	1060	324	56	11
	1125	335	63	13

Tab. 7bc – CL4 106

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1103	243	47	5
	1174	250	53	7
	1249	258	60	9
	1326	266	67	11
	1406	275	75	13
30	1048	264	43	5
	1114	272	48	7
	1185	281	54	9
	1259	290	61	11
	1335	299	68	13
35	988	289	38	5
	1054	298	43	7
	1119	307	49	9
	1189	317	55	11
	1261	328	61	13
40	926	319	34	5
	988	329	38	7
	1052	339	43	9
	1116	350	49	11
	1185	361	54	13

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 134a
7) Fluid: Water
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7bd – CQ4 068

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	735	175	43	5
	784	181	49	7
	834	188	55	9
	885	194	62	11
	937	201	69	13
30	694	191	39	5
	739	197	44	7
	787	204	49	9
	836	211	55	11
	886	218	62	13
35	649	208	34	5
	693	214	39	7
	737	221	44	9
	783	229	49	11
	831	237	55	13
40	602	227	30	5
	643	234	34	7
	685	242	38	9
	728	249	43	11
	773	258	48	13

Tab. 7be – CQ4 074

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	778	194	48	5
	828	200	54	7
	879	207	61	9
	931	214	68	11
	986	221	76	13
30	734	212	43	5
	781	219	49	7
	830	226	55	9
	881	234	61	11
	931	242	68	13
35	687	233	38	5
	732	240	43	7
	778	248	49	9
	826	256	54	11
	875	264	60	13
40	638	255	33	5
	681	263	38	7
	724	271	42	9
	769	280	47	11
	815	289	53	13

Tab. 7bf – CQ4 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	857	203	37	5
	912	209	42	7
	970	215	47	9
	1029	222	52	11
	1090	229	59	13
30	810	223	33	5
	863	230	37	7
	918	237	42	9
	975	244	47	11
	1033	252	53	13
35	762	246	29	5
	812	253	34	7
	864	261	38	9
	917	269	42	11
	973	277	47	13
40	711	271	26	5
	758	279	29	7
	807	287	33	9
	858	296	37	11
	910	305	42	13

Tab. 7bg – CQ4 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	893	220	40	5
	951	228	45	7
	1011	236	50	9
	1072	245	57	11
	1133	254	63	13
30	843	241	36	5
	898	249	40	7
	955	257	45	9
	1013	266	51	11
	1074	276	57	13
35	790	263	32	5
	842	272	36	7
	896	281	40	9
	952	291	45	11
	1009	301	51	13
40	734	289	28	5
	783	298	31	7
	835	308	35	9
	887	318	40	11
	941	330	44	13

Tab. 7bh – CQ4 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	956	228	45	5
	1019	236	51	7
	1084	245	58	9
	1149	254	65	11
	1218	264	73	13
30	903	246	41	5
	962	255	46	7
	1025	264	52	9
	1089	274	59	11
	1153	285	66	13
35	846	268	36	5
	903	277	41	7
	962	287	46	9
	1024	297	52	11
	1086	308	59	13
40	786	292	31	5
	841	302	36	7
	897	313	41	9
	955	324	46	11
	1015	336	51	13

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Water*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7bi – CQ4 099

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1004	242	50	5
	1069	251	56	7
	1133	260	63	9
	1202	269	71	11
	1274	280	79	13
30	948	263	45	5
	1009	273	51	7
	1073	282	57	9
	1137	292	64	11
	1205	303	72	13
35	889	288	40	5
	947	298	45	7
	1008	309	51	9
	1070	320	57	11
	1133	331	64	13
40	827	317	35	5
	883	327	39	7
	940	339	44	9
	999	351	50	11
	1060	364	55	13

Tab. 7bj – CQ4 106

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1061	259	44	5
	1125	268	49	7
	1194	277	55	9
	1265	287	62	11
	1338	298	69	13
30	1002	283	39	5
	1066	293	44	7
	1129	303	50	9
	1196	314	55	11
	1265	326	62	13
35	940	311	35	5
	1001	322	39	7
	1063	334	44	9
	1124	346	49	11
	1189	359	55	13
40	876	345	30	5
	933	357	34	7
	991	370	38	9
	1051	383	43	11
	1110	398	48	13

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 134a
7) Fluid: Water
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7bk – FA7 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	922	246	157	6
	981	254	175	8
	1044	263	196	10
	1108	272	219	12
	1176	282	244	14
30	862	272	139	6
	918	281	156	8
	977	290	174	10
	1038	300	195	12
	1102	311	217	14
35	796	301	122	6
	848	310	135	8
	904	320	152	10
	961	331	170	12
	1022	342	189	14
40	724	333	104	6
	773	343	114	8
	824	354	128	10
	878	365	144	12
	935	378	160	14

Tab. 7bl – FA7 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	971	271	172	6
	1033	280	193	8
	1096	291	214	10
	1163	302	239	12
	1232	314	266	14
30	905	298	152	6
	962	308	170	8
	1022	319	190	10
	1085	331	211	12
	1150	343	235	14
35	833	327	132	6
	887	338	147	8
	943	350	164	10
	1001	362	184	12
	1063	376	202	14
40	756	359	112	6
	806	371	123	8
	858	383	137	10
	913	397	153	12

Tab. 7bm – FA7 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1033	299	188	6
	1096	310	211	8
	1162	322	234	10
	1229	335	259	12
	1300	349	–	14
30	959	326	165	6
	1018	338	184	8
	1080	351	205	10
	1143	365	228	12
	1209	380	253	14
35	880	356	143	6
	935	369	159	8
	993	382	178	10
	1052	397	197	12
	1113	412	216	14
40	797	388	121	6
	848	401	132	8
	901	415	147	10

Notes:
1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Mixture glycol/water 30/70%

Tab. 7bn – FA7 100

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1159	294	246	6
	1233	304	276	8
	1309	315	–	10
	1389	327	–	12
	1472	341	–	14
30	1086	323	220	6
	1155	334	246	8
	1227	346	275	10
	1303	358	–	12
	1381	372	–	14
35	1007	355	192	6
	1072	367	215	8
	1140	379	241	10
	1210	393	268	12
	1284	407	–	14
40	923	392	164	6
	984	404	184	8
	1047	417	207	10
	1113	431	231	12
	1181	446	258	14

Tab. 7bo – FA7 107

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1240	321	244	6
	1316	333	272	8
	1395	345	–	10
	1477	358	–	12
	1561	373	–	14
30	1162	353	217	6
	1234	366	243	8
	1308	379	270	10
	1385	393	–	12
	1464	408	–	14
35	1079	391	191	6
	1146	403	213	8
	1215	417	237	10
	1287	432	264	12
	1361	448	292	14
40	990	433	164	6
	1052	447	183	8
	1117	462	204	10
	1184	478	227	12
	1253	495	249	14

Tab. 7bp – FA7 115

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1299	350	266	6
	1378	363	–	8
	1461	376	–	10
	1546	391	–	12
	1635	406	–	14
30	1216	384	237	6
	1291	398	264	8
	1369	412	–	10
	1450	428	–	12
	1533	444	–	14
35	1127	423	206	6
	1198	438	232	8
	1271	453	257	10
	1347	470	287	12
	1426	488	–	14
40	1032	466	177	6
	1098	482	198	8
	1167	498	219	10
	1238	516	244	12

8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7bq – FA7 122

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1361	380	259	6
	1444	394	–	8
	1531	410	–	10
	1622	426	–	12
	1715	443	–	14
30	1272	417	230	6
	1351	432	256	8
	1433	448	–	10
	1518	465	–	12
	1607	484	–	14
35	1177	456	201	6
	1251	472	223	8
	1328	490	249	10
	1409	509	275	12
	1492	529	–	14
40	1075	498	173	6
	1145	516	190	8
	1217	535	211	10

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7br – FB7 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	902	254	151	6
	960	263	169	8
	1019	273	188	10
	1081	283	210	12
	1146	294	233	14
30	840	281	134	6
	894	291	148	8
	950	301	166	10
	1009	312	184	12
	1070	323	205	14
35	773	311	116	6
	823	321	128	8
	876	332	143	10
	930	344	160	12
	988	356	176	14
40	699	343	98	6
	746	354	107	8
	795	366	119	10
	846	379	133	12

Tab. 7bs – FB7 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	948	280	164	6
	1006	291	184	8
	1067	302	205	10
	1130	314	227	12
	1196	327	252	14
30	880	308	145	6
	935	319	161	8
	992	331	179	10
	1051	343	200	12
	1112	357	222	14
35	807	338	125	6
	858	350	139	8
	912	362	153	10
	967	376	170	12
	1024	390	189	14
40	729	370	104	6
	776	383	114	8
	826	396	128	10

Tab. 7bt – FB7 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1005	309	179	6
	1065	321	200	8
	1127	334	222	10
	1191	348	246	12
	1257	363	–	14
30	930	337	157	6
	986	350	175	8
	1044	364	194	10
	1104	378	215	12
	1166	394	234	14
35	850	367	135	6
	902	381	149	8
	957	395	164	10
	1012	411	181	12
	1069	427	200	14
40	767	399	111	6
	814	413	122	8

Tab. 7bu – FB7 100

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1136	303	238	6
	1207	314	266	8
	1281	326	–	10
	1357	339	–	12
	1437	352	–	14
30	1061	333	211	6
	1128	344	235	8
	1198	357	262	10
	1269	370	–	12
	1344	385	–	14
35	982	366	183	6
	1044	378	205	8
	1109	392	229	10
	1176	406	256	12
	1246	421	–	14
40	897	403	156	6
	955	416	176	8
	1015	430	196	10
	1078	445	216	12
	1143	461	240	14

Tab. 7bv – FB7 107

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1214	332	235	6
	1287	344	261	8
	1362	357	291	10
	1441	372	–	12
	1521	387	–	14
30	1134	365	208	6
	1203	378	232	8
	1274	392	257	10
	1347	407	285	12
	1423	424	–	14
35	1050	404	182	6
	1114	418	203	8
	1180	433	225	10
	1248	449	250	12
	1319	466	274	14
40	960	449	155	6
	1020	463	174	8
	1081	479	190	10
	1144	496	211	12

Tab. 7bw – FB7 115

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1269	362	255	6
	1346	376	284	8
	1425	390	–	10
	1506	406	–	12
	1591	422	–	14
30	1185	398	226	6
	1257	412	252	8
	1331	428	280	10
	1408	444	–	12
	1488	462	–	14
35	1095	437	197	6
	1162	453	219	8
	1232	470	242	10
	1304	488	267	12
	1378	507	–	14
40	999	481	165	6
	1062	498	185	8
	1127	516	205	10

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7bx – FB7 122

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1328	394	248	6
	1408	409	275	8
	1491	425	–	10
	1577	443	–	12
	1666	461	–	14
30	1238	431	220	6
	1313	447	244	8
	1391	465	271	10
	1472	484	–	12
	1556	504	–	14
35	1141	471	192	6
	1211	489	211	8
	1285	508	233	10
	1361	528	258	12
	1439	549	–	14
40	1038	513	161	6
	1104	532	178	8

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 407C*
7) *Fluid: Mixture glycol/water 30/70%*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7by – FL7 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	881	261	189	6
	936	271	209	8
	994	281	233	10
	1054	292	260	12
	1116	303	289	14
30	819	289	166	6
	870	299	184	8
	924	310	205	10
	980	321	229	12
	1038	334	255	14
35	750	319	144	6
	798	330	158	8
	848	341	177	10
	901	354	195	12
	955	367	217	14
40	676	352	118	6
	720	364	131	8
	767	376	146	10

Tab. 7bz – FL7 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	996	261	190	6
	1060	270	213	8
	1126	279	238	10
	1196	290	266	12
	1269	301	–	14
30	931	287	169	6
	991	297	189	8
	1054	307	212	10
	1120	318	236	12
	1188	329	263	14
35	860	316	147	6
	917	326	165	8
	976	337	185	10
	1038	348	207	12
	1102	361	231	14
40	784	347	126	6
	837	358	140	8
	892	370	157	10
	950	382	174	12
	1011	395	195	14

Tab. 7ca – FL7 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1062	288	210	6
	1129	298	235	8
	1198	309	262	10
	1269	322	–	12
	1344	335	–	14
30	990	315	185	6
	1052	326	207	8
	1117	338	231	10
	1184	351	258	12
	1254	364	–	14
35	912	344	161	6
	970	356	179	8
	1031	368	201	10
	1094	382	223	12
	1159	396	248	14
40	829	376	136	6
	883	388	152	8
	940	401	170	10
	999	415	188	12
	1059	431	209	14

Tab. 7cb – FL7 099

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1113	312	229	6
	1181	324	256	8
	1252	336	–	10
	1325	350	–	12
	1401	365	–	14
30	1037	343	202	6
	1101	355	226	8
	1167	369	251	10
	1236	383	–	12
	1307	398	–	14
35	956	377	175	6
	1016	390	195	8
	1078	404	218	10
	1141	419	242	12
	1208	436	265	14
40	870	415	149	6
	926	429	166	8
	983	444	182	10
	1042	460	204	12

Tab. 7cc – FL7 106

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1186	340	225	6
	1256	353	250	8
	1329	367	277	10
	1404	382	–	12
	1481	399	–	14
30	1106	375	199	6
	1172	389	221	8
	1239	404	245	10
	1309	420	272	12
	1381	437	–	14
35	1020	415	173	6
	1082	430	192	8
	1145	446	213	10
	1210	463	234	12
	1276	481	257	14
40	929	462	147	6
	986	478	162	8

Tab. 7cd – FL7 114

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1312	344	230	6
	1393	357	–	8
	1477	370	–	10
	1565	384	–	12
	1655	399	–	14
30	1230	378	204	6
	1307	391	229	8
	1386	405	–	10
	1469	420	–	12
	1554	436	–	14
35	1142	416	179	6
	1214	431	200	8
	1289	446	223	10
	1366	462	–	12
	1447	479	–	14
40	1048	459	154	6
	1115	474	172	8
	1186	490	190	10
	1258	508	212	12
	1333	526	235	14

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7ce – FL7 121

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1376	374	219	6
	1461	388	244	8
	1550	402	272	10
	1642	418	302	12
	1738	434	–	14
30	1288	410	196	6
	1369	425	217	8
	1452	441	242	10
	1539	457	270	12
	1630	475	299	14
35	1194	449	171	6
	1269	465	190	8
	1348	482	212	10
	1430	500	236	12
	1516	519	260	14
40	1093	491	147	6
	1163	508	164	8
	1237	527	181	10
	1314	546	201	12

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 407C*
7) *Fluid: Mixture glycol/water 30/70%*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7cf – FQ7 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	824	286	168	6
	872	298	185	8
	923	310	205	10
	974	323	227	12
	1028	338	247	14
30	757	316	145	6
	802	328	158	8
	848	342	175	10
	897	356	194	12
	946	371	213	14
35	685	348	121	6
	726	361	133	8
	768	376	147	10

Tab. 7cg – FQ7 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	946	281	174	6
	1004	291	193	8
	1065	303	215	10
	1127	315	239	12
	1192	328	265	14
30	878	309	153	6
	932	320	170	8
	989	332	189	10
	1047	345	211	12
	1108	359	233	14
35	804	339	132	6
	855	351	146	8
	908	364	161	10
	962	377	179	12
	1019	392	198	14
40	726	372	109	6
	772	384	120	8
	821	398	134	10

Tab. 7ch – FQ7 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1002	310	190	6
	1062	322	211	8
	1124	335	234	10
	1187	349	259	12
	1253	365	–	14
30	927	339	166	6
	983	351	184	8
	1040	365	204	10
	1099	380	226	12
	1160	396	246	14
35	847	369	141	6
	898	382	157	8
	952	397	172	10
	1007	413	190	12
	1063	429	210	14
40	763	401	117	6
	810	415	128	8

Tab. 7ci – FQ7 099

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1047	339	206	6
	1108	353	228	8
	1170	367	253	10
	1235	383	–	12
	1301	401	–	14
30	968	372	179	6
	1025	387	199	8
	1083	402	220	10
	1143	419	240	12
	1204	437	264	14
35	885	409	151	6
	937	424	167	8
	990	441	185	10
	1045	459	204	12

Tab. 7cj – FQ7 106

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1111	373	202	6
	1174	388	223	8
	1237	405	245	10
	1302	423	267	12
	1369	442	–	14
30	1028	412	176	6
	1086	429	192	8
	1144	446	211	10
	1204	466	232	12
	1265	486	254	14
35	939	457	147	6
	992	475	163	8
	1046	494	179	10

Tab. 7ck – FQ7 114

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	1246	372	209	6
	1319	386	233	8
	1395	402	–	10
	1473	419	–	12
	1554	436	–	14
30	1160	409	184	6
	1229	424	205	8
	1300	441	227	10
	1373	459	–	12
	1449	478	–	14
35	1068	449	159	6
	1132	467	175	8
	1199	485	195	10
	1267	504	215	12
	1337	524	237	14
40	970	495	132	6

Notes:
1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7cl – FQ7 121

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1301	405	199	6
	1377	421	219	8
	1457	439	244	10
	1539	457	270	12
	1624	477	297	14
30	1209	443	176	6
	1280	461	193	8
	1355	479	214	10
	1432	499	235	12
	1512	521	259	14
35	1111	484	150	6
	1177	503	165	8
	1247	523	182	10
	1318	544	202	12

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 407C
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7cm – FA4 069

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	751	167	163	6
	803	173	183	8
	858	178	206	10
	914	184	233	12
	973	191	–	14
30	712	182	148	6
	761	187	167	8
	813	193	188	10
	868	200	211	12
	923	206	–	14
35	670	198	134	6
	716	204	149	8
	766	210	168	10
	817	217	189	12
	872	224	213	14
40	625	216	119	6
	669	222	133	8
	716	229	149	10
	764	236	168	12
	816	244	190	14

Tab. 7cn – FA4 075

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	796	183	180	6
	850	189	203	8
	906	195	228	10
	964	201	–	12
	1026	208	–	14
30	754	201	164	6
	805	207	185	8
	859	213	208	10
	915	219	233	12
	974	227	–	14
35	710	220	148	6
	759	226	166	8
	810	233	187	10
	864	240	210	12
	919	248	–	14
40	663	241	132	6
	710	248	147	8
	758	255	166	10
	809	263	187	12
	862	271	208	14

Tab. 7co – FA4 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	854	202	132	6
	910	208	147	8
	970	215	166	10
	1032	221	185	12
	1095	229	206	14
30	809	222	120	6
	863	229	135	8
	919	236	151	10
	979	243	169	12
	1041	251	189	14
35	762	245	109	6
	813	252	121	8
	867	259	136	10
	923	267	152	12
	982	276	170	14
40	712	270	97	6
	760	277	107	8
	811	285	120	10
	865	294	136	12
	921	303	151	14

Tab. 7cp – FA4 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	890	219	143	6
	948	227	160	8
	1010	235	179	10
	1075	244	200	12
	1140	253	222	14
30	841	239	129	6
	897	247	144	8
	956	256	161	10
	1018	265	182	12
	1082	275	203	14
35	790	262	116	6
	843	270	129	8
	899	279	145	10
	957	289	163	12
	1019	300	183	14
40	736	287	103	6
	786	296	114	8
	839	306	129	10
	895	316	144	12
	953	328	160	14

Tab. 7cq – FA4 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	924	236	152	6
	985	245	171	8
	1049	255	191	10
	1113	265	213	12
	1183	276	238	14
30	872	256	138	6
	930	265	154	8
	990	276	172	10
	1054	287	194	12
	1119	298	215	14
35	816	278	123	6
	871	288	137	8
	929	299	154	10
	990	311	172	12
	1053	324	192	14
40	758	303	109	6
	810	314	121	8
	865	326	135	10
	923	339	152	12
	983	352	169	14

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Mixture glycol/water 30/70%*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7cr – FA4 100

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1025	231	194	6
	1093	239	219	8
	1166	247	245	10
	1242	256	–	12
	1322	265	–	14
30	972	250	177	6
	1039	259	199	8
	1107	267	224	10
	1180	277	251	12
	1256	287	–	14
35	916	273	159	6
	980	282	180	8
	1046	291	203	10
	1114	301	227	12
	1187	312	255	14
40	858	299	142	6
	918	309	160	8
	981	319	181	10
	1048	330	204	12
	1115	341	228	14

Tab. 7cs – FA4 107

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1090	246	198	6
	1160	254	222	8
	1235	262	249	10
	1314	271	279	12
	1396	281	–	14
30	1035	268	182	6
	1101	276	202	8
	1172	286	227	10
	1248	295	254	12
	1326	306	285	14
35	976	294	165	6
	1041	303	183	8
	1107	313	205	10
	1179	323	231	12
	1253	335	258	14
40	915	324	147	6
	976	334	164	8
	1041	345	183	10
	1107	357	204	12
	1178	369	229	14

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 134a
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7ct – FB4 069

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	741	171	159	6
	792	177	178	8
	845	182	201	10
	901	189	225	12
	957	196	–	14
30	702	186	144	6
	749	192	162	8
	800	198	183	10
	853	205	205	12
	908	212	229	14
35	659	202	130	6
	704	208	144	8
	752	215	163	10
	802	222	184	12
	855	230	206	14
40	614	221	115	6
	656	227	128	8
	702	234	144	10
	749	242	162	12
	799	250	183	14

Tab. 7cu – FB4 075

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	784	188	175	6
	837	194	198	8
	892	200	222	10
	948	207	–	12
	1008	214	–	14
30	742	206	160	6
	793	212	180	8
	845	219	202	10
	900	226	226	12
	956	233	–	14
35	698	225	144	6
	745	232	160	8
	795	239	181	10
	847	247	203	12
	902	255	227	14
40	651	247	128	6
	696	255	143	8
	743	262	160	10
	792	270	179	12
	844	279	200	14

Tab. 7cv – FB4 081

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	841	208	129	6
	896	214	144	8
	954	221	161	10
	1014	229	180	12
	1077	237	201	14
30	795	229	117	6
	848	236	130	8
	903	243	145	10
	960	251	163	12
	1020	260	183	14
35	748	252	105	6
	797	259	116	8
	849	267	131	10
	904	276	146	12
	961	285	164	14
40	698	277	93	6
	745	285	104	8
	794	294	115	10
	845	303	130	12
	899	313	144	14

Tab. 7cw – FB4 087

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	875	225	138	6
	932	233	153	8
	992	242	173	10
	1054	251	194	12
	1118	261	215	14
30	826	246	126	6
	880	254	139	8
	937	263	156	10
	997	273	175	12
	1059	284	195	14
35	774	269	112	6
	826	278	124	8
	880	288	140	10
	936	298	157	12
	995	310	174	14
40	720	295	99	6
	768	304	109	8
	820	315	122	10
	873	326	137	12
	929	338	153	14

Tab. 7cx – FB4 093

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	907	242	147	6
	967	252	165	8
	1028	262	184	10
	1091	273	206	12
	1158	285	229	14
30	855	262	133	6
	911	273	148	8
	969	283	166	10
	1031	295	186	12
	1093	307	208	14
35	799	286	119	6
	852	296	132	8
	908	308	148	10
	966	320	164	12
	1027	334	183	14
40	741	312	103	6
	790	323	114	8
	844	336	128	10
	898	349	144	12
	956	363	161	14

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Mixture glycol/water 30/70%*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7cy – FB4 100

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1011	236	190	6
	1080	244	213	8
	1149	252	240	10
	1223	262	–	12
	1301	272	–	14
30	958	256	172	6
	1023	265	194	8
	1090	274	218	10
	1160	284	244	12
	1235	294	–	14
35	902	279	155	6
	964	289	175	8
	1028	299	197	10
	1095	309	220	12
	1165	320	247	14
40	843	306	138	6
	901	316	155	8
	963	327	175	10
	1027	339	195	12
	1093	351	219	14

Tab. 7cz – FB4 107

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1075	252	194	6
	1143	260	216	8
	1216	269	242	10
	1292	279	272	12
	1372	289	–	14
30	1019	275	177	6
	1086	284	198	8
	1153	293	220	10
	1226	304	247	12
	1302	315	276	14
35	960	301	160	6
	1023	311	177	8
	1089	322	199	10
	1156	333	223	12
	1229	346	247	14
40	899	333	142	6
	958	344	157	8
	1021	356	177	10
	1086	368	198	12
	1152	382	219	14

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Mixture glycol/water 30/70%*
8) *ΔT on evaporator: 5°C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7da – FL4 068

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	730	175	155	6
	780	181	174	8
	831	187	195	10
	885	194	218	12
	940	201	–	14
30	690	190	141	6
	736	196	157	8
	785	203	176	10
	837	210	198	12
	890	218	222	14
35	647	207	126	6
	691	214	141	8
	737	221	158	10
	785	228	177	12
	836	236	199	14
40	601	226	112	6
	642	233	123	8
	686	241	139	10
	731	249	156	12
	779	257	173	14

Tab. 7db – FL4 074

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	772	193	171	6
	823	199	192	8
	877	206	215	10
	931	213	–	12
	989	221	–	14
30	730	211	155	6
	778	218	174	8
	829	225	195	10
	882	233	218	12
	936	241	–	14
35	685	232	139	6
	730	239	155	8
	778	247	174	10
	828	255	195	12
	881	264	217	14
40	637	254	124	6
	680	262	137	8
	725	270	154	10
	773	279	171	12
	822	288	190	14

Tab. 7dc – FL4 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	827	214	163	6
	880	221	183	8
	935	229	204	10
	994	237	227	12
	1054	246	254	14
30	780	236	149	6
	831	243	165	8
	884	251	184	10
	939	260	206	12
	997	270	229	14
35	732	260	133	6
	780	268	147	8
	830	276	165	10
	882	286	185	12
	937	296	204	14
40	683	286	118	6
	727	294	131	8
	774	304	146	10
	823	314	161	12
	875	325	180	14

Tab. 7dd – FL4 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	912	210	161	6
	974	217	182	8
	1038	225	204	10
	1104	233	228	12
	1175	241	256	14
30	865	229	147	6
	923	237	165	8
	985	244	186	10
	1050	253	209	12
	1116	262	234	14
35	814	251	133	6
	870	259	149	8
	929	267	168	10
	991	276	188	12
	1055	285	212	14
40	761	275	119	6
	814	283	132	8
	870	292	148	10
	928	302	168	12
	990	312	187	14

Tab. 7de – FL4 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	949	227	169	6
	1013	235	191	8
	1080	244	214	10
	1148	254	239	12
	1222	264	–	14
30	898	246	154	6
	959	254	172	8
	1023	264	194	10
	1090	274	218	12
	1159	284	243	14
35	843	267	138	6
	901	276	155	8
	963	286	174	10
	1027	297	196	12
	1092	308	219	14
40	786	291	122	6
	841	301	136	8
	899	312	154	10
	960	323	172	12
	1024	335	194	14

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Mixture glycol/water 30/70%*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7df – FL4 099

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	996	241	184	6
	1063	250	208	8
	1130	259	233	10
	1202	269	260	12
	1277	280	–	14
30	942	262	167	6
	1005	272	189	8
	1071	281	212	10
	1138	292	236	12
	1210	303	264	14
35	885	287	150	6
	945	297	168	8
	1008	307	190	10
	1073	319	213	12
	1140	331	238	14
40	826	315	134	6
	882	325	149	8
	942	337	166	10
	1004	349	188	12
	1069	363	209	14

Tab. 7dg – FL4 106

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1058	259	189	6
	1124	267	210	8
	1195	277	235	10
	1269	287	262	12
	1346	299	293	14
30	1001	282	171	6
	1066	292	191	8
	1131	303	213	10
	1201	314	238	12
	1274	326	266	14
35	942	310	155	6
	1002	321	172	8
	1067	333	191	10
	1131	345	212	12
	1201	359	236	14
40	880	343	138	6
	937	355	151	8
	997	368	169	10
	1060	382	189	12
	1123	396	210	14

Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 134a
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

Cooling Capacity Performance

Tab. 7dh – FQ4 068

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	699	187	144	6
	744	193	160	8
	792	201	179	10
	841	209	200	12
	892	217	222	14
30	657	203	130	6
	700	210	144	8
	744	218	160	10
	791	226	179	12
	839	236	199	14
35	613	221	115	6
	652	229	127	8
	695	237	142	10
	738	246	157	12
	783	256	174	14
40	566	242	101	6
	604	250	110	8
	642	259	122	10
	683	268	136	12
	725	278	151	14

Tab. 7di – FQ4 074

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	737	208	158	6
	784	216	176	8
	833	224	197	10
	883	232	219	12
	934	242	–	14
30	693	228	143	6
	737	236	158	8
	783	244	176	10
	831	254	195	12
	880	264	217	14
35	647	250	127	6
	688	258	139	8
	731	268	154	10
	776	278	172	12
	822	288	191	14
40	599	274	110	6
	637	283	121	8
	677	293	135	10
	719	304	150	12

Tab. 7dj – FQ4 080

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	785	233	150	6
	834	242	166	8
	885	251	185	10
	937	261	206	12
	991	272	226	14
30	738	257	135	6
	783	266	149	8
	831	276	166	10
	881	287	183	12
	932	298	202	14
35	689	282	120	6
	732	292	131	8
	776	303	145	10
	822	314	161	12
	870	327	179	14
40	639	310	105	6
	678	321	115	8
	719	332	127	10

Tab. 7dk – FQ4 086

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	878	224	151	6
	935	232	169	8
	995	241	190	10
	1058	250	211	12
	1122	260	236	14
30	829	245	137	6
	883	253	152	8
	940	262	171	10
	1000	272	191	12
	1062	283	214	14
35	776	268	122	6
	828	277	137	8
	882	287	153	10
	939	297	171	12
	998	309	190	14
40	722	294	108	6
	770	303	120	8
	822	314	133	10
	875	325	149	12
	931	337	167	14

Tab. 7dl – FQ4 092

Ta [°C]	Pf [kW]	Pa [kW]	dPev [kPa]	Two [°C]
25	910	241	157	6
	970	250	177	8
	1032	261	197	10
	1095	271	220	12
	1162	283	245	14
30	857	261	142	6
	914	271	158	8
	973	282	178	10
	1034	294	199	12
	1097	306	221	14
35	801	284	126	6
	855	295	141	8
	910	307	158	10
	969	319	176	12
	1030	333	196	14
40	743	311	110	6
	793	322	122	8
	846	335	137	10
	901	348	154	12
	958	362	172	14

Notes:

1) *Ta: Outdoor temperature*
2) *Pf: Cooling capacity*
3) *Pa: Compressors power absorbed*
4) *dPev: Evaporator pressure drop*
5) *Two: Leaving water temperature*
6) *Refrigerant: R 134a*
7) *Fluid: Mixture glycol/water 30/70%*
8) *ΔT on evaporator: 5 °C*
9) *Power supply: 400V / 3Ph / 50Hz*
10) *Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W*
11) *Sea level: 0 m*
12) *Rated in accordance with EN 12055*
13) *Interpolat. between points is permissible; extrapolat. is not permitted*

Cooling Capacity Performance

Tab. 7dm – FQ4 099

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	953	258	171	6
	1015	268	191	8
	1078	279	214	10
	1142	290	238	12
	1211	303	264	14
30	898	281	154	6
	956	292	172	8
	1016	304	193	10
	1079	317	213	12
	1142	330	237	14
35	840	308	137	6
	894	320	153	8
	951	333	170	10
	1010	347	189	12
	1071	362	211	14
40	779	339	119	6
	830	352	133	8
	883	366	149	10
	938	381	166	12
	996	398	184	14

Tab. 7dn – FQ4 106

Ta [°C]	**Pf** [kW]	**Pa** [kW]	**dPev** [kPa]	**Two** [°C]
25	1010	279	174	6
	1072	290	194	8
	1135	301	214	10
	1202	314	239	12
	1272	328	263	14
30	951	306	158	6
	1010	317	174	8
	1072	331	192	10
	1133	344	213	12
	1198	360	236	14
35	891	337	139	6
	945	351	154	8
	1003	365	171	10
	1062	381	190	12
	1121	397	210	14
40	827	375	123	6
	878	389	135	8
	931	405	149	10
	986	423	165	12

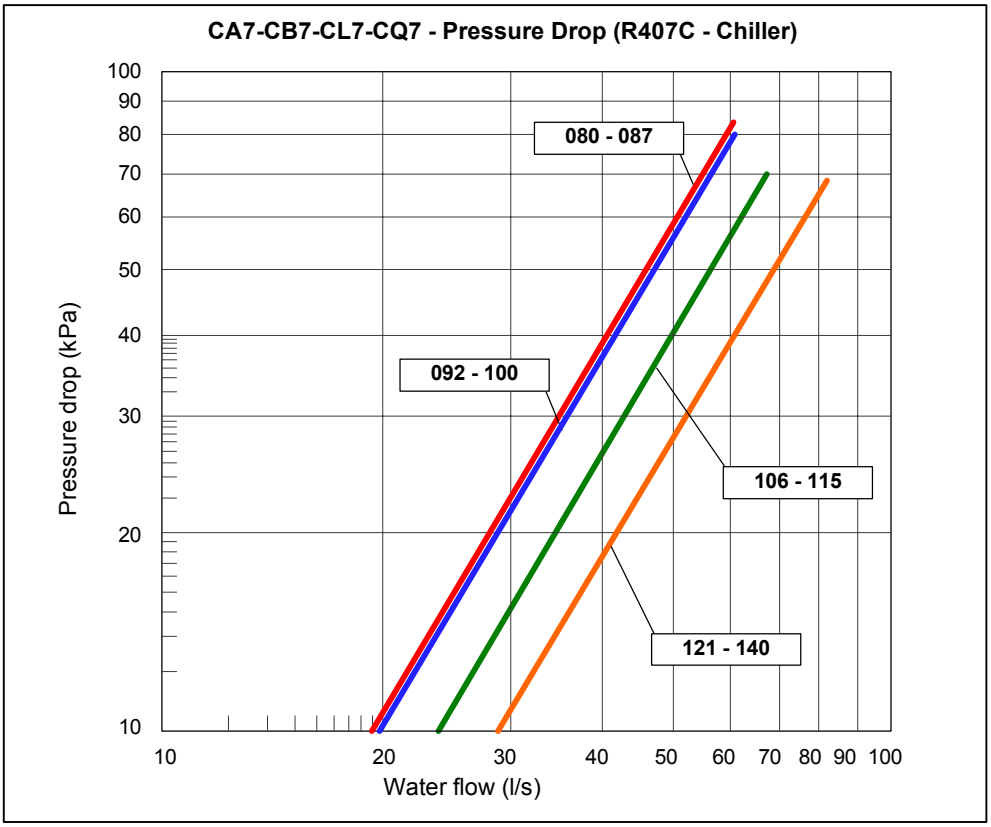
Notes:

1) Ta: Outdoor temperature
2) Pf: Cooling capacity
3) Pa: Compressors power absorbed
4) dPev: Evaporator pressure drop
5) Two: Leaving water temperature
6) Refrigerant: R 134a
7) Fluid: Mixture glycol/water 30/70%
8) ΔT on evaporator: 5 °C
9) Power supply: 400V / 3Ph / 50Hz
10) Evaporator fouling factor: 0,43 x 10^{-4} m^2 °C / W
11) Sea level: 0 m
12) Rated in accordance with EN 12055
13) Interpolat. between points is permissible; extrapolat. is not permitted

8 Hydraulic Features and Performance Adjustment Factors

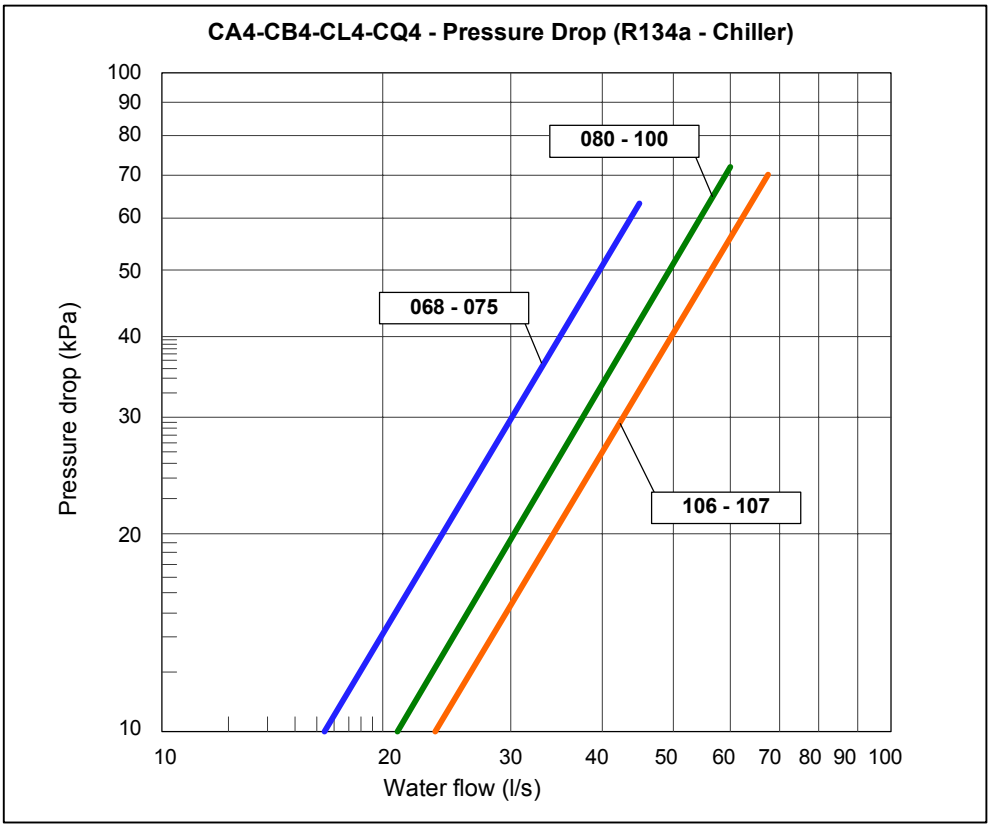
Hydraulic Features

Hydraulic Pressure Drop



Models

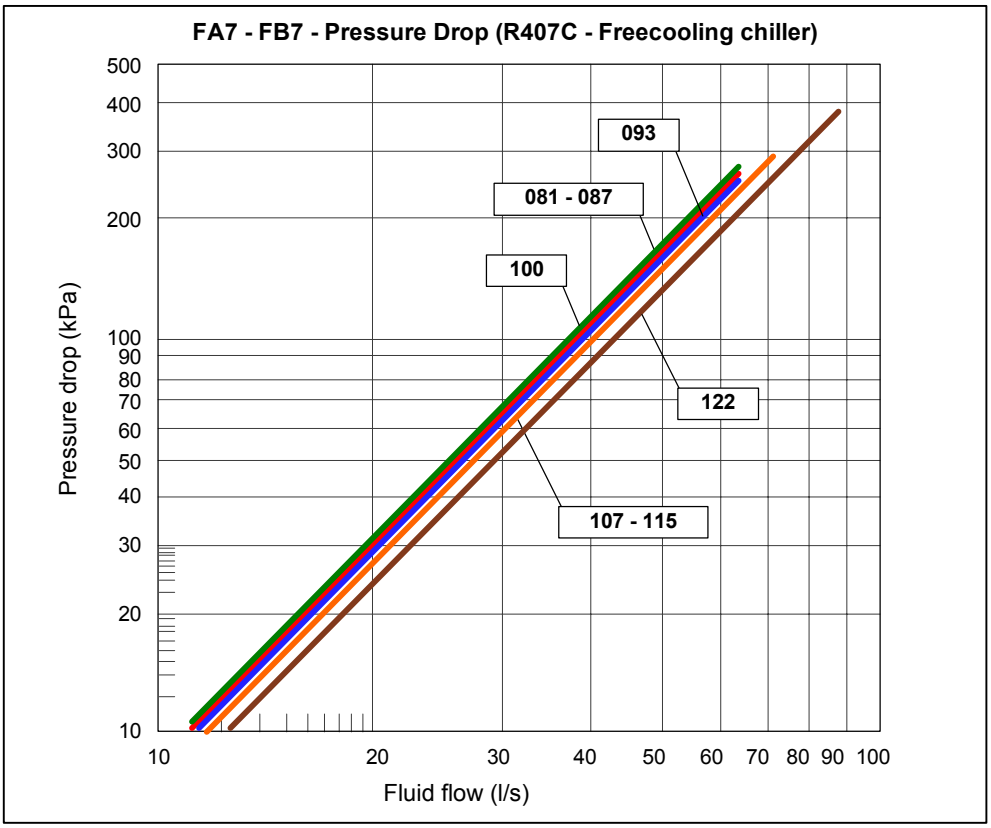
- 080 - 087
- 092 - 100
- 106 - 115
- 121 - 140



Models

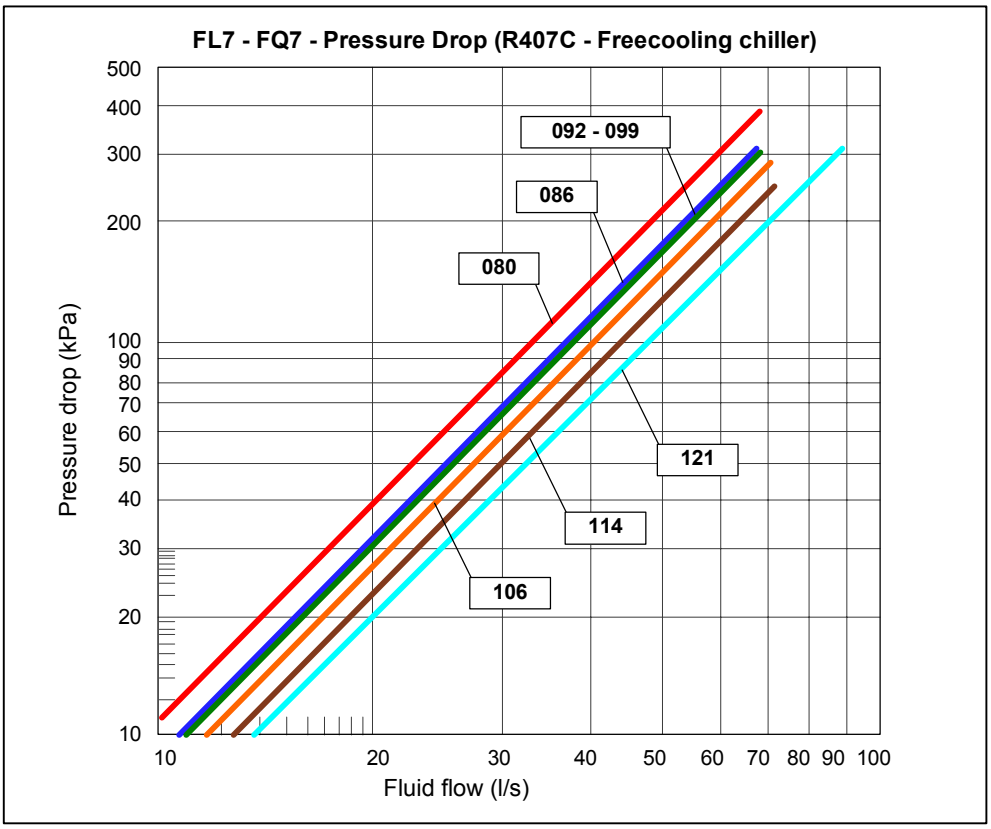
- 068 - 075
- 080 - 100
- 106 - 107

Hydraulic Features and Performance Adjustment Factors



Models

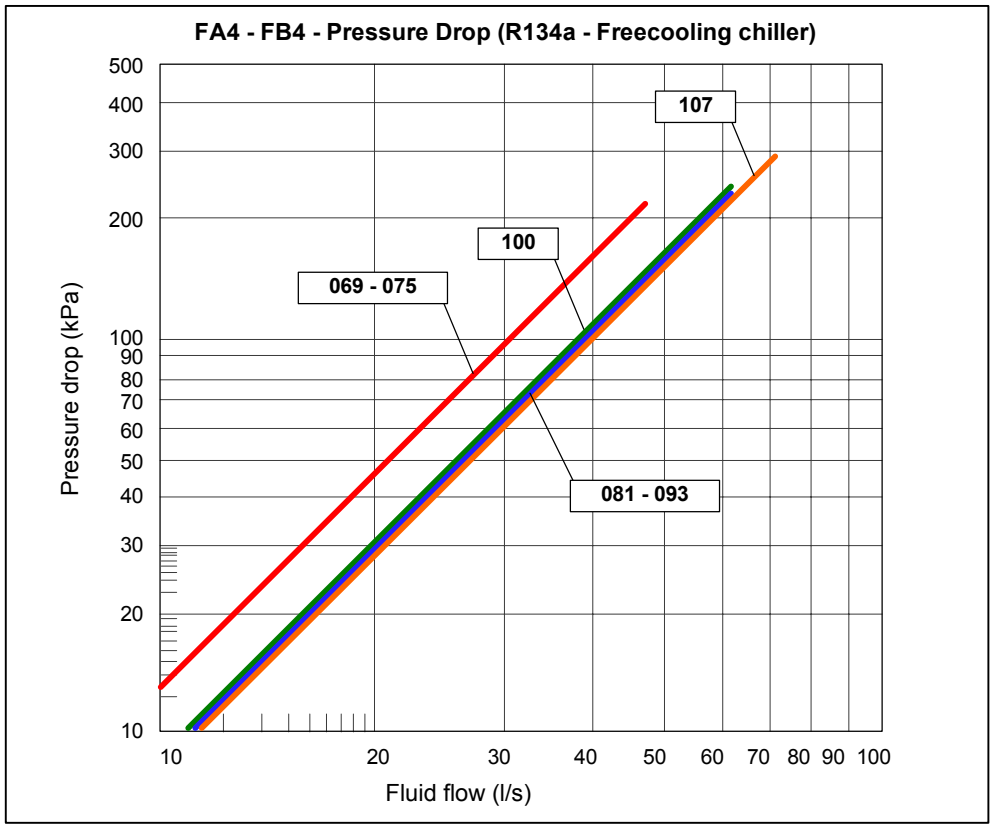
- 081 - 087
- 093
- 100
- 107 - 115
- 122



Models

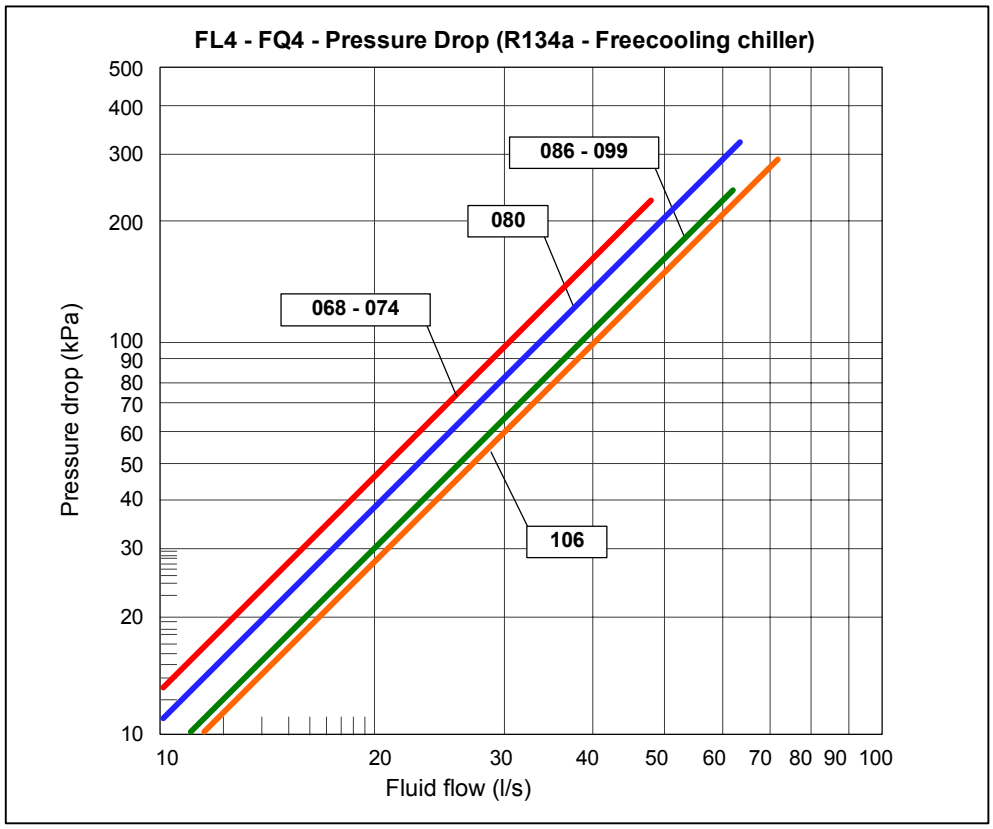
- 080
- 086
- 092 - 099
- 106
- 114
- 121

Hydraulic Features and Performance Adjustment Factors



Models

- 069 - 075
- 081 - 093
- 100
- 107



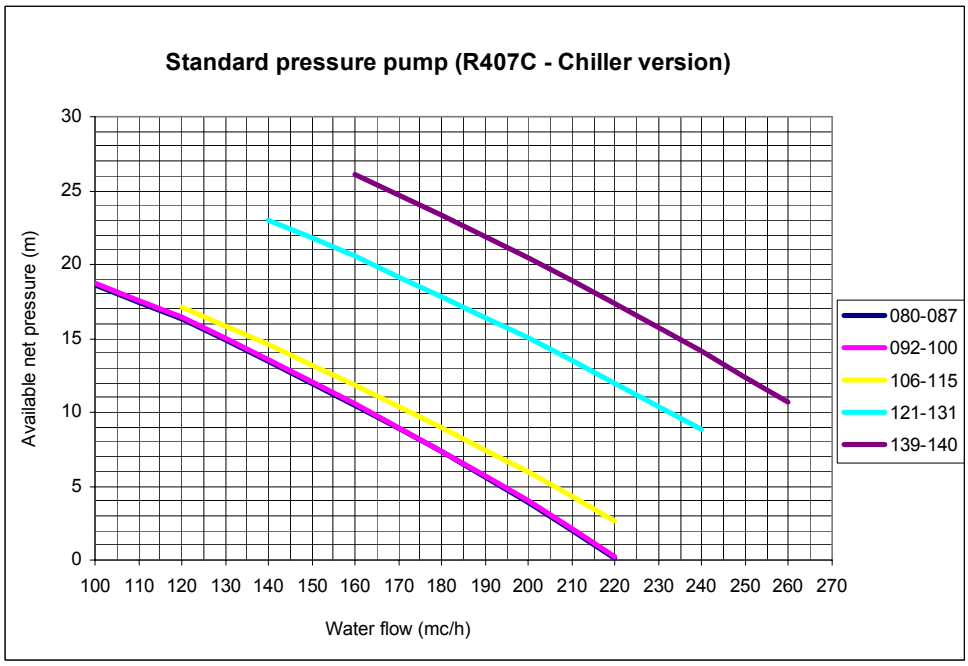
Models

- 068 - 074
- 080
- 086 - 099
- 106

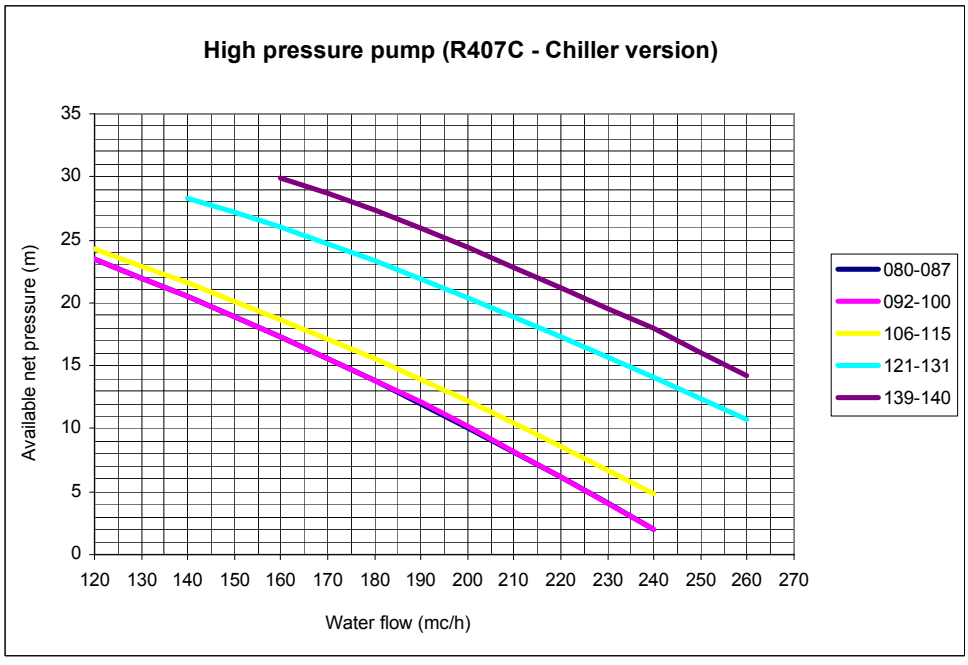
Pumps Pressure Diagrams
(Internal hydraulic pressure drops included)

Note:
The available net pressure (m) is referred to column of water / mixture water-glycol.

Mod. R407C - CA7 - CB7 - CL7 - CQ7

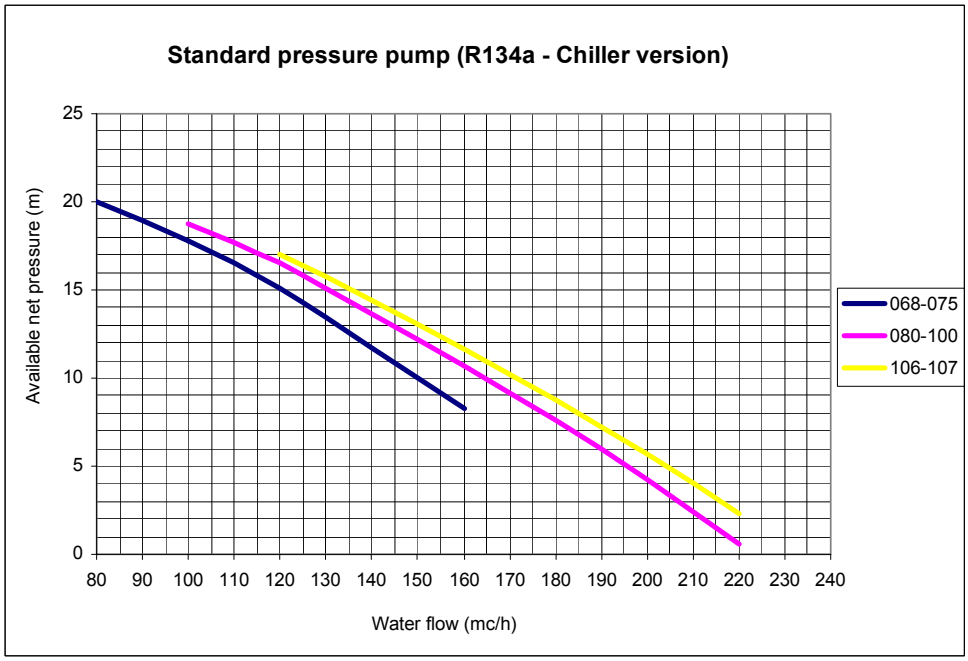


Mod. R407C - CA7 - CB7 - CL7 - CQ7

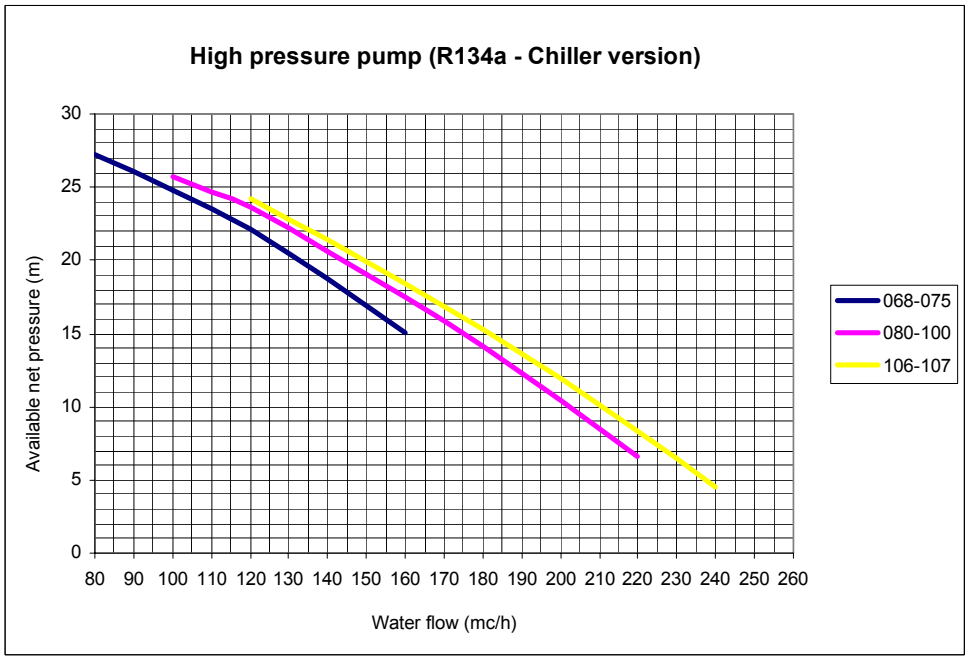


Hydraulic Features and Performance Adjustment Factors

Mod. R134a - CA4 - CB4 - CL4 - CQ4

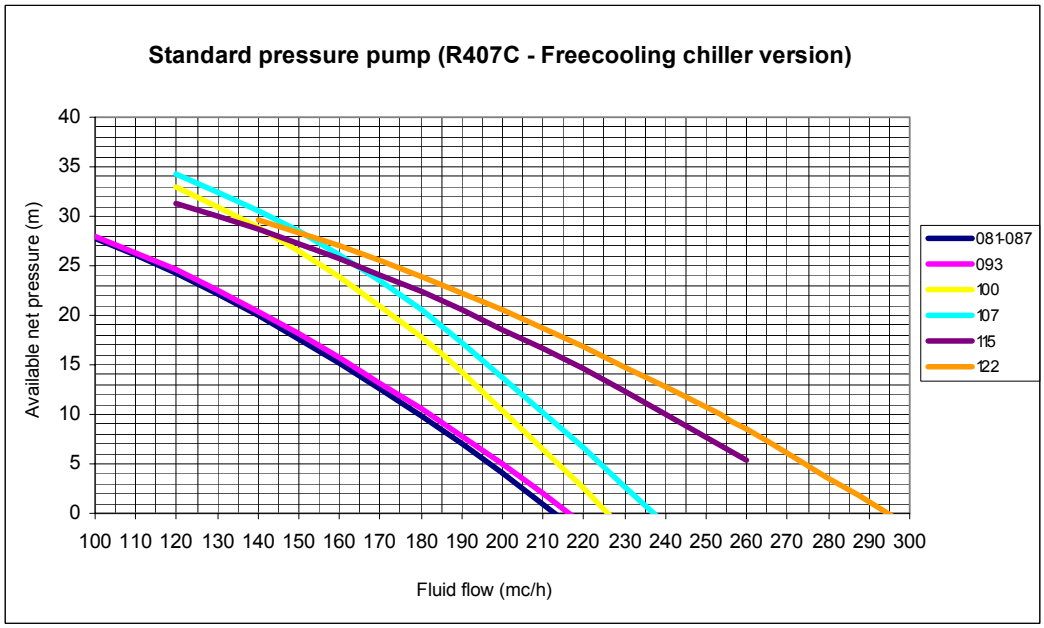


Mod. R134a - CA4 - CB4 - CL4 - CQ4

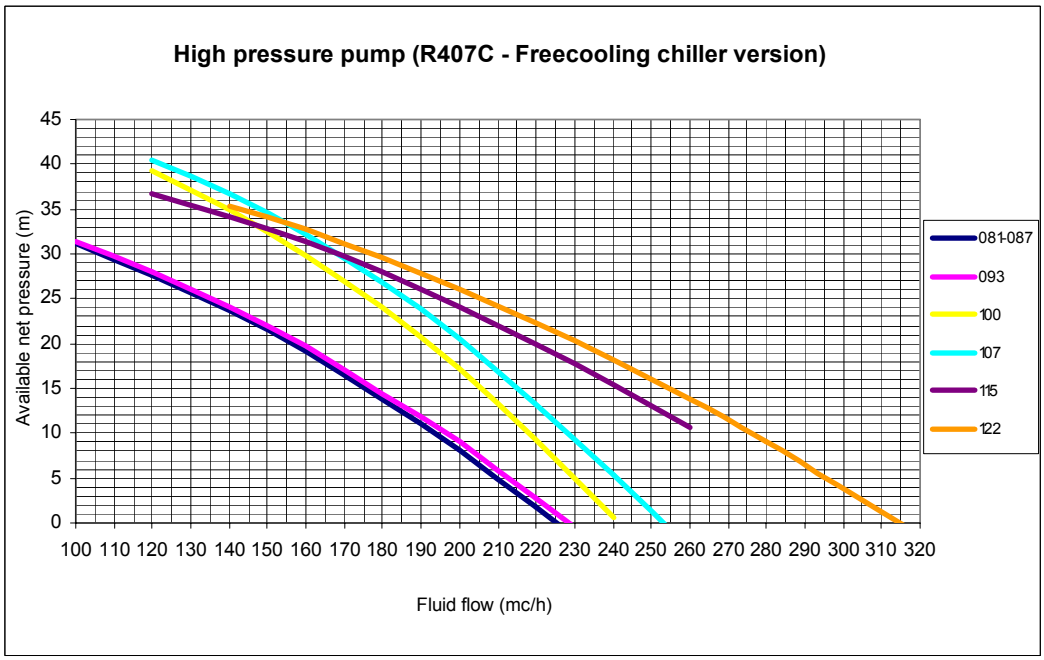


Hydraulic Features and Performance Adjustment Factors

Mod. R407C - FA7 - FB7

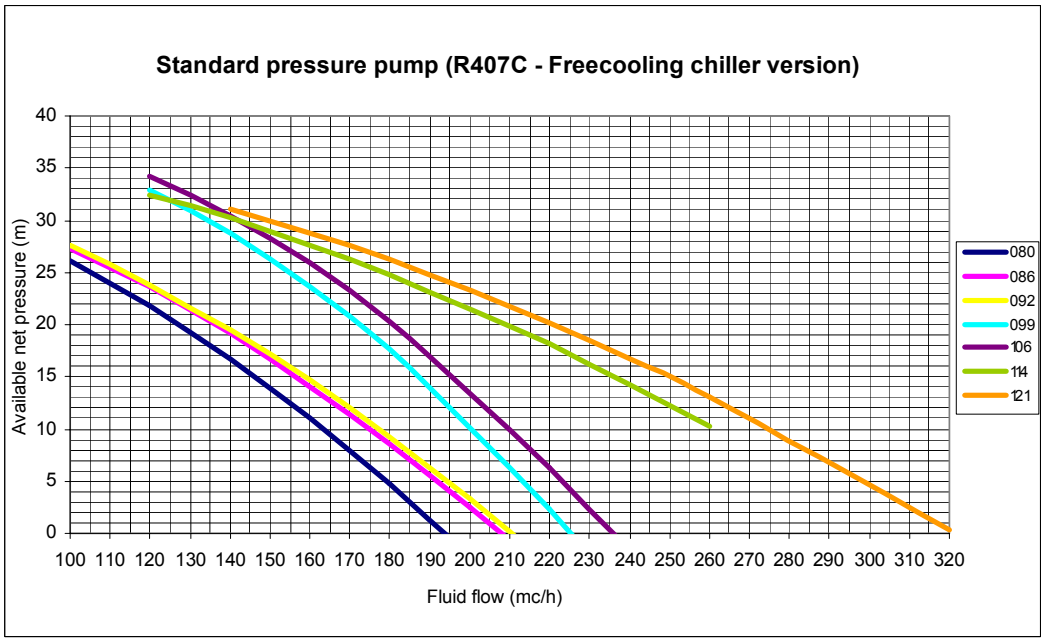


Mod. R407C - FA7 - FB7

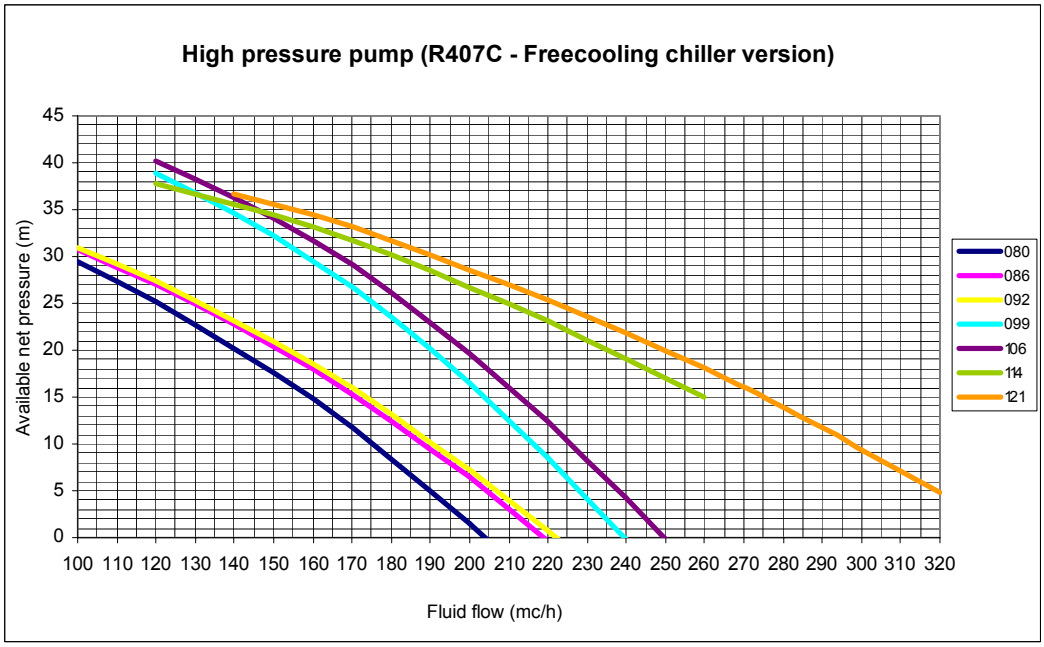


Hydraulic Features and Performance Adjustment Factors

Mod. R407C - FL7 - FQ7

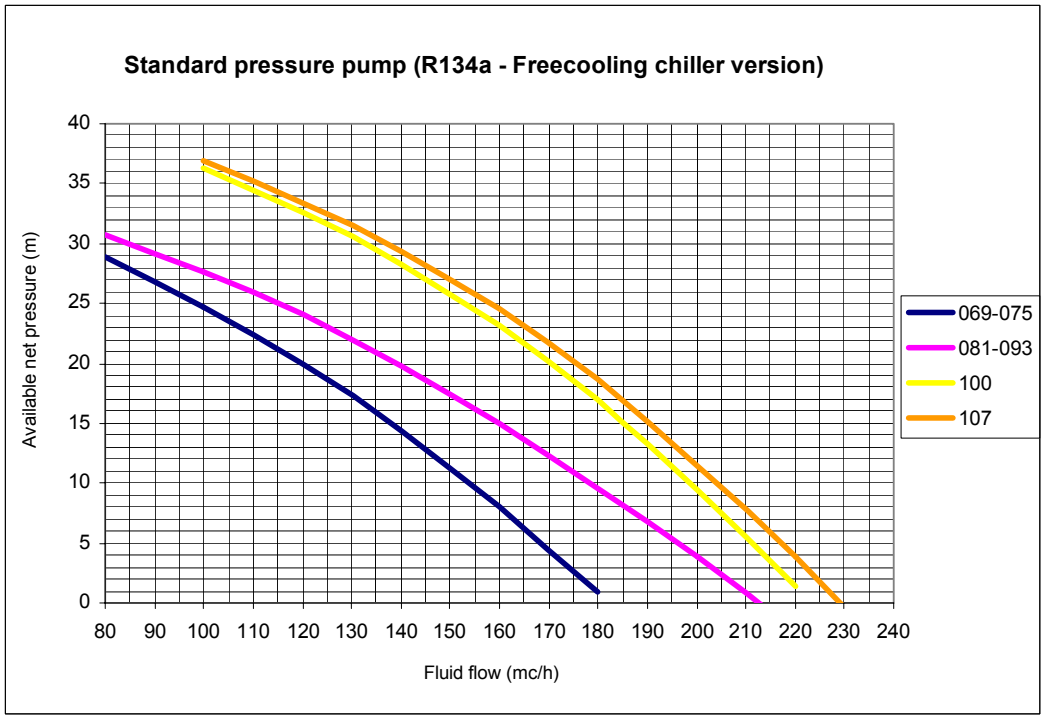


Mod. R407C - FL7 - FQ7

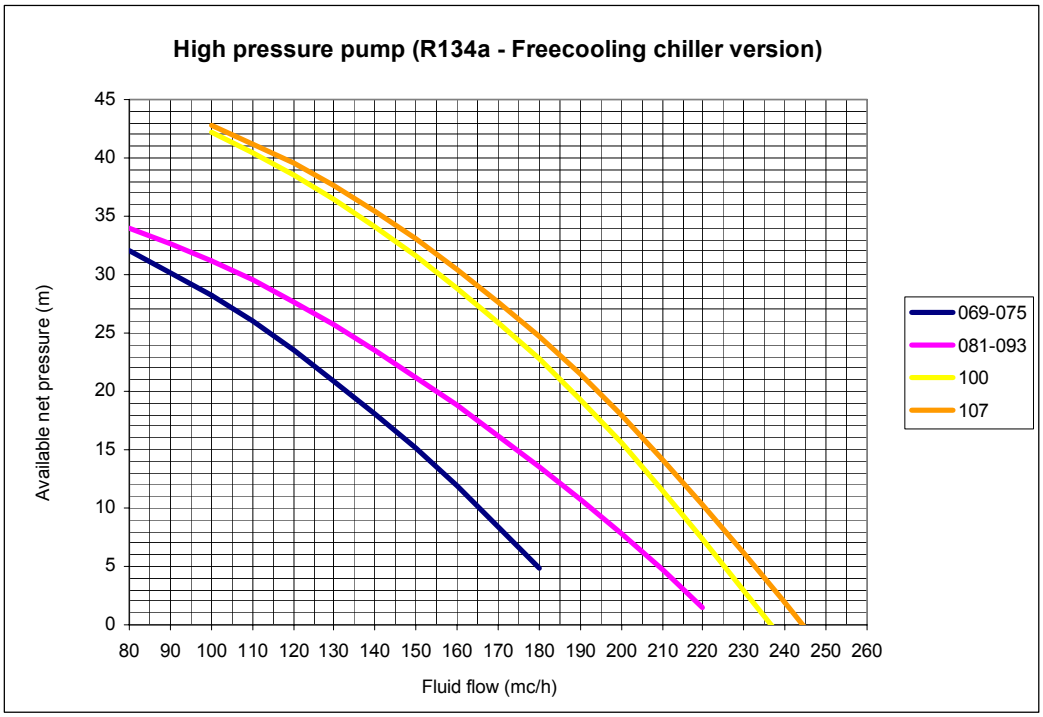


Hydraulic Features and Performance Adjustment Factors

Mod. R134a - FA4 - FB4

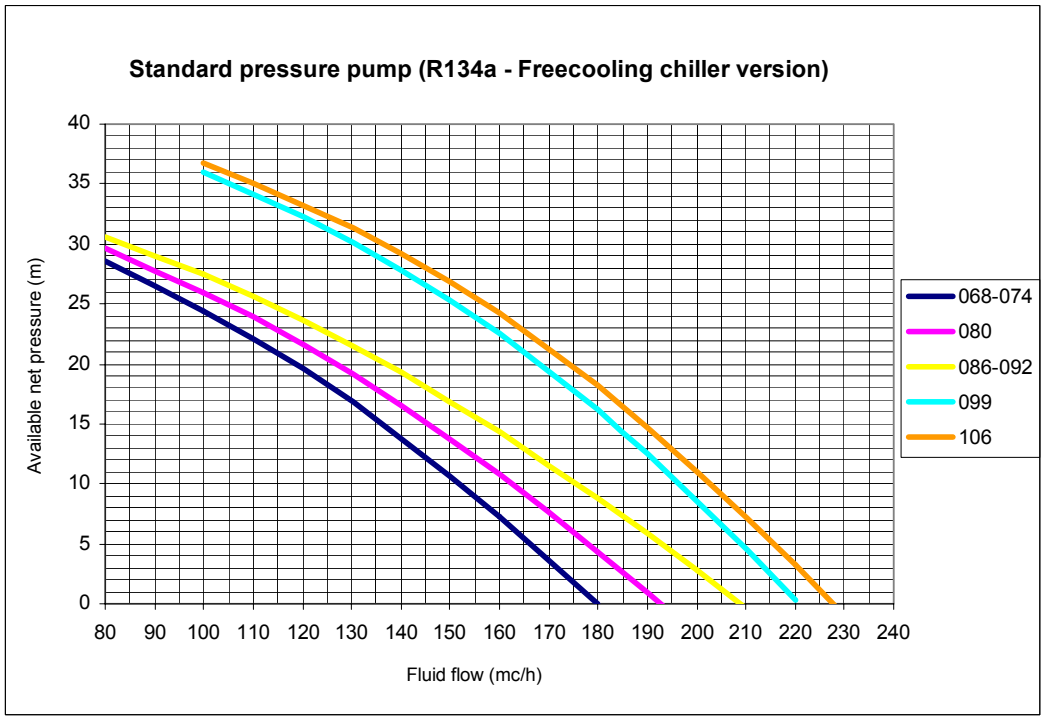


Mod. R134a - FA4 - FB4

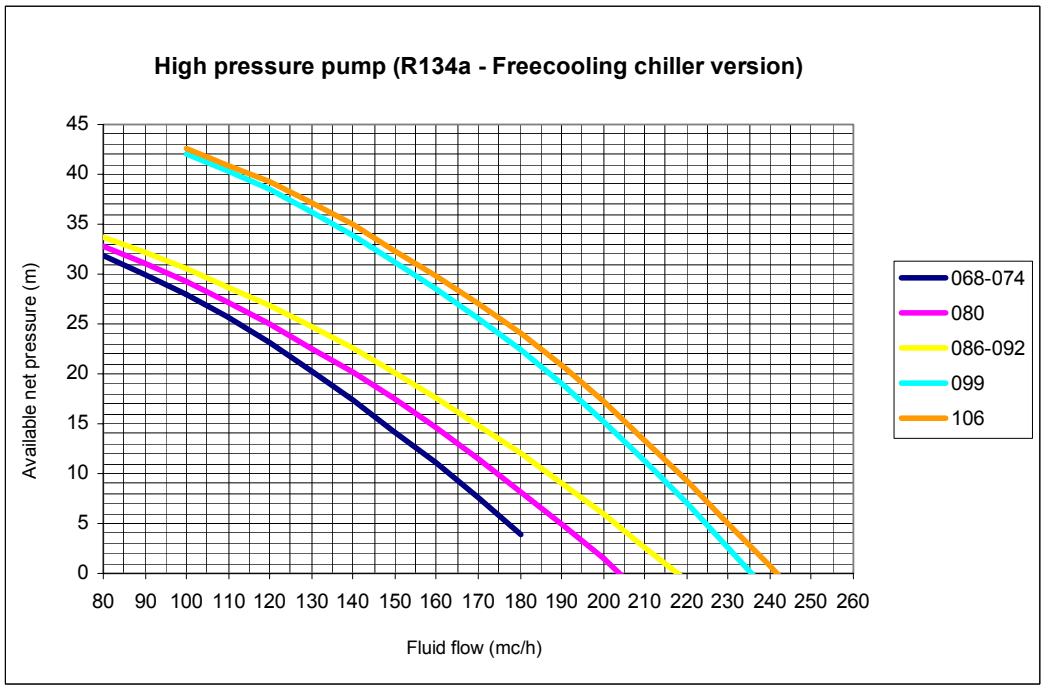


Hydraulic Features and Performance Adjustment Factors

Mod. R134a - FL4 - FQ4



Mod. R134a - FL4 - FQ4



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. 8a – 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	0,955	0,990	0,990	0,985	0,975

Tab. 8b – 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. 8c – Fouling correction factors

Fouling factors [10^{-4} m² °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
0,176	0,960	0,985
0,352	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} m² °C / W. For different fouling factor values, performances should be corrected with the correction factors shown above.

Sea level: Correction factors

Tab. 8d – 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.

9 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 (condenser water inlet/outlet temperature 30/35°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 (condenser water inlet/outlet temperature 30/35°C, evaporator water inlet/outlet temperature 12/7°C), calculated in according to ISO 3744 procedure method are indicated in the following tables.

Tab. 9a – SPL – CA7 – CA4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CA4 069	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CA4 075	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CA7 081 – CA4 081	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CA7 087 – CA4 087	73.0	84.0	81.0	79.0	78.0	77.0	74.0	65.0	83.5
CA7 093 – CA4 093	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
CA7 100 – CA4 100	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
CA7 107 – CA4 107	74.0	84.0	83.0	81.0	79.0	77.0	75.0	65.0	84.5
CA7 115	74.0	84.0	83.0	81.0	79.0	77.0	75.0	65.0	84.5
CA7 122	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0
CA7 131	75.0	85.0	84.0	83.0	81.0	78.0	76.0	65.0	86.0
CA7 140	75.0	85.0	84.0	83.0	81.0	78.0	76.0	65.0	86.0

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

Tab. 9b – PWL – CA7 – CA4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CA4 069	94.0	105.0	102.0	100.0	99.0	98.0	95.0	86.0	104.5
CA4 075	94.0	105.0	102.0	100.0	99.0	98.0	95.0	86.0	104.5
CA7 081 – CA4 081	94.0	105.0	102.0	100.0	99.0	98.0	95.0	86.0	104.5
CA7 087 – CA4 087	94.0	105.0	102.0	100.0	99.0	98.0	95.0	86.0	104.5
CA7 093 – CA4 093	94.0	104.0	103.0	101.0	100.0	98.0	95.0	86.0	105.0
CA7 100 – CA4 100	94.0	104.0	103.0	101.0	100.0	98.0	95.0	86.0	105.0
CA7 107 – CA4 107	95.0	105.0	104.0	102.0	100.0	98.0	96.0	86.0	105.5
CA7 115	95.0	105.0	104.0	102.0	100.0	98.0	96.0	86.0	105.5
CA7 122	96.0	106.0	105.0	104.0	102.0	99.0	97.0	87.0	106.5
CA7 131	97.0	107.0	106.0	105.0	103.0	100.0	98.0	87.0	108.0
CA7 140	97.0	107.0	106.0	105.0	103.0	100.0	98.0	87.0	108.0

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

Sound Levels

Tab. 9c – SPL – CB7 – 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
CB7 081 – CB4 081	71.0	81.0	81.0	79.0	73.0	68.0	60.0	50.0	79.5
CB7 087 – CB4 087	71.0	81.0	81.0	79.0	73.0	68.0	60.0	50.0	79.5
CB7 093 – CB4 093	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
CB7 100 – CB4 100	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
CB7 107 – CB4 107	72.0	82.0	82.0	79.0	75.0	70.0	63.0	51.0	80.5
CB7 115	72.0	82.0	82.0	79.0	75.0	70.0	63.0	51.0	80.5
CB7 122	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
CB7 131	73.0	84.0	82.0	81.0	77.0	71.0	65.0	52.0	82.0
CB7 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. 9d – PWL – CB7 – CB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CB4 069	92.0	102.0	102.0	100.0	94.0	89.0	81.0	71.0	100.5
CB4 075	92.0	102.0	102.0	100.0	94.0	89.0	81.0	71.0	100.5
CB7 081 – CB4 081	92.0	102.0	102.0	100.0	94.0	89.0	81.0	71.0	100.5
CB7 087 – CB4 087	92.0	102.0	102.0	100.0	94.0	89.0	81.0	71.0	100.5
CB7 093 – CB4 093	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0
CB7 100 – CB4 100	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0
CB7 107 – CB4 107	93.0	103.0	103.0	100.0	96.0	91.0	84.0	72.0	101.5
CB7 115	93.0	103.0	103.0	100.0	96.0	91.0	84.0	72.0	101.5
CB7 122	94.5	104.5	103.5	101.5	96.5	92.5	85.5	73.5	102.5
CB7 131	95.0	106.0	104.0	103.0	99.0	93.0	87.0	74.0	104.0
CB7 140	95.0	106.0	104.0	103.0	99.0	93.0	87.0	74.0	104.0

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

Sound Levels

Tab. 9e – SPL – CL7 – 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
CL7 080 – CL4 080	70.0	77.0	76.0	70.0	69.0	63.0	55.0	47.0	73.5
CL7 086 – CL4 086	70.0	77.0	76.0	70.0	69.0	63.0	55.0	47.0	73.5
CL7 092 – CL4 092	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
CL7 099 – CL4 099	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
CL7 106 – CL4 106	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
CL7 114	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
CL7 121	71.0	79.0	77.0	72.0	70.0	65.0	58.0	49.0	75.0
CL7 130	71.0	79.0	77.0	72.0	70.0	65.0	58.0	49.0	75.0
CL7 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. 9f – PWL – CL7 – CL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CL4 068	91.0	97.0	97.0	91.0	89.0	83.0	75.0	68.0	94.0
CL4 074	91.0	97.0	97.0	91.0	89.0	83.0	75.0	68.0	94.0
CL7 080 – CL4 080	91.0	98.0	97.0	91.0	90.0	84.0	76.0	68.0	94.5
CL7 086 – CL4 086	91.0	98.0	97.0	91.0	90.0	84.0	76.0	68.0	94.5
CL7 092 – CL4 092	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
CL7 099 – CL4 099	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
CL7 106 – CL4 106	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
CL7 114	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
CL7 121	93.0	101.0	99.0	94.0	92.0	87.0	80.0	71.0	97.0
CL7 130	93.0	101.0	99.0	94.0	92.0	87.0	80.0	71.0	97.0
CL7 139	93.0	101.0	99.0	94.0	92.0	87.0	80.0	71.0	97.0

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

Sound Levels

Tab. 9g – SPL – CQ7 – 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
CQ7 080 – CQ4 080	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
CQ7 086 – CQ4 086	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
CQ7 092 – CQ4 092	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
CQ7 099 – CQ4 099	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
CQ7 106 – CQ4 106	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
CQ7 114	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
CQ7 121	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. 9h – PWL – CQ7 – CQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CQ4 068	88.0	88.0	86.0	85.0	81.0	75.0	68.0	63.0	86.0
CQ4 074	88.0	88.0	86.0	85.0	81.0	75.0	68.0	63.0	86.0
CQ7 080 – CQ4 080	88.0	89.0	86.0	86.0	81.0	75.0	68.0	63.0	86.5
CQ7 086 – CQ4 086	88.0	89.0	86.0	86.0	81.0	75.0	68.0	63.0	86.5
CQ7 092 – CQ4 092	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
CQ7 099 – CQ4 099	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
CQ7 106 – CQ4 106	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
CQ7 114	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
CQ7 121	90.0	91.0	89.0	88.0	84.0	78.0	70.0	64.0	89.0

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

Sound Levels

Tab. 9i – SPL – FA7 – FA4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
FA4 069	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FA4 075	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FA7 081 – FA4 081	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FA7 087 – FA4 087	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FA7 093 – FA4 093	73.0	83.0	82.0	80.0	79.0	77.0	74.0	65.0	84.0
FA7 100 – FA4 100	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0
FA7 107 – FA4 107	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0
FA7 115	74.0	84.0	83.0	82.0	80.0	77.0	75.0	65.0	85.0
FA7 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. 9j – PWL – FA7 – FA4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FA4 069	94.0	104.0	103.0	101.0	100.0	98.0	95.0	86.0	105.0
FA4 075	94.0	104.0	103.0	101.0	100.0	98.0	95.0	86.0	105.0
FA7 081 – FA4 081	94.0	104.0	103.0	101.0	100.0	98.0	95.0	86.0	105.0
FA7 087 – FA4 087	94.0	104.0	103.0	101.0	100.0	98.0	95.0	86.0	105.0
FA7 093 – FA4 093	94.0	104.0	103.0	101.0	100.0	98.0	95.0	86.0	105.0
FA7 100 – FA4 100	95.5	105.5	104.5	103.5	101.5	98.5	96.5	86.5	106.5
FA7 107 – FA4 107	95.5	105.5	104.5	103.5	101.5	98.5	96.5	86.5	106.5
FA7 115	95.5	105.5	104.5	103.5	101.5	98.5	96.5	86.5	106.5
FA7 122	95.5	105.5	104.5	103.5	101.5	98.5	96.5	86.5	106.5

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

Sound Levels

Tab. 9k – SPL – FB7 – 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
FB7 081 – FB4 081	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB7 087 – FB4 087	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB7 093 – FB4 093	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0
FB7 100 – FB4 100	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
FB7 107 – FB4 107	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
FB7 115	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0
FB7 122	73.0	83.0	82.0	80.0	75.0	71.0	64.0	52.0	81.0

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

Tab. 9l – PWL – FB7 – FB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FB4 069	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0
FB4 075	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0
FB7 081 – FB4 081	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0
FB7 087 – FB4 087	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0
FB7 093 – FB4 093	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0
FB7 100 – FB4 100	94.5	104.5	103.5	101.5	96.5	92.5	85.5	73.5	102.5
FB7 107 – FB4 107	94.5	104.5	103.5	101.5	96.5	92.5	85.5	73.5	102.5
FB7 115	94.5	104.5	103.5	101.5	96.5	92.5	85.5	73.5	102.5
FB7 122	94.5	104.5	103.5	101.5	96.5	92.5	85.5	73.5	102.5

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

Sound Levels

Tab. 9m – SPL – FL7 – 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
FL7 080 – FL4 080	70.0	76.0	76.0	70.0	68.0	62.0	54.0	47.0	73.0
FL7 086 – FL4 086	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL7 092 – FL4 092	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL7 099 – FL4 099	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL7 106 – FL4 106	70.0	79.0	76.0	71.0	69.0	64.0	56.0	48.0	74.0
FL7 114	71.0	79.0	77.0	72.0	70.0	65.0	58.0	49.0	75.0
FL7 121	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. 9n – PWL – FL7 – FL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FL4 068	91.0	97.0	97.0	91.0	89.0	83.0	75.0	68.0	94.0
FL4 074	91.0	97.0	97.0	91.0	89.0	83.0	75.0	68.0	94.0
FL7 080 – FL4 080	91.0	97.0	97.0	91.0	89.0	83.0	75.0	68.0	94.0
FL7 086 – FL4 086	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
FL7 092 – FL4 092	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
FL7 099 – FL4 099	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
FL7 106 – FL4 106	91.5	100.5	97.5	92.5	90.5	85.5	77.5	69.5	95.5
FL7 114	93.0	101.0	99.0	94.0	92.0	87.0	80.0	71.0	97.0
FL7 121	93.0	101.0	99.0	94.0	92.0	87.0	80.0	71.0	97.0

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

Sound Levels

Tab. 9o – SPL – FQ7 – 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
FQ7 080 – FQ4 080	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
FQ7 086 – FQ4 086	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ7 092 – FQ4 092	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ7 099 – FQ4 099	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ7 106 – FQ4 106	68.0	68.0	66.0	65.0	61.0	55.0	47.0	42.0	66.0
FQ7 114	68.0	69.0	67.0	66.0	62.0	56.0	48.0	42.0	67.0
FQ7 121	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. 9p – PWL – FQ7 – FQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
FQ4 068	88.0	89.0	86.0	86.0	81.0	75.0	68.0	63.0	86.5
FQ4 074	88.0	89.0	86.0	86.0	81.0	75.0	68.0	63.0	86.5
FQ7 080 – FQ4 080	88.0	89.0	86.0	86.0	81.0	75.0	68.0	63.0	86.5
FQ7 086 – FQ4 086	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
FQ7 092 – FQ4 092	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
FQ7 099 – FQ4 099	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
FQ7 106 – FQ4 106	89.5	89.5	87.5	86.5	82.5	76.5	68.5	63.5	87.5
FQ7 114	90.0	91.0	89.0	88.0	84.0	78.0	70.0	64.0	89.0
FQ7 121	90.0	91.0	89.0	88.0	84.0	78.0	70.0	64.0	89.0

Note:
Sound power 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.

10 Electrical Data

Tab. 10a – Electrical data – CA7 081–140

Models CA7		081	087	093	100	107	115	122	131	140
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz								
OA (1)	A	536	586	639	691	728	781	814	846	902
FLA	A	716	756	807	857	918	948	990	1012	1012
LRA	A	851	972	1023	1087	1148	1303	1345	1367	1367
Compressors – Power input (1)	kW	301	328	351	384	399	434	447	453	490
Compressors – Nominal current (1)	A	480	530	572	624	650	703	724	734	790
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450	450/450	450
Fans number	n.	10		12		14		16	20	
Fans – Power input	kW	3								
Fans – Nominal current	A	5.6								
Fans – Max. current	A	6.3								
Std. head pressure pump model (Opt.)	–	80–160/147–127						80–160/153		80–160 /163
Std. head pressure pump – Motor power	kW	11						15		18.5
Std. head pressure pump – Max. current	A	21.4						28		34
High head pressure pump model (Opt.)	–	80–160/153						80–160/163		80–160 /169
High head pressure pump – Motor power	kW	15						18.5		22
High head pressure pump – Max. current	A	28						34		42

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R407C refrigerant

Tab. 10b – Electrical data – CB7 081–140

Models CB7		081	087	093	100	107	115	122	131	140
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz								
OA (1)	A	546	596	648	705	742	796	826	854	914
FLA	A	710	750	800	850	910	940	980	1000	1000
LRA	A	845	966	1016	1080	1140	1295	1335	1355	1355
Compressors – Power input (1)	kW	310	339	362	397	414	449	461	466	505
Compressors – Nominal current (1)	A	496	546	588	645	672	726	746	754	814
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450	450/450	450
Fans number	n.	10		12		14		16	20	
Fans – Power input	kW	2.3								
Fans – Nominal current	A	5								
Fans – Max. current	A	5.3								
Std. head pressure pump model (Opt.)	–	80–160/147–127						80–160/153		80–160 /163
Std. head pressure pump – Motor power	kW	11						15		18.5
Std. head pressure pump – Max. current	A	21.4						28		34
High head pressure pump model (Opt.)	–	80–160/153						80–160/163		80–160 /169
High head pressure pump – Motor power	kW	15						18.5		22
High head pressure pump – Max. current	A	28						34		42

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R407C refrigerant

Electrical Data

Tab. 10c – Electrical data – CL7 080–139

Models CL7		080	086	092	099	106	114	121	130	139
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz								
OA (1)	A	526	576	614	662	720	774	788	847	910
FLA	A	710	750	798	848	898	928	972	972	972
LRA	A	845	966	1014	1078	1128	1283	1327	1327	1327
Compressors – Power input (1)	kW	298	325	340	371	408	442	441	480	521
Compressors – Nominal current (1)	A	476	526	556	604	662	716	716	775	838
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450	450/450	450
Fans number	n.	14		16				20		
Fans – Power input	kW	1.7								
Fans – Nominal current	A	3.6								
Fans – Max. current	A	4.1								
EC Fans – Power input (Opt.)	kW	1.3								
EC Fans – Nominal current (Opt.)	A	2.3								
Std. head pressure pump model (Opt.)	–	80–160/147–127						80–160/153		80–160 /163
Std. head pressure pump – Motor power	kW	11						15		18.5
Std. head pressure pump – Max. current	A	21.4						28		34
High head pressure pump model (Opt.)	–	80–160/153						80–160/163		80–160 /169
High head pressure pump – Motor power	kW	15						18.5		22
High head pressure pump – Max. current	A	28						34		42

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R407C refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Tab. 10d – Electrical data – CQ7 080–121

Models CQ7		080	086	092	099	106	114	121
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	545	596	628	687	760	816	812
FLA	A	689	729	774	824	874	904	942
LRA	A	824	945	990	1054	1104	1259	1297
Compressors – Power input (1)	kW	323	352	366	403	448	485	477
Compressors – Nominal current (1)	A	516	567	594	653	726	782	770
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450
Fans number	n.	14		16				20
Fans – Power input	kW	1.1						
Fans – Mominal current	A	2.1						
Fans – Max. current	A	2.3						
EC Fans – Power input (Opt.)	kW	0.8						
EC Fans – Nominal current (Opt.)	A	1.5						
Std. head pressure pump model (Opt.)	–	80–160/147–127						80–160/153
Std. head pressure pump – Motor power	kW	11						15
Std. head pressure pump – Max. current	A	21.4						28
High head pressure pump model (Opt.)	–	80–160/153						80–160/163
High head pressure pump – Motor power	kW	15						18.5
High head pressure pump – Max. current	A	28						34

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R407C refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Electrical Data

Tab. 10e – Electrical data – CA4 069–107

Models CA4		069	075	081	087	093	100	107
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	380	408	440	476	515	544	566
FLA	A	616	646	676	686	707	747	798
LRA	A	772	801	831	952	973	1037	1088
Compressors – Power input (1)	kW	195	215	238	256	269	288	295
Compressors – Nominal current (1)	A	324	352	384	420	448	477	488
Compressors – Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	10				12		14
Fans – Power input	kW	3						
Fans – Nominal current	A	5.6						
Fans – Max. current	A	6.3						
Std. head pressure pump model (Opt.)	–	80–160/147–127						
Std. head pressure pump – Motor power	kW	11						
Std. head pressure pump – Max. current	A	21.4						
High head pressure pump model (Opt.)	–	80–160/153						
High head pressure pump – Motor power	kW	15						
High head pressure pump – Max. current	A	28						

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R134a refrigerant

Tab. 10f – Electrical data – CB4 069–107

Models CB4		069	075	081	087	093	100	107
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	380	411	446	482	520	551	572
FLA	A	610	640	670	680	700	740	790
LRA	A	766	795	825	946	966	1030	1080
Compressors – Power input (1)	kW	200	221	245	264	277	297	304
Compressors – Nominal current (1)	A	330	361	396	432	460	491	502
Compressors – Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	10				12		14
Fans – Power input	kW	2.3						
Fans – Nominal current	A	5						
Fans – Max. current	A	5.3						
Std. head pressure pump model (Opt.)	–	80–160/147–127						
Std. head pressure pump – Motor power	kW	11						
Std. head pressure pump – Max. current	A	21.4						
High head pressure pump model (Opt.)	–	80–160/153						
High head pressure pump – Motor power	kW	15						
High head pressure pump – Max. current	A	28						

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R134a refrigerant

Electrical Data

Tab. 10g – Electrical data – CL4 068–106

Models CL4		068	074	080	086	092	099	106
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	375	406	432	466	494	521	552
FLA	A	603	633	670	680	698	738	778
LRA	A	759	788	825	946	964	1028	1068
Compressors – Power input (1)	kW	201	223	236	254	261	278	298
Compressors – Nominal current (1)	A	332	363	382	416	436	463	494
Compressors – Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	12		14		16		
Fans – Power input	kW	1.7						
Fans – Nominal current	A	3.6						
Fans – Max. current	A	4.1						
EC Fans – Power input (Opt.)	kW	1.3						
EC Fans – Nominal current (Opt.)	A	2.3						
Std. head pressure pump model (Opt.)	–	80–160/147–127						
Std. head pressure pump – Motor power	kW	11						
Std. head pressure pump – Max. current	A	21.4						
High head pressure pump model (Opt.)	–	80–160/153						
High head pressure pump – Motor power	kW	15						
High head pressure pump – Max. current	A	28						

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R134a refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Tab. 10h – Electrical data – CQ4 068–106

Models CQ4		068	074	080	086	092	099	106
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	377	414	437	473	496	527	564
FLA	A	585	615	649	659	674	714	754
LRA	A	741	770	804	925	940	1004	1044
Compressors–Power input (1)	kW	214	240	253	272	277	298	322
Compressors–Nominal current (1)	A	352	389	408	444	462	493	530
Compressors–Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	12		14		16		
Fans–Power input	kW	1.1						
Fans–Nominal current	A	2.1						
Fans–Max. current	A	2.3						
EC Fans–Power input (Opt.)	kW	0.8						
EC Fans–Nominal current (Opt.)	A	1.5						
Std. head pressure pump model (Opt.)	–	80–160/147–127						
Std. head pressure pump–Motor power	kW	11						
Std. head pressure pump–Max. current	A	21.4						
High head pressure pump model (Opt.)	–	80–160/153						
High head pressure pump–Motor power	kW	15						
High head pressure pump–Max. current	A	28						

(1) – Outdoor temperature 35°C; water inlet/outlet temperature 12/7°C; R134a refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Electrical Data

Tab. 10i – Electrical data – FA7 081–122

Models FA7		081	087	093	100	107	115	122
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	584	635	692	713	774	829	886
FLA	A	732	772	812	886	936	966	996
LRA	A	867	988	1028	1116	1166	1321	1351
Compressors – Power input (1)	kW	320	350	382	379	417	453	490
Compressors – Nominal current (1)	A	512	563	620	617	678	733	790
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450
Fans number	n.	12			16			16
Fans – Power input	kW	3.2						
Fans – Nominal current	A	6.0						
Fans – Max. current	A	6.3						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)			80–200/178 (1+1)		80–160/167 (2)	
Std. head pressure pump – Motor power	kW	18.5			30		22+22	
Std. head pressure pump – Max. current	A	34			55		42+42	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)			80–200/188 (1+1)		80–200/178 (2)	
High head pressure pump – Motor power	kW	22			30		30+30	
High head pressure pump – Max. current	A	42			55		55+55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R407C refrigerant

Tab. 10j – Electrical data – FB7 081–122

Models FB7		081	087	093	100	107	115	122
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	591	644	701	718	784	841	900
FLA	A	721	761	801	872	922	952	982
LRA	A	856	977	1017	1102	1152	1307	1337
Compressors – Power input (1)	kW	332	362	395	392	433	470	508
Compressors – Nominal current (1)	A	530	583	640	636	702	759	818
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450
Fans number	n.	12			16			
Fans – Power input	kW	2.35						
Fans – Nominal current	A	5.1						
Fans – Max. current	A	5.3						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)			80–200/178 (1+1)		80–160/167 (2)	
Std. head pressure pump – Motor power	kW	18.5			30		22+22	
Std. head pressure pump – Max. current	A	34			55		42+42	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)			80–200/188 (1+1)		80–200/178 (2)	
High head pressure pump – Motor power	kW	22			30		30+30	
High head pressure pump – Max. current	A	42			55		55+55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R407C refrigerant

Electrical Data

Tab. 10k – Electrical data – FL7 080–121

Models FL7		080	086	092	099	106	114	121
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	590	604	661	717	783	797	854
FLA	A	706	761	801	851	901	946	976
LRA	A	841	977	1017	1081	1131	1301	1331
Compressors – Power input (1)	kW	341	337	368	404	446	446	482
Compressors – Nominal current (1)	A	544	543	600	656	722	721	778
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450
Fans number	n.	12	16				20	
Fans – Power input	kW	1.8						
Fans – Nominal current	A	3.8						
Fans – Max. current	A	4.1						
EC Fans – Power input (Opt.)	kW	1.4						
EC Fans – Nominal current (Opt.)	A	2.4						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)			80–200/178 (1+1)		80–160/167 (2)	
Std. head pressure pump – Motor power	kW	18.5			30		22+22	
Std. head pressure pump – Max. current	A	34			55		42+42	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)			80–200/188 (1+1)		80–200/178 (2)	
High head pressure pump – Motor power	kW	22			30		30+30	
High head pressure pump – Max. current	A	42			55		55+55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R407C refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Tab. 10l – Electrical data – FQ7 080–121

Models FQ7		080	086	092	099	106	114	121
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	624	620	679	748	833	826	886
FLA	A	686	735	775	825	875	914	944
LRA	A	821	951	991	1055	1105	1269	1299
Compressors – Power input (1)	kW	376	364	397	441	494	485	523
Compressors – Nominal current (1)	A	598	585	644	713	798	782	842
Compressors – Max. current	A	330	330/370	370	370/420	420	420/450	450
Fans number	n.	12	16				20	
Fans – Power input	kW	1.15						
Fans – Nominal current	A	2.2						
Fans – Max. current	A	2.3						
EC Fans – Power input (Opt.)	kW	0.9						
EC Fans – Nominal current (Opt.)	A	1.5						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)			80–200/178 (1+1)		80–160/167 (2)	
Std. head pressure pump – Motor power	kW	18.5			30		22+22	
Std. head pressure pump – Max. current	A	34			55		42+42	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)			80–200/188 (1+1)		80–200/178 (2)	
High head pressure pump – Motor power	kW	22			30		30+30	
High head pressure pump – Max. current	A	42			55		55+55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R407C refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Electrical Data

Tab. 10m – Electrical data – FA4 069–107

Models FA4		069	075	081	087	093	100	107
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	418	451	490	527	566	578	612
FLA	A	632	662	692	702	712	776	816
LRA	A	788	817	847	968	978	1066	1106
Compressors – Power input (1)	kW	210	233	259	279	299	291	313
Compressors – Nominal current (1)	A	346	379	418	455	494	482	516
Compressors – Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	12					16	
Fans – Power input	kW	3.2						
Fans – Nominal current	A	6.0						
Fans – Max. current	A	6.3						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)					80–200/178 (1+1)	
Std. head pressure pump – Motor power	kW	18.5					30	
Std. head pressure pump – Max. current	A	34					55	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)					80–200/188 (1+1)	
High head pressure pump – Motor power	kW	22					30	
High head pressure pump – Max. current	A	42					55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R134a refrigerant

Tab. 10n – Electrical data – FB4 069–107

Models FB4		069	075	081	087	093	100	107
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	415	449	491	529	569	575	612
FLA	A	621	651	681	691	701	762	802
LRA	A	777	806	836	957	967	1052	1092
Compressors – Power input (1)	kW	215	239	267	288	308	299	322
Compressors – Nominal current (1)	A	354	388	430	468	508	493	530
Compressors – Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	12					16	
Fans – Power input	kW	2.35						
Fans – Nominal current	A	5.1						
Fans – Max. current	A	5.3						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)					80–200/178 (1+1)	
Std. head pressure pump – Motor power	kW	18.5					30	
Std. head pressure pump – Max. current	A	34					55	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)					80–200/188 (1+1)	
High head pressure pump – Motor power	kW	22					30	
High head pressure pump – Max. current	A	42					55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R134a refrigerant

Electrical Data

Tab. 10o – Electrical data – FL4 068–106

Models FL4		068	074	080	086	092	099	106
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	408	445	490	497	535	567	607
FLA	A	606	636	666	691	701	741	781
LRA	A	762	791	821	957	967	1031	1071
Compressors – Power input (1)	kW	221	247	276	267	286	307	333
Compressors – Nominal current (1)	A	362	399	444	436	474	506	546
Compressors – Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	12			16			
Fans – Power input	kW	1.8						
Fans – Nominal current	A	3.8						
Fans – Max. current	A	4.1						
EC Fans – Power input (Opt.)	kW	1.4						
EC Fans – Nominal current (Opt.)	A	2.4						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)					80–200/178 (1+1)	
Std. head pressure pump – Motor power	kW	18.5					30	
Std. head pressure pump – Max. current	A	34					55	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)					80–200/188 (1+1)	
High head pressure pump – Motor power	kW	22					30	
High head pressure pump – Max. current	A	42					55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R134a refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Tab. 10p – Electrical data – FQ4 068–106

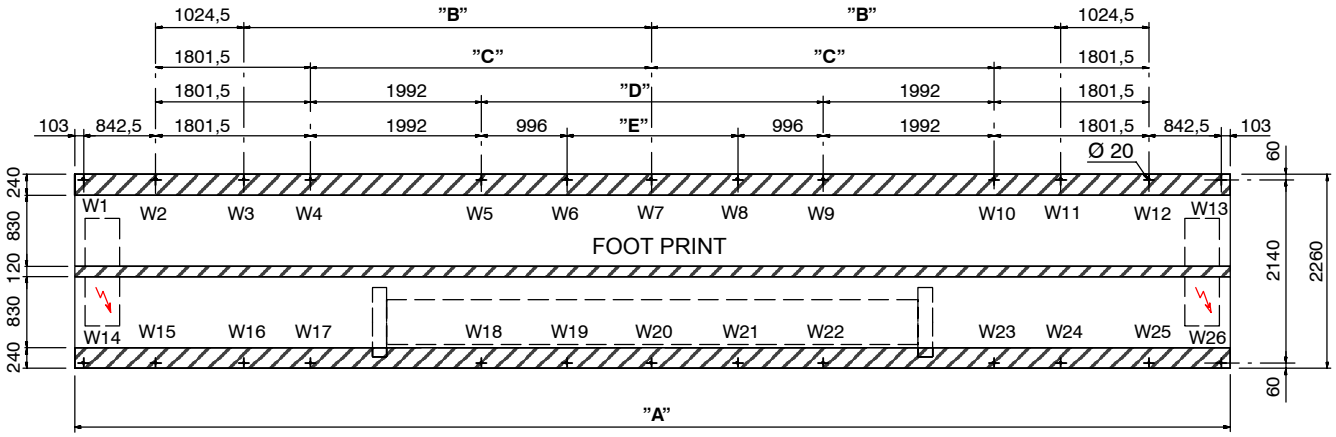
Models FQ4		068	074	080	086	092	099	106
Power supply	V/Ph/Hz	400 V / 3 Ph / 50 Hz						
OA (1)	A	414	458	510	501	541	580	631
FLA	A	586	616	646	665	675	715	755
LRA	A	742	771	801	931	941	1005	1045
Compressors – Power input (1)	kW	237	268	303	287	307	333	365
Compressors – Nominal current (1)	A	388	432	484	466	506	545	596
Compressors – Max. current	A	280	280/310	310	310/320	320	320/360	360
Fans number	n.	12			16			
Fans – Power input	kW	1.15						
Fans – Nominal current	A	2.2						
Fans – Max. current	A	2.3						
EC Fans – Power input (Opt.)	kW	0.9						
EC Fans – Nominal current (Opt.)	A	1.5						
Std. head pressure pump model (Opt.)	–	80–160/161 (1+1)					80–200/178 (1+1)	
Std. head pressure pump – Motor power	kW	18.5					30	
Std. head pressure pump – Max. current	A	34					55	
High head pressure pump model (Opt.)	–	80–160/167 (1+1)					80–200/188 (1+1)	
High head pressure pump – Motor power	kW	22					30	
High head pressure pump – Max. current	A	42					55	

(1) – Outdoor temperature 35°C; fluid inlet/outlet temperature 15/10°C; fluid: mixture 70/30% acqua/glicole; R134a refrigerant

Note: The electrical data shown for the EC fans are referred to operating conditions (rpm/air delivery) perfectly equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

11 Application Consideration

Fig. 11a – Support positions and loads



Tab. 11a – Dimensions

Models	Size	Fans nr.	Dimensions (mm)				
			"A"	"B"	"C"	"D"	"E"
CA7 / CB7 CA4 / CB4 CL4 / CQ4	081–087–093–100 069–075–081–087–093–100 068–074	10 – 12	8482	2271	–	–	–
CA7 / CB7 CL7 / CQ7 CA4 / CB4 CL4 / CQ4	107–115 080–086 107 080–086	14	9478	–	1992	–	–
CA7 / CB7 CL7 / CQ7 CL4 / CQ4	122 092–099–106–114 092–099–106	16	11470	–	–	1992	–
CA7 / CB7 CL7 / CQ7	131–140 121–130–139	20	13462	–	–	–	1992
FA7 / FB7 FL7 / FQ7 FA4 / FB4 FL4 / FQ4	081–087–093 080 069–075–081–087–093 068–074–080	12	9478	–	1992	–	–
FA7 / FB7 FL7 / FQ7 FA4 / FB4 FL4 / FQ4	100–107–115–122 086–092–099–106 100–107 086–092–099–106	16	11470	–	–	1992	–
FL7 / FQ7	114–121	20	13462	–	–	–	1992

Tab. 11b – 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	
CA/CB7 081	571	571	571	–	–	–	571	–	–	–	575	575	575	730	730	730	–	–	–	730	–	–	–	735	735	735	9134
CA/CB7 087	574	574	574	–	–	–	574	–	–	–	574	574	574	734	734	734	–	–	–	734	–	–	–	734	734	734	9156
CA/CB7 093	583	583	583	–	–	–	583	–	–	–	587	587	587	744	744	744	–	–	–	744	–	–	–	749	749	749	9316
CA/CB7 100	586	586	586	–	–	–	586	–	–	–	588	588	588	746	746	746	–	–	–	746	–	–	–	748	748	748	9336
CA/CB7 107	634	634	–	634	–	–	634	–	–	637	–	637	637	812	812	–	812	–	–	812	–	–	816	–	816	816	10143
CA/CB7 115	641	641	–	641	–	–	633	–	–	633	–	633	633	827	827	–	827	–	–	817	–	–	817	–	817	817	10204
CA/CB7 122	612	612	–	612	612	–	–	–	615	615	–	615	615	782	782	–	782	782	–	–	–	785	785	–	785	785	11176
CA/CB7 131	544	544	–	544	544	544	–	543	543	543	–	543	543	680	680	–	680	680	680	–	679	679	679	–	679	679	12230
CA/CB7 140	544	544	–	544	544	544	–	546	546	546	–	546	546	679	679	–	679	679	679	–	682	682	682	–	682	682	12255
CL/CQ7 080	606	606	–	606	–	–	606	–	–	609	–	609	609	765	765	–	765	–	–	765	–	–	769	–	769	769	9618
CL/CQ7 086	609	609	–	609	–	–	608	–	–	608	–	608	608	769	769	–	769	–	–	768	–	–	768	–	768	768	9638
CL/CQ7 092	584	584	–	584	584	–	–	–	586	586	–	586	586	725	725	–	725	725	–	–	–	728	728	–	728	728	10492
CL/CQ7 099	586	586	–	586	586	–	–	–	587	587	–	587	587	726	726	–	726	726	–	–	–	728	728	–	728	728	10508
CL/CQ7 106	594	594	–	594	594	–	–	–	597	597	–	597	597	750	750	–	750	750	–	–	–	753	753	–	753	753	10776
CL/CQ7 114	600	600	–	600	600	–	–	–	593	593	–	593	593	763	763	–	763	763	–	–	–	754	754	–	754	754	10840
CL/CQ7 121	526	526	–	526	526	526	–	528	528	528	–	528	528	661	661	–	661	661	661	–	664	664	664	–	664	664	11895
CL/CQ7 130	528	528	–	528	528	528	–	527	527	527	–	527	527	664	664	–	664	664	664	–	663	663	663	–	663	663	11910
CL/CQ7 139	528	528	–	528	528	528	–	530	530	530	–	530	530	663	663	–	663	663	663	–	666	666	666	–	666	666	11935
CA/CB4 069	568	568	568	–	–	–	568	–	–	–	571	571	571	729	729	729	–	–	–	729	–	–	–	733	733	733	9100
CA/CB4 075	569	569	569	–	–	–	569	–	–	–	571	571	571	730	730	730	–	–	–	730	–	–	–	733	733	733	9108
CA/CB4 081	572	572	572	–	–	–	572	–	–	–	575	575	575	737	737	737	–	–	–	737	–	–	–	742	742	742	9187
CA/CB4 087	580	580	580	–	–	–	573	–	–	–	573	573	573	752	752	752	–	–	–	744	–	–	–	744	744	744	9264
CA/CB4 093	585	585	585	–	–	–	585	–	–	–	588	588	588	761	761	761	–	–	–	761	–	–	–	766	766	766	9446
CA/CB4 100	589	589	589	–	–	–	588	–	–	–	588	588	588	766	766	766	–	–	–	765	–	–	–	765	765	765	9477
CA/CB4 107	635	635	–	635	–	–	635	–	–	639	–	639	639	830	830	–	830	–	–	830	–	–	835	–	835	835	10282
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

Tab. 11c – 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	
FA/FB7 081	755	755	–	755	–	–	755	–	–	758	–	758	758	906	906	–	906	–	–	906	–	–	910	–	910	910	11648
FA/FB7 087	758	758	–	758	–	–	757	–	–	757	–	757	757	909	909	–	909	–	–	909	–	–	909	–	909	909	11665
FA/FB7 093	771	771	–	771	–	–	771	–	–	774	–	774	774	918	918	–	918	–	–	918	–	–	922	–	922	922	11844
FA/FB7 100	772	772	–	772	772	–	–	–	773	773	–	773	773	899	899	–	899	899	–	–	–	900	900	–	900	900	13376
FA/FB7 107	780	780	–	780	780	–	–	–	782	782	–	782	782	923	923	–	923	923	–	–	–	926	926	–	926	926	13644
FA/FB7 115	786	786	–	786	786	–	–	–	779	779	–	779	779	936	936	–	936	936	–	–	–	927	927	–	927	927	13712
FA/FB7 122	785	785	–	785	785	–	–	–	788	788	–	788	788	942	942	–	942	942	–	–	–	945	945	–	945	945	13840
FL/FQ7 080	746	746	–	746	–	–	746	–	–	750	–	750	750	897	897	–	897	–	–	897	–	–	901	–	901	901	11525
FL/FQ7 086	745	745	–	745	745	–	–	–	744	744	–	744	744	877	877	–	877	877	–	–	–	876	876	–	876	876	12968
FL/FQ7 092	756	756	–	756	756	–	–	–	758	758	–	758	758	884	884	–	884	884	–	–	–	887	887	–	887	887	13140
FL/FQ7 099	758	758	–	758	758	–	–	–	759	759	–	759	759	886	886	–	886	886	–	–	–	887	887	–	887	887	13160
FL/FQ7 106	766	766	–	766	766	–	–	–	769	769	–	769	769	910	910	–	910	910	–	–	–	913	913	–	913	913	13432
FL/FQ7 114	686	686	–	686	686	686	–	679	679	679	–	679	679	806	806	–	806	806	806	–	797	797	797	–	797	797	14840
FL/FQ7 121	684	684	–	684	684	684	–	686	686	686	–	686	686	810	810	–	810	810	810	–	812	812	812	–	812	812	14960
FA/FB4 069	753	753	–	753	–	–	753	–	–	756	–	756	756	905	905	–	905	–	–	905	–	–	909	–	909	909	11627
FA/FB4 075	754	754	–	754	–	–	754	–	–	756	–	756	756	907	907	–	907	–	–	907	–	–	909	–	909	909	11639
FA/FB4 081	757	757	–	757	–	–	757	–	–	760	–	760	760	914	914	–	914	–	–	914	–	–	918	–	918	918	11718
FA/FB4 087	765	765	–	765	–	–	757	–	–	757	–	757	757	929	929	–	929	–	–	920	–	–	920	–	920	920	11790
FA/FB4 093	774	774	–	774	–	–	774	–	–	777	–	777	777	936	936	–	936	–	–	936	–	–	940	–	940	940	11991
FA/FB4 100	777	777	–	777	777	–	–	–	774	774	–	774	774	919	919	–	919	919	–	–	–	916	916	–	916	916	13544
FA/FB4 107	782	782	–	782	782	–	–	–	785	785	–	785	785	941	941	–	941	941	–	–	–	944	944	–	944	944	13808
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

Tab. 11d – 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	
CA/CB7 081	635	635	635	–	–	–	635	–	–	–	639	639	639	767	767	767	–	–	–	767	–	–	–	771	771	771	9838
CA/CB7 087	638	638	638	–	–	–	638	–	–	–	638	638	638	770	770	770	–	–	–	770	–	–	–	770	770	770	9856
CA/CB7 093	654	654	654	–	–	–	654	–	–	–	657	657	657	784	784	784	–	–	–	784	–	–	–	789	789	789	10090
CA/CB7 100	656	656	656	–	–	–	656	–	–	–	658	658	658	786	786	786	–	–	–	786	–	–	–	788	788	788	10106
CA/CB7 107	704	704	–	704	–	–	704	–	–	708	–	708	708	852	852	–	852	–	–	852	–	–	856	–	856	856	10916
CA/CB7 115	711	711	–	711	–	–	704	–	–	704	–	704	704	867	867	–	867	–	–	857	–	–	857	–	857	857	10978
CA/CB7 122	675	675	–	675	675	–	–	–	678	678	–	678	678	818	818	–	818	818	–	–	–	821	821	–	821	821	11968
CA/CB7 131	595	595	–	595	595	595	–	594	594	594	–	594	594	709	709	–	709	709	709	–	708	708	708	–	708	708	13030
CA/CB7 140	598	598	–	598	598	598	–	600	600	600	–	600	600	711	711	–	711	711	711	–	713	713	713	–	713	713	13110
CL/CQ7 080	670	670	–	670	–	–	670	–	–	673	–	673	673	801	801	–	801	–	–	801	–	–	805	–	805	805	10318
CL/CQ7 086	673	673	–	673	–	–	672	–	–	672	–	672	672	805	805	–	805	–	–	804	–	–	804	–	804	804	10338
CL/CQ7 092	646	646	–	646	646	–	–	–	648	648	–	648	648	760	760	–	760	760	–	–	–	763	763	–	763	763	11268
CL/CQ7 099	648	648	–	648	648	–	–	–	649	649	–	649	649	762	762	–	762	762	–	–	–	763	763	–	763	763	11288
CL/CQ7 106	656	656	–	656	656	–	–	–	659	659	–	659	659	785	785	–	785	785	–	–	–	788	788	–	788	788	11552
CL/CQ7 114	662	662	–	662	662	–	–	–	655	655	–	655	655	798	798	–	798	798	–	–	–	789	789	–	789	789	11616
CL/CQ7 121	576	576	–	576	576	576	–	578	578	578	–	578	578	690	690	–	690	690	690	–	693	693	693	–	693	693	12685
CL/CQ7 130	579	579	–	579	579	579	–	578	578	578	–	578	578	693	693	–	693	693	693	–	692	692	692	–	692	692	12710
CL/CQ7 139	582	582	–	582	582	582	–	584	584	584	–	584	584	695	695	–	695	695	695	–	697	697	697	–	697	697	12790
CA/CB4 069	632	632	632	–	–	–	632	–	–	–	635	635	635	765	765	765	–	–	–	765	–	–	–	769	769	769	9800
CA/CB4 075	633	633	633	–	–	–	633	–	–	–	635	635	635	767	767	767	–	–	–	767	–	–	–	769	769	769	9812
CA/CB4 081	636	636	636	–	–	–	636	–	–	–	639	639	639	773	773	773	–	–	–	773	–	–	–	778	778	778	9887
CA/CB4 087	644	644	644	–	–	–	637	–	–	–	637	637	637	786	786	788	–	–	–	780	–	–	–	780	780	780	9964
CA/CB4 093	655	655	655	–	–	–	655	–	–	–	659	659	659	801	801	801	–	–	–	801	–	–	–	806	806	806	10219
CA/CB4 100	660	660	660	–	–	–	659	–	–	–	659	659	659	807	807	807	–	–	–	805	–	–	–	805	805	805	10257
CA/CB4 107	706	706	–	706	–	–	706	–	–	709	–	709	709	871	871	–	871	–	–	871	–	–	875	–	875	875	11060
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

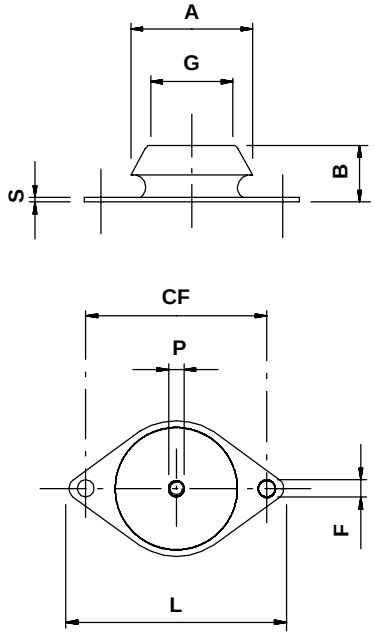
Tab. 11e – Weight distribution – unit with pumps (Freecooling)

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	
FA/FB7 081	810	810	–	810	–	–	810	–	–	813	–	813	813	934	934	–	934	–	–	934	–	–	938	–	938	938	12229
FA/FB7 087	813	813	–	813	–	–	813	–	–	813	–	813	813	937	937	–	937	–	–	937	–	–	937	–	937	937	12250
FA/FB7 093	820	820	–	820	–	–	820	–	–	824	–	824	824	942	942	–	942	–	–	942	–	–	946	–	946	946	12358
FA/FB7 100	829	829	–	829	829	–	–	–	830	830	–	830	830	934	934	–	934	934	–	–	–	934	934	–	934	934	14108
FA/FB7 107	837	837	–	837	837	–	–	–	839	839	–	839	839	958	958	–	958	958	–	–	–	961	961	–	961	961	14380
FA/FB7 115	844	844	–	844	844	–	–	–	836	836	–	836	836	970	970	–	970	970	–	–	–	962	962	–	962	962	14448
FA/FB7 122	842	842	–	842	842	–	–	–	845	845	–	845	845	976	976	–	976	976	–	–	–	979	979	–	979	979	14568
FL/FQ7 080	801	801	–	801	–	–	801	–	–	805	–	805	805	925	925	–	925	–	–	925	–	–	929	–	929	929	12106
FL/FQ7 086	793	793	–	793	793	–	–	–	792	792	–	792	792	902	902	–	902	902	–	–	–	901	901	–	901	901	13552
FL/FQ7 092	799	799	–	799	799	–	–	–	802	802	–	802	802	906	906	–	906	906	–	–	–	909	909	–	909	909	13664
FL/FQ7 099	815	815	–	815	815	–	–	–	816	816	–	816	816	920	920	–	920	920	–	–	–	921	921	–	921	921	13888
FL/FQ7 106	823	823	–	823	823	–	–	–	826	826	–	826	826	944	944	–	944	944	–	–	–	947	947	–	947	947	14160
FL/FQ7 114	731	731	–	731	731	731	–	724	724	724	–	724	724	833	833	–	833	833	833	–	825	825	825	–	825	825	15565
FL/FQ7 121	730	730	–	730	730	730	–	732	732	732	–	732	732	837	837	–	837	837	837	–	839	839	839	–	839	839	15690
FA/FB4 069	808	808	–	808	–	–	808	–	–	811	–	811	811	934	934	–	934	–	–	934	–	–	937	–	937	937	12212
FA/FB4 075	809	809	–	809	–	–	809	–	–	811	–	811	811	935	935	–	935	–	–	935	–	–	937	–	937	937	12220
FA/FB4 081	812	812	–	812	–	–	812	–	–	816	–	816	816	942	942	–	942	–	–	942	–	–	946	–	946	946	12302
FA/FB4 087	821	821	–	821	–	–	813	–	–	813	–	813	813	957	957	–	957	–	–	948	–	–	948	–	948	948	12378
FA/FB4 093	823	823	–	823	–	–	823	–	–	827	–	827	827	960	960	–	960	–	–	960	–	–	965	–	965	965	12508
FA/FB4 100	834	834	–	834	834	–	–	–	831	831	–	831	831	953	953	–	953	953	–	–	–	951	951	–	951	951	14276
FA/FB4 107	839	839	–	839	839	–	–	–	842	842	–	842	842	975	975	–	975	975	–	–	–	978	978	–	978	978	14536
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

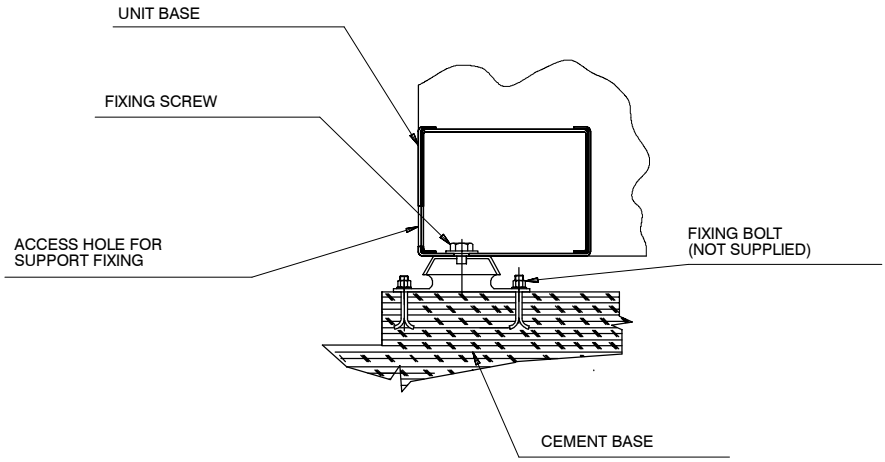
Application Consideration

Fig. 11b – Rubber anti–vibration support

Rubber support dimensions



Rubber support installation



Tab. 11f – 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. 11g – Rubber support (Chiller)

Unit	Configuration	Fans N.	Support kit code	Single support code	Kit support pieces
CA7 / CB7 081 CA7 / CB7 087	With or without pumps	10	489030	270326	14
CA7 / CB7 093 CA7 / CB7 100		12			
CA7 / CB7 107 CA7 / CB7 115		14			
CA7 / CB7 122		16	489031		16
CA7 / CB7 131 CA7 / CB7 140		20	485772		20
CL7 / CQ7 080 CL7 / CQ7 086		14	489030		14
CL7 / CQ7 092 CL7 / CQ7 099 CL7 / CQ7 106 CL7 / CQ7 114		16	489031		16
CL7 / CQ7 121 CL7 / CQ7 130 CL7 / CQ7 139		20	485772		20
CA4 / CB4 069 CA4 / CB4 075 CA4 / CB4 081 CA4 / CB4 087		10	489030		14
CA4 / CB4 093 CA4 / CB4 100		12			
CA4 / CB4 107		14			
CL4 / CQ4 068 CL4 / CQ4 074		12			
CL4 / CQ4 080 CL4 / CQ4 086		14			
CL4 / CQ4 092 CL4 / CQ4 099 CL4 / CQ4 106		16	489031		16

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

Tab. 11h – Rubber support (Freecooling)

Unit	Configuration	Fans N.	Support kit code	Single support code	Kit support pieces
FA7 / FB7 081 FA7 / FB7 087 FA7 / FB7 093	With or without pumps	12	489030	270326	14
FA7 / FB7 100 FA7 / FB7 107 FA7 / FB7 115 FA7 / FB7 122		16	489031		16
FL7 / FQ7 080		12	489030		14
FL7 / FQ7 086 FL7 / FQ7 092 FL7 / FQ7 099 FL7 / FQ7 106		16	489031		16
FL7 / FQ7 114 FL7 / FQ7 121		20	485772		20
FA4 / FB4 069 FA4 / FB4 075 FA4 / FB4 081 FA4 / FB4 087 FA4 / FB4 093		12	489030		14
FA4 / FB4 100 FA4 / FB4 107		16	489031		16
FL4 / FQ4 068 FL4 / FQ4 074 FL4 / FQ4 080		12	489030		14
FL4 / FQ4 086 FL4 / FQ4 092 FL4 / FQ4 099 FL4 / FQ4 106		16	489031		16

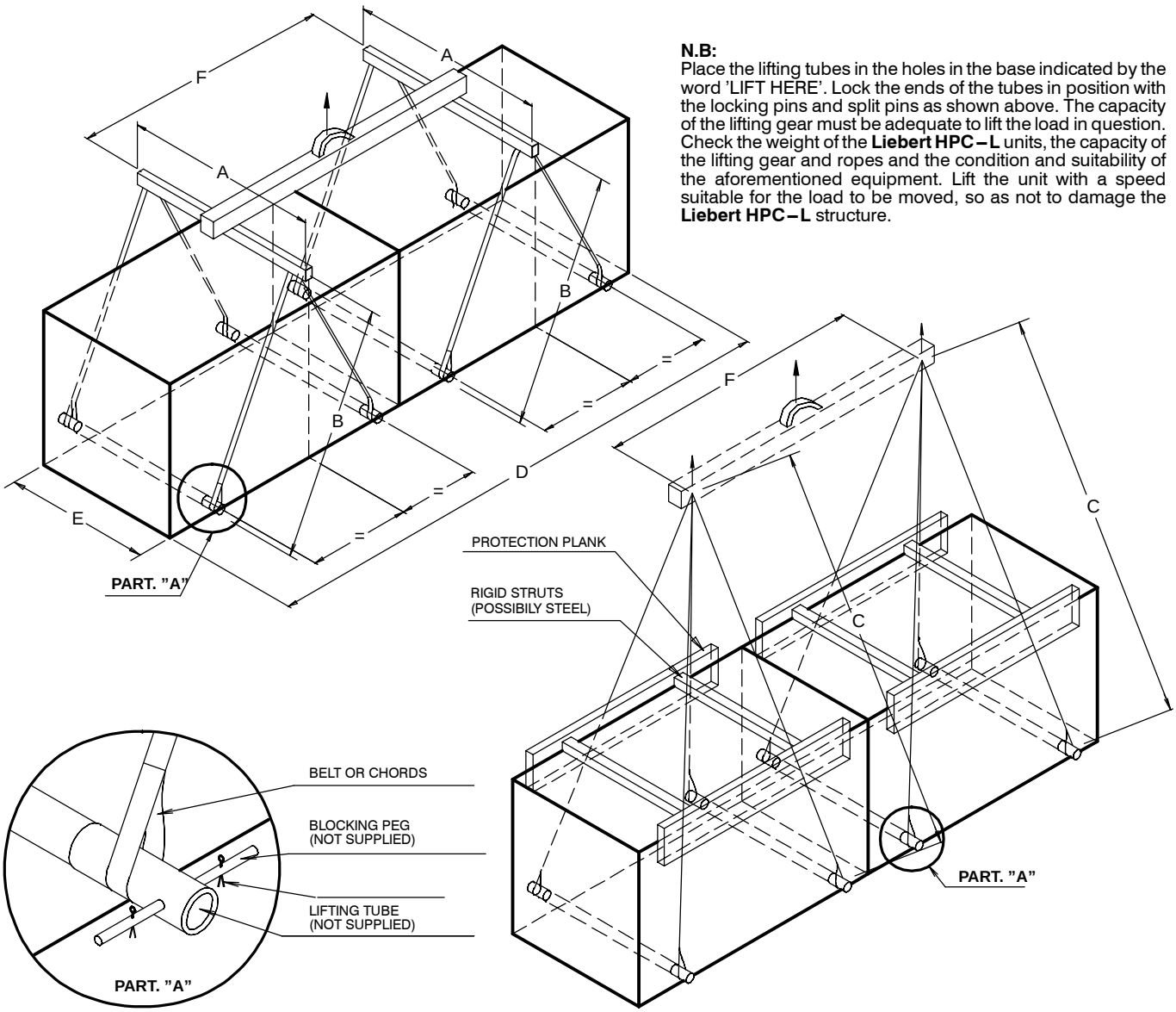
Each kit is complete with stainless steel fixing screws and plain washers for unit assembly.

Tab. 11i – Rubber support (No glycol group) – see Fig. 12q

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

Application Consideration

Fig. 11c – Lifting instructions



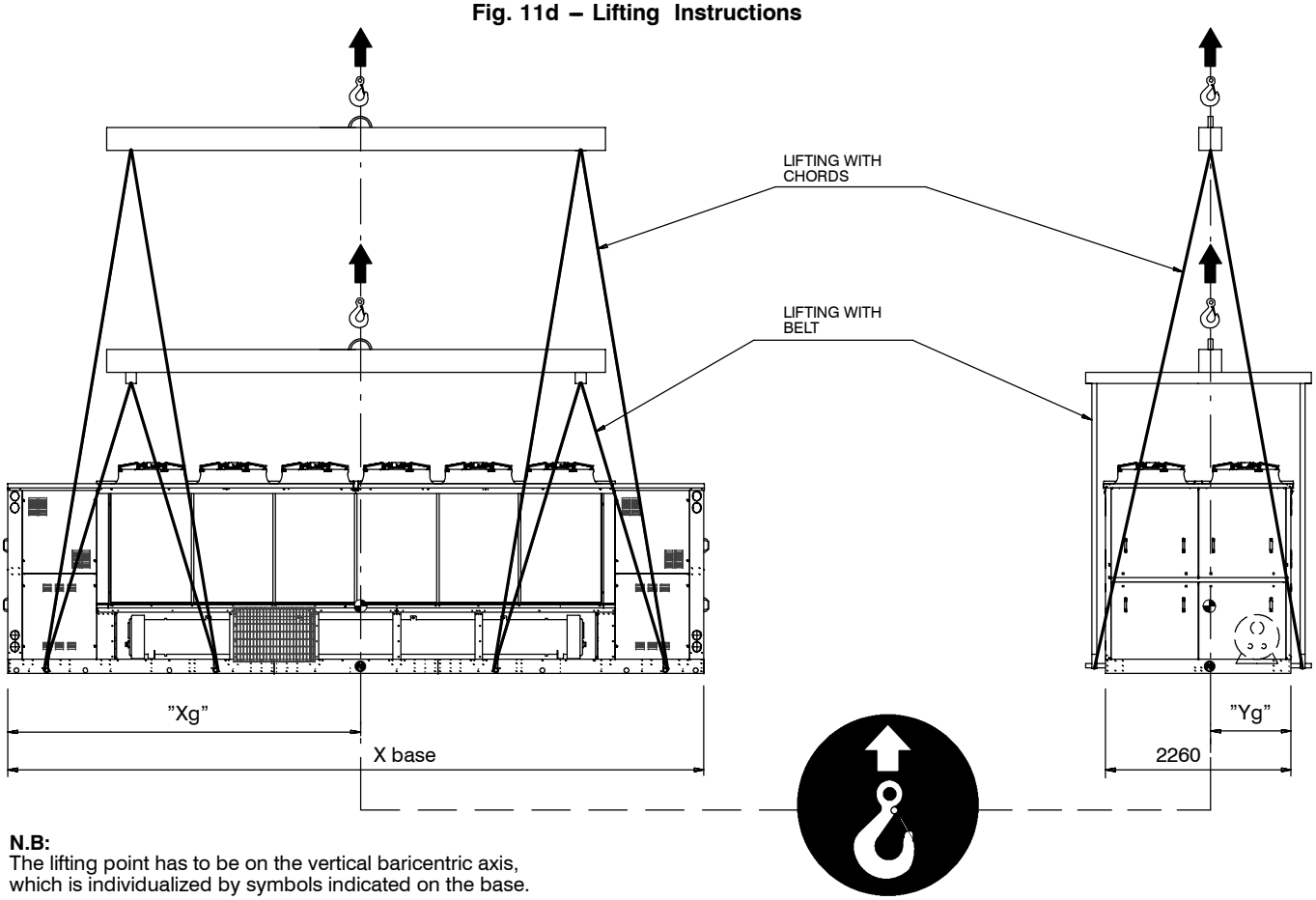
N.B:
Place the lifting tubes in the holes in the base indicated by the word 'LIFT HERE'. Lock the ends of the tubes in position with the locking pins and split pins as shown above. The capacity of the lifting gear must be adequate to lift the load in question. Check the weight of the **Liebert HPC–L** 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.

Tab. 11j – Lifting

Models	Fans nr.	"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm) (Base)	"E" (mm) (Base / Roof)	"F" (mm)
CA7 / CB7 081–087–093–100 CA4 / CB4 069–075–081–087–093–100 CL4 / CQ4 068–074	10 / 12	2750	≃ 4500	≃ 10000	8482	2260 / 2308	5476
CA7 / CB7 107–115 CA4 / CB4 107 CL7 / CQ7 080–086 CL4 / CQ4 080–086	14	2750	≃ 4500	≃ 10000	9478	2260 / 2308	5974
FA7 / FB7 081–087–093 FA4 / FB4 069–075–081–087–093 FL7 / FQ7 080 FL4 / FQ4 068–074–080	12	2750	≃ 4500	≃ 10000	9478	2260 / 2308	5974
CA7 / CB7 122 CL7 / CQ7 092–099–106–114 CL4 / CQ4 092–099–106 FA7 / FB7 100–107–115–122 FA4 / FB4 100–107 FL7 / FQ7 086–092–099–106 FL4 / FQ4 086–092–099–106	16	2750	≃ 4500	≃ 10000	11470	2260 / 2308	7100
CA7 / CB7 131–140 CL7 / CQ7 121–130–139 FL7 / FQ7 114–121	20	2750	≃ 4500	≃ 10000	13462	2260 / 2308	8056

Application Consideration

Fig. 11d – Lifting Instructions



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

Tab. 11k – Shipping weight and unit baricentre position (with and without pumps) – Chiller version

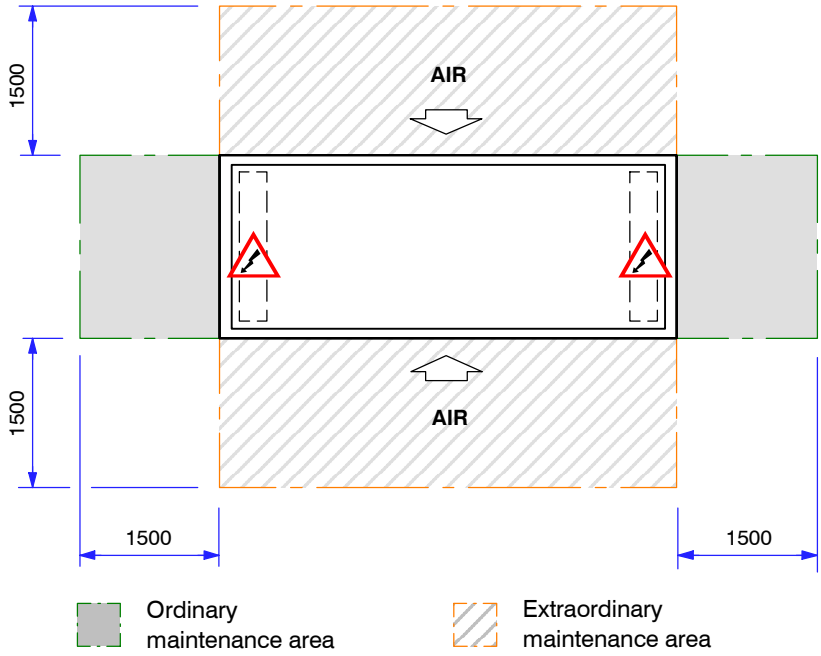
Models	X base (mm)	Unit without pumps			Unit with pumps		
		"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)	"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)
CA7 / CB7 081	8482	4250	1024	8690	4249	1049	9291
CA7 / CB7 087	8482	4241	1024	8712	4241	1050	9311
CA7 / CB7 093	8482	4250	1023	8902	4249	1049	9546
CA7 / CB7 100	8482	4246	1024	8922	4245	1050	9563
CA7 / CB7 107	9478	4747	1023	9637	4747	1048	10283
CA7 / CB7 115	9478	4721	1019	9698	4722	1044	10343
CA7 / CB7 122	11470	5743	1020	10730	5742	1043	11394
CA7 / CB7 131	13462	6727	1030	11784	6728	1050	12452
CA7 / CB7 140	13462	6738	1030	11809	6738	1052	12530
CL7 / CQ7 080	9478	4747	1029	9174	4747	1053	9775
CL7 / CQ7 086	9478	4738	1030	9194	4738	1053	9795
CL7 / CQ7 092	11470	5743	1035	10078	5742	1058	10724
CL7 / CQ7 099	11470	5738	1037	10094	5737	1059	10742
CL7 / CQ7 106	11470	5743	1030	10270	5742	1053	10918
CL7 / CQ7 114	11470	5712	1026	10334	5714	1049	10978
CL7 / CQ7 121	13462	6738	1027	11449	6738	1048	12112
CL7 / CQ7 130	13462	6727	1027	11464	6728	1048	12132
CL7 / CQ7 139	13462	6738	1028	11489	6738	1050	12210
CA4 / CB4 069	8482	4250	1020	8686	4249	1046	9287
CA4 / CB4 075	8482	4246	1020	8694	4245	1046	9297
CA4 / CB4 081	8482	4250	1015	8815	4249	1041	9416
CA4 / CB4 087	8482	4224	1011	8892	4226	1037	9492
CA4 / CB4 093	8482	4250	1009	9074	4249	1036	9721
CA4 / CB4 100	8482	4238	1010	9105	4238	1036	9751
CA4 / CB4 107	9478	4747	1009	9836	4747	1034	10483
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

Application Consideration

Tab. 11l – 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)
FA7 / FB7 081	9478	4746	1048	10618	4746	1067	11123
FA7 / FB7 087	9478	4738	1048	10638	4738	1067	11143
FA7 / FB7 093	9478	4746	1049	10785	4746	1067	11250
FA7 / FB7 100	11470	5737	1059	12192	5737	1076	12867
FA7 / FB7 107	11470	5741	1054	12371	5741	1070	13046
FA7 / FB7 115	11470	5716	1050	12439	5717	1067	13114
FA7 / FB7 122	11470	5742	1043	12623	5741	1060	13298
FL7 / FQ7 080	9478	4746	1047	10498	4746	1066	11003
FL7 / FQ7 086	11470	5733	1056	11812	5733	1073	12317
FL7 / FQ7 092	11470	5742	1057	11957	5741	1073	12422
FL7 / FQ7 099	11470	5737	1058	11972	5737	1075	12647
FL7 / FQ7 106	11470	5742	1052	12151	5741	1069	12826
FL7 / FQ7 114	13462	6709	1056	13441	6710	1072	14116
FL7 / FQ7 121	13462	6737	1049	13623	6737	1065	14298
FA4 / FB4 069	9478	4746	1045	10630	4746	1064	11135
FA4 / FB4 075	9478	4742	1045	10640	4742	1064	11145
FA4 / FB4 081	9478	4746	1041	10763	4746	1060	11268
FA4 / FB4 087	9478	4723	1037	10836	4723	1057	11341
FA4 / FB4 093	9478	4746	1037	10974	4746	1055	11439
FA4 / FB4 100	11470	5729	1048	12404	5729	1065	13079
FA4 / FB4 107	11470	5742	1042	12591	5741	1059	13266
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

Fig. 11e – Service areas (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

12 Dimensional Data

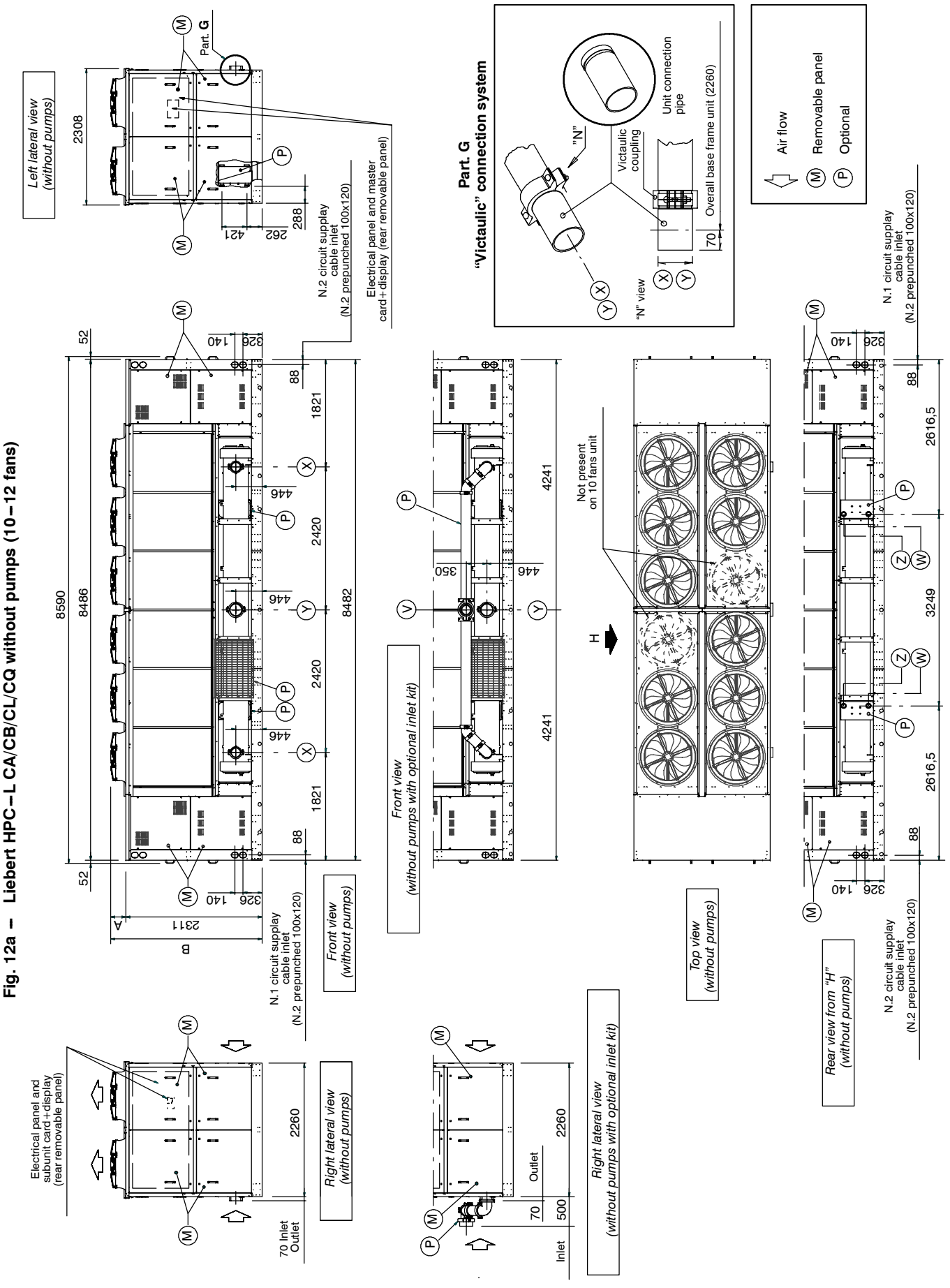
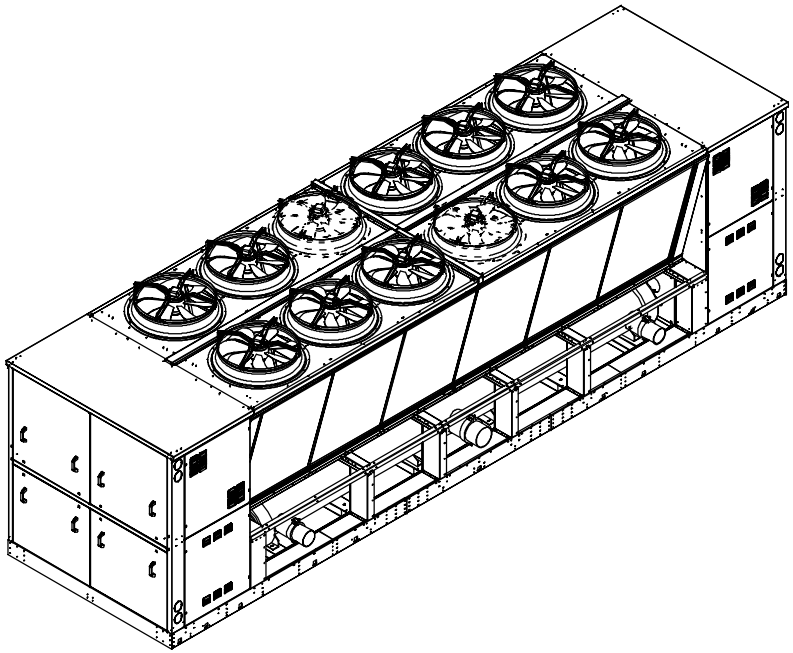


Fig. 12a – Liebert HPC–L CA/CB/CL/CQ without pumps (10–12 fans)

Tab. 12a – HPC–L CA/CB/CL/CQ without pumps (10–12 fans)

				Chiller water connection			Partial heat recovery water connection (Opt. not available with pumps)	
Model	**"A"** (mm)	**"B"** (mm)	**Fans N.**	**"X"** (Standard)	**"V"** (Optional)	**"Y"**	**"W"**	**"Z"**
CA7 081–087 **CA4 069–075–081–087**	252	2563	10	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male
CA7 093–100 **CA4 093–100**			12	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm		
CB7 081–087 **CB4 069–075–081–087**	260	2571	10	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm		
CB7 093–100 **CB4 093–100**			12	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm		
CL4 / CQ4 068–074	260 (*)	2571 (*)		2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm		

(*) In EC fans version added 30 mm



Dimensional Data

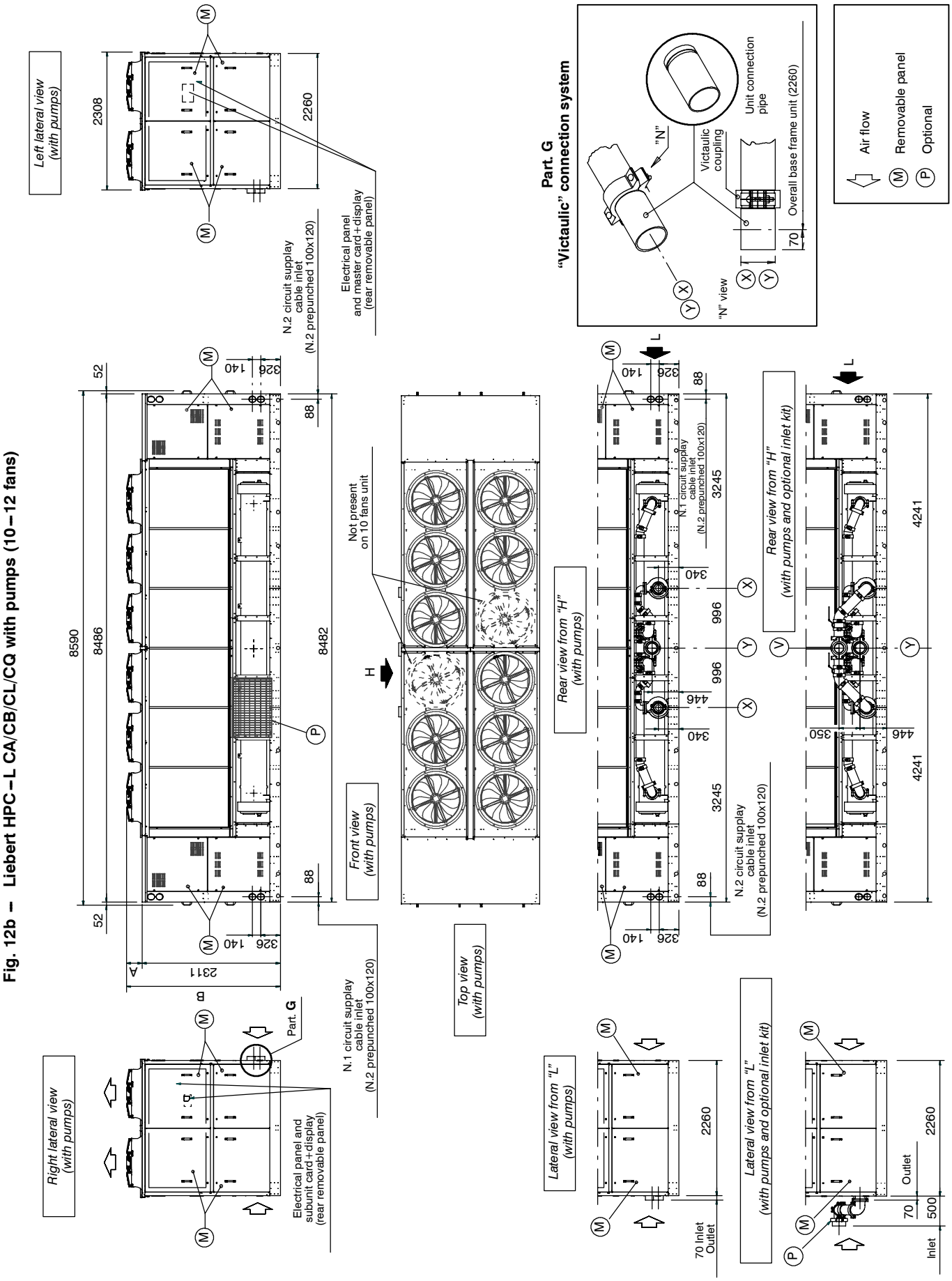


Fig. 12b – Liebert HPC–L CA/CB/CL/CQ with pumps (10–12 fans)

Tab. 12b – HPC–L CA/CB/CL/CQ with pumps (10–12 fans)

				Chiller water connection		
Model	**"A"** (mm)	**"B"** (mm)	**Fans N.**	**"X"** (Standard)	**"V"** (Optional)	**"Y"**
CA7 081–087 **CA4 069–075–081–087**	252	2563	10	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm
CA7 093–100 **CA4 093–100**			12	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm
CB7 081–087 **CB4 069–075–081–087**	260	2571	10	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm
CB7 093–100 **CB4 093–100**			12	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm
CL4 / CQ4 068–074	260 *(*)*	2571 *(*)*		2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm

(*) In EC fans version added 30 mm

Dimensional Data

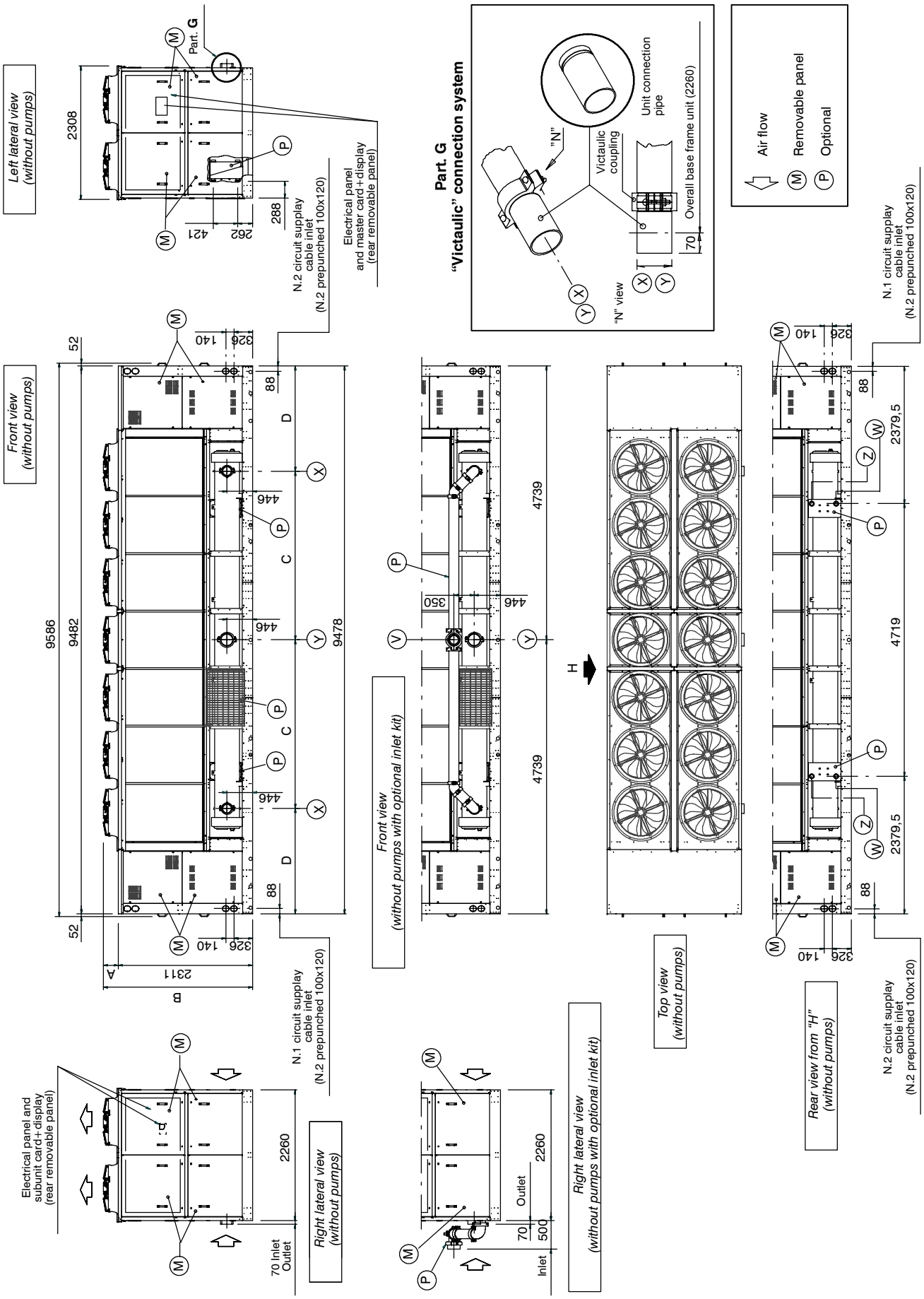
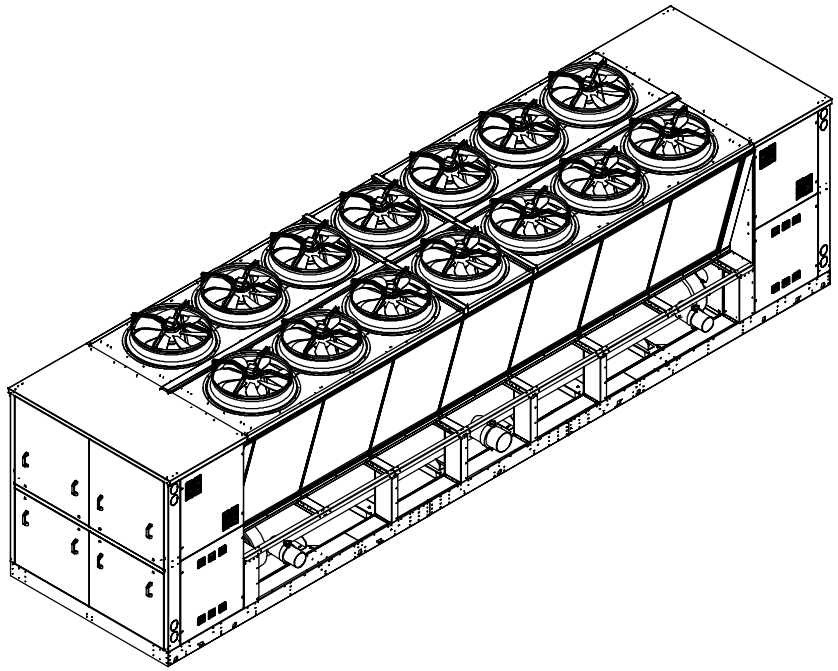


Fig. 12c – Liebert HPC–L CA/CB/CL/CQ without pumps (14 fans)

Tab. 12c – HPC–L CA/CB/CL/CQ without pumps (14 fans)

					Chiller water connection			Partial heat recovery water connection (Opt. not available with pumps)	
Model	**"A"** (mm)	**"B"** (mm)	**"C"** (mm)	**"D"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**	**"W"**	**"Z"**
CA7 107–115 CA4 107	252	2563	2920	1819	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male
CB7 107–115 CB4 107		2571							
CL7 / CQ7 080–086 CL4 / CQ4 080–086		2571 (*)	2420	2319	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm		

(*) In EC fans version added 30 mm



Dimensional Data

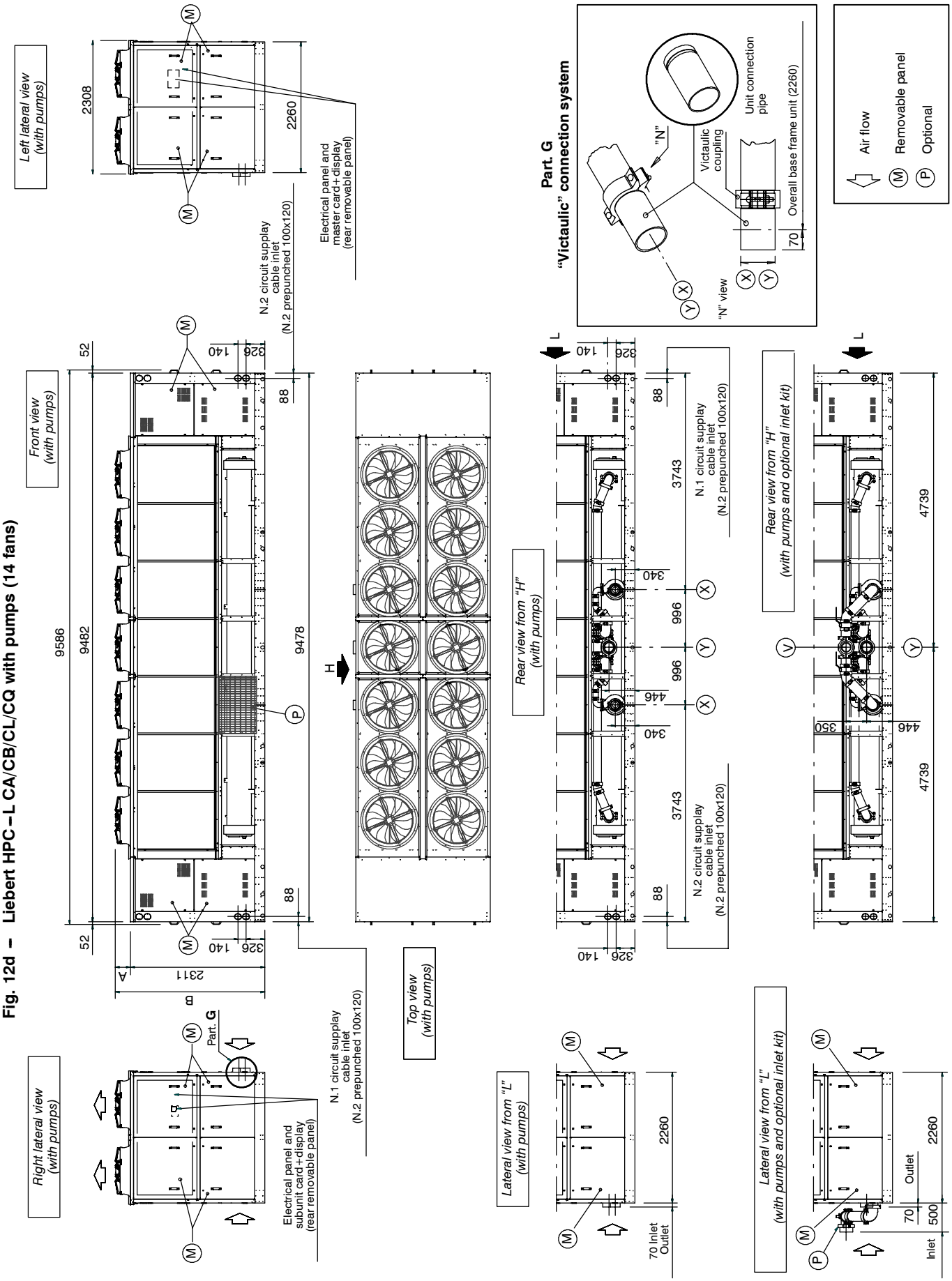


Fig. 12d – Liebert HPC–L CA/CB/CL/CQ with pumps (14 fans)

Tab. 12d – HPC–L CA/CB/CL/CQ with pumps (14 fans)

			Chiller water connection		
Model	**"A"** (mm)	**"B"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**
CA7 107–115 **CA4 107**	252	2563	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm
CB7 107–115 **CB4 107**	260	2571			
CL7 / CQ7 080–086 **CL4 / CQ4 080–086**	260 (*)	2571 (*)	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm

(*) In EC fans version added 30 mm

Dimensional Data

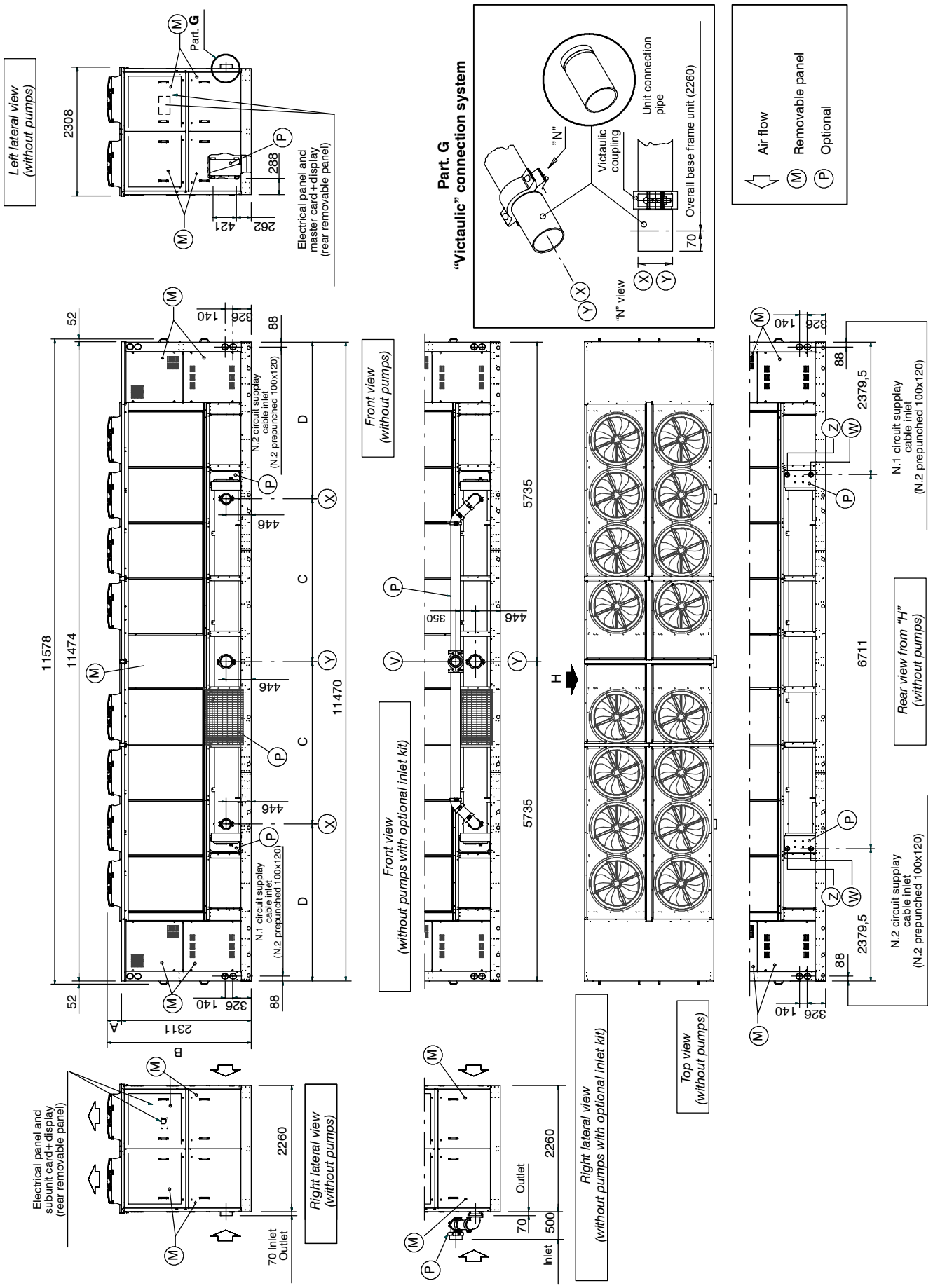
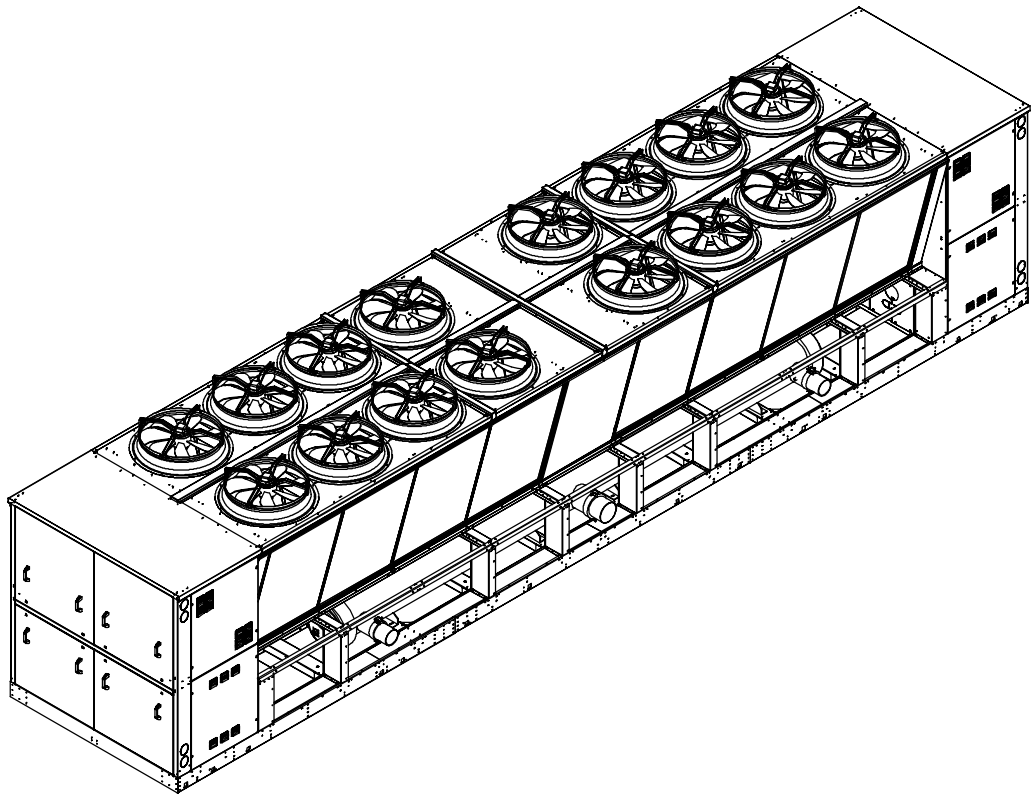


Fig. 12e – Liebert HPC–L CA/CB/CL/CQ without pumps (16 fans)

Tab. 12e – HPC–L CA/CB/CL/CQ without pumps (16 fans)

					Chiller water connection			Partial heat recovery water connection (Opt. not available with pumps)	
Model	**"A"** (mm)	**"B"** (mm)	**"C"** (mm)	**"D"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**	**"W"**	**"Z"**
CA7 122	252	2563	2920	2815	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male
CB7 122	260	2571							
CL7 / CQ7 092–099 CL4 / CQ4 092–099	260 (*)	2571 (*)	2420	3315					
CL7 / CQ7 106–114 CL4 / CQ4 106			2920	2815					

(*) In EC fans version added 30 mm



Dimensional Data

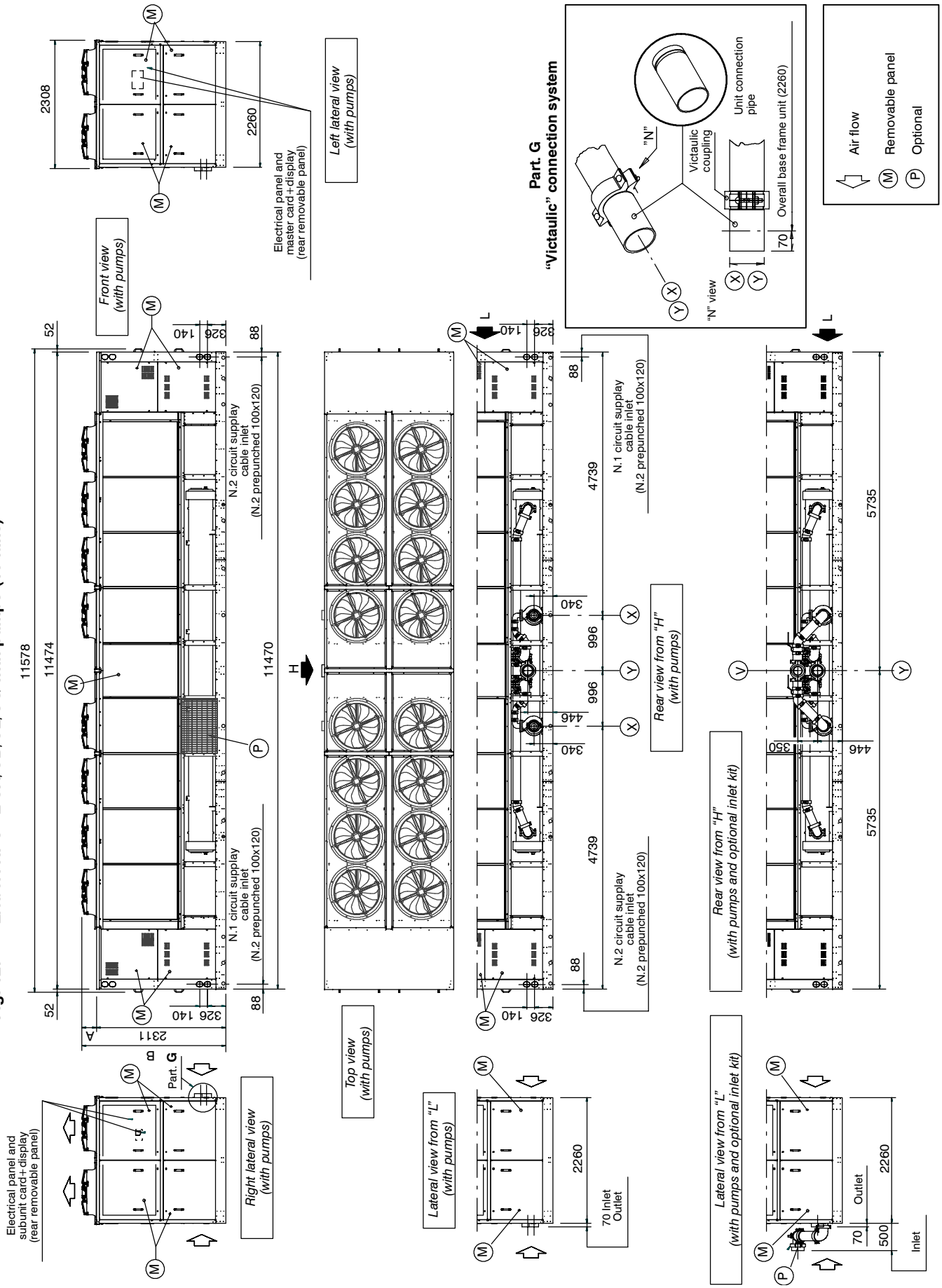


Fig. 12f – Liebert HPC–L CA/CB/CL/CQ with pumps (16 fans)

Tab. 12f – HPC–L CA/CB/CL/CQ with pumps (16 fans)

			Chiller water connection		
Model	**"A"** (mm)	**"B"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**
CA7 122	252	2563	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm
CB7 122	260	2571			
CL7 / CQ7 092–099 CL4 / CQ4 092–099	260 *(*)*	2571 *(*)*			
CL7 / CQ7 106–114 CL4 / CQ4 106					

(*) In EC fans version added 30 mm

Dimensional Data

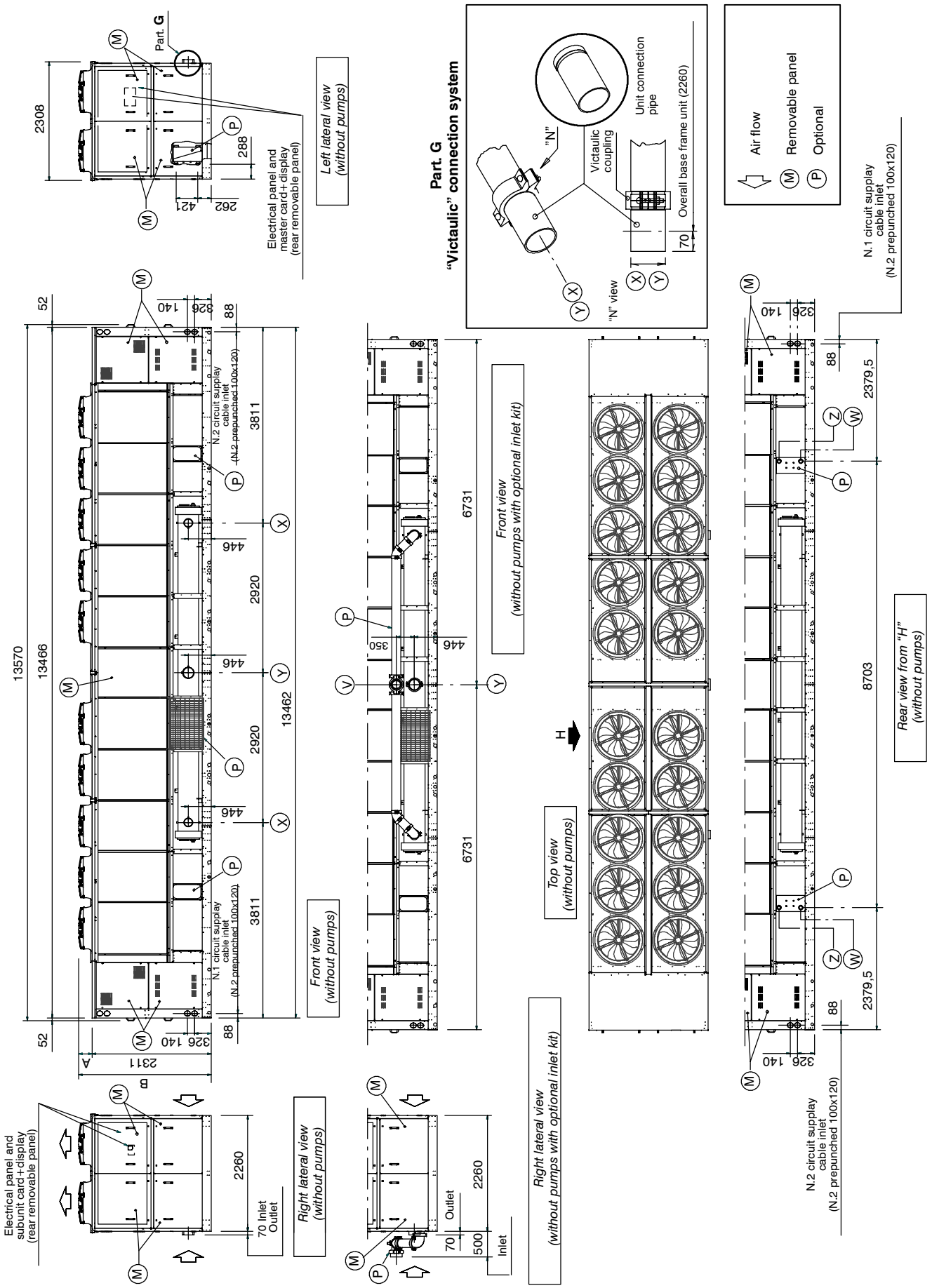
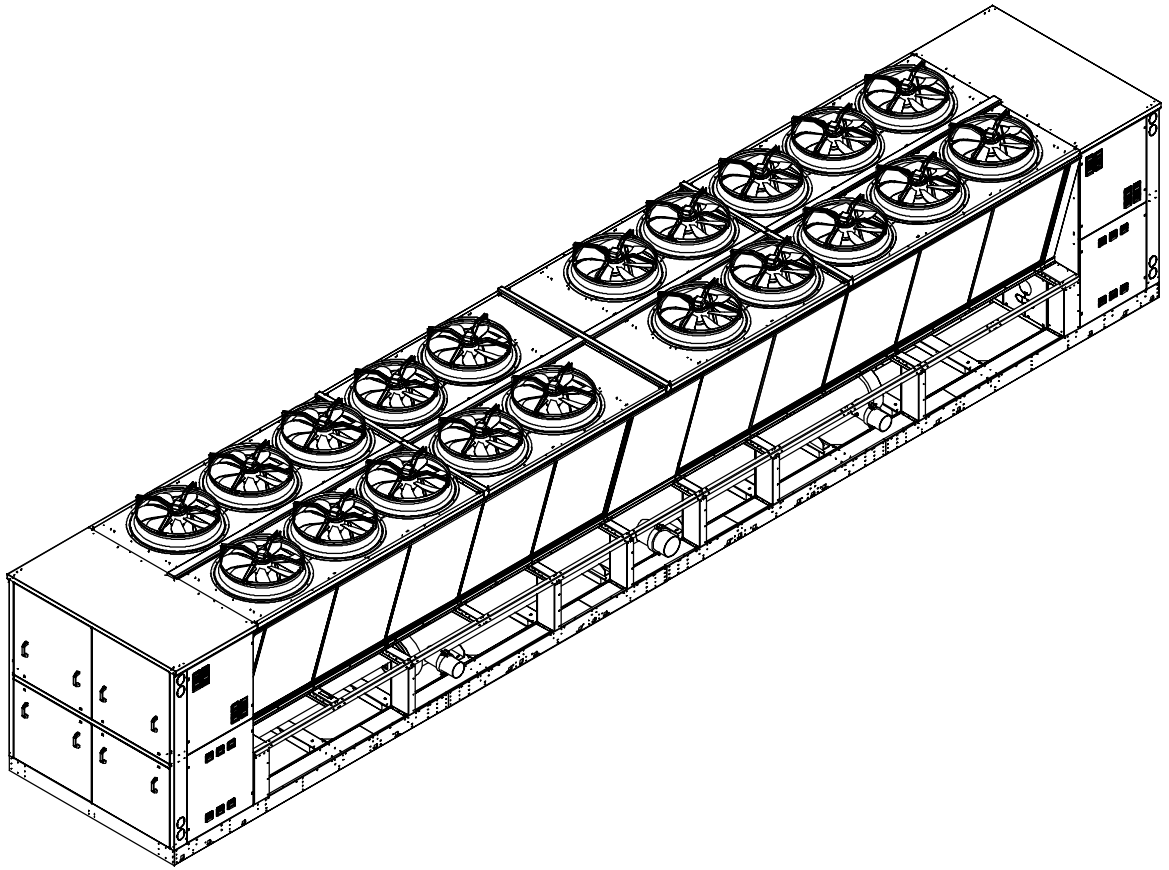


Fig. 12g – Liebert HPC–L CA/CB/CL/CQ without pumps (20 fans)

Tab. 12g – HPC–L CA/CB/CL/CQ without pumps (20 fans)

			Chiller water connection			Partial heat recovery water connection (Opt. not available with pumps)	
Model	**"A"** (mm)	**"B"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**	**"W"**	**"Z"**
CA7 131–140	252	2563	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male
CB7 131–140	260	2571					
CL7 / CQ7 121–130–139	260 (*)	2571 (*)					

(*) *In EC fans version added 30 mm*



Dimensional Data

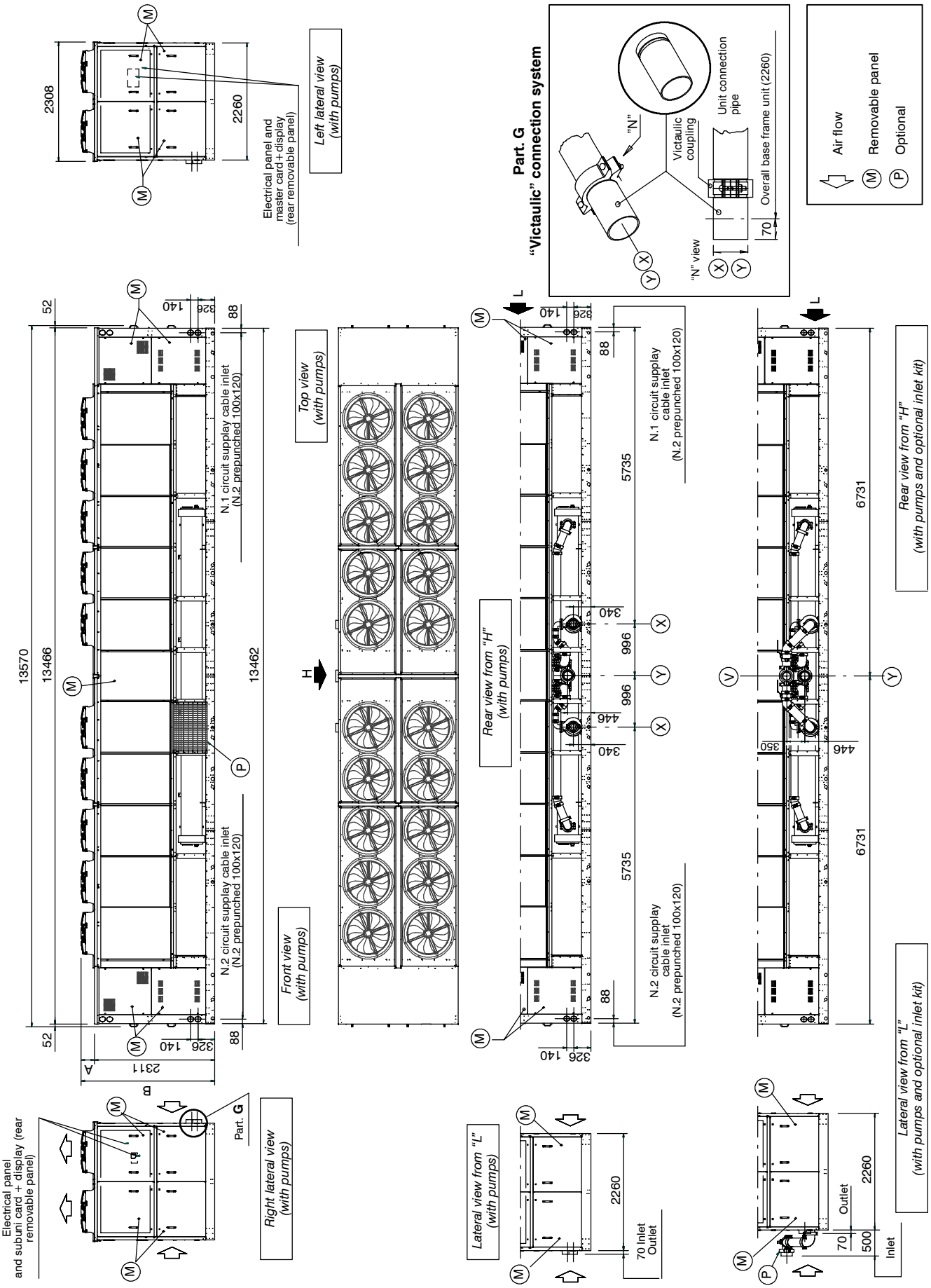


Fig. 12h – Liebert HPC–L CA/CB/CL/CQ with pumps (20 fans)

Tab. 12h – HPC–L CA/CB/CL/CQ with pumps (20 fans)

			Chiller water connection		
Model	**"A"** (mm)	**"B"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**
CA7 131–140	252	2563	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm
CB7 131–140	260	2571			
CL7 / CQ7 121–130–139	260 (*)	2571 (*)			

(*) In EC fans version added 30 mm

Dimensional Data

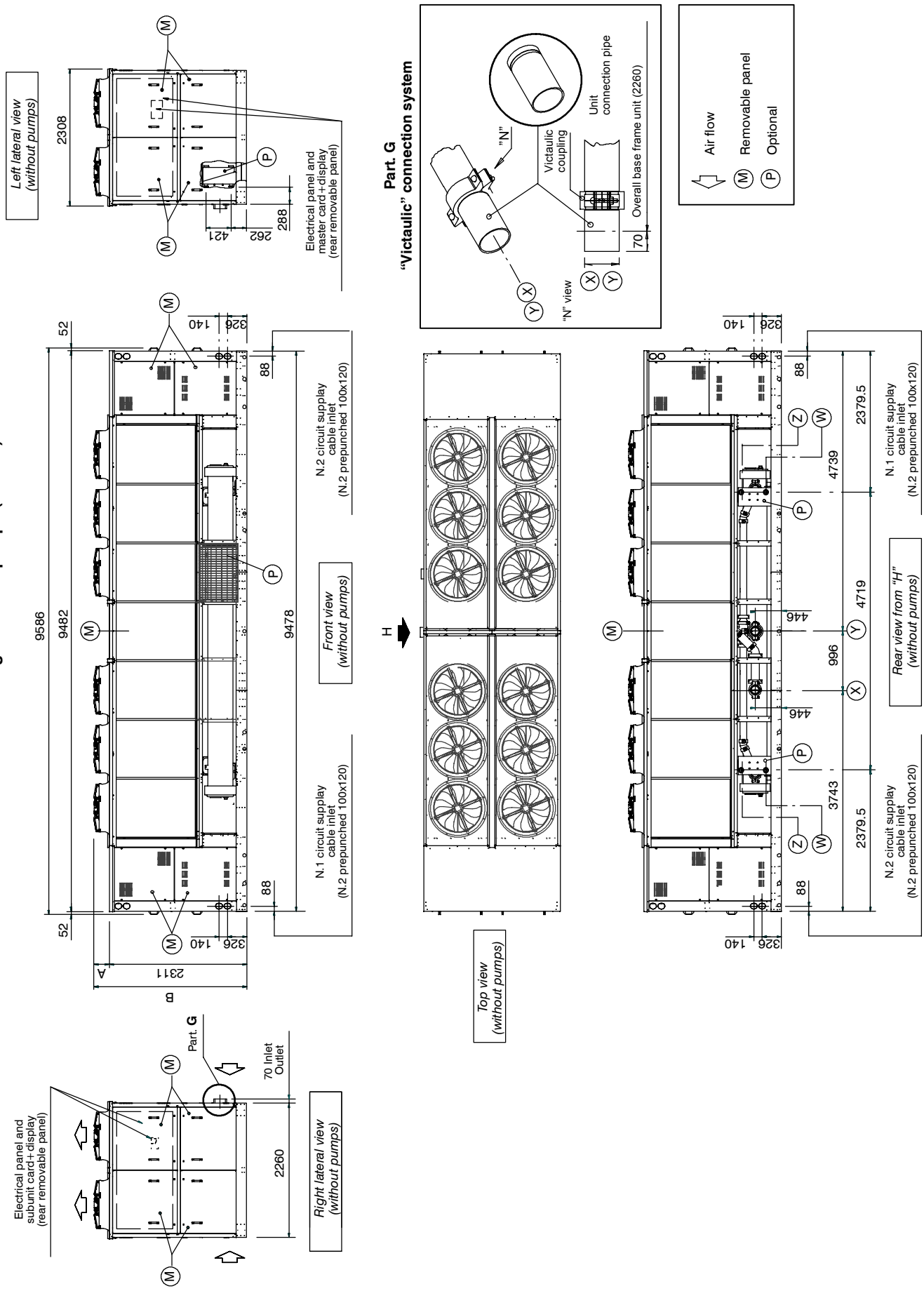


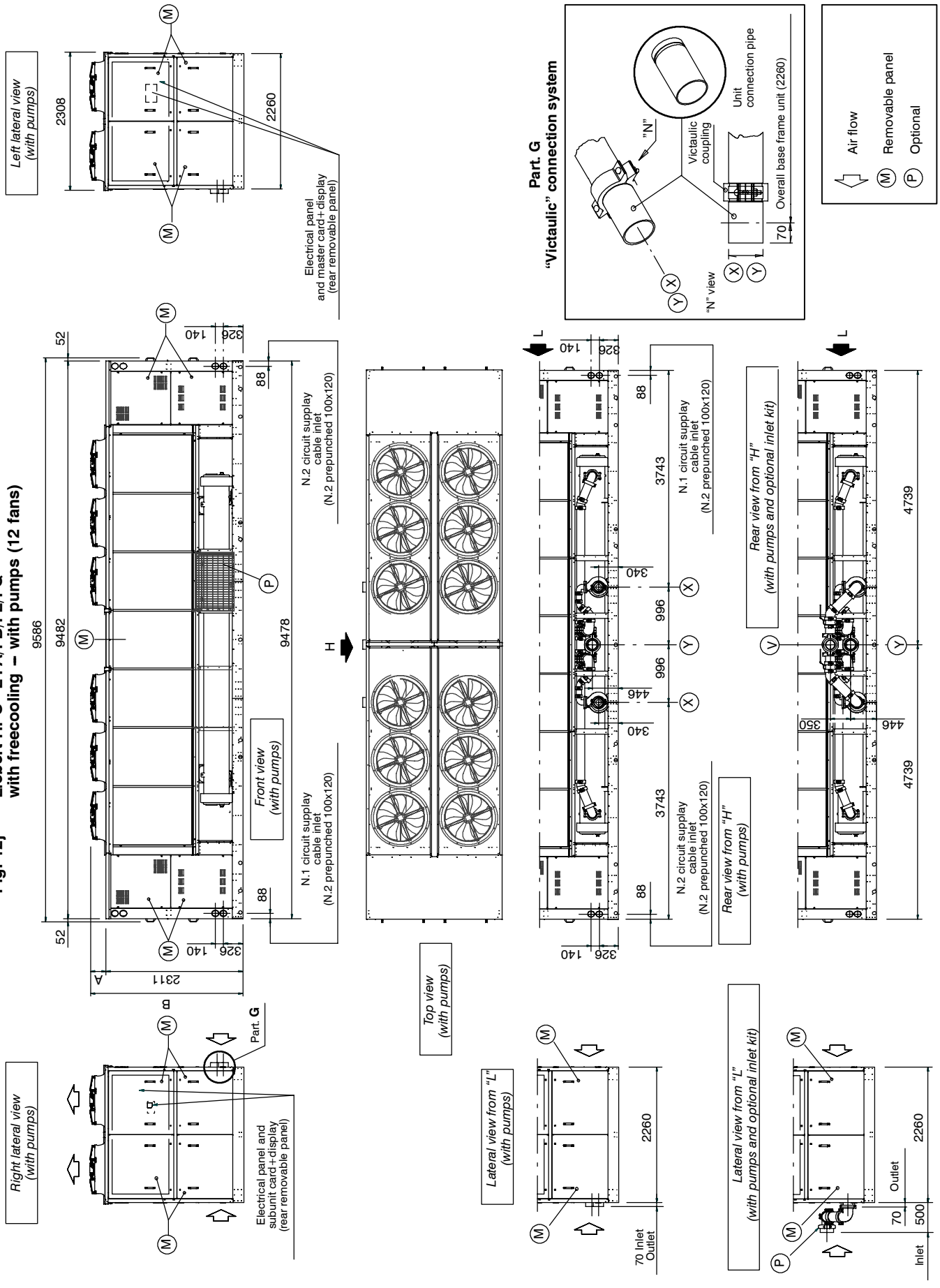
Fig. 12i – Liebert HPC–L FA/FB/FL/FQ with freecooling – without pumps (12 fans)

Tab. 12i – HPC–L FA/FB/FL/FQ with freecooling – without pumps (12 fans)

			Chiller water connection		Partial heat recovery water connection (Opt. not available with pumps)	
Model	**"A"** (mm)	**"B"** (mm)	**"X"**	**"Y"**	**"W"**	**"Z"**
FA7 081–087 **FA4 069–075–081–087**	252	2563	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male
FB7 081–087 **FB4 069–075–081–087**	260	2571				
FA7 093 **FA4 093**	252	2563	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm		
FB7 093 **FB4 093**	260	2571				
FL7 / FQ7 080 **FL4 / FQ4 068–074–080**	260 *(*)*	2571 *(*)*	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm		

(*) In EC fans version added 30 mm

Dimensional Data



Tab. 12j – HPC–L FA/FB/FL/FQ with freecooling – with pumps (12 fans)

			Chiller water connection		
Model	**"A"** (mm)	**"B"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**
FA7 081–087 **FA4 069–075–081–087**	252	2563	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm
FB7 081–087 **FB4 069–075–081–087**	260	2571			
FA7 093 **FA4 093**	252	2563	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm
FB7 093 **FB4 093**	260	2571			
FL7 / FQ7 080 **FL4 / FQ4 068–074–080**	260 *(*)*	2571 *(*)*	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm

(*) In EC fans version added 30 mm

Dimensional Data

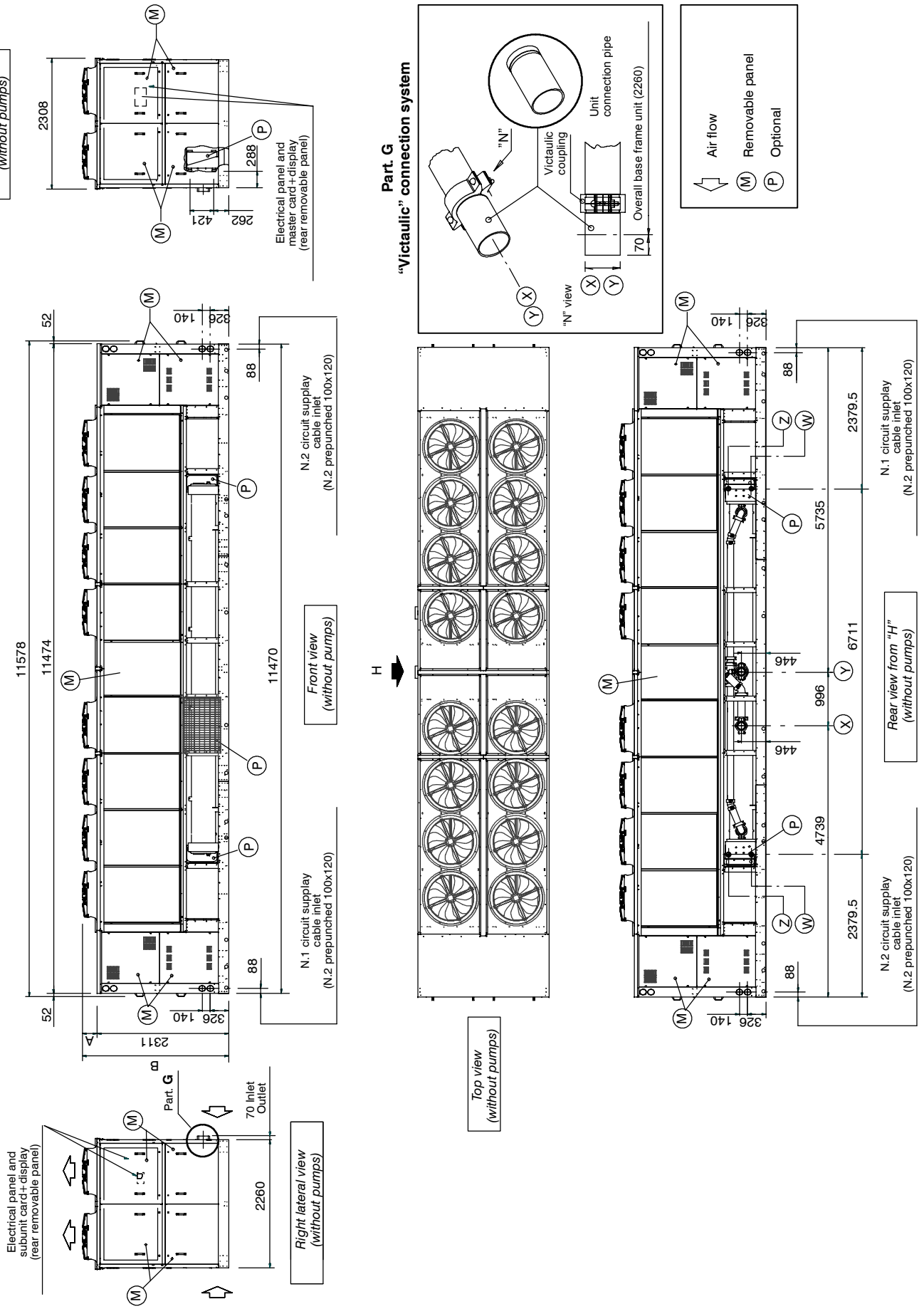


Fig. 12k – Liebert HPC–L FA/FB/FL/FQ with freecooling – without pumps (16 fans)

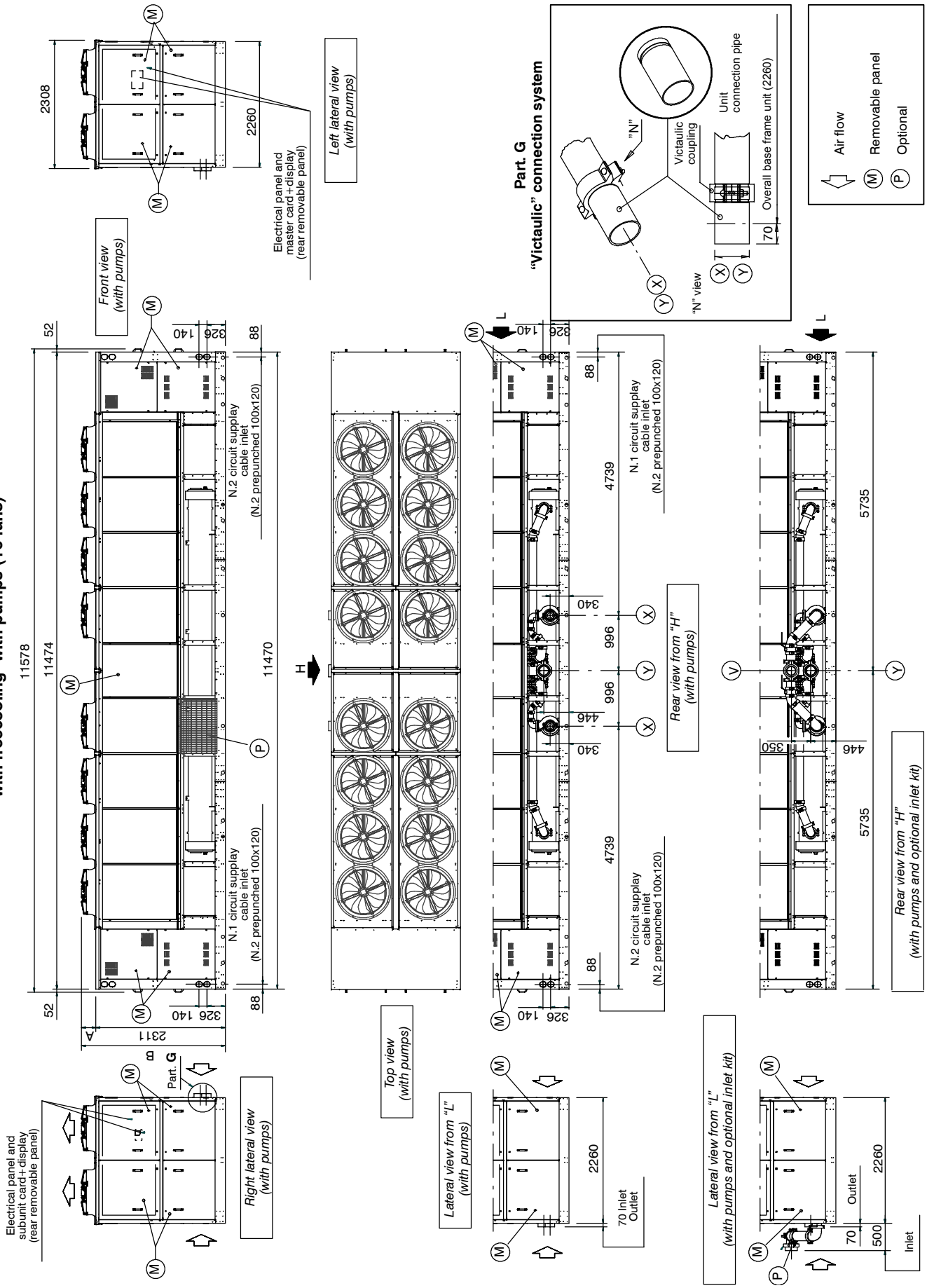
Tab. 12k – HPC–L FA/FB/FL/FQ with freecooling – without pumps (16 fans)

			Chiller water connection		Partial heat recovery water connection (Opt. not available with pumps)	
Model	**"A"** (mm)	**"B"** (mm)	**"X"**	**"Y"**	**"W"**	**"Z"**
FA7 100–107–115–122 **FA4 100–107**	252	2563	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male
FB7 100–107–115–122 **FB4 100–107**	260	2571				
FL7 / FQ7 086 **FL4 / FQ4 086**	260 *(*)*	2571 *(*)*	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm		
FL7 / FQ7 092–099–106 **FL4 / FQ4 092–099–106**	260 *(*)*	2571 *(*)*	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm		

(*) In EC fans version added 30 mm

Dimensional Data

Fig. 12l – Liebert HPC–L FA/FB/FL/FQ with freecooling with pumps (16 fans)



Tab. 12l – HPC–L FA/FB/FL/FQ with freecooling – with pumps (16 fans)

			Chiller water connection		
Model	**"A"** (mm)	**"B"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**
FA7 100–107–115–122 **FA4 100–107**	252	2563	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm
FB7 100–107–115–122 **FB4 100–107**	260	2571			
FL7 / FQ7 086 **FL4 / FQ4 086**	260 *(*)*	2571 *(*)*	2 x Inlet DN125–5"–139.7mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm
FL7 / FQ7 092–099–106 **FL4 / FQ4 092–099–106**	260 *(*)*	2571 *(*)*	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm

(*) In EC fans version added 30 mm

Dimensional Data

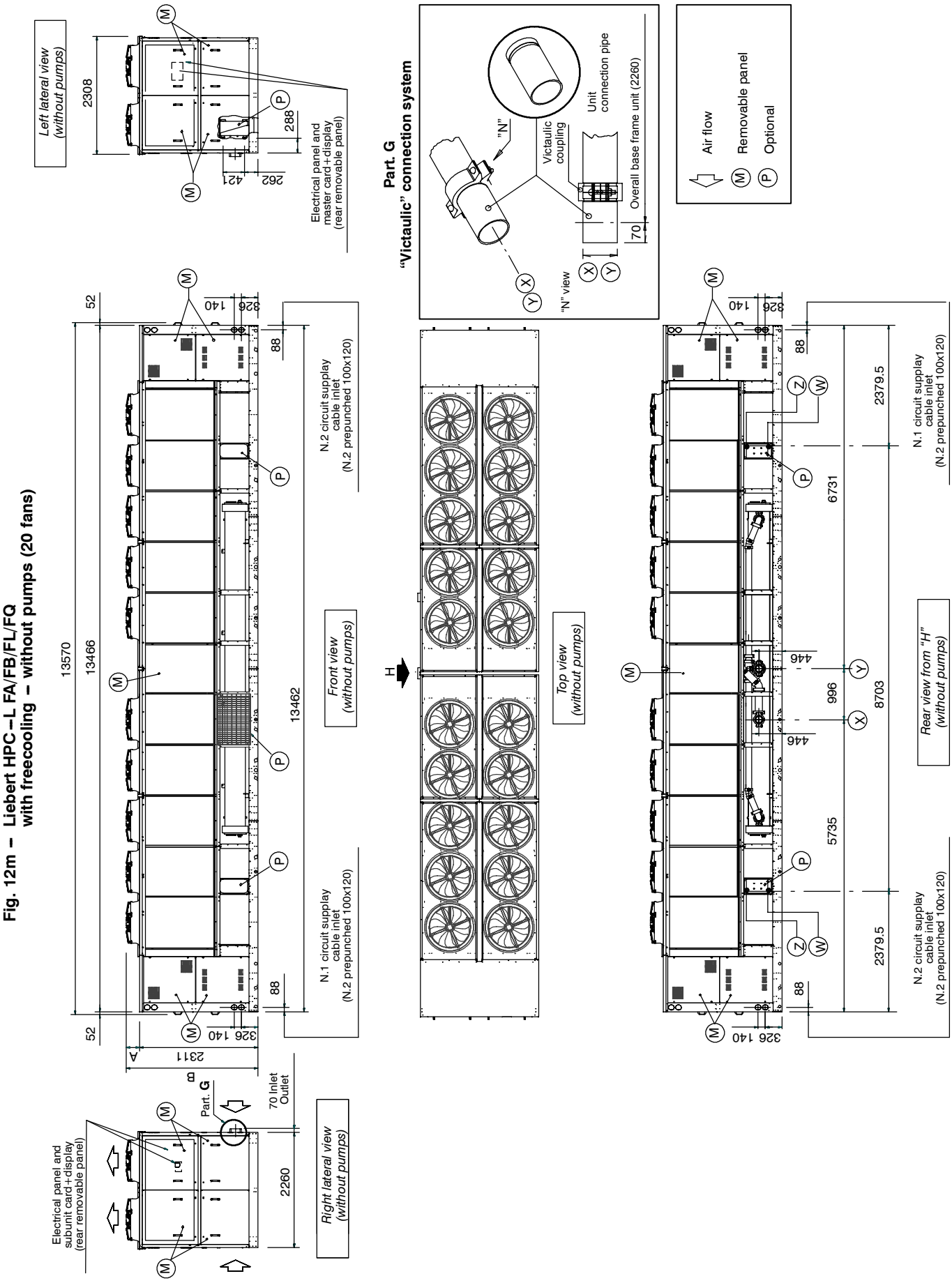


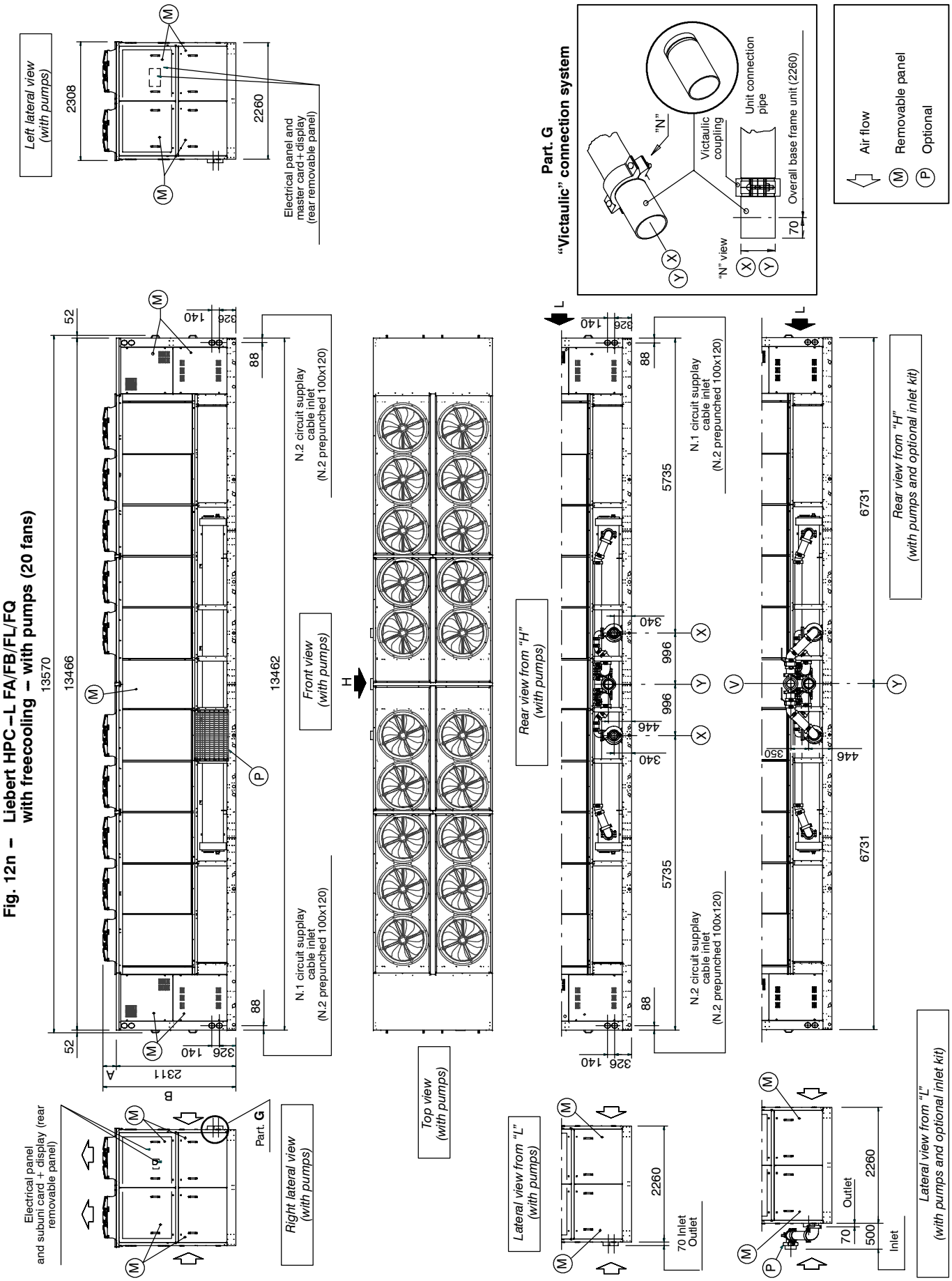
Fig. 12m – Liebert HPC–L FA/FB/FL/FQ with freecooling – without pumps (20 fans)

Tab. 12m – HPC–L FA/FB/FL/FQ with freecooling – without pumps (20 fans)

			Chiller water connection		Partial heat recovery water connection (Opt. not available with pumps)	
Model	**"A"** (mm)	**"B"** (mm)	**"X"**	**"Y"**	**"W"**	**"Z"**
FL7 / FQ7 114–121	260 (*)	2571 (*)	1 x Inlet DN200 – 8" – 219.1mm	1 x Outlet DN200 – 8" – 219.1mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male

(*) In EC fans version added 30 mm

Dimensional Data



Tab. 12n – HPC–L FA/FB/FL/FQ with freecooling – with pumps (20 fans)

			Chiller water connection		
Model	**"A"** (mm)	**"B"** (mm)	**"X"** (Standard)	**"V"** (Optional)	**"Y"**
FL7 / FQ7 114–121	260 *(*)*	2571 *(*)*	2 x Inlet DN150–6"–168.3mm	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm

(*) In EC fans version added 30 mm

Dimensional Data

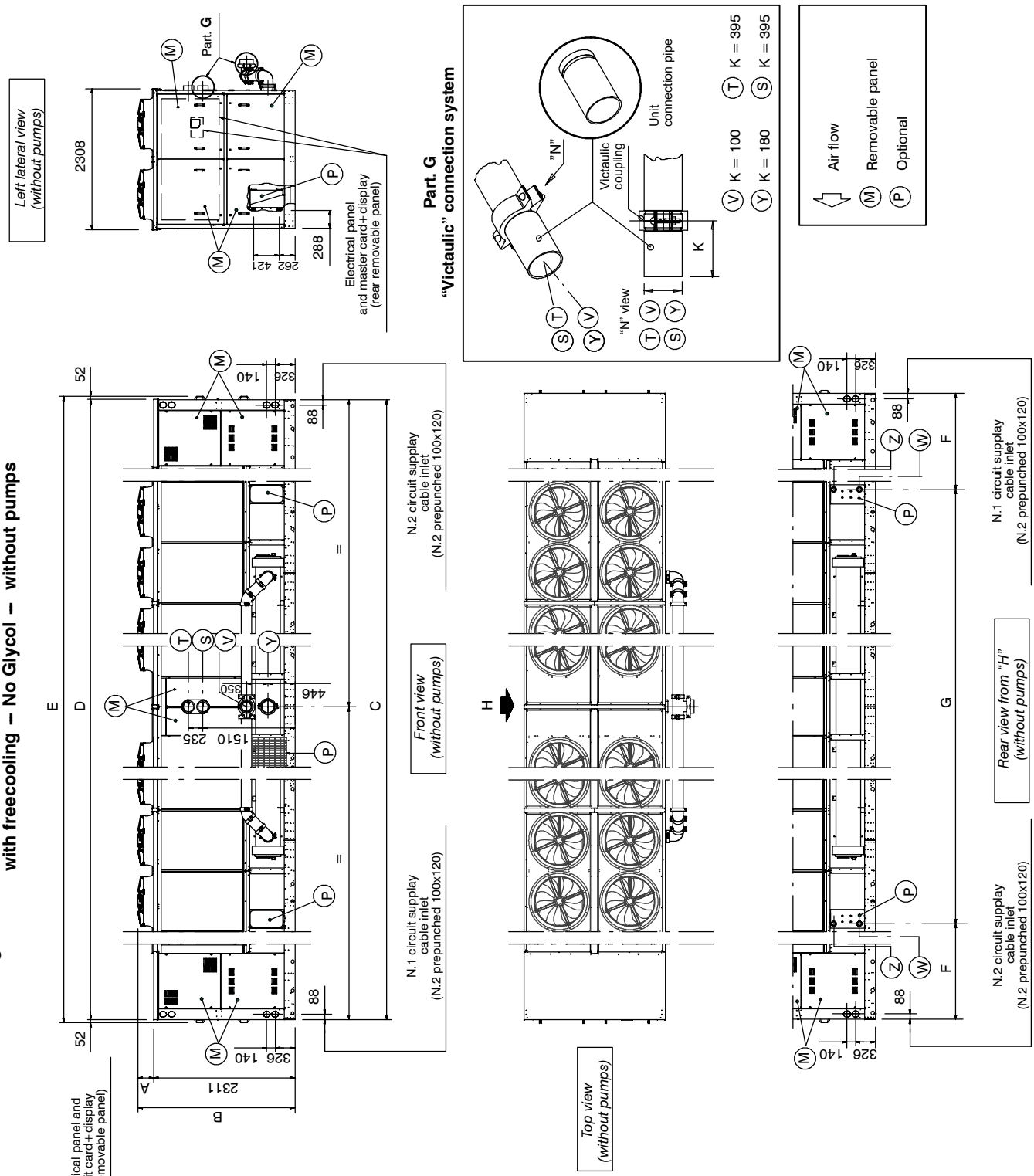


Fig. 12o – Liebert HPC–L FA/FB/FL/FQ with freecooling – No Glycol – without pumps

Tab. 12o – HPC–L FA/FB/FL/FQ with freecooling – No Glycol – without pumps

									Chiller water connection		No Glycol connection		Partial heat recovery water connection (Opt. not available with pumps)	
Model	**Fans N.**	**"A"** (mm)	**"B"** (mm)	**"C"** (mm)	**"D"** (mm)	**"E"** (mm)	**"F"** (mm)	**"G"** (mm)	**"V"**	**"Y"**	**"T"**	**"S"**	**"W"**	**"Z"**
FA7 081–087 **FA4 069–075–081–087**	12	252	2563	9478	9482	9586	2379.5	4719	1 x Inlet DN150–6 –168.3mm	1 x Outlet DN150–6" –168.3mm	1 x Inlet DN150–6 –168.3mm	1 x Outlet DN150–6 –168.3mm	2 x Inlet $2^1/_2$" Gas Male	2 x Outlet $2^1/_2$" Gas Male
FA7 093 **FA4 093**				9478	9482	9586	2379.5	4719	1 x Inlet DN200–8 –219.1mm	1 x Outlet DN200–8" –219.1mm				
FA7 100–107–115–122 **FA4 100–107**	16			11470	11474	11578	2379.5	6711						
FB7 081–087 **FB4 069–075–081–087**	12	260	2571	9478	9482	9586	2379.5	4719	1 x Inlet DN150–6" –168.3mm	1 x Outlet DN150–6" –168.3mm				
FB7 093 **FB4 093**				9478	9482	9586	2379.5	4719	1 x Inlet DN200–8" –219.1mm	1 x Outlet DN200–8" –219.1mm				
FB7 100–107–115–122 **FB4 100–107**	16			11470	11474	11578	2379.5	6711						
FL7/FQ7 080 **FL4/FQ4 068–074–080**	12	260 (*)	2571 (*)	9478	9482	9586	2379.5	4719	1 x Inlet DN150–6" –168.3mm	1 x Outlet DN150–6" –168.3mm				
FL7/FQ7 086 **FL4/FQ4 086**	16			11470	11474	11578	2379.5	6711						
FL7/FQ7 092–099–106 **FL4/FQ4 092–099–106**				11470	11474	11578	2379.5	6711	1 x Inlet DN200–8" –219.1mm	1 x Outlet DN200–8" –219.1mm				
FL7/FQ7 114–121	20			13462	13466	13570	2379.5	8703						

(*) In EC fans version added 30 mm

Dimensional Data

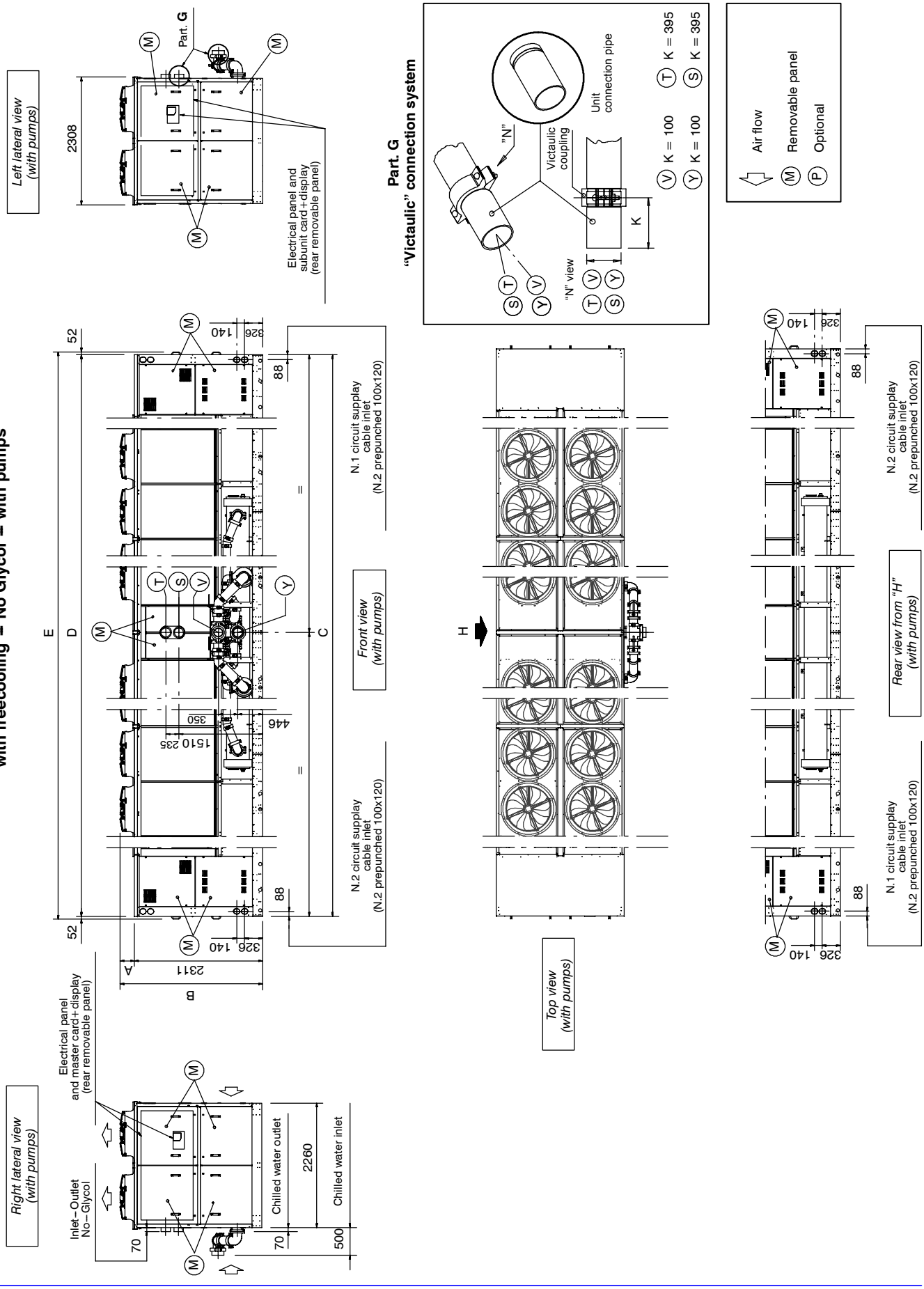


Fig. 12p – Liebert HPC–L FA/FB/FL/FQ with freecooling – No Glycol – with pumps

Tab. 12p – HPC–L FA/FB/FL/FQ with freecooling – No Glycol – with pumps

									Chiller water connection		No–Glycol connection	
Model	**Fans N.**	**"A"** (mm)	**"B"** (mm)	**"C"** (mm)	**"D"** (mm)	**"E"** (mm)	**"F"** (mm)	**"G"** (mm)	**"V"**	**"Y"**	**"T"**	**"S"**
FA7 081–087 **FA4 069–075–081–087**	12	252	2563	9478	9482	9586	2379.5	4719	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm
FA7 093 **FA4 093**				9478	9482	9586	2379.5	4719	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm		
FA7 100–107–115–122 **FA4 100–107**	16			11470	11474	11578	2379.5	6711				
FB7 081–087 **FB4 069–075–081–087**	12	260	2571	9478	9482	9586	2379.5	4719	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm		
FB7 093 **FB4 093**				9478	9482	9586	2379.5	4719	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN150–6"–168.3mm		
FB7 100–107–115–122 **FB4 100–107**	16			11470	11474	11578	2379.5	6711				
FL7/FQ7 080 **FL4/FQ4 068–074–080**	12	260 (*)	2571 (*)	9478	9482	9586	2379.5	4719	1 x Inlet DN150–6"–168.3mm	1 x Outlet DN150–6"–168.3mm		
FL7/FQ7 086 **FL4/FQ4 086**	16			11470	11474	11578	2379.5	6711				
FL7/FQ7 092–099–106 **FL4/FQ4 092–099–106**				11470	11474	11578	2379.5	6711	1 x Inlet DN200–8"–219.1mm	1 x Outlet DN200–8"–219.1mm		
FL7/FQ7 114–121	20			13462	13466	13570	2379.5	8703				

(*) In EC fans version added 30 mm

Dimensional Data

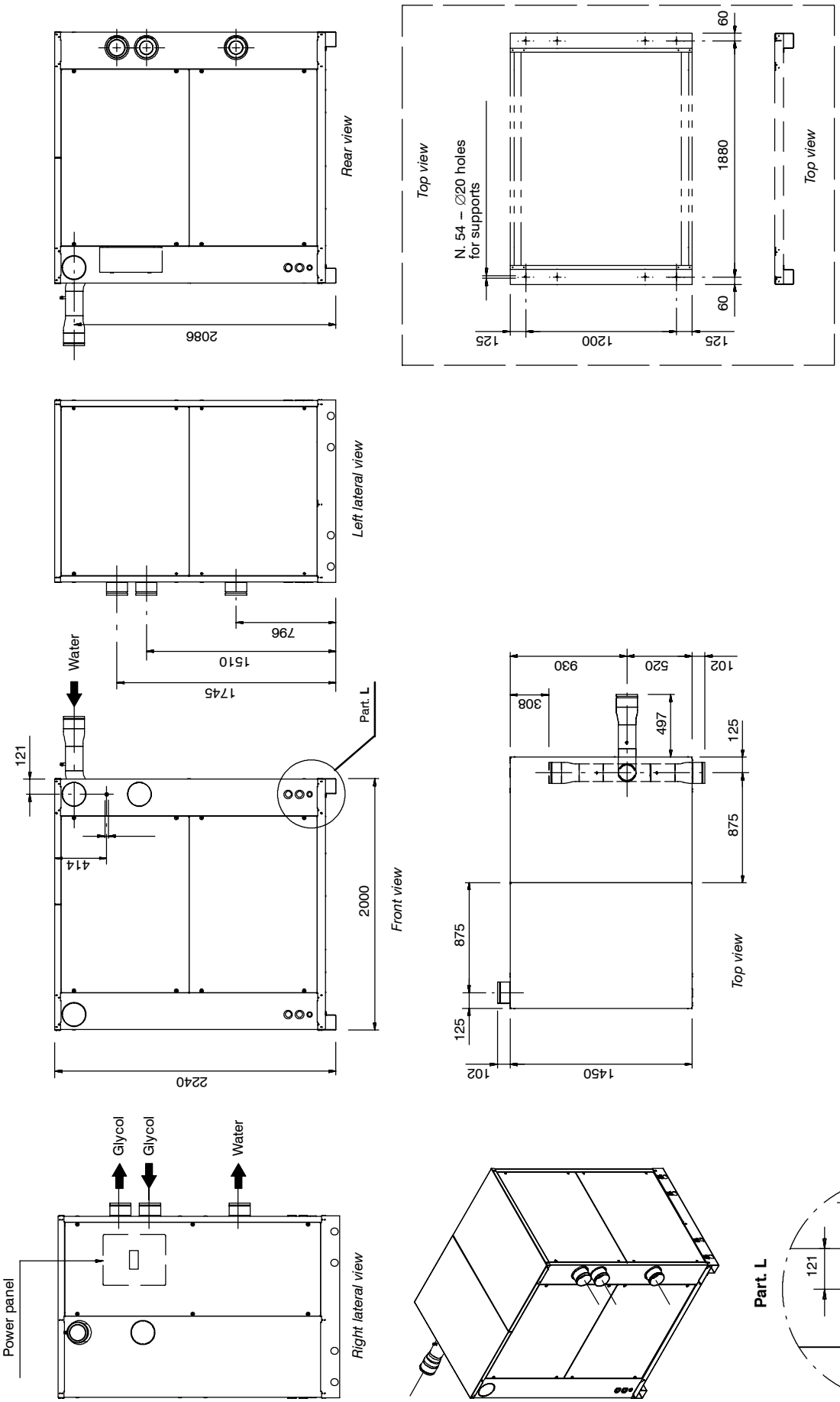
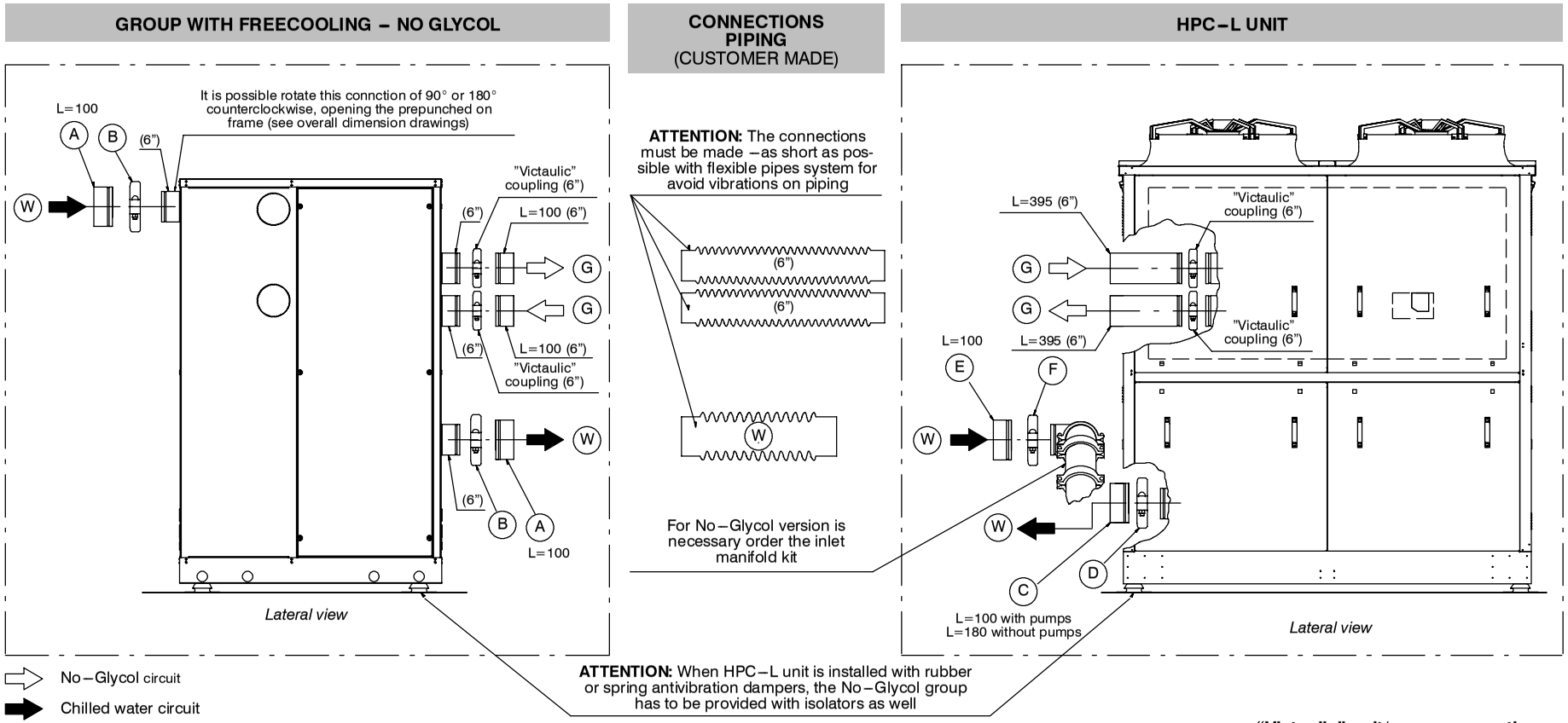


Fig. 12q – No Glycol group dimensions



Tab. 12q – 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 connction (W)	No Glycol connection (G)
FA7 / FB7 081–087 FA4 / 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
FA7 / FB7 093 FA4 / FB4 093		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	
FA7 / FB7 100–107–115–122 FA4 / FB4 100–107	16									
FL7 / FQ7 080 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	
FL7 / FQ7 086 FL4 / FQ4 086	16									
FL7 / FQ7 092–099–106 FL4 / FQ4 092–099–106		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	
FL7 FQ7 114–121	20									

"Victaulic" unit/group connection system

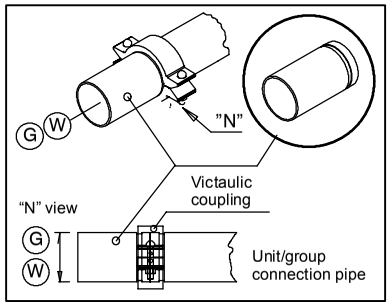
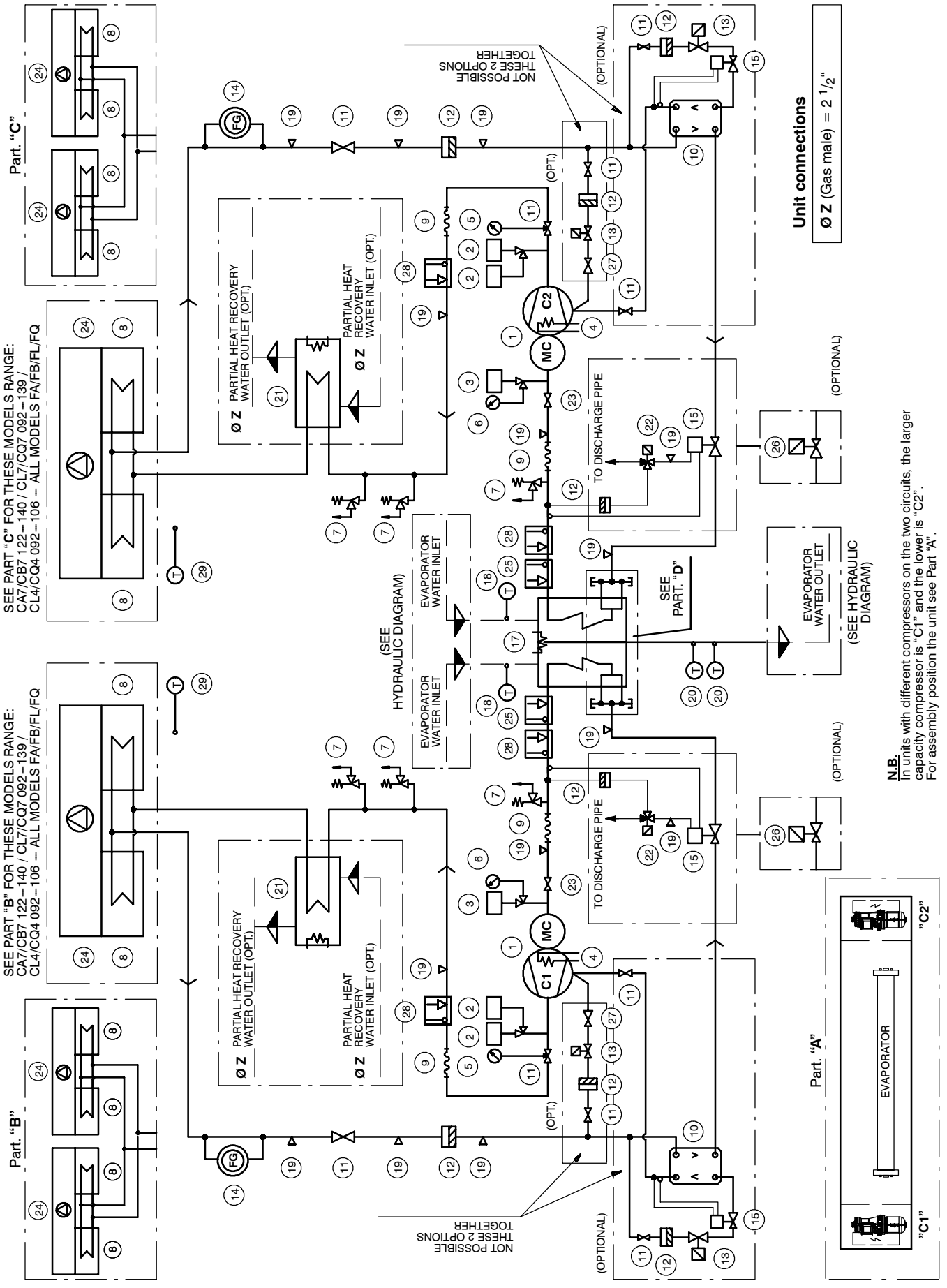
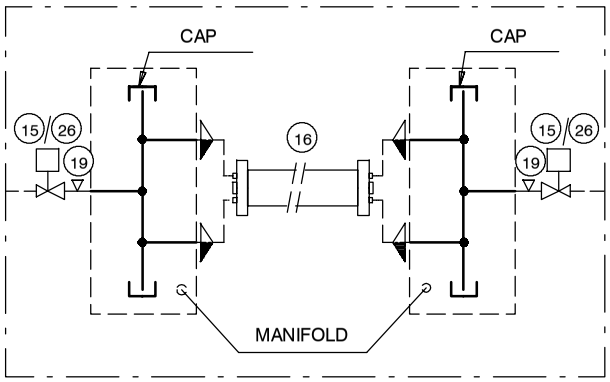


Fig. 12r – Instructions for HPC–L unit / No Glycol group piping

13 Refrigerant Circuit



Part. **"D"**



Tab. 13a – Refrigerant components

Pos.	Description	Pos.	Description
1	Compressor	16	Evaporator
2	High pressure switch *(HP)*	17	Antifreeze heater *(Opt.)*
3	Low pressure switch *(LP)*	18	Service thermostat sensor
4	Crankcase heater	19	Charge connection
5	High pressure manometer *(Opt.)*	20	Antifreeze / Capacity sensor control
6	Low pressure manometer *(Opt.)*	21	Partial heat recovery with heater *(Opt.)*
7	Safety valve	22	Three way solenoid valve
8	Condenser	23	Valve *(Opt. – Not available on mod. CA/CB/FA/FB4 087–107 – CL/CQ/FL/FQ4 086–108 – CA/CB/FA/FB7 115–140 – CL/CQ/FL/FQ7 114–139)*
9	Flex. pipe shock absorber *(Only "Q" version)*		
10	Economizer	24	Fans
11	Shut–off valve	25	Sensor kit for electronic expansion valve *(Opt.)*
12	Filter dryer	26	Electronic thermostatic expansion valve *(Opt.)*
13	Shut–off solenoid valve	27	Liquid injection
14	Sight glass	28	Kit pressure trasducer + Temperature sensor
15	Thermostatic expansion valve	29	External air temperature sensor

14 Hydraulic Circuit

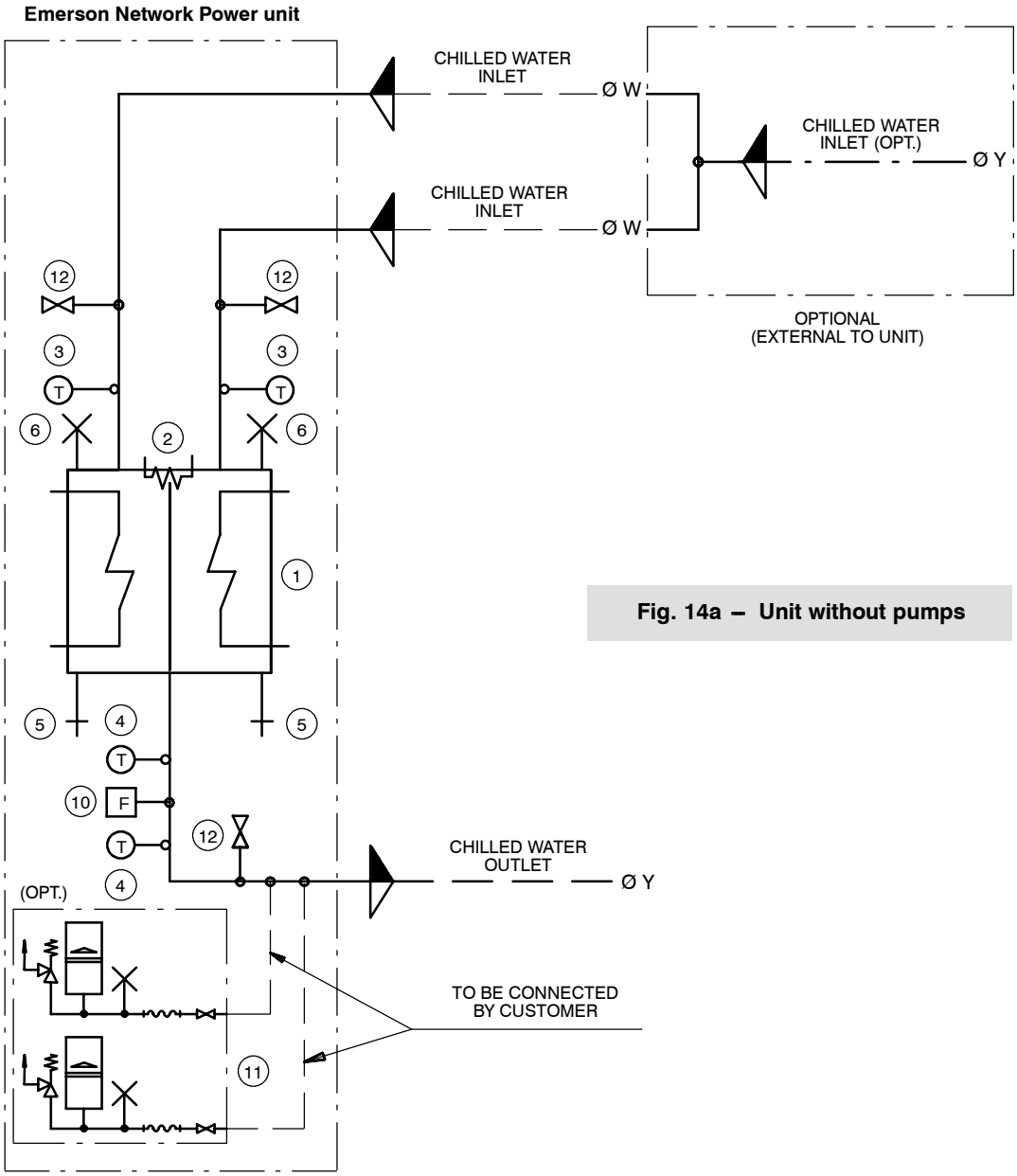


Fig. 14a – Unit without pumps

Tab. 14a – Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	–	–
2	Evaporator antifreeze heater *(Opt.)*	–	–
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
–	–	–	–

Tab. 14b – Unit connections

HPC–L	Ø W (Victaulic coupling)	Ø Y (Victaulic coupling)
CA7 / CB7 081–087	(2x) DN125 – 5” – 139.7 mm	(1x) DN150 – 6” – 168.3 mm
CA7 / CB7 093–100–107–115–122–131–140	(2x) DN150 – 6” – 168.3 mm	(1x) DN200 – 8” – 219.1 mm
CL7 / CQ7 080–086	(2x) DN125 – 5” – 139.7 mm	(1x) DN150 – 6” – 168.3 mm
CL7 / CQ7 092–099–106–114–121–130–139	(2x) DN150 – 6” – 168.3 mm	(1x) DN200 – 8” – 219.1 mm
CA4 / CB4 069–075–081–087	(2x) DN125 – 5” – 139.7 mm	(1x) DN150 – 6” – 168.3 mm
CA4 / CB4 093–100–107	(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	(2x) DN150 – 6” – 168.3 mm	(1x) DN200 – 8” – 219.1 mm

Hydraulic Circuit

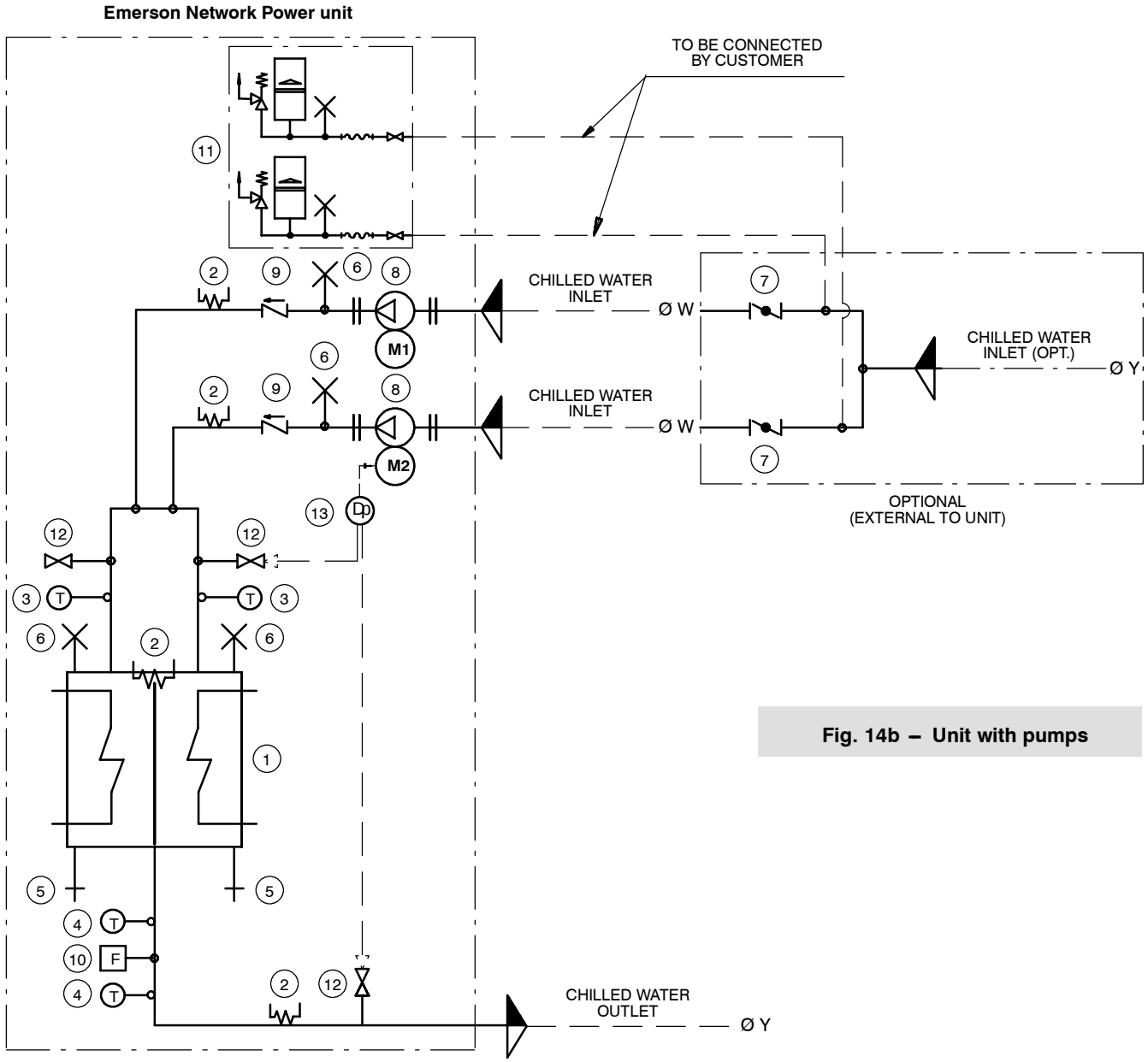


Fig. 14b – Unit with pumps

Tab. 14c – 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. 14d – Unit connections

HPC–L	Ø W (Victaulic coupling)	Ø Y (Victaulic coupling)
CA7 / CB7 081–087	(2x) DN125 – 5” – 139.7 mm	(1x) DN150 – 6” – 168.3 mm
CA7 / CB7 093–100–107–115–122–131–140	(2x) DN150 – 6” – 168.3 mm	(1x) DN200 – 8” – 219.1 mm
CL7 / CQ7 080–086	(2x) DN125 – 5” – 139.7 mm	(1x) DN150 – 6” – 168.3 mm
CL7 / CQ7 092–099–106–114–121–130–139	(2x) DN150 – 6” – 168.3 mm	(1x) DN200 – 8” – 219.1 mm
CA4 / CB4 069–075–081–087	(2x) DN125 – 5” – 139.7 mm	(1x) DN150 – 6” – 168.3 mm
CA4 / CB4 093–100–107	(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	(2x) DN150 – 6” – 168.3 mm	(1x) DN200 – 8” – 219.1 mm

Hydraulic Circuit

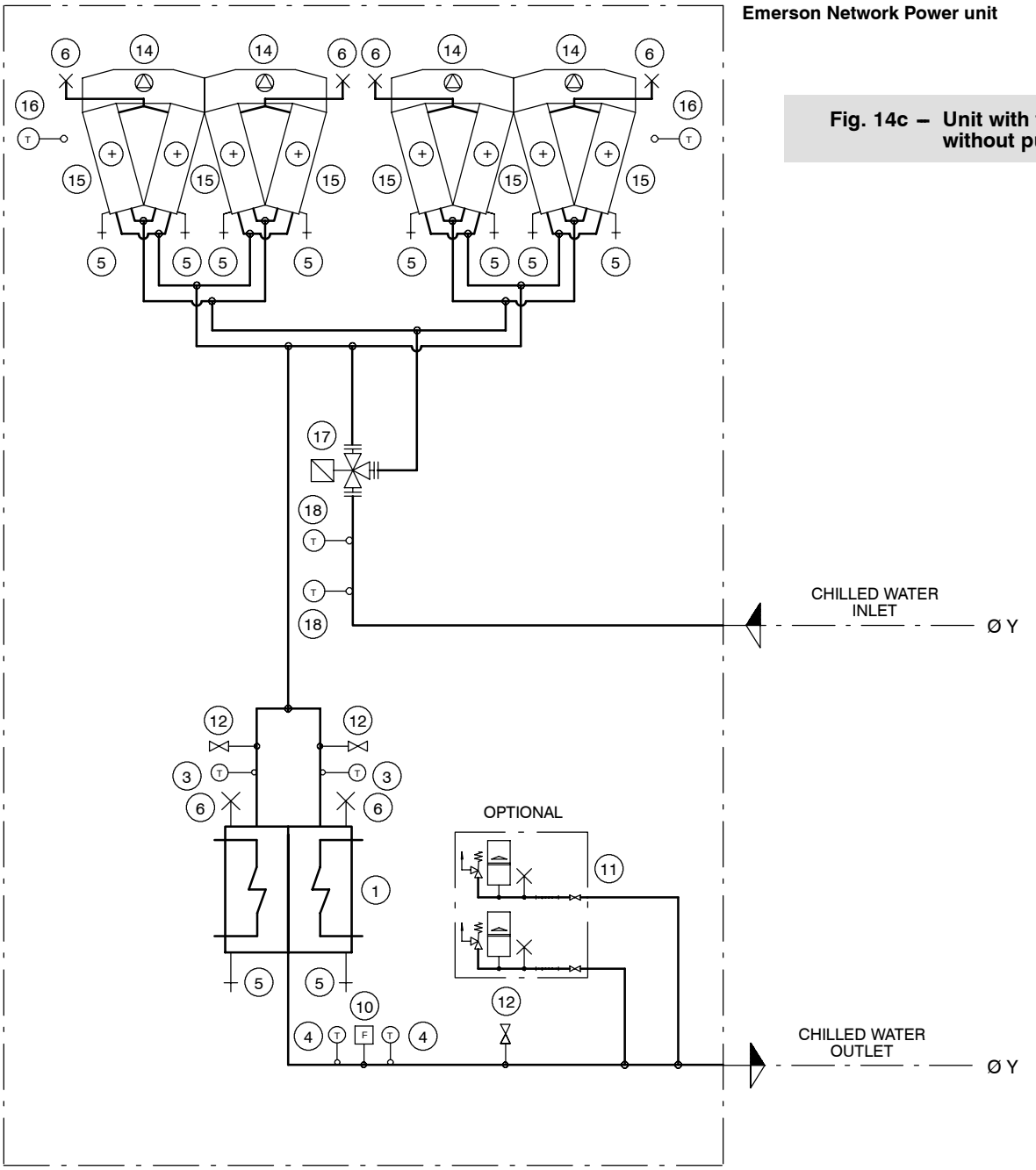


Fig. 14c – Unit with freecooling – without pumps

Tab. 14e – Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
–	–	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	17	3 way valve
7	–	18	Control freecooling thermostat sensor
8	–	19	–
9	–	20	–
10	Flow switch		
11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Opt. without pumps)*		

Tab. 14f – Unit connections (Iron tubes)

HPC–L	Ø Y (*) (Victaulic coupling)
FA7 / FB7 081	(1x) DN150 – 6” – 168.3 mm
FA7 / FB7 087	(1x) DN150 – 6” – 168.3 mm
FA7 / FB7 093	(1x) DN200 – 8” – 219.1 mm
FA7 / FB7 100	(1x) DN200 – 8” – 219.1 mm
FA7 / FB7 107	(1x) DN200 – 8” – 219.1 mm
FA7 / FB7 115	(1x) DN200 – 8” – 219.1 mm
FA7 / FB7 122	(1x) DN200 – 8” – 219.1 mm
FL7 / FQ7 080	(1x) DN150 – 6” – 168.3 mm
FL7 / FQ7 086	(1x) DN150 – 6” – 168.3 mm
FL7 / FQ7 092	(1x) DN200 – 8” – 219.1 mm
FL7 / FQ7 099	(1x) DN200 – 8” – 219.1 mm
FL7 / FQ7 106	(1x) DN200 – 8” – 219.1 mm
FL7 / FQ7 114	(1x) DN200 – 8” – 219.1 mm
FL7 / FQ7 121	(1x) DN200 – 8” – 219.1 mm
FA4 / FB4 069	(1x) DN150 – 6” – 168.3 mm
FA4 / FB4 075	(1x) DN150 – 6” – 168.3 mm
FA4 / FB4 081	(1x) DN150 – 6” – 168.3 mm
FA4 / FB4 087	(1x) DN150 – 6” – 168.3 mm
FA4 / FB4 093	(1x) DN200 – 8” – 219.1 mm
FA4 / FB4 100	(1x) DN200 – 8” – 219.1 mm
FA4 / FB4 107	(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

Hydraulic Circuit

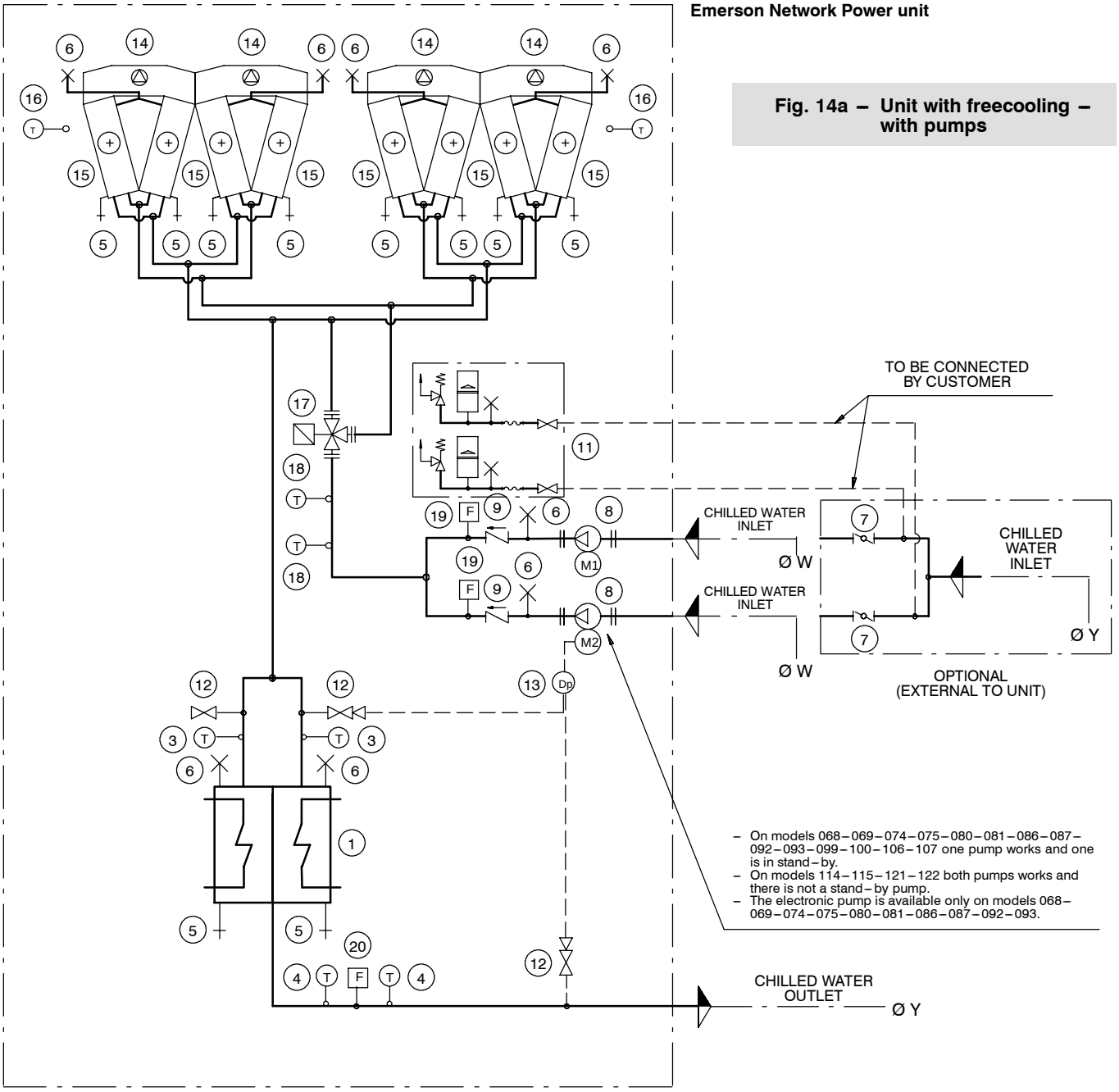


Fig. 14a – Unit with freecooling – with pumps

Tab. 14g – Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
–	–	13	Differential transducer *(only with elect. pump available on 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	Flow switch *(on Mod. 115–122 / 114–121)*
10	–	20	Flow switch *(on Mod. 069–107 / 068–106)*
11	Kit expansion tank + Safety valve + Air valve + Flex. + Valve *(Opt. without pumps)*		

Hydraulic Circuit

Tab. 14h – Unit connections (Iron tubes)

HPC–L	Ø Y (*) (Victaulic coupling)	Ø W (*) (Victaulic coupling)
FA7 / FB7 081	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FA7 / FB7 087	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FA7 / FB7 093	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FA7 / FB7 100	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FA7 / FB7 107	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FA7 / FB7 115	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FA7 / FB7 122	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FL7 / FQ7 080	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FL7 / FQ7 086	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FL7 / FQ7 092	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FL7 / FQ7 099	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FL7 / FQ7 106	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FL7 / FQ7 114	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FL7 / FQ7 121	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FA4 / FB4 069	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FA4 / FB4 075	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FA4 / FB4 081	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FA4 / FB4 087	(1x) DN150 – 6” – 168.3 mm	(2x) DN125 – 5” – 139.7 mm
FA4 / FB4 093	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FA4 / FB4 100	(1x) DN200 – 8” – 219.1 mm	(2x) DN150 – 6” – 168.3 mm
FA4 / FB4 107	(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

Hydraulic Circuit

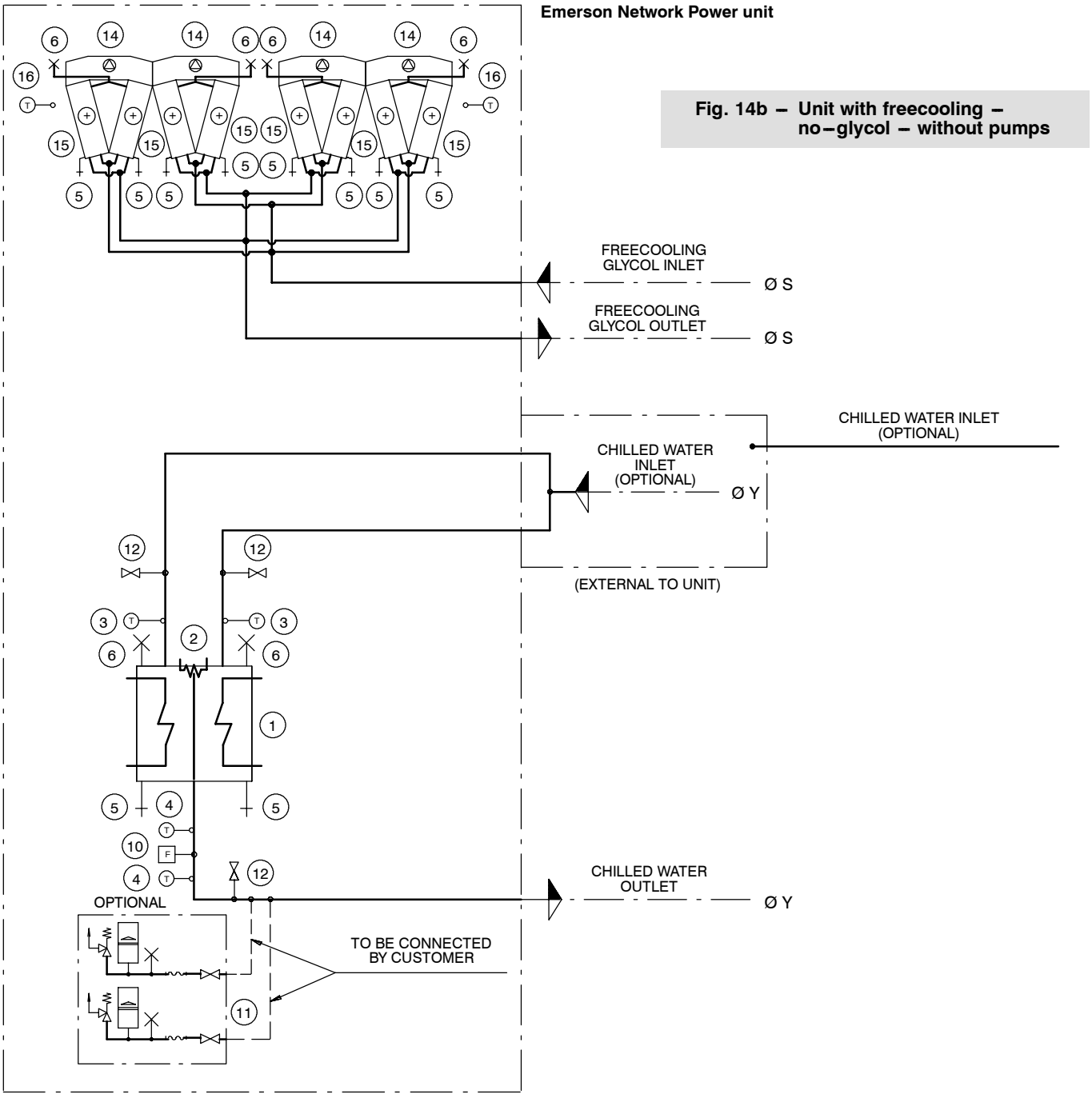


Fig. 14b – Unit with freecooling – no–glycol – without pumps

Tab. 14i – Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
2	Evaporator + Piping antifreeze heater *(Opt.)*	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 *(Opt. without pumps)*		

Hydraulic Circuit

Tab. 14j – Unit connections (Iron tubes)

HPC–L	Ø S (*) (Victaulic coupling)	Ø Y (*) (Victaulic coupling)
FA7 / FB7 081	DN150 – 6” – 168.3 mm	DN150 – 6” – 168.3 mm
FA7 / FB7 087		DN150 – 6” – 168.3 mm
FA7 / FB7 093		DN200 – 8” – 219.1 mm
FA7 / FB7 100		DN200 – 8” – 219.1 mm
FA7 / FB7 107		DN200 – 8” – 219.1 mm
FA7 / FB7 115		DN200 – 8” – 219.1 mm
FA7 / FB7 122		DN200 – 8” – 219.1 mm
FL7 / FQ7 080		DN150 – 6” – 168.3 mm
FL7 / FQ7 086		DN150 – 6” – 168.3 mm
FL7 / FQ7 092		DN200 – 8” – 219.1 mm
FL7 / FQ7 099		DN200 – 8” – 219.1 mm
FL7 / FQ7 106		DN200 – 8” – 219.1 mm
FL7 / FQ7 114		DN200 – 8” – 219.1 mm
FL7 / FQ7 121		DN200 – 8” – 219.1 mm
FA4 / FB4 069		DN150 – 6” – 168.3 mm
FA4 / FB4 075		DN150 – 6” – 168.3 mm
FA4 / FB4 081		DN150 – 6” – 168.3 mm
FA4 / FB4 087		DN150 – 6” – 168.3 mm
FA4 / FB4 093		DN200 – 8” – 219.1 mm
FA4 / FB4 100		DN200 – 8” – 219.1 mm
FA4 / FB4 107		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

Hydraulic Circuit

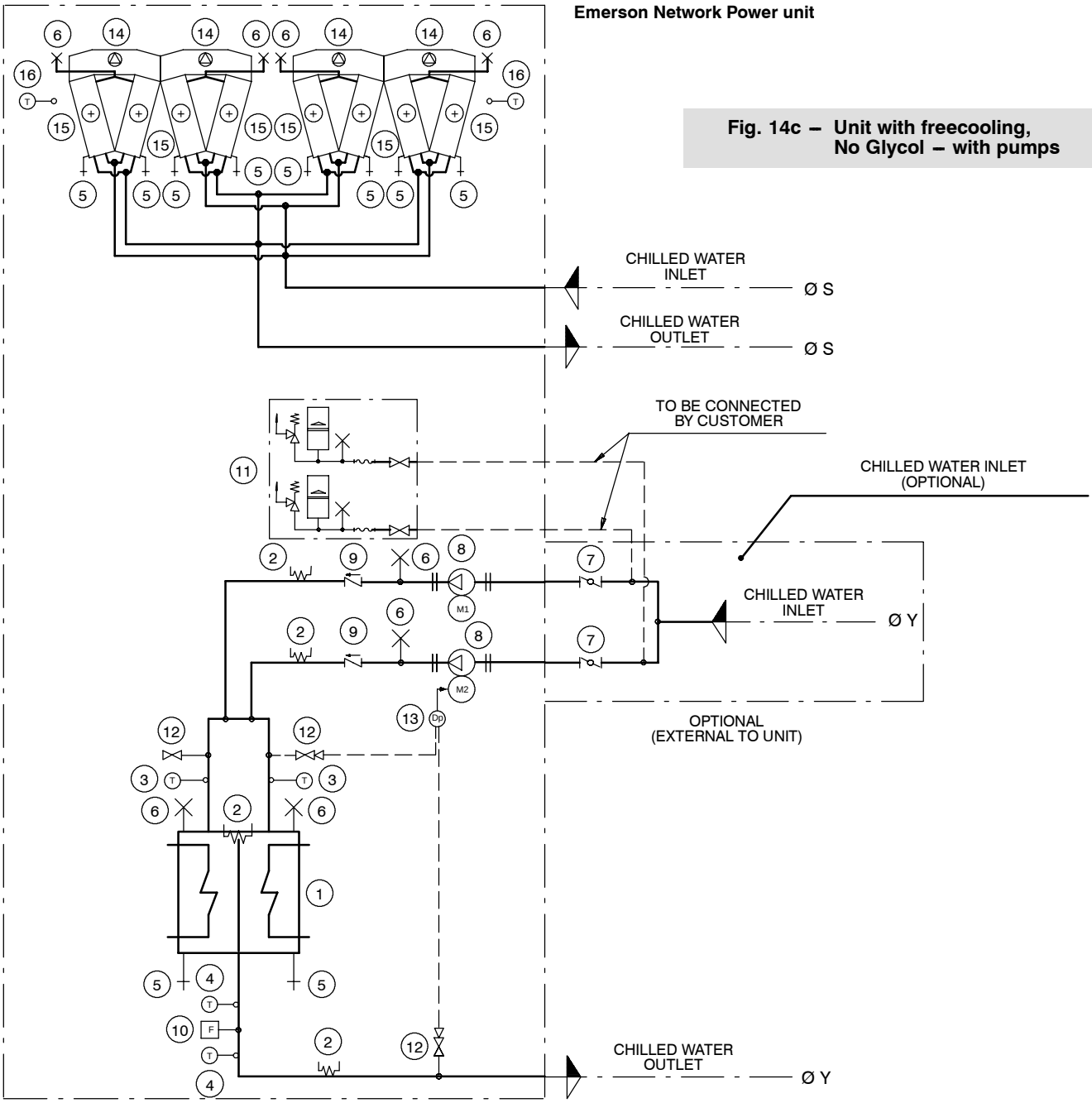


Fig. 14c – Unit with freecooling, No Glycol – with pumps

Tab. 14k – Hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Service valve with cap
2	Evaporator + Piping antifreeze heater *(Opt.)*	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 *(Opt. without pumps)*		

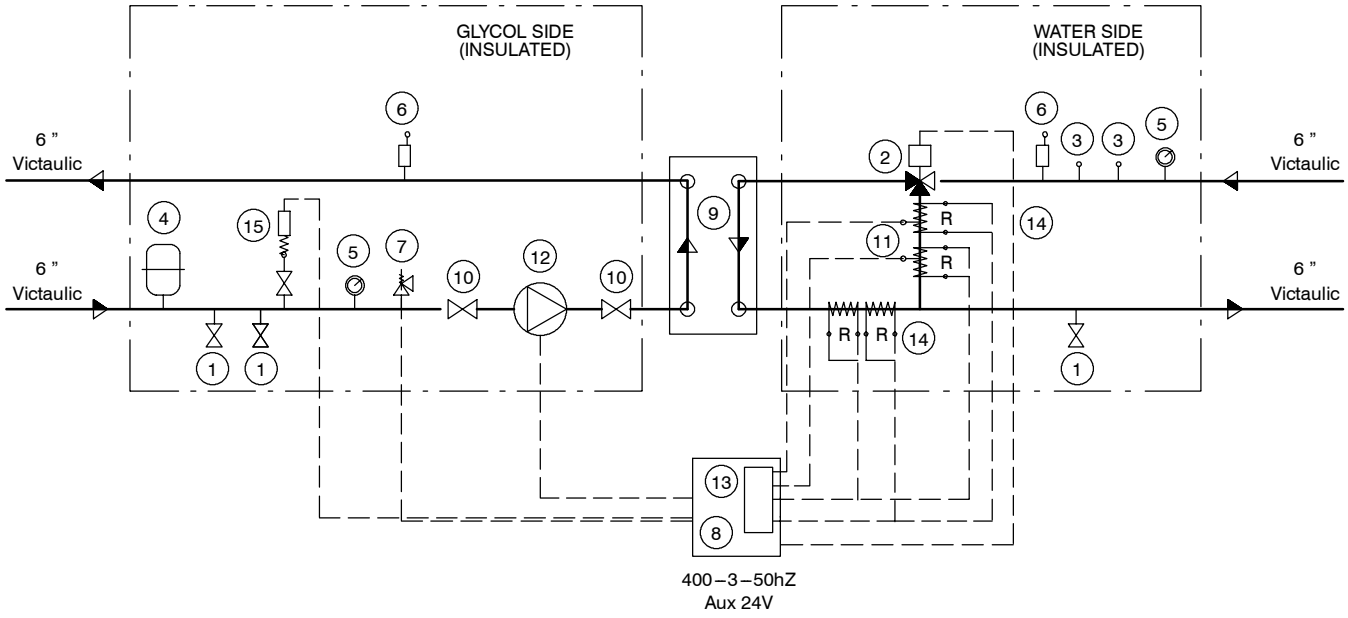
Hydraulic Circuit

Tab. 14l – Unit connections (Iron tubes)

HPC–L	Ø S (*) (Victaulic coupling)	Ø Y (*) (Victaulic coupling)
FA7 / FB7 081	DN150 – 6” – 168.3 mm	DN150 – 6” – 168.3 mm
FA7 / FB7 087		DN150 – 6” – 168.3 mm
FA7 / FB7 093		DN200 – 8” – 219.1 mm
FA7 / FB7 100		DN200 – 8” – 219.1 mm
FA7 / FB7 107		DN200 – 8” – 219.1 mm
FA7 / FB7 115		DN200 – 8” – 219.1 mm
FA7 / FB7 122		DN200 – 8” – 219.1 mm
FL7 / FQ7 080		DN150 – 6” – 168.3 mm
FL7 / FQ7 086		DN150 – 6” – 168.3 mm
FL7 / FQ7 092		DN200 – 8” – 219.1 mm
FL7 / FQ7 099		DN200 – 8” – 219.1 mm
FL7 / FQ7 106		DN200 – 8” – 219.1 mm
FL7 / FQ7 114		DN200 – 8” – 219.1 mm
FL7 / FQ7 121		DN200 – 8” – 219.1 mm
FA4 / FB4 069		DN150 – 6” – 168.3 mm
FA4 / FB4 075		DN150 – 6” – 168.3 mm
FA4 / FB4 081		DN150 – 6” – 168.3 mm
FA4 / FB4 087		DN150 – 6” – 168.3 mm
FA4 / FB4 093		DN200 – 8” – 219.1 mm
FA4 / FB4 100		DN200 – 8” – 219.1 mm
FA4 / FB4 107		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

Hydraulic Circuit

Fig. 14d – No Glycol unit



Tab. 14m – 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 litri)	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)		

Il Fabbricante dichiara che questo prodotto è conforme alle direttive Europee:
The Manufacturer hereby declares that this product conforms to the European Union directives:
Der Hersteller erklärt hiermit, dass dieses Produkt den Anforderungen der Europäischen Richtlinien gerecht wird:
Le Fabricant déclare que ce produit est conforme aux directives Européennes:
El Fabricante declara que este producto es conforme a las directivas Europeas:
O Fabricante declara que este produto está em conformidade com as directivas Europeias:
Tillverkare försäkrar härmed att denna produkt överensstämmer med Europeiska Uniones direktiv:
De Fabrikant verklaart dat dit produkt conform de Europese richtlijnen is:
Vaimistaja vakuuttaa täten, että tämä tuote täyättää seuraavien EU – direktiivien vaatimukset:
Produsent erklærer herved at dette produktet er i samsvar med EU – direktiver:
Fabrikant erklærer herved, at dette produkt opfylder kravene i EU direktiverne:
Ο Κατασκευαστής δηλώνει ότι το παρόν προϊόν είναι κατασκευασμένο αύμφωνα με τις οδηγίες της Ε.Ε.:

98/37/CE; 89/336/CEE; 73/23/CEE; 97/23/CE

Ensuring The High Availability Of Mission-Critical Data And Applications.

Emerson Network Power, a business of Emerson (NYSE:EMR), is the global leader in enabling Business-Critical Continuity™ from grid to chip for telecommunication networks, data centers, health care and industrial facilities. Emerson Network Power provides innovative solutions and expertise in areas including AC and DC power and precision cooling systems, embedded computing and power, integrated racks and enclosures, power switching and controls, monitoring, and connectivity. All solutions are supported globally by local Emerson Network Power service technicians. Liebert power, precision cooling and monitoring products and services from Emerson Network Power improve the utilization and management of data center and network technologies by increasing IT system availability, fl exibility and effi ciency.

Locations

Emerson Network Power - Headquarters EMEA
Via Leonardo Da Vinci 16/18
Zona Industriale Tognana
35028 Piove di Sacco (PD) Italy
Tel: +39 049 9719 111
Fax: +39 049 5841 257

Emerson Network Power - Service EMEA
Via Leonardo Da Vinci 16/18
Zona Industriale Tognana
35028 Piove di Sacco (PD) Italy
Tel: +39 049 9719 111
Fax: +39 049 9719045

United States
1050 Dearborn Drive
P.O. Box 29186
Columbus, OH 43229
Tel: +1 614 8880246

Asia
7/F, Dah Sing Financial Centre
108 Gloucester Road,Wanchai
Hong Kong
Tel: +852 2572220
Fax: +852 28029250

Emerson Network Power
The global leader in Business-Critical Continuity™.

- AC Power
- Connectivity
- DC Power
- Embedded Computing
- Embedded Power
- Monitoring
- Outside Plant
- Power Switching & Control
- Precision Cooling
- Rack & Integrated Cabinets
- Services
- Surge Protection