Precision Cooling for
Business-Critical Continuity

Liebert HPC-M

Air Cooled Chillers with semi-hermetic Screw Compressors

PRODUCT DOCUMENTATION

Liebert HPC-M - PD - 273546 - 14.09.2012

Liebert

EMERSON
Network Power

Liebert HPC – M

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

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.

Liebert HPC-M, is the new **Emerson Network Power** product line of air-cooled chillers, covering a power range from **350 to 800 kW**, designed to combine the best performance in terms of efficiency and reliability with the lowest impact on the environment.

29 models, 3 sound emission versions, the newly born **"G"** version characterized by high efficiency and wide application range, one chiller and one freecooling configurations, a wide range of options and accessories – such as economizer and electronic expansion valve, just to name two of them – **Liebert HPC-M** can be a leader in the chiller world. The new medium capacity range **Liebert HPC-M** allows **Emerson Network Power** to be a leader company not only in its natural industry, the technological market where **Emerson Network Power** can count on a recognized brand equity, but also in other industries such as commercial and industrial cooling.

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

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

With **@connectivity**, a highly sophisticated way to let the system components communicate, **Liebert HPC – M** is part of the network created for an improved operations management system.

Liebert HPC – M

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 9001:2008

The product conforms to European Union directives 2006/42/EC; 2004/108/EC; 2006/95/EC and 97/23/EC.

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

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

@ Connectivity

When the room units are equipped with the same type of control system **Emerson Network Power** (iCOM and CDL), 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-M** 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" Set–point (energy saving & noise reduction);
- lower water temperature if one or more Air Conditioners fail (keep capacity in emergency situations);
- . . . and much more!

To add the **@connectivity** to your system, it is simply necessary:
To build up an Hironet connection between the room units and the **Liebert HPC-M** units. The network can be only 1 (if the distance and the number of units allow this) or it can be split in several networks.
On **@connectivity** it is possible to define the rules that you want your system to respect.
It will be then up to the web capabilities to allow the view and control of your system from any PC of your Local area network (provided that the **@connectivity** PC is connected on the LAN) or even.
If you have a connection to Internet and your system is open to external access, you will have the possibility to view and control your system via Internet

Features and Benefits

Reliability and Low Environmental Impact

Reliability

The **Liebert HPC-M** 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-M** 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.
Furthermore, **Liebert HPC-M** compressor design with two independent refrigeration circuits allows maximum internal redundancy and thus system reliability.
All **Liebert HPC-M** units are run tested at the factory before shipment

High outdoor temperature

The oversizing of heat exchangers and the wide operating range of the screw compressors permit the use of **Liebert HPC-M** units in high temperature environments as well, up to 46° C at 100% full load, and up to 52° C at full load on “G” version. 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.

Resistance to liquid slugging

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

Start–up management

The specific features of **Liebert HPC-M** 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; PHE and shell & tube evaporators selected for R134a application; aerodynamic profiled blade fans with high efficiency nozzles and continuous speed regulation; large surface W-shaped condenser coils and the advanced features of the microprocessor control ensure the achievement of unequalled efficiency figures.

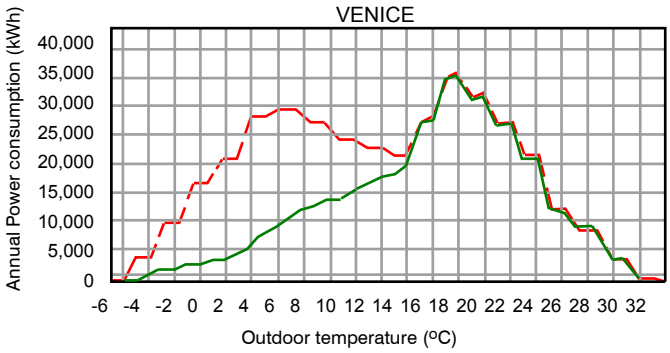
Features and Benefits

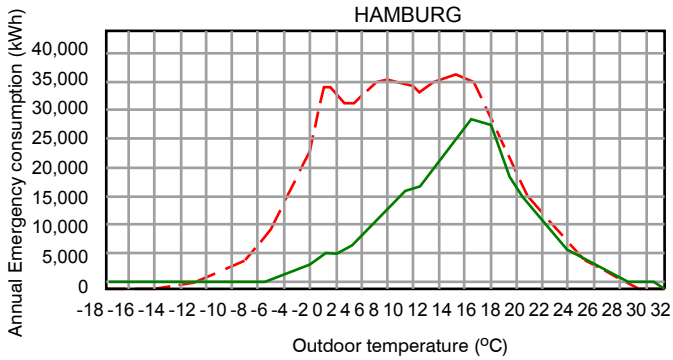
Freecooling module

The execution with built–in free-cooling module, allows **Liebert HPC-M** 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.





Annual energy consumption (Chiller).
Annual energy consumption, chiller plus free cooling module.

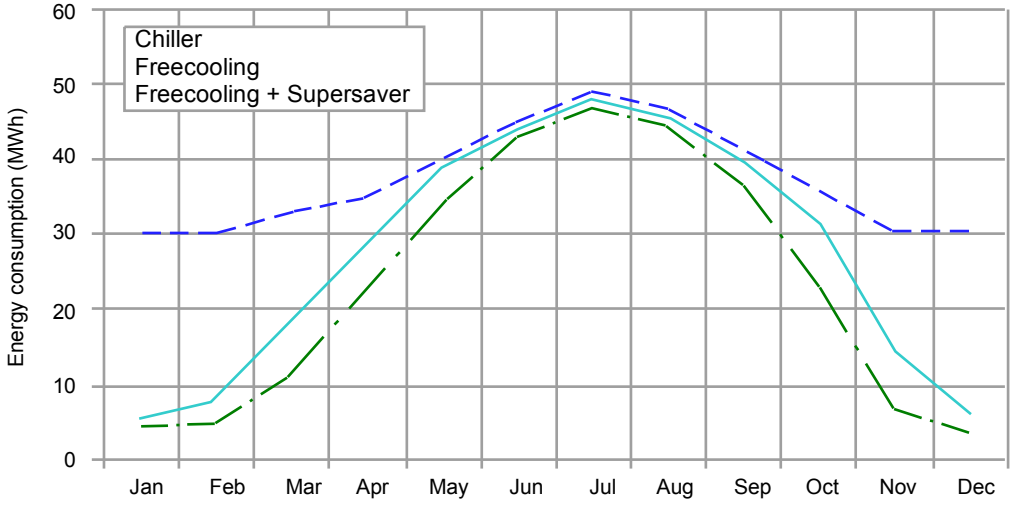
Reduced space requirements in comparison with a conventional chiller plus a dry-cooler, are obtained through the Freecooling execution's compact design and the reduction of the compressors working hours offers exceptional saving both in the long and short term. The different strategies adopted by the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

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%.

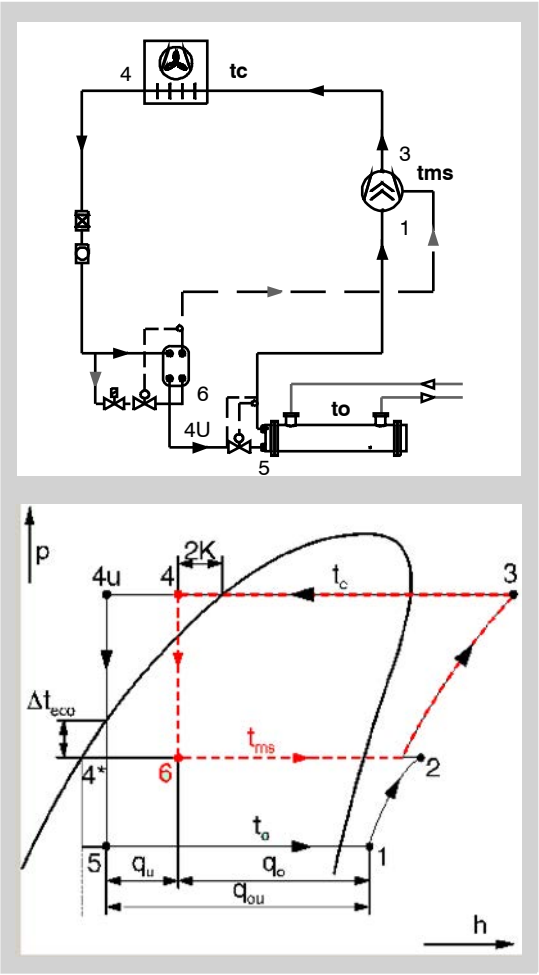
Annual power consumption. Comparison among the systems:



Traditional Chiller.
Freecooling execution.
Freecooling execution plus Supersaver.

Features and Benefits

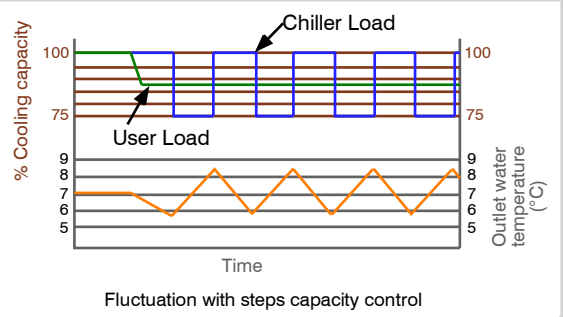
Economiser circuit



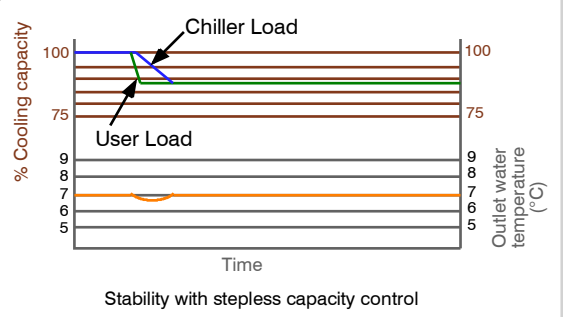
The operation with economizer is a convenient and efficient method to increase the cooling capacity and the COP. This device is particularly advisable for the conditioning applications where the condensing temperatures are high or medium. By this operation system, the liquid refrigerant is cooled by a heat exchanger (sub–cooler). When a sub–cooler is used, some of the refrigerant mass (ECO flow rate) is separated from the condenser mass after the condenser (4). This ECO mass is thus expanded at an intermediate pressure (t ms). The ECO mass evaporates inside the sub–cooler and enters the compressor through the economizer opening.
The evaporator mass flow rate is sub–cooled by the exchanger at a lower liquid temperature (4u). The intermediate pressure at the economizer changes depending on the type of compressor, on the operating conditions (evaporations and condensation temperatures) and on the ECO flow rate. The additional sub–cooling of the liquid involves a significant increase of the cooling capacity. From certain operating conditions, the electric absorption by the compressor increases less proportionally than the cooling capacity (improving the machine efficiency), as the compression process occurs at a better efficiency level due to the positive contribution of the fresh gas portion sucked through the ECO opening. A further feature of the economizer circuit in the **Liebert HPC–M** 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



Fluctuation with steps capacity control



Stability with stepless capacity control

power step would be too high or too low when compared to the building – cooling load, so loosing water temperature 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 – M 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 – M** 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

In chiller with"EC" fans (see § 5.6) the performance of units in terms of cooling capacity, noise and above all energy efficiency ratio (EER) and Seasonal Energy Efficiency (IPLV-ESEER) are influenced by the speed of these fans (or RPM) which are regulated by the microprocessor control.

Especially for "**G**" version chiller performance parameters are optimized in different points (RPM) as shown in the chart below.

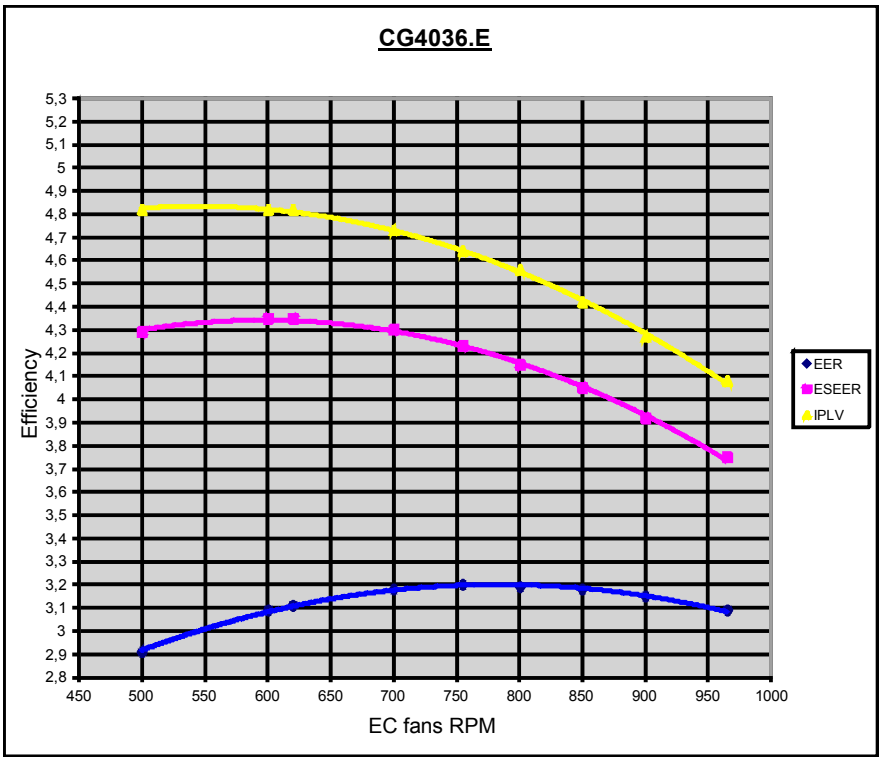
Features and Benefits

Tab. 1a – Efficiency ratios

HPC – M							
Model	**Size**	**EER**	**EER optim.**	**IPLV**	**IPLV optim.**	**ESEER**	**ESEER optim.**
CG4	**036.E**	3.08	3.20	4.08	4.84	3.75	4.35
	039.E	3.20	3.27	4.29	4.89	3.93	4.40
	046.E	3.20	3.34	4.00	4.67	3.70	4.24
	052.E	3.30	3.24	4.17	4.72	3.85	4.28
	058.E	3.25	3.50	4.14	4.81	3.79	4.34
	066.E	3.26	3.30	4.28	4.79	3.90	4.31
CB4	**031.E**	3.00	–	4.05	–	3.69	–
	036.E	2.89	–	4.13	–	3.70	–
	039.E	2.96	–	4.31	–	3.86	–
	046.E	3.02	–	4.17	–	3.76	–
	052.E	3.10	–	4.28	–	3.89	–
	058.E	3.03	–	4.14	–	3.76	–
	066.E	3.02	–	4.30	–	3.89	–
	078.E	2.93	–	3.96	–	3.52	–
CL4	**031.E**	3.02	–	4.25	–	3.87	–
	036.E	2.98	–	4.40	–	3.95	–
	039.E	3.08	–	4.44	–	3.99	–
	046.E	3.13	–	4.46	–	4.02	–
	052.E	3.16	–	4.33	–	3.96	–
	058.E	3.12	–	4.43	–	4.00	–
	066.E	3.22	–	4.55	–	4.12	–
	078.E	2.90	–	4.05	–	3.59	–
CQ4	**031.E**	3.03	–	4.68	–	4.20	–
	036.E	3.13	–	4.83	–	4.33	–
	039.E	3.13	–	4.91	–	4.37	–
	046.E	3.21	–	4.82	–	4.32	–
	052.E	3.18	–	4.77	–	4.33	–
	058.E	3.26	–	4.87	–	4.39	–
	066.E	3.07	–	4.85	–	4.34	–

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

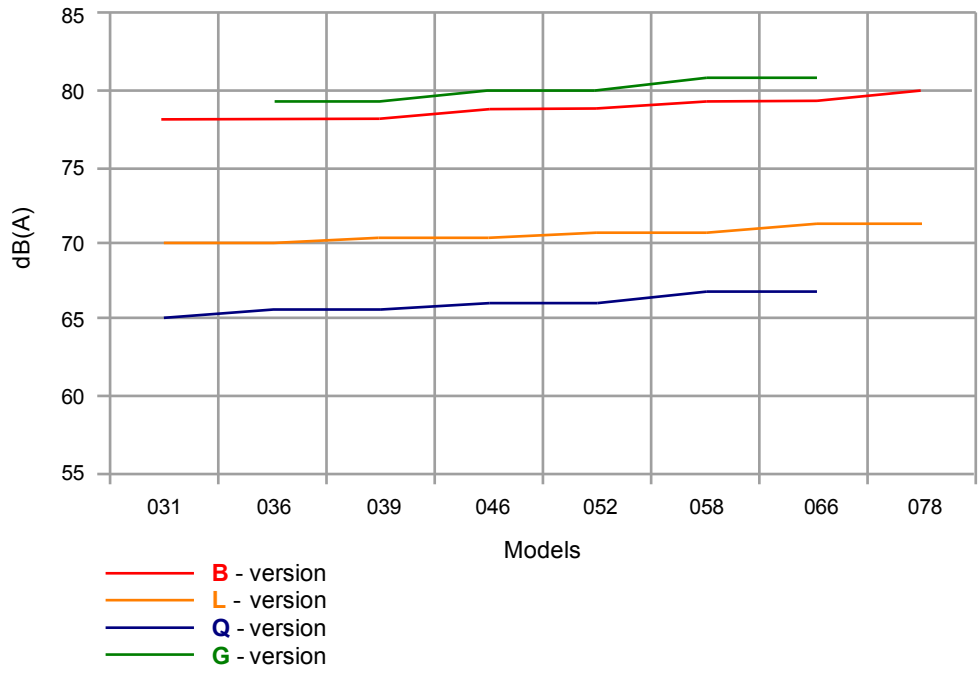
The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.



Low sound emission

The **Liebert HPC – M** series is characterised by unrivalled low sound emissions, in particular the models of the version “Q”.
A sound – proofed compressors enclosure, compressor fastening on insulating/anti – vibration supports, fans and speed adjusters specifically designed to reduce sound emission lead to these superior results.
All units are equipped with a modulating fans speed control; controlled by a special algorithm which, while optimising the compressors management, enables to keep the fan speed always to the minimum.
Even lower sound emission levels can be obtained with the EC fans (with integrated electronic switching motor), above all in low speed operation.

Liebert HPC-M chiller sound emission at 1 m distance



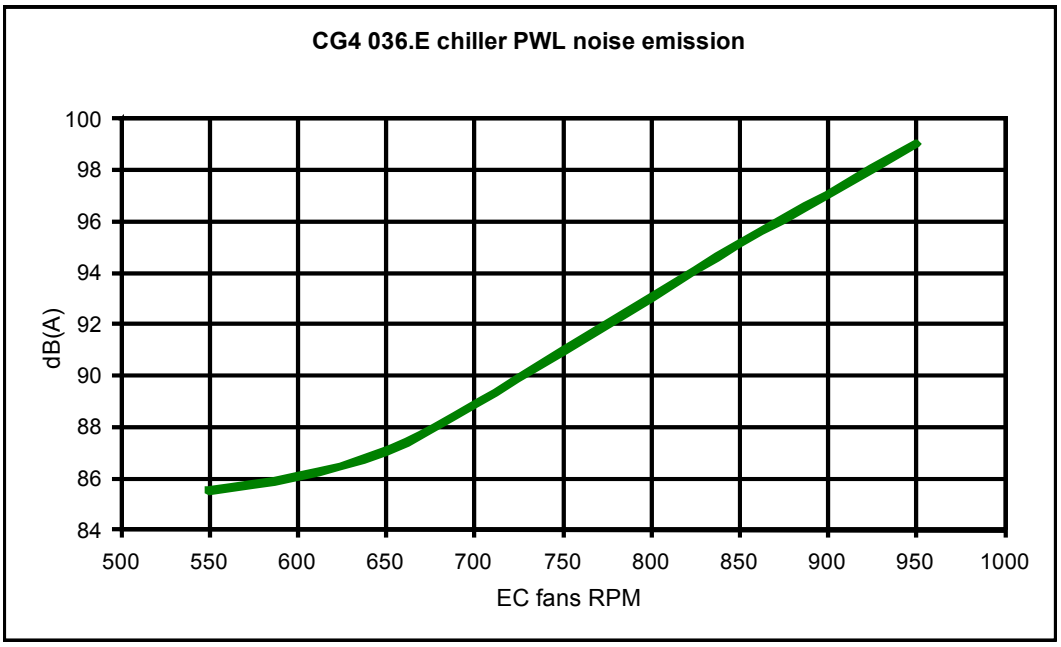
Tab. 1b – Sound levels

Models	HPC – M [dB(A)]			
	“B” version	“L” version	“Q” version	“G” version
031.E	78.0	70.0	65.0	–
036.E	78.0	70.0	65.5	79.5
039.E	78.0	70.5	65.5	79.5
046.E	78.5	70.5	66.0	80.0
052.E	78.5	71.0	66.0	80.0
058.E	79.0	71.0	67.0	81.0
066.E	79.0	72.0	67.0	81.0
078.E	80.0	72.0	–	–

The unit sound level in the versions ”B”and “L” is lowered by 3 dB(A) in standard operating conditions with outlet water 7° C and outdoor air lower than 30° C by suitable measures, such as:

- better sound insulation of the compressors compartment (only for “B” version);
- automatic fan speed reduction with special control set (for ”B”and “L” versions).

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



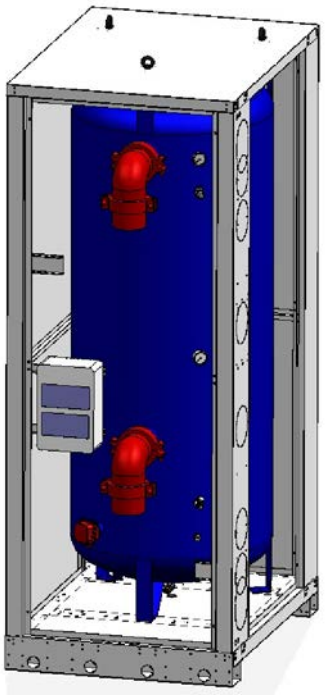
Flexibility: Hydronic Module

In order to match different kinds of installations and applications, **Liebert HPC–M** units are available with a hydronic module, which can be adapted/adjusted depending on the specific requests.

Based on this philosophy, the units can be equipped with everything that is needed for the correct installation and, in this way, reduce the complexity of the commissioning: 2 circulating pumps, water filter, safety valve, expansion vessel, flow switch. With all these elements included inside the unit, it is just a matter of connecting the chiller to the system.

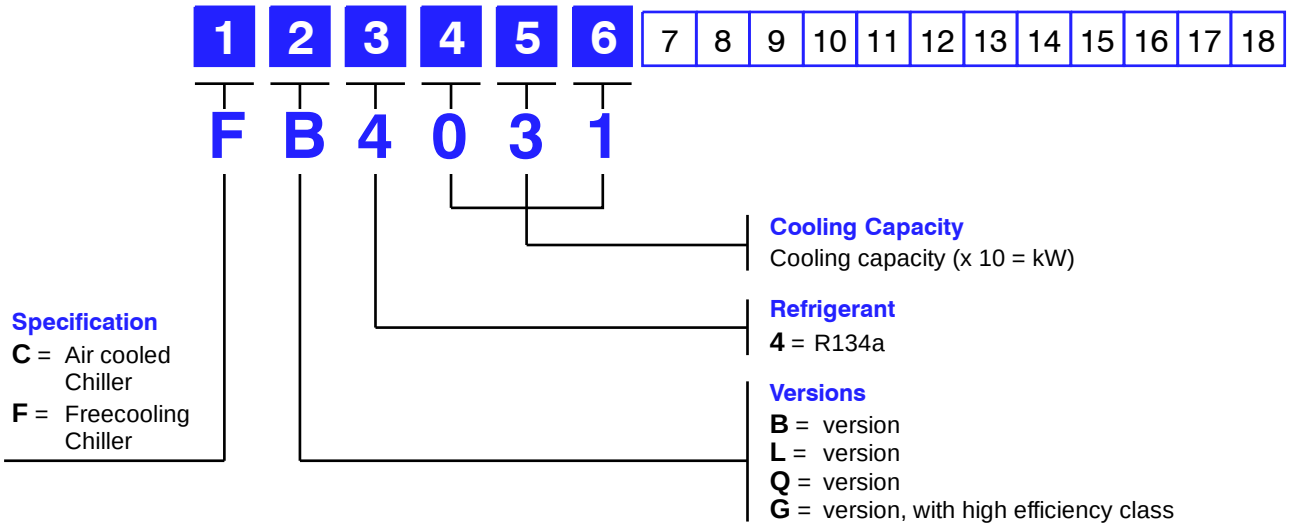
The buffer tank with a volume of 1185 litres can be supplied within a stand alone module suitably designed to enable hydraulic connections aligned with all **Liebert HPC–M** pipines configurations.

But, if some or all of these components are already present in the hydraulic line, **Liebert HPC–M** can be equipped only with what is not already connected in the system. This level of flexibility allows true customisation of the unit.



2 Model Number Description

Model Nomenclature / Digit Numbers



Liebert HPC–M

Digits 1, 2, 3, 4, 5, 6 – Base unit

Base unit main features

- Base and self-supporting frame made of galvanized steel with baked powder enamel of a suitable thickness;
- Semi-hermetic screw compressors with continuous capacity control;
- Electronic expansion valve (EEV);
- Axial fans with modulating fan speed control;
- 2 independent refrigeration circuits;
- 1 water circuit with flow switch;
- Dry expansion evaporator with independent circuits for each compressor on the refrigerant side;
- International approval 97/23 EC-PED;
- Electric panel CE compliant and complete with safety equipments, fan motors protection, fuses and protection thermal relays for compressors, power supply 400V/3Ph/50Hz (RST + PE);
- iCOM board / display control;
- Main switch on each electric board;
- Antiscratch plastic film packaging;
- Color "Grey" (RAL7032).

Digit 7 – Display and switch

A = FTE display
B = FTE display + Network switch
E = iCOM Coldfire display
F = iCOM Coldfire display + Network switch

Digit 8 – Compressor suction shut–off valve

0 = None
1 = With shut–off valve

Digit 9 – Monitoring

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

Digit 10 – Economiser (ECO)

0 = No ECO
1 = With ECO

Digit 11 – Fan speed control

1 = TRIAC control
3 = EC–Fan

Digit 12 – Pumps group / Hydraulic Kit

0 = None
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 – Free

Digit 14 – Electric panel options

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

Digit 15 – Evaporator electric heaters

0 = None
1 = With evaporator heating resistor
2 = With evaporator, pumps and pipes heating resistor

Digit 16 – Compressor power factor capacitors

0 = None
1 = With compressor power factor capacitors

Digit 17 – Condensing coil filter / Protection grid

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. 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 "G" versions admit Maximum Water Outlet Temperature of 20° C and Maximum water return temperature of 26° C when the units are at full power.

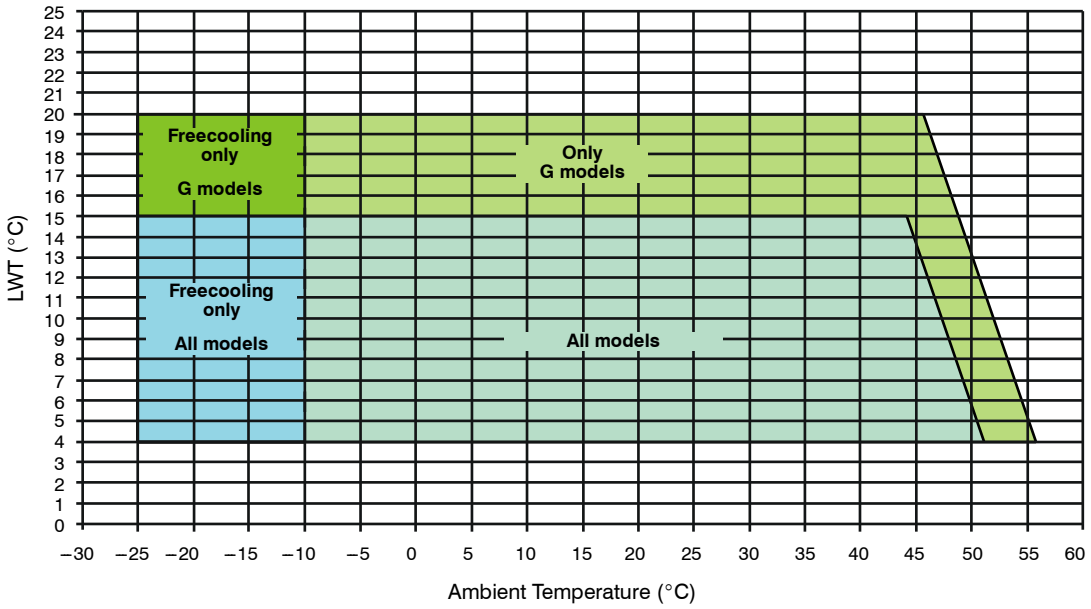
The maximum glycol percentage permitted is 50% (35% with pump sets fitted)

The minimum glycol percentage necessary is in relation to the minimum ambient air temperature conditions referred to the place of installation.
The maximum hydraulic working pressure is 6 Barg. This limit does not depend on the presence or absence of the pumps in the unit.
Nominal power supply tolerance: 400V +/_ 10%; max. voltage unbalance: 2%.
See operation range Table in which each model's limits are indicated; for different values ask your agent.

Unit storage conditions:

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

Average HPC–M Range Working Limits



Operating Range

Tab. 3a – Operating range – Chiller

Models: CB4 031.E–078.E		031.E	036.E	039.E	046.E	052.E	058.E	066.E	078.E
Operating range									
Max. outdoor temperature (1)	°C	51	50	49	51	50	50	49	49
Max. water flow	m³/h	–	–	–	–	–	145	145	218
Safety devices settings									
High pressure switch (1)	bar				18				
High pressure safety valve	bar				20				
HP safety valves (each circuit)	Nr.			1				2	
High pressure safety valve connection	in				1.1/4" G				
Low pressure switch	bar				1.1				
Low pressure safety valve	bar				12				
LP safety valves (each circuit)	Nr.				1				
Low pressure safety valve connection	in				3/4" G				

Models: CL4 031.E–078.E		031.E	036.E	039.E	046.E	052.E	058.E	066.E	078.E
Operating range									
Max. outdoor temperature (1)	°C	50	50	50	51	50	50	51	48
Max. water flow	m³/h	–	–	–	–	120	145	145	218
Safety devices settings									
High pressure switch (1)	bar				18				
High pressure safety valve	bar				20				
HP safety valves (each circuit)	Nr.			1				2	
High pressure safety valve connection	in				1.1/4" G				
Low pressure switch	bar				1.1				
Low pressure safety valve	bar				12				
LP safety valves (each circuit)	Nr.				1				
Low pressure safety valve connection	in				3/4" G				

Models: CQ4 031.E–066.E		031.E	036.E	039.E	046.E	052.E	058.E	066.E
Operating range								
Max. outdoor temperature (1)	°C	48	50	49	50	48	50	47
Max. water flow	m³/h	–	–	–	100	120	145	145
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
HP safety valves (each circuit)	Nr.			1			2	
High pressure safety valve connection	in				1.1/4" G			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			
LP safety valves (each circuit)	Nr.				1			
Low pressure safety valve connection	in				3/4" G			

Models: CG4 036.E–066.E		–	036.E	039.E	046.E	052.E	058.E	066.E
Operating range								
Max. outdoor temperature (1)	°C		59	59	59	59	60	58
Max. water flow	m³/h		–	–	100	120	145	145
Safety devices settings								
High pressure switch (1)	bar				20			
High pressure safety valve	bar				22			
HP safety valves (each circuit)	Nr.			1			2	
High pressure safety valve connection	in				1.1/4" G			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			
LP safety valves (each circuit)	Nr.				1			
Low pressure safety valve connection	in				3/4" G			

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

Notes:
The units are equipped with automatic capacity reduction system to avoid the machine lock before reaching the indicated outdoor air temperature max. limits.
In the units with economizer option, such device is disabled (version "G" excluded) before reaching the indicated outdoor air temperature max. limits.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government..*

Operating Range

Tab. 3b – Operating range – Freecooling

Models: FB4 031–078		031.E	036	039	046.E	052	058.E	066	078
Operating range									
Max. outdoor temperature (1)	°C	50	48	46	49	47	48	46	46
Max. fluid flow	m³/h	–	–	–	–	–	145	145	218
Safety devices settings									
High pressure switch (1)	bar				18				
High pressure safety valve	bar				20				
HP safety valves (each circuit)	Nr.			1				2	
High pressure safety valve connection	in				1.1/4" G				
Low pressure switch	bar				1.1				
Low pressure safety valve	bar				12				
LP safety valves (each circuit)	Nr.				1				
Low pressure safety valve connection	in				3/4" G				

Models: FL4 031–078		031.E	036	039.E	046	052.E	058	066	078
Operating range									
Max. outdoor temperature (1)	°C	48	46	49	48	49	47	48	45
Max. fluid flow	m³/h	–	–	–	–	120	145	145	218
Safety devices settings									
High pressure switch (1)	bar				18				
High pressure safety valve	bar				20				
HP safety valves (each circuit)	Nr.			1				2	
High pressure safety valve connection	in				1.1/4" G				
Low pressure switch	bar				1.1				
Low pressure safety valve	bar				12				
LP safety valves (each circuit)	Nr.				1				
Low pressure safety valve connection	in				3/4" G				

Models: FQ4 031–066		031	036.E	039	046.E	052	058	066
Operating range								
Max. outdoor temperature (1)	°C	45	48	46	48	45	47	44
Max. fluid flow	m³/h	–	–	–	100	120	145	145
Safety devices settings								
High pressure switch (1)	bar				18			
High pressure safety valve	bar				20			
HP safety valves (each circuit)	Nr.			1			2	
High pressure safety valve connection	in				1.1/4" G			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			
LP safety valves (each circuit)	Nr.				1			
Low pressure safety valve connection	in				3/4" G			

Models: FG4 036.E–066.E		–	036.E	039.E	046.E	052.E	058.E	066.E
Operating range								
Max. outdoor temperature (1)	°C		58	56	58	56	57	55
Max. fluid flow	m³/h		–	–	100	120	145	145
Safety devices settings								
High pressure switch (1)	bar				20			
High pressure safety valve	bar				22			
HP safety valves (each circuit)	Nr.			1			2	
High pressure safety valve connection	in				1.1/4" G			
Low pressure switch	bar				1.1			
Low pressure safety valve	bar				12			
LP safety valves (each circuit)	Nr.				1			
Low pressure safety valve connection	in				3/4" G			

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

Notes:
The units are equipped with automatic capacity reduction system to avoid the machine lock before reaching the indicated outdoor air temperature max. limits.
In the units with economizer option, such device is disabled (version "G" excluded) before reaching the indicated outdoor air temperature max. limits.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government..*

4 Technical Data

Tab. 4a – Technical Data – CB4 031.E–078.E

Model CB4		031.E	036.E	039.E	046.E	052.E	058.E	066.E	078.E
Performance (1)									
Cooling capacity	kW	303	334	388	426	494	544	618	736
Compressors power input	kW	87	101	117	122	140	156	182	222
Total power input	kW	101	115	131	141	159	180	205	251
Unit EER	-	3.00	2.89	2.96	3.02	3.10	3.03	3.02	2.93
Water flow	m^3/h	52.1	57.4	66.8	73.2	85.0	93.4	106.2	126.4
Water pressure drop	kPa	31	29	33	32	34	42	58	40
Performance (2)									
Cooling capacity	kW	326	377	420	471	538	596	670	800
Compressors power input	kW	98	119	134	144	163	183	209	250
Total power input	kW	113	134	148	163	182	207	233	278
Unit EER	-	2.89	2.82	2.83	2.89	2.96	2.88	2.88	2.88
Water flow	m^3/h	56.1	64.8	72.1	81.0	94.7	102.4	115.0	137.5
Water pressure drop	kPa	35	36	39		41	50	67	47
Sound level									
SPL (Sound Pressure Level) (3)	dB(A)		78.0		78.5		79.0		80.0
PWL (Sound Power Level) (4)	dB(A)		98.0		99.0		100.0		101.0
Refrigeration circuits									
Number of refrigeration circuits	No				2				
Refrigerant charge (each circuit)	kg	42	43	44	52	53	70		82
Compressors									
Number of compressors	No				2				
Type	-				Double screw with integrated oil separator				
Nominal power (each compressor)	HP	70	80	90		110	125	140	160
Capacity control	-				25 ⇒ 100 % stepless				
Fans									
Number of fans	No		6		8		10		12
Type	-				Axial - AC motor -				
Wheel nominal diameter	mm				900				
RPM	1/min				900				
Nominal power input (each fan)	kW				2.4				
Fans power input	kW		14.3		19.0		23.8		28.6
Air flow rate	m^3/h	120870		115566	161160	154088	201450	192610	231132
Evaporator									
Number of evaporators	No				1				
Type	-		Plate heat exchanger				Shell & tube		
Internal volume (each circuit, refrigerant side)	l	18	21	24	28	34	40	44	51
Condensing coil									
Material tubes / fins	-				Copper / aluminium				
Rows / fins space	no/mm				3 / 1,8				
Face area	m^2		13.0		17.3		21.6		25.9
Internal volume (each circuit)	l		72		98		122		146
Water connections									
Diameters inlet / outlet	DN-inch	DN100-4"-114,3			DN125-5"-139,7				
Unit volume	l	66	73	78	109	122	325	320	387
Dimensions									
Length	mm		4021		5017		6013		7009
Depth	mm				2260				
Height	mm				2570				
Weights									
Net weight	kg	3625	3667	3707	4931	5010	5764	5792	6497
Operating weight	kg	3691	3740	3785	5040	5132	6089	6112	6884

Notes:

(1) - Cooling capacity 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) - Cooling capacity 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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*

Technical Data

Tab. 4b – Technical Data – CL4 031.E–078.E

Model CL4		031.E	036.E	039.E	046.E	052.E	058.E	066.E	078.E
Performance (1)									
Cooling capacity	kW	299	334	396	426	494	544	631	721
Compressors power input	kW	89	101	115	122	139	157	175	228
Total power input	kW	99	111	129	136	156	174	196	249
Unit EER	-	3.02	2.98	3.08	3.13	3.16	3.12	3.22	2.90
Water flow	m^3/h	51.4	57.4	68.1	73.2	84.9	93.5	108.4	124.0
Water pressure drop	kPa	30	29	35	32	51	42	60	39
Performance (2)									
Cooling capacity	kW	323	377	426	471	540	597	680	786
Compressors power input	kW	101	120	130	144	161	184	199	258
Total power input	kW	112	130	144	158	179	202	220	279
Unit EER	-	2.88	2.89	2.96	2.98	3.02	2.96	3.09	2.82
Water flow	m^3/h	55.5	64.7	73.2	80.9	92.7	102.5	116.7	135.1
Water pressure drop	kPa	35	38	40	39	60	50	69	46
Sound level									
SPL (Sound Pressure Level) (3)	dB(A)	70.0		70.5		71.0		72.0	
PWL (Sound Power Level) (4)	dB(A)	90.0		91.0		92.0		93.0	
Refrigeration circuits									
Number of refrigeration circuits	No	2							
Refrigerant charge (each circuit)	kg	42	43	49	52	70		75	82
Compressors									
Number of compressors	No	2							
Type	-	Double screw with integrated oil separator							
Nominal power (each compressor)	HP	70	80	90		110	125	140	160
Capacity control	-	25 ⇒ 100 % stepless							
Fans									
Number of fans	No	6		8		10		12	
Type	-	Axial - AC motor -							
Wheel nominal diameter	mm	800							
RPM	1/min	900							
Nominal power input (each fan)	kW	1.7							
Fans power input	kW	10.4		13.9		17.4		20.9	
Air flow rate	m^3/h	106176	102438	141568	136584	176960	170730	212352	204876
Evaporator									
Number of evaporators	No	1							
Type	-	Plate heat exchanger				Shell & tube			
Internal volume (each circuit, refrigerant side)	l	18	21	24	28	37	40	44	51
Condensing coil									
Material tubes / fins	-	Copper / aluminium							
Rows / fins space	no/mm	3 / 1,8							
Face area	m^2	13.0		17.3		21.6		25.9	
Internal volume (each circuit)	l	72		98		122		146	
Water connections									
Diameters inlet / outlet	DN-inch	DN100-4"-114,3				DN125-5"-139,7			
Unit volume	l	66	73	88	109	335	324	348	387
Dimensions									
Length	mm	4021		5017		6013		7009	
Depth	mm	2260							
Height	mm	2570							
Weights									
Net weight	kg	3567	3606	4134	4821	5575	5604	6121	6287
Operating weight	kg	3633	3679	4222	4930	5910	5928	6469	6674

Notes:

(1) - Cooling capacity 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) - Cooling capacity 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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*

Technical Data

Tab. 4c – Technical Data – CQ4 031.E–066.E

Model CQ4		031.E	036.E	039.E	046.E	052.E	058.E	066.E
Performance *(1)*								
Cooling capacity	kW	292	334	387	421	483	542	603
Compressors power input	kW	92	101	118	124	145	158	188
Total power input	kW	97	107	124	131	152	166	196
Unit EER	-	3.03	3.13	3.13	3.21	3.18	3.26	3.07
Water flow	m^3/h	50.2	57.3	66.5	72.3	83.0	93.2	103.5
Water pressure drop	kPa	29		33	48	49	42	55
Performance *(2)*								
Cooling capacity	kW	317	377	418	469	531	595	656
Compressors power input	kW	107	119	136	148	170	185	218
Total power input	kW	111	125	141	155	177	194	226
Unit EER	-	2.85	3.02	2.96	3.02	3.00	3.07	2.90
Water flow	m^3/h	54.5	64.7	71.9	80.6	91.2	102.2	112.7
Water pressure drop	kPa	33	36	38	59	58	50	65
Sound level								
SPL (Sound Pressure Level) *(3)*	dB(A)	65.0	65.5		66.0		67.0	
PWL (Sound Power Level) *(4)*	dB(A)	85.0	86.0		87.0		88.0	
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	43	48	49	70		75	
Compressors								
Number of compressors	No	2						
Type	-	Double screw with integrated oil separator						
Nominal power (each compressor)	HP	70	80	90		110	125	140
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	6	8		10		12	
Type	-	Axial - EC motor -						
Wheel nominal diameter	mm	800						
RPM	1/min	700						
Nominal power input (each fan)	kW	0.7						
Fans power input	kW	4.3	5.7		7.1		8.5	
Air flow rate	m^3/h	80304	111288	107072	139110	133840	160608	160608
Evaporator								
Number of evaporators	No	1						
Type	-	Plate heat exchanger			Shell & tube			
Internal volume (each circuit, refrigerant side)	l	18	21	24	34	37	40	44
Condensing coil								
Material tubes / fins	-	Copper / aluminium						
Rows / fins space	no/mm	3 / 1,8						
Face area	m^2	13.0	17.3		21.6		25.9	
Internal volume (each circuit)	l	72	98		122		146	
Water connections								
Diameters inlet / outlet	DN-inch	DN100-4"-114,3			DN125-5"-139,7			
Unit volume	l	66	83	88	339	335	354	348
Dimensions								
Length	mm	4021	5017		6013		7009	
Depth	mm	2260						
Height	mm	2570						
Weights								
Net weight	kg	3676	4203	4244	5657	5685	6203	6231
Operating weight	kg	3742	4286	4332	5996	6020	6557	6579

Notes:

(1) - Cooling capacity 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) - Cooling capacity 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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*

Technical Data

Tab. 4d – Technical Data – CG4 036.E–066.E

Model CG4		036.E	039.E	046.E	052.E	058.E	066.E
Performance (1)							
Cooling capacity	kW	353	412	447	516	563	644
Compressors power input	kW	95	109	115	132	144	168
Total power input	kW	115	129	140	157	173	197
Unit EER	-	3.08	3.20	3.20	3.30	3.25	3.26
Water flow	m^3/h	60.6	70.7	76.8	88.6	96.7	110.6
Water pressure drop	kPa	32	37	54	55	45	63
Performance (2)							
Cooling capacity	kW	393	439	489	555	609	688
Compressors power input	kW	109	122	133	150	165	191
Total power input	kW	129	142	158	174	194	220
Unit EER	-	3.06	3.10	3.10	3.19	3.13	3.12
Water flow	m^3/h	67.5	75.3	84.0	95.4	104.5	118.2
Water pressure drop	kPa	39	42	64		52	71
Sound level							
SPL (Sound Pressure Level) (3)	dB(A)	79.5		80.0		81.0	
PWL (Sound Power Level) (4)	dB(A)	100.0		101.0		102.0	
Refrigeration circuits							
Number of refrigeration circuits	No	2					
Refrigerant charge (each circuit)	kg	48	49	70		75	
Compressors							
Number of compressors	No	2					
Type	-	Double screw with integrated oil separator					
Nominal power (each compressor)	HP	90	100	125	140		160
Capacity control	-	25 ⇒ 100 % stepless					
Fans							
Number of fans	No	8		10		12	
Type	-	Axial - EC motor -					
Wheel nominal diameter	mm	900					
RPM	1/min	990					
Nominal power input (each fan)	kW	2.5					
Fans power input	kW	19.6		24.5		29.4	
Air flow rate	m^3/h	177136	169736	221420	212170	254604	
Evaporator							
Number of evaporators	No	1					
Type	-	Plate heat exchanger		Shell & tube			
Internal volume (each circuit, refrigerant side)	l	21	24	34	37	40	44
Condensing coil							
Material tubes / fins	-	Copper / aluminium					
Rows / fins space	no/mm	3 / 1,8					
Face area	m^2	17.3		21.6		25.9	
Internal volume (each circuit)	l	98		122		146	
Water connections							
Diameters inlet / outlet	DN-inch	DN100-4"-114,3		DN125-5"-139,7			
Unit volume	l	83	88	341	333	354	343
Dimensions							
Length	mm	5017		6013		7009	
Depth	mm	2260					
Height	mm	2570					
Weights							
Net weight	kg	4393	4434	5927	5955	6483	6511
Operating weight	kg	4476	4522	6268	6288	6837	6854

Notes:

(1) - Cooling capacity 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) - Cooling capacity 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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*

Technical Data

Tab. 4e – Technical Data – FB4 031–078

Model FB4		031.E	036	039	046.E	052	058.E	066	078
Performance (1)									
Cooling capacity	kW	318	348	396	447	506	578	644	762
Freecooling capacity	kW	202	206	212	273	280	341	348	421
Compressors power input	kW	91	106	128	128	152	166	197	242
Total power input	kW	105	121	143	148	171	191	221	271
Unit EER	-	3.02	2.89	2.78	3.03	2.85	3.03	2.91	2.81
Coolant fluid flow	m^3/h	60.8	66.7	76.1	85.6	96.9	110.7	123.2	146.0
Hydraulic pressure drop	kPa	117	125	148	111	125	123	159	158
Performance (2)									
Cooling capacity	kW	340	391	429	493	551	631	697	827
Freecooling capacity	kW	206	212	216	280	285	349	354	429
Compressors power input	kW	104	126	148	152	179	196	230	275
Total power input	kW	119	141	163	171	198	220	254	304
Unit EER	-	2.87	2.78	2.64	2.88	2.78	2.87	2.74	2.72
Coolant fluid flow	m^3/h	65.1	74.9	82.2	94.2	105.8	120.7	133.4	158.4
Hydraulic pressure drop	kPa	133	154	170	133	146	144	184	183
Sound level									
SPL (Sound Pressure Level) (3)	dB(A)		78.0		78.5		79.0		80.0
PWL (Sound Power Level) (4)	dB(A)		98.0		99.0		100.0		101.0
Refrigeration circuits									
Number of refrigeration circuits	No				2				
Refrigerant charge (each circuit)	kg	42	43	44	52	53	70		82
Compressors									
Number of compressors	No				2				
Type	-				Double screw with integrated oil separator				
Nominal power (each compressor)	HP	70	80	90		110	125	140	160
Capacity control	-				25 ⇒ 100 % stepless				
Fans									
Number of fans	No		6		8		10		12
Type	-				Axial - AC motor -				
Wheel nominal diameter	mm				900				
RPM	1/min				900				
Nominal power input (each fan)	kW				2.4				
Fans power input	kW		14.5		19.4		24.2		29.0
Air flow rate	m^3/h		109140		145520		181900		218280
Evaporator									
Number of evaporators	No				1				
Type	-		Plate heat exchanger				Shell & tube		
Internal volume (each circuit, refrigerant side)	l	18	21	24	28	34	40	44	51
Condensing coil									
Material tubes / fins	-				Copper / aluminium				
Rows / fins space	no/mm				3 / 1,8				
Face area	m^2		13.0		17.3		21.6		25.9
Internal volume (each circuit)	l		72		98		122		146
Freecooling coil									
Material tubes / fins	-				Copper / aluminium				
Rows / fins space	no/mm				3 / 2,5				
Face area	m^2		13.0		17.3		21.6		25.9
Hydraulic connections									
Diameters inlet / outlet	DN-inch		DN100-4"-114,3				DN125-5"-139,7		
Unit volume	l	227	234	239	326	339	583	596	713
Dimensions									
Length	mm		4021		5017		6013		7009
Depth	mm				2260				
Height	mm				2570				
Weights									
Net weight	kg	4095	4137	4177	5526	5607	6517	6558	7391
Operating weight	kg	4322	4371	4416	5852	5946	7100	7154	8104

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 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 (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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*
The technical data of the eligible freecooling models at the working conditions defined by ECA Scheme are shown at the end of section 4.

Technical Data

Tab. 4f – Technical Data – FL4 031–078

Model FL4		031.E	036	039.E	046	052.E	058	066	078
Performance (1)									
Cooling capacity	kW	312	342	413	439	528	569	658	746
Freecooling capacity	kW	191	194	256	257	316	320	387	394
Compressors power input	kW	93	109	119	132	147	170	191	249
Total power input	kW	103	120	133	146	165	188	213	270
Unit EER	-	3.02	2.86	3.10	3.00	3.20	3.02	3.09	2.76
Coolant fluid flow	m^3/h	59.8	65.6	79.1	84.1	101.0	108.9	126.0	143.1
Hydraulic pressure drop	kPa	114	121	140	108	126	119	168	153
Performance (2)									
Cooling capacity	kW	336	386	443	486	572	623	712	811
Freecooling capacity	kW	195	200	260	264	324	328	394	402
Compressors power input	kW	106	131	136	158	172	202	220	285
Total power input	kW	117	142	150	172	190	220	241	306
Unit EER	-	2.88	2.72	2.95	2.82	3.01	2.83	2.94	2.65
Coolant fluid flow	m^3/h	64.3	73.9	84.7	93.0	109.5	119.2	135.7	155.4
Hydraulic pressure drop	kPa	130	142	159	130	146	141	192	176
Sound level									
SPL (Sound Pressure Level) (3)	dB(A)	70.0		70.5		71.0		72.0	
PWL (Sound Power Level) (4)	dB(A)	90.0		91.0		92.0		93.0	
Refrigeration circuits									
Number of refrigeration circuits	No	2							
Refrigerant charge (each circuit)	kg	42	43	49	52	70		75	82
Compressors									
Number of compressors	No	2							
Type	-	Double screw with integrated oil separator							
Nominal power (each compressor)	HP	70	80	90		110	125	140	160
Capacity control	-	25 ⇒ 100 % stepless							
Fans									
Number of fans	No	6		8		10		12	
Type	-	Axial - AC motor -							
Wheel nominal diameter	mm	800							
RPM	1/min	900							
Nominal power input (each fan)	kW	1.8							
Fans power input	kW	10.7		14.2		17.8		21.4	
Air flow rate	m^3/h	97668		130244		162780		195336	
Evaporator									
Number of evaporators	No	1							
Type	-	Plate heat exchanger				Shell & tube			
Internal volume (each circuit, refrigerant side)	l	18	21	24	28	37	40	44	51
Condensing coil									
Material tubes / fins	-	Copper / aluminium							
Rows / fins space	no/mm	3 / 1,8							
Face area	m^2	13.0		17.3		21.6		25.9	
Internal volume (each circuit)	l	72		98		122		146	
Freecooling coil									
Material tubes / fins	-	Copper / aluminium							
Rows / fins space	no/mm	3 / 2,5							
Face area	m^2	13.0		17.3		21.6		25.9	
Hydraulic connections									
Diameters inlet / outlet	DN-inch	DN100-4"-114,3				DN125-5"-139,7			
Unit volume	l	227	234	288	326	592	584	674	711
Dimensions									
Length	mm	4021		5017		6013		7009	
Depth	mm	2260							
Height	mm	2570							
Weights									
Net weight	kg	4035	4076	4694	5416	6328	6357	7023	7181
Operating weight	kg	4262	4310	4982	5742	6920	6941	7697	7892

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 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 (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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*
The technical data of the eligible freecooling models at the working conditions defined by ECA Scheme are shown at the end of section 4.

Technical Data

Tab. 4g – Technical Data – FQ4 031–066

Model FQ4		031	036.E	039	046.E	052	058	066
Performance (1)								
Cooling capacity	kW	298	349	396	449	506	567	628
Freecooling capacity	kW	165	216	223	268	275	329	335
Compressors power input	kW	99	106	128	132	157	171	204
Total power input	kW	104	112	134	139	164	180	213
Unit EER	-	2.88	3.12	2.97	3.22	3.08	3.15	2.95
Coolant fluid flow	m^3/h	57.0	66.9	76.0	85.8	96.8	108.6	120.3
Hydraulic pressure drop	kPa	104	112	130	108	117	124	153
Performance (2)								
Cooling capacity	kW	324	392	428	498	554	622	684
Freecooling capacity	kW	169	223	227	276	281	336	342
Compressors power input	kW	116	126	147	158	186	203	241
Total power input	kW	120	132	153	165	193	212	250
Unit EER	-	2.69	2.97	2.80	3.01	2.87	2.94	2.74
Coolant fluid flow	m^3/h	62.1	75.1	82.0	95.1	106.0	119.1	130.9
Hydraulic pressure drop	kPa	122	137	150	131	138	146	179
Sound level								
SPL (Sound Pressure Level) (3)	dB(A)	65.0	65.5		66.0		67.0	
PWL (Sound Power Level) (4)	dB(A)	85.0	86.0		87.0		88.0	
Refrigeration circuits								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	43	48	49	70		75	
Compressors								
Number of compressors	No	2						
Type	-	Double screw with integrated oil separator						
Nominal power (each compressor)	HP	70	80	90	110		125	140
Capacity control	-	25 ⇒ 100 % stepless						
Fans								
Number of fans	No	6	8		10		12	
Type	-	Axial - EC motor -						
Wheel nominal diameter	mm	800						
RPM	1/min	700						
Nominal power input (each fan)	kW	0.7						
Fans power input	kW	4.4	5.8		7.3		8.8	
Air flow rate	m^3/h	76350	101800		127250		152700	
Evaporator								
Number of evaporators	No	1						
Type	-	Plate heat exchanger			Shell & tube			
Internal volume (each circuit, refrigerant side)	l	18	21	24	34	37	40	44
Condensing coil								
Material tubes / fins	-	Copper / aluminium						
Rows / fins space	no/mm	3 / 1,8						
Face area	m^2	13.0	17.3		21.6		25.9	
Internal volume (each circuit)	l	72	98		122		146	
Freecooling coil								
Material tubes / fins	-	Copper / aluminium						
Rows / fins space	no/mm	3 / 2,5						
Face area	m^2	13.0	17.3		21.6		25.9	
Hydraulic connections								
Diameters inlet / outlet	DN-inch	DN100-4"-114,3			DN125-5"-139,7			
Unit volume	l	227	283	288	602	594	655	674
Dimensions								
Length	mm	4021	5017		6013		7009	
Depth	mm	2260						
Height	mm	2570						
Weights								
Net weight	kg	4144	4763	4804	6410	6438	7073	7133
Operating weight	kg	4371	5046	5092	7012	7032	7728	7807

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 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 (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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*
The technical data of the eligible freecooling models at the working conditions defined by ECA Scheme are shown at the end of section 4.

Technical Data

Tab. 4h – Technical Data – FG4 036.E–066.E

Model FG4		036.E	039.E	046.E	052.E	058.E	066.E
Performance (1)							
Cooling capacity	kW	371	424	479	543	595	679
Freecooling capacity	kW	277	287	344	354	422	440
Compressors power input	kW	99	116	120	142	154	182
Total power input	kW	119	136	145	167	184	213
Unit EER	-	3.12	3.12	3.30	3.25	3.23	3.19
Coolant fluid flow	m^3/h	71.0	81.2	91.5	103.8	113.8	130.0
Hydraulic pressure drop	kPa	124	147	122	132	134	177
Performance (2)							
Cooling capacity	kW	411	452	520	584	642	726
Freecooling capacity	kW	287	293	355	363	432	448
Compressors power input	kW	114	131	139	162	178	208
Total power input	kW	134	151	164	187	208	238
Unit EER	-	3.07	2.99	3.17	3.12	3.08	3.05
Coolant fluid flow	m^3/h	78.6	86.5	99.5	111.6	122.7	138.8
Hydraulic pressure drop	kPa	149	165	143	151	154	200
Sound level							
SPL (Sound Pressure Level) (3)	dB(A)	79.5		80.0		81.0	
PWL (Sound Power Level) (4)	dB(A)	100.0		101.0		102.0	
Refrigeration circuits							
Number of refrigeration circuits	No	2					
Refrigerant charge (each circuit)	kg	48	49	70		75	
Compressors							
Number of compressors	No	2					
Type	-	Double screw with integrated oil separator					
Nominal power (each compressor)	HP	90	100	125	140		160
Capacity control	-	25 ⇒ 100 % stepless					
Fans							
Number of fans	No	8		10		12	
Type	-	Axial - EC motor -					
Wheel nominal diameter	mm	900					
RPM	1/min	990					
Nominal power input (each fan)	kW	2.5					
Fans power input	kW	20.1		25.1		30.1	
Air flow rate	m^3/h	160496		200620		240744	
Evaporator							
Number of evaporators	No	1					
Type	-	Plate heat exchanger		Shell & tube			
Internal volume (each circuit, refrigerant side)	l	21	24	34	37	40	44
Condensing coil							
Material tubes / fins	-	Copper / aluminium					
Rows / fins space	no/mm	3 / 1,8					
Face area	m^2	17.3		21.6		25.9	
Internal volume (each circuit)	l	98		122		146	
Freecooling coil							
Material tubes / fins	-	Copper / aluminium					
Rows / fins space	no/mm	3 / 2,5					
Face area	m^2	17.28		21.6		25.92	
Hydraulic connections							
Diameters inlet / outlet	DN-inch	DN100-4"-114,3		DN125-5"-139,7			
Unit volume	l	283	288	598	593	655	676
Dimensions							
Length	mm	5017		6013		7009	
Depth	mm	2260					
Height	mm	2570					
Weights							
Net weight	kg	4953	4994	6680	6708	7353	7413
Operating weight	kg	5236	5282	7278	7301	8008	8089

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 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 (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.

*The models indicated with the extension **.E** are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.*
The technical data of the eligible freecooling models at the working conditions defined by ECA Scheme are shown at the end of section 4.

Technical Data
(According to the operating conditions defined by ECA certification for free cooling units)

The following tables show the technical data of the free cooling models eligible for ECAs, at the conditions defined by the same regulation. These models are indicated with the extension .E, and are eligible for Enhanced Capital Allowances as defined by the ECA Scheme approved by the UK Government.

The ECA operating conditions for freecooling models are indicated in the notes below (1) and (2). The operating conditions defined by the ECA Scheme for the models without freecooling are the same used for the tables at the beginning of this section, so the eligible models without freecooling are not indicated in the following tables.

Tab. 4i – Technical Data (by ECA certification for Freecooling units)

Models: FG4 (Table of eligible models only)		**036.E**	**039.E**	**046.E**	**052.E**	**058.E**	**066.E**
Performance (1)							
Cooling capacity	kW	348	399	441	500	547	625
Freecooling capacity	kW	253	243	316	300	371	362
Compressors power input	kW	96	113	116	137	149	176
Total power input	kW	117	133	142	162	179	206
Unit EER	-	2.99	2.99	3.12	3.08	3.05	3.04
Coolant fluid flow	m^3/h	59.8	68.5	75.8	85.9	94	107.3
Hydraulic pressure drop	kPa	71	85	68	74	75	99
Performance (2)							
Cooling capacity	kW	389	428	485	544	596	674
Freecooling capacity	kW	246	240	311	296	366	358
Compressors power input	kW	111	128	136	157	172	201
Total power input	kW	131	148	161	183	203	232
Unit EER	-	2.96	2.89	3.01	2.98	2.94	2.91
Coolant fluid flow	m^3/h	66.8	73.6	83.2	93.4	102.4	115.6
Hydraulic pressure drop	kPa	87	97	80	86	87	113

Tab. 4j – Technical Data (by ECA certification for Freecooling units)

Models: FB4 (Table of eligible models only)		**031.E**	**046.E**	**058.E**
Performance (1)				
Cooling capacity	kW	298	419	534
Freecooling capacity	kW	163	217	270
Compressors power input	kW	88	124	160
Total power input	kW	103	144	184
Unit EER	-	2.90	2.92	2.91
Coolant fluid flow	m^3/h	51.2	72	91.8
Hydraulic pressure drop	kPa	66	65	69
Performance (2)				
Cooling capacity	kW	322	466	588
Freecooling capacity	kW	163	214	267
Compressors power input	kW	101	148	188
Total power input	kW	115	168	213
Unit EER	-	2.79	2.78	2.77
Coolant fluid flow	m^3/h	55.3	80	101
Hydraulic pressure drop	kPa	76	79	82

Notes:

(1) Cooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 35° C; coolant inlet/outlet temperature 12/7° C; water without glycol.
Freecooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 2° C; coolant outlet temperature 7° C; water without glycol; coolant fluid flow as indicated at (1) conditions.

(2) Cooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 35° C; coolant inlet/outlet temperature 12/7° C; water without glycol; economizer option.
Freecooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 2° C; coolant outlet temperature 7° C; water without glycol; coolant fluid flow as indicated at (2) conditions; economizer option.

Note: *For all other technical data see table Tab. 4h (for HPC-M FG4 models) and Tab. 4e (for HPC-M FB4 models).*

Technical Data

Tab. 4k – Technical Data (by ECA certification for Freecooling units)

Models: FL4 (Table of eligible models only)		**031.E**	**039.E**	**052.E**
Performance (1)				
Cooling capacity	kW	293	388	486
Freecooling capacity	kW	152	205	253
Compressors power input	kW	90	116	142
Total power input	kW	101	130	160
Unit EER	-	2.91	2.98	3.05
Coolant fluid flow	m^3/h	50.4	66.7	83.6
Hydraulic pressure drop	kPa	65	81	70
Performance (2)				
Cooling capacity	kW	318	419	533
Freecooling capacity	kW	150	203	253
Compressors power input	kW	104	133	166
Total power input	kW	114	147	183
Unit EER	-	2.78	2.85	2.91
Coolant fluid flow	m^3/h	54.6	72.1	91.6
Hydraulic pressure drop	kPa	75	94	83

Tab. 4l – Technical Data (by ECA certification for Freecooling units)

Models: FQ4 (Table of eligible models only)		**036.E**	**046.E**
Performance (1)			
Cooling capacity	kW	328	413
Freecooling capacity	kW	174	217
Compressors power input	kW	103	127
Total power input	kW	109	134
Unit EER	-	3.00	3.08
Coolant fluid flow	m^3/h	56.3	70.9
Hydraulic pressure drop	kPa	64	60
Performance (2)			
Cooling capacity	kW	372	462
Freecooling capacity	kW	170	214
Compressors power input	kW	123	152
Total power input	kW	128	160
Unit EER	-	2.89	2.90
Coolant fluid flow	m^3/h	63.8	79.4
Hydraulic pressure drop	kPa	80	74

Notes:

(3) Cooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 35° C; coolant inlet/outlet temperature 12/7° C; water without glycol.
Freecooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 2° C; coolant outlet temperature 7° C; water without glycol; coolant fluid flow as indicated at (1) conditions.

(4) Cooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 35° C; coolant inlet/outlet temperature 12/7° C; water without glycol; economizer option.
Freecooling capacity at the following conditions defined by ECA Scheme: power supply 400V/3Ph/50Hz; outdoor temperature 2° C; coolant outlet temperature 7° C; water without glycol; coolant fluid flow as indicated at (2) conditions; economizer option.

Note: *For all other technical data see table Tab. 4f (for HPC-M FL4 models) and Tab. 4g (for HPC-M FQ4 models).*

5 Mechanical Specifications

Construction and Panels

The **Liebert HPC – M** 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 mm gauge galvanised steel channels, polyester powder painted in RAL7032, interconnected using special rivets with elevated mechanical characteristics and the frame hidden inner parts are in galvanized steel.

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

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

In the **L**, **Q** and **G** versions, panels are lined with sound – proof material; compressors are mounted on anti – vibration mounts to prevent vibration transmission to the unit casing and **Q** and **G** versions compressor compartment is lined with 35mm thick, double layer, polyurethane sound – proof material embedded with double high density sound – proof diaphragms.

Refrigeration Circuit

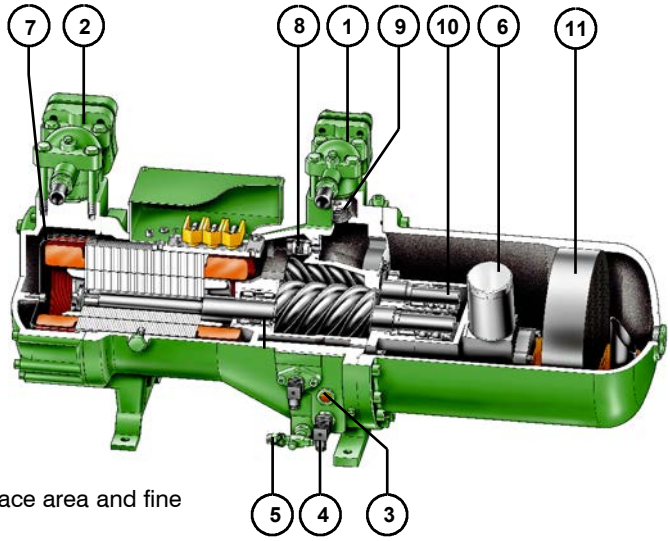
All models are equipped with two compressors configured in independent refrigeration circuits. Each circuit includes double safety pressure switch for high pressure, an electronic safety pressure switch for low pressure, an electronic expansion valve, a filter dryer with disposable anti – acid solid cartridge, a humidity indicator lamp, high and low pressure safety valves, charge connections and a manual on – off valve; circuit with economizer exchanger (optional), high and low pressure gauges and inlet and outlet flexible hoses (only in the ”Q” and “G” versions).

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

Mechanical Specifications

Compressor

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



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

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

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

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

The main screw (male, with 5 lobes) is driven directly by the motor and drives the secondary one (female, with 6 cavities). A check valve (9) 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 (10), 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 (11) is integrated in the execution.

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

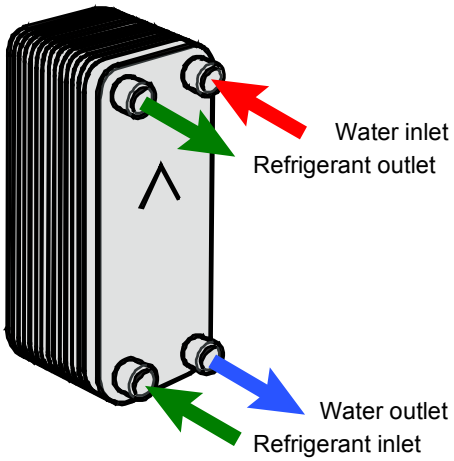
Electronic expansion valve

The electronic expansion valve used in the **Liebert HPC-M** range enables accurate and min. possible control of the super heating 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 final result of the application of the electronic expansion valve on **Liebert HPC-M** is therefore an improved energy operating costs and a higher reliability, thanks to its special adjustment features above all on partial loads, conditions under which every chiller operates for most of the time.

Mechanical Specifications

Evaporators



6-8 fans Liebert HPC-M units are equipped with direct expansion, weld-brazed plate type evaporators, designed, constructed, tested (pressure test on both refrigerant and water sides) and documented to comply with PED 97/23/EC standards.
The corrugation (typical angle) and the design of each plate have been thoroughly analyzed and thus optimized to better meet the physical features of the refrigerant (R134a) and provide for an optimal refrigerant distribution. This means really oustanding performances in the thermal energy transfer.
They incorporate two refrigerant circuits and one water circuit. The plate are fabricated from seamless carbon stainless steeel AISI 316, reciprocally welded with pure copper; plate not in contact with fluid are fabricated from seamless carbon stainless steeel AISI 304.
All exchangers are optimized for the refrigerant R134a and are complete with inner device (distributor) evenly distributing the refrigerant gas in each channel.
The exchanger are “true dual” type, therefore the primary fluid (water) is always cooled in each channel by at least one refrigerant circuit, even when one of the two circuits is off.
They are externally insulated against condensate with closed cell elastomer.
The evaporators are connected with lines equipped with drainage and vent connections.
The evaporators are protected against freezing by a paddle-type flow switch and a standard antifreeze sensor directly managed by the microprocessor.
As an option, thermostatically controlled heaters are applied to prevent freezing with outdoor temperatures below 0°C without primary flow.

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

Tab. 5a – Evaporator working limits

Design temperature	Design pressure		Test pressure	
Min. / Max.	Refrigerant	Water	Refrigerant	Water
-196 / +155 °C	23.0 bar	23.0 bar	30.0 bar	30.0 bar

10-12 fans Liebert HPC-M 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.
They incorporate two refrigeration circuits and one water circuit. The shell is fabricated from seamless carbon steel with internally finned copper tubes and tube sheets of heavy gauge carbon steel.
Baffles are of plastic material; heads are constructed of special cast iron, gaskets of an asbestos free compound and bolts of carbon steel. They are externally insulated with closed cell elastomer with high resistance to UV rays HT-type for outdoor installations.
The evaporators are equipped with drainage and vent connections.
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 is fitted inside the shell to prevent freezing with outdoor temperatures below 0ºC.

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

Tab. 5b – Evaporator working limits

Design temperature	Design pressure		Test pressure	
Min. / Max.	Refrigerant	Water	Refrigerant	Water
-10 / +80 °C	24.5 bar	10.5 bar	27.0 bar	11.5 bar

Mechanical Specifications

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 mechanically expanded in order to have the best contact with fins; the tubes are grooved type to increase the thermal exchange. The Aluminium fins are manufactured with a special high efficiency louvered surface that increases the thermal exchange.
The condenser coils are tested at a pressure of 30bar.

Hydraulic Circuit

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

Hydraulic Kit (Option)

Il comprises an expansion vessel (charged at 1.5 bar, max. operating pressure 10.0 bar) and a safety valve set at 6.0 bar. Their installation positions are indicated in the hydraulic circuit schematic.

Expansion vessel volumes: 12 lt

Such kit is always supplied together with the pump option.

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.

Freecooling execution

Liebert HPC–M 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;
- calibrated orifice plate installed in the by-pass of the freecooling coils to maintain the circuit pressure drop when the position of the three-way valve changes to by-pass - This is in order to prevent big variations of the water flow to the evaporator (this component is not fitted in case inverter pump option is selected).

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.

Inertial Tank (Accessory)

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

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

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

Mechanical Specifications

Built in carbon steel and coated with anti – condensate insulation with PVC film proper for outdoor installation.
It is installed inside a cabinet that have punched holes on its vertical beams enabling its installation in line with hydraulic pipings of chillers HPC – M in different configurations.

As option the buffer tank is supplied with water electrical heater complete with electric panel, thermostat and temperature sensor.

Technical Data:

- Internal volume: 1185 litres
- Net weight: 430 kg
- Working weight: 1615 kg

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 at factory or at the installation site thanks to a simple control display fitted in the electrical panel; 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.

Mechanical Specifications

Fan Section

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

The characteristics of the motor depend on the unit version:

"G" : . . . . . 6 – pole motor, propeller diameter 910 mm, 900 rpm;

"B" : . . . . . 6 – pole motor, propeller diameter 910 mm, 900 rpm;

"L" : . . . . . 6 – pole motor, propeller diameter 800 mm, 900 rpm;

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

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

EC fans

In all versions, as alternative to the standard modulating adjustment (TRIAC), it is possible to choose fans with electronic switching motor, with the same aeraulic performance as those installed in the selected unit, as well as the possibility of a fan modulating adjustment entirely managed by the 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 inrush current 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). It is divided into two sections (power and control) with an accessible door to the control display section (without door interlock) in order to allow maintenance, checking, adjustment operation without switching off the unit.
The panel has a degree of protection equivalent to IP54.
The temperature inside the electric board is managed with the forced ventilation controlled by the microprocessor board. 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, 400V ±10% / 3Ph + PE / 50Hz;
- auxiliary power supply circuit, 230V / 1Ph / 50Hz and 24V / 1Ph / 50Hz;
- main switch;
- main switch for auxiliary circuit and fast start feature (optional);
- energy meter (optional);
- fuses, thermal relays and contactor to protect/activate the compressors (partwinding or star/delta);
- timing for star/delta or partwindig managed by the microprocessor;

- MCBs and contactors to protect/activate the pumps (optional);
- MCBs for fans with modulating speed control (triac or EC-Fan);
- relay for checking phase sequence, minimum voltage, loss one or more phase ;
- manual operation through iCOM controller;
- PFC (Power Factor Correction) for compressor between cos φ 0,95 – 0,93 (optional);
- volt-free contacts to remote indication of:
  - compressors in operation;
  - pump(s) in operation;
  - general alarm;
  - warning alarm;
  - compressor alarm 1/2;
  - high temperature inlet/outlet water alarm;
  - water flow alarm;
  - compressor contactors melted;
  - condenser fan failure 1/2;
  - configurable free contact;
  - external input for remote ON/OFF.

Packing

Units are shipped with plastic film protection.

Warranty Clauses

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

Final Tests and Reference Standards

The units are designed, manufactured and tested in compliance with the European directives 2006/42/EC; 2004/108/EC; 2006/95/EC and 97/23/EC. The Quality management system of the HPAC division is approved by LRQA in conformity with the norms ISO 9001:2008 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 – M** 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 and freecooling models one pump is operating and one is in stand-by.

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 (Versions: B, L, Q, G)

Versions	Model	Pump rotor model	Nominal motor power (kW)	Noise level (*) [dB(A)]	Each pump weight (kg)
B – L – Q	**031**	65–125/120–110	4	63	82
B – L – Q – G	**036**	65–125/120–110	4	63	82
B – L – Q – G	**039**	65–125/120–110	4	63	82
B – L – Q – G	**046**	65–125/127	5.5	62	94
B – L – Q – G	**052**	65–125/127	5.5	62	94
B – L – Q – G	**058**	65–125/127	5.5	62	94
B – L – Q – G	**066**	65–125/137	7.5	60	108
B – L	**078**	80–160/147	11	60	178

(*) – According to ISO 3744

Tab. 5d - High head pressure - Chiller (Versions: B, L, Q, G)

Versions	Model	Pump rotor model	Nominal motor power (kW)	Noise level (*) [dB(A)]	Each pump weight (kg)
B – L – Q	**031**	65–125/127	5.5	62	94
B – L – Q – G	**036**	65–125/127	5.5	62	94
B – L – Q – G	**039**	65–125/127	5.5	62	94
B – L – Q – G	**046**	65–125/137	7.5	60	108
B – L – Q – G	**052**	65–125/137	7.5	60	108
B – L – Q – G	**058**	65–125/137	7.5	60	108
B – L – Q – G	**066**	65–125/144	11	60	172
B – L	**078**	80–160/151	15	60	192

(*) – According to ISO 3744

Mechanical Specifications

Tab. 5e - Standard head pressure - Freecooling (Versions: B, L, Q, G)

Versions	Model	Pump rotor model	Nominal motor power (kW)	Noise level (*) [dB(A)]	Each pump weight (kg)
B – L – Q	**031**	65–125/137	7.5	60	108
B – L – Q – G	**036**	65–125/144	11	60	172
B – L – Q – G	**039**	65–125/144	11	60	172
B – L – Q – G	**046**	65–125/144	11	60	172
B – L – Q – G	**052**	65–125/144	11	60	172
B – L – Q – G	**058**	65–160/157	11	60	170
B – L – Q – G	**066**	65–160/173	15	60	184
B – L	**078**	80–160/167	22	65.5	221

(*) – According to ISO 3744

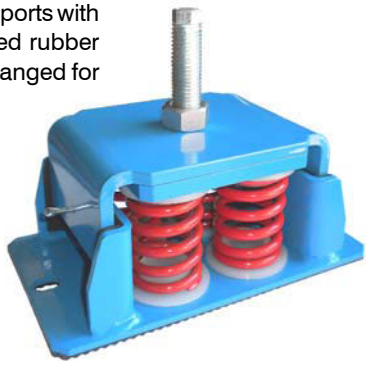
Tab. 5f - High head pressure - Freecooling (Versions: B, L, Q, G)

Versions	Model	Pump rotor model	Nominal motor power (kW)	Noise level (*) [dB(A)]	Each pump weight (kg)
B – L – Q	**031**	65–125/144	11	60	172
B – L – Q – G	**036**	65–160/157	11	60	170
B – L – Q – G	**039**	65–160/157	11	60	170
B – L – Q – G	**046**	65–160/157	11	60	170
B – L – Q – G	**052**	65–160/157	11	60	170
B – L – Q – G	**058**	65–160/173	15	60	184
B – L – Q – G	**066**	65–160/177	18.5	60.5	197
B – L	**078**	80–160/177	30 (**)	71	277

(*) – According to ISO 3744
(**) – Inverter version not available

Mechanical Specifications

Anti–Vibration mounts



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

Spring vibration–damping support made of:

- Base plate in carbon steel; sand–blasted and cataphoresis protected; epoxy powder coated; with welded stiffeners and slots for screwing it on the ground.
- Cover in carbon steel; sand–blasted and cataphoresis protected; epoxy powder coated; with M16 hole.
- Intermediate plate, to equalize the springs loads: sand–blasted and cataphoresis protected; epoxy powder coated.
- Plastic spring locking rings and guiding profiles to guarantee the insulation from the vibrations.
- Hexhagonal head screw and hexagonal nut M16, zinc plated, used to level the unit after positioning.
- Spring steel helicoidal springs (UNI EN 10270–1 SH), cataphoresis protected.
- A pad with antislip reliefs stabilizes the damper position by friction.

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

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

Other accessories

The following accessories can be installed as options:

- Coil–protecting mechanical filters (recommended to aid the coil maintenance–cleaning).
- Pump/evaporator heaters and lines needed to avoid the frost risk on such components.
- Compressor power factor capacitors: they enable to get a Cosfì value equal to about 0.94 on the compressors, in rated operating conditions.
- Certified lifting bars.
- Cold Fire Display.
- Top extension for Electrical Panel.

6 Controls

Microprocessor Controls

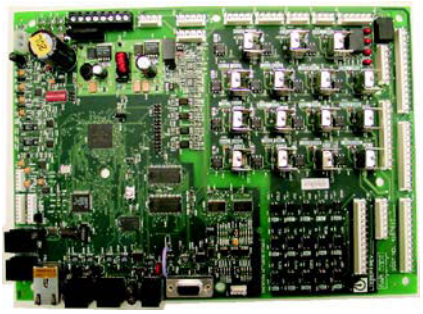
iCOM Control

Liebert HPC–M models are controlled by **iCOM Large** (Fig. 6).

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

iCOM

Fig. 6



- The standard software of the **Liebert HPC–M** Units includes special control algorithms that ensure real energy savings and enhance the reliability of the full system.
- Immediate set–up can be available through the "Unit Code" system. In case of re–configuration needs, the full configuration of the unit and recalculation of all the thresholds levels (which depend on the refrigerant type) are available by simply enabling the configuration Unit Code.
- Sequential auto–restart timer allows phased units restart after power failure.
- Pumps' durability is granted by a special auto–rotation start–up function.
- The record of the working hours of compressors, pumps and freecooling is easily available via the CDL iCOM display.
- Auto–selection of the best control strategy at different ambient temperatures is implemented in order to assure an optimised usage of the compressors and condensers fans.
- The "Ambient compensation" function can be enabled to make the unit set–point rise automatically during warm periods, permitting energy savings.
- For low noise versions with fan speed control there is a special algorithm which, together with the compressor management, keeps the fan speed on the lowest possible value.
- Compressors' Run/Stop time management is implemented in order to obtain the optimisation of compressors' operations either within the unit, or, in case of networking Ethernet, within the whole of the **Liebert HPC–M** 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. The information on the cooling needs of the air conditioners is available to the **Liebert HPC–M** units, that will manage its resources (compressors and freecooling) in the most efficient way in order to save additional energy.
- When used with Controls electronic expansion valves board, the **Liebert HPC–M** provides the control of the superheat in the evaporator. In order to perform this control task, it requires the suction pressure and the suction gas temperature value. These signals can be received through two analogue inputs.
- All settings are protected through a 3–Level Password system.
- Input for Remote on–off and Volt–free contacts for simple remote monitoring of alarms and warnings are available.
- Up to 16 **Liebert HPC–M** units can be easily linked together on a network to provide teamwork mode, stand–by operation and duty cycling without additional hardware. Reliability is not affected if there are problems on the data communication buses, because the units return automatically to the stand–alone mode.

Controls

iCOM Technical Data

Technical Data	iCOM Large
E2prom	4 Mbit + 512 kbit
Flash memory	32 Mbit
RAM memory	128 Mbit
Microcontroller	Coldfire 32 Mbit
Analogue Input	4 x 0–10V, 0–5V, 4..20mA (selectable) + 2 PTC/NTC + 2 NTC
Digital Input	15 x opto–coupled
Analogue Output	4 x 0–10V
Digital Output	15 triacs output and 2 relay output
Time and date	Buffered by an LI–battery
Hirobus Lan connectors	2 RJ45 sockets (for unit in LAN, remote display)
Ethernet network connectors	1 RJ45 socket
CAN bus connectors	2 RJ12 sockets
Hironet connectors	1 RJ10 socket for RS485 (direct connection to proprietary supervision)
RS232 service port	1 db9 socket

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

The CDL graphic display featuring a 24h/8 days graphic record of controlled parameters as well as the last 200 events occurred.
A back–up battery keeps the data stored in the memory (graphic data record, alarms).

- Large graphic display (320 x 240 pixel).
- System Window: system operation status at a glance.
- Self–explanatory Icons: they are used for the Menu–Layout of the CDL iCOM.
- Online Help: every single parameter has its own multi–page explanation.
- Status Report of the latest 400 event/messages of the unit/system.
- Four different Graphic Data Records.
- Timer and Date mode (electronic timer included in the software).
- Semi or full manual mode software management including all safety devices.
- 4–Level passwords system to protect all the settings.
- Ergonomic design for use also as portable device (start–up and ”flying connections” by service personnel).
- Multi–language menu with on–the–fly language selection.

CDL Technical Data

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

Liebert HPC–M Connectivity

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

Hirovisor IP software

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

BMSs connections

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

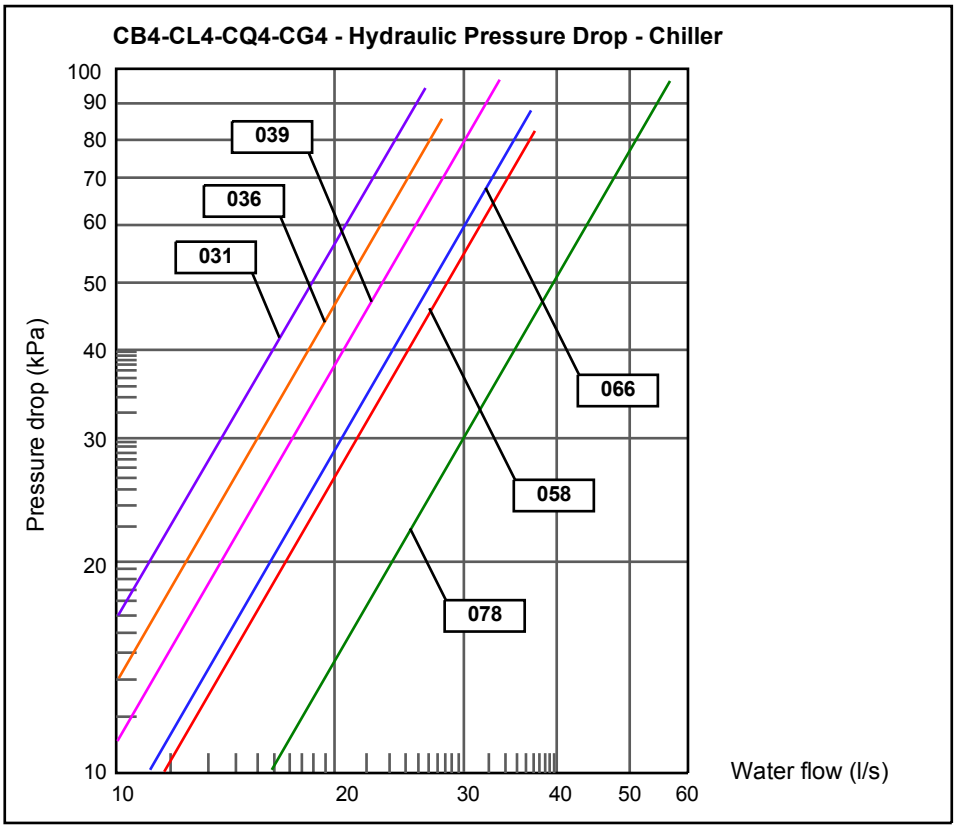
Alarm Board (accessory)

The Alarm Board converts Alarms (high priority) or Warnings (lower priority) from iCOM into Volt–free contacts (up to five, either normally open).
In this way, following Warnings/Alarms are separated: High or Low refrigerant pressure; High water Temperature; Low water Temperature; Pump failure, Compressor failures etc.

7 Hydraulic Features and Performance Adjustment Factors

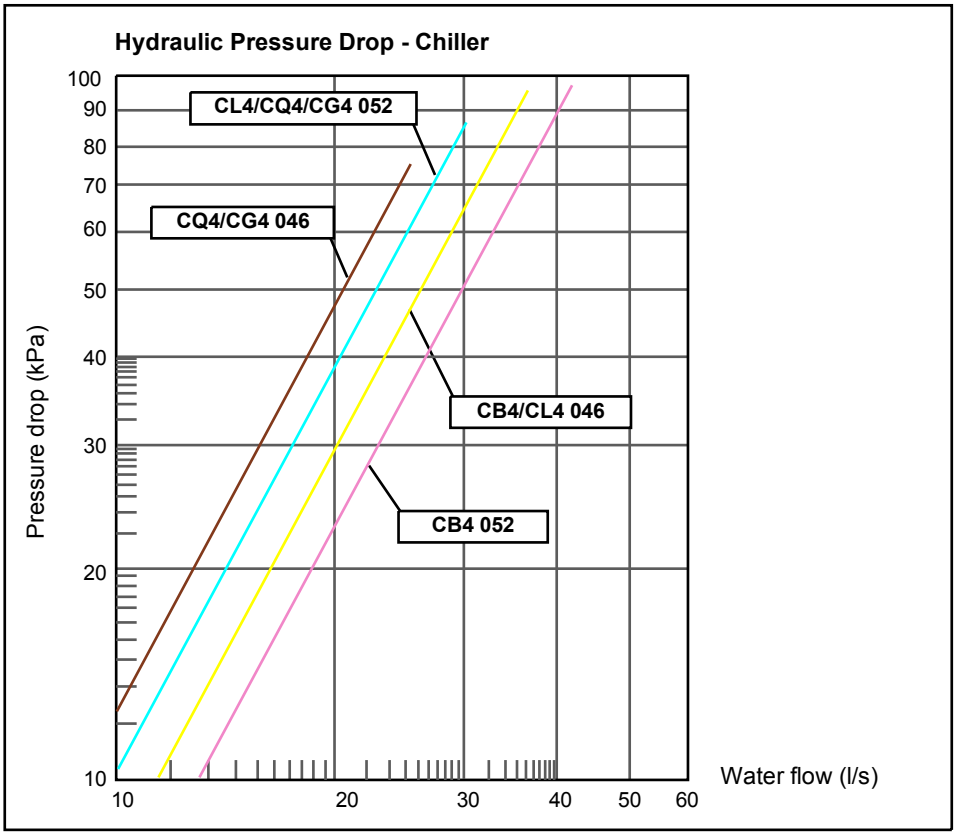
Hydraulic Features

Hydraulic Pressure Drop



Models

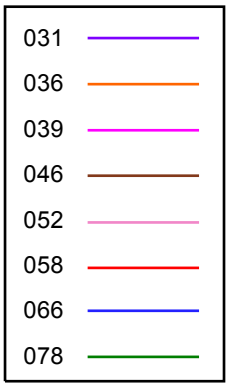
- 031
- 036
- 039
- 058
- 066
- 078

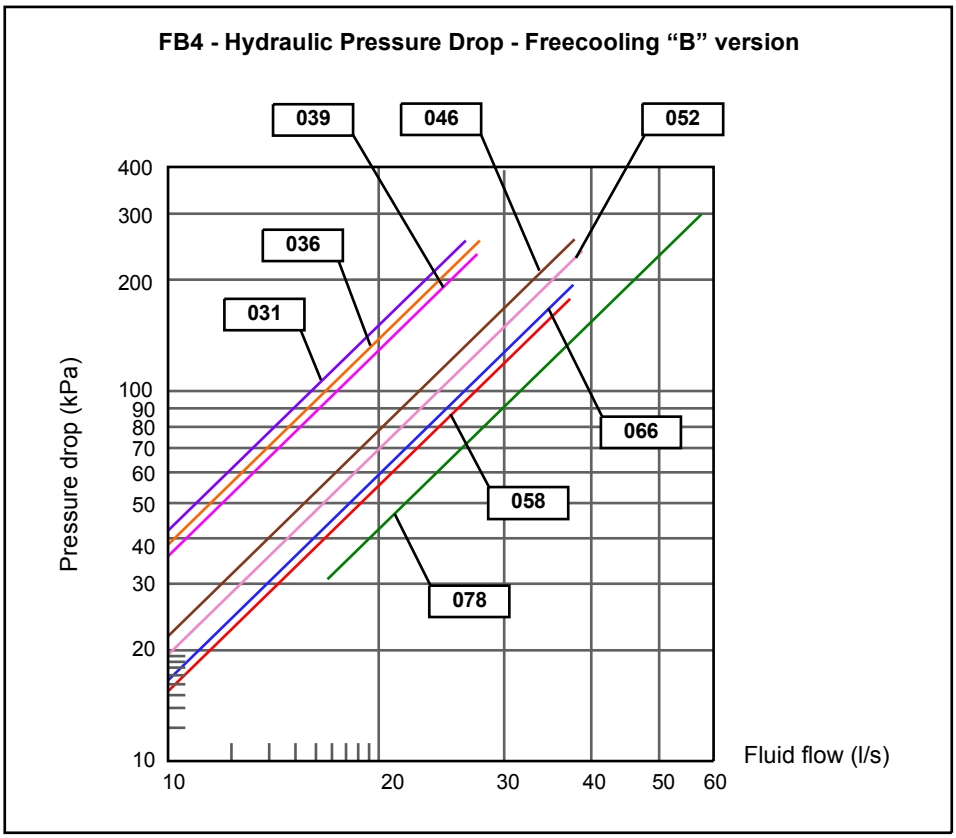


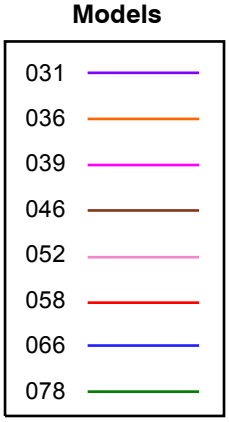
Models

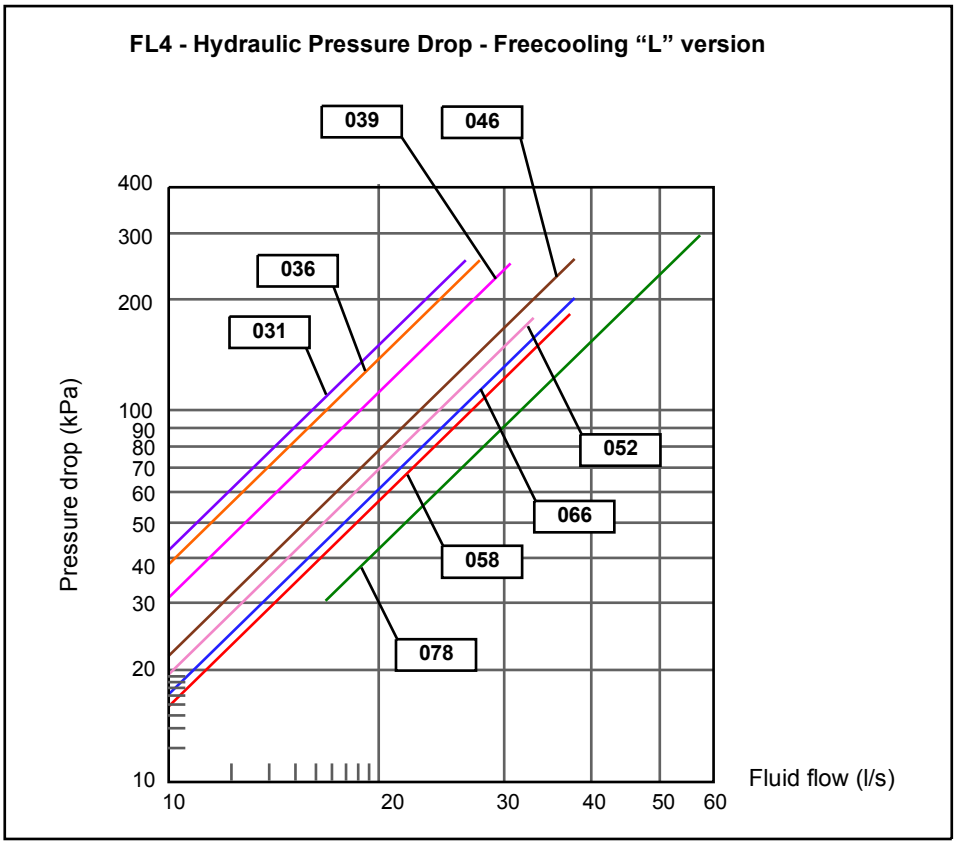
- CQ4/CG4 046
- CB4/CL4 046
- CL4/CQ4/CG4 052
- CB4 052

Hydraulic Features and Performance Adjustment Factors

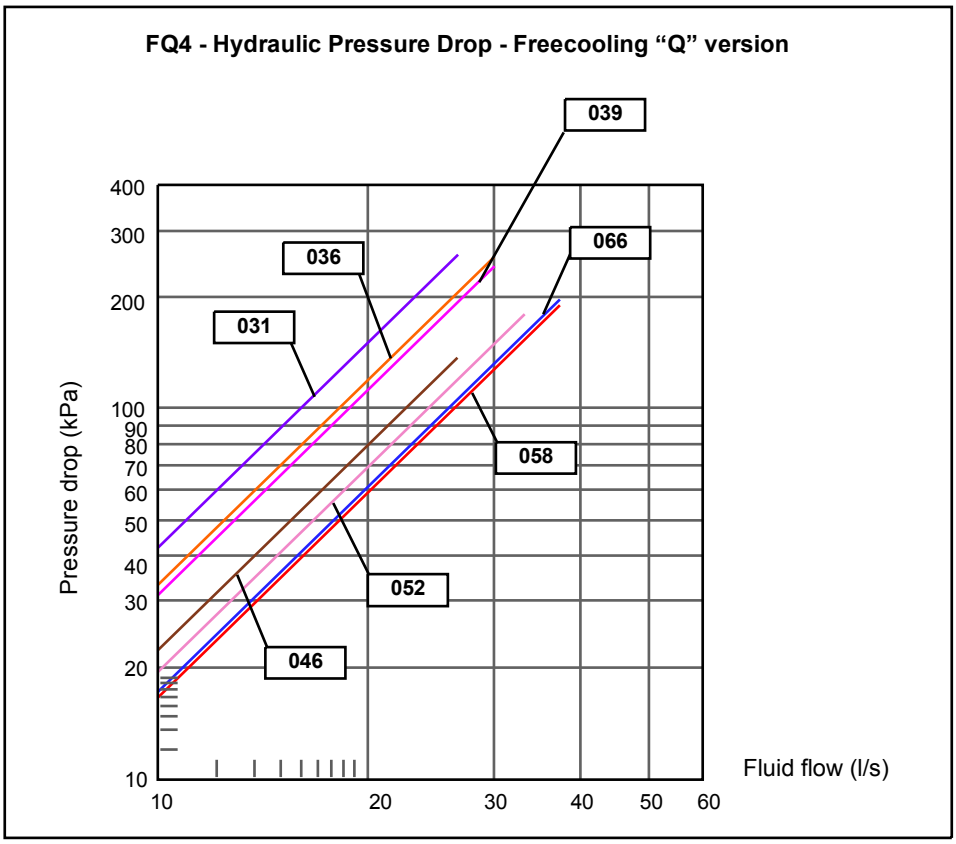


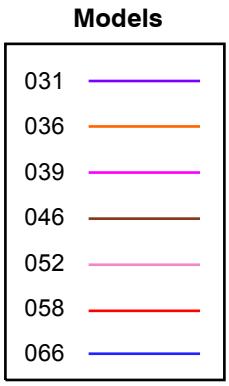


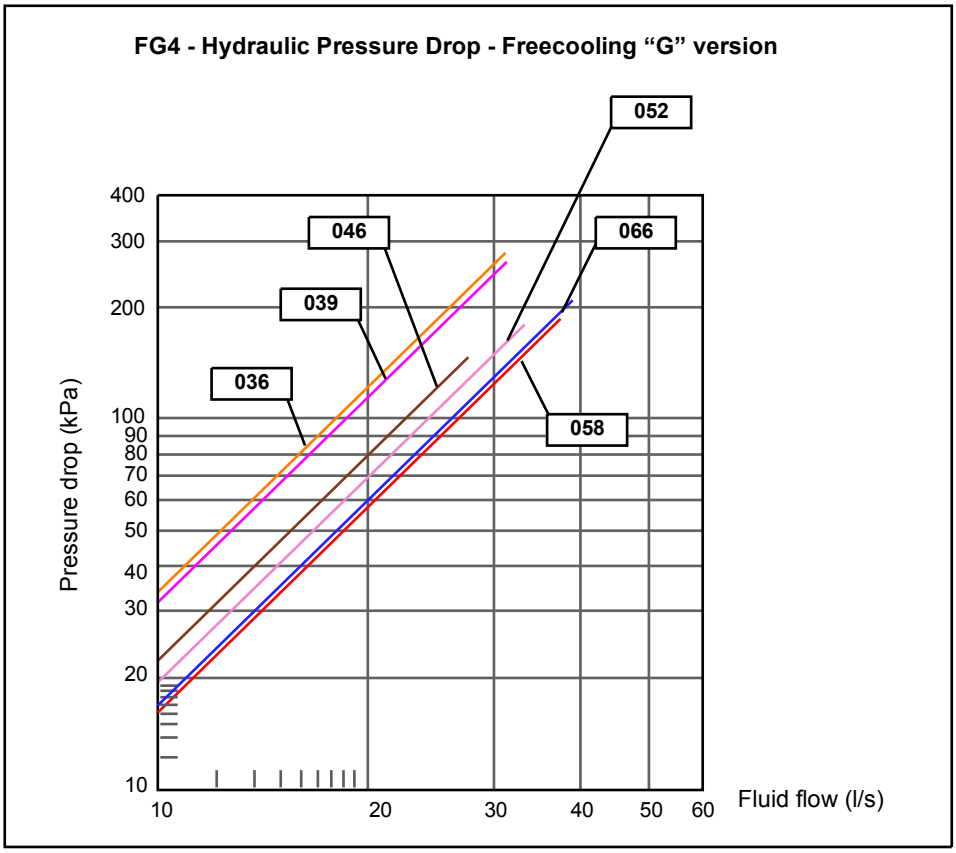


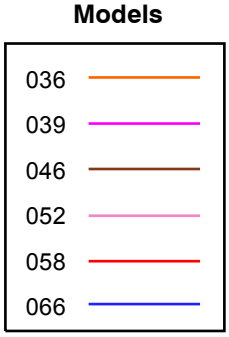


Hydraulic Features and Performance Adjustment Factors









Correction Factors

Glycol mixture correction factors

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

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

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

Tab. 7a – Chiller table

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

Tab. 7b – Freecooling table

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

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

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

Fouling correction factors

Tab. 7c – Fouling correction factors

Fouling factors [10^{-4} m^2 °C/W]	Correction factors	
	F1a refrigeration capacity correction factor	F2a compressor power input correction factor
0	1,015	1,005
0,43	1	1
0,88	0,985	0,995
1,76	0,960	0,985
3,52	0,915	0,965

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

Sea level correction factors

Tab. 7d – Sea level correction factors

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

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

8 Sound Levels

Sound Pressure and Power Levels

SPL

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

PWL

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

Tab. 8a – SPL CB4 – FB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CB4031.E – FB4031.E	70.0	79.0	79.0	78.0	71.0	67.0	59.0	50.0	78.0
CB4036.E – FB4036	70.0	79.0	79.0	78.0	71.0	67.0	59.0	50.0	78.0
CB4039.E – FB4039	70.0	79.0	79.0	78.0	71.0	67.0	59.0	50.0	78.0
CB4046.E – FB4046.E	71.0	80.0	80.0	78.0	72.0	67.0	60.0	50.0	78.5
CB4052.E – FB4052	71.0	80.0	80.0	78.0	72.0	67.0	60.0	50.0	78.5
CB4058.E – FB4058.E	72.0	80.0	81.0	78.0	73.0	68.0	60.0	51.0	79.0
CB4066.E – FB4066	72.0	80.0	81.0	78.0	73.0	68.0	60.0	51.0	79.0
CB4078.E – FB4078	72.0	81.0	82.0	79.0	74.0	69.0	61.0	51.0	80.0

Tab. 8b – PWL CB4 – FB4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CB4031.E – FB4031.E	90.0	99.0	99.0	98.0	91.0	87.0	79.0	70.0	98.0
CB4036.E – FB4036	90.0	99.0	99.0	98.0	91.0	87.0	79.0	70.0	98.0
CB4039.E – FB4039	90.0	99.0	99.0	98.0	91.0	87.0	79.0	70.0	98.0
CB4046.E – FB4046.E	91.5	100.5	100.5	98.5	92.5	87.5	80.5	70.5	99.0
CB4052.E – FB4052	91.5	100.5	100.5	98.5	92.5	87.5	80.5	70.5	99.0
CB4058.E – FB4058.E	93.0	101.0	102.0	99.0	94.0	89.0	81.0	72.0	100.0
CB4066.E – FB4066	93.0	101.0	102.0	99.0	94.0	89.0	81.0	72.0	100.0
CB4078.E – FB4078	93.0	102.0	103.0	100.0	95.0	90.0	82.0	72.0	101.0

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

Sound Levels

Tab. 8c – SPL CL4 – FL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CL4031.E – FL4031.E	68.0	72.0	72.0	69.0	64.0	58.0	51.0	47.0	70.0
CL4036.E – FL4036	68.0	72.0	72.0	69.0	64.0	58.0	51.0	47.0	70.0
CL4039.E – FL4039.E	68.0	72.0	73.0	69.0	65.0	58.0	51.0	47.0	70.5
CL4046.E – FL4046	68.0	72.0	73.0	69.0	65.0	58.0	51.0	47.0	70.5
CL4052.E – FL4052.E	69.0	73.0	73.0	69.0	66.0	60.0	52.0	48.0	71.0
CL4058.E – FL4058	69.0	73.0	73.0	69.0	66.0	60.0	52.0	48.0	71.0
CL4066.E – FL4066	69.0	74.0	74.0	70.0	67.0	61.0	53.0	48.0	72.0
CL4078.E – FL4078	69.0	74.0	74.0	70.0	67.0	61.0	53.0	48.0	72.0

Tab. 8d – PWL CL4 – FL4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CL4031.E – FL4031.E	88.0	92.0	92.0	89.0	84.0	78.0	71.0	67.0	90.0
CL4036.E – FL4036	88.0	92.0	92.0	89.0	84.0	78.0	71.0	67.0	90.0
CL4039.E – FL4039.E	88.5	92.5	93.5	89.5	85.5	78.5	71.5	67.5	91.0
CL4046.E – FL4046	88.5	92.5	93.5	89.5	85.5	78.5	71.5	67.5	91.0
CL4052.E – FL4052.E	90.0	94.0	94.0	90.0	87.0	81.0	73.0	69.0	92.0
CL4058.E – FL4058	90.0	94.0	94.0	90.0	87.0	81.0	73.0	69.0	92.0
CL4066.E – FL4066	90.0	95.0	95.0	91.0	88.0	82.0	74.0	69.0	93.0
CL4078.E – FL4078	90.0	95.0	95.0	91.0	88.0	82.0	74.0	69.0	93.0

Tab. 8e – SPL CQ4 – FQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CQ4031.E – FQ4031	67.0	67.0	65.0	64.0	60.0	54.0	47.0	42.0	65.0
CQ4036.E – FQ4036.E	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
CQ4039.E – FQ4039	67.0	68.0	65.0	65.0	60.0	54.0	47.0	42.0	65.5
CQ4046.E – FQ4046.E	67.0	68.0	66.0	65.0	61.0	55.0	47.0	43.0	66.0
CQ4052.E – FQ4052	67.0	68.0	66.0	65.0	61.0	55.0	47.0	43.0	66.0
CQ4058.E – FQ4058	67.0	69.0	67.0	66.0	62.0	56.0	48.0	44.0	67.0
CQ4066.E – FQ4066	67.0	69.0	67.0	66.0	62.0	56.0	48.0	44.0	67.0

Tab. 8f – PWL CQ4 – FQ4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CQ4031.E – FQ4031	87.0	87.0	85.0	84.0	80.0	74.0	67.0	62.0	85.0
CQ4036.E – FQ4036.E	87.5	88.5	85.5	85.5	80.5	74.5	67.5	62.5	86.0
CQ4039.E – FQ4039	87.5	88.5	85.5	85.5	80.5	74.5	67.5	62.5	86.0
CQ4046.E – FQ4046.E	88.0	89.0	87.0	86.0	82.0	76.0	68.0	64.0	87.0
CQ4052.E – FQ4052	88.0	89.0	87.0	86.0	82.0	76.0	68.0	64.0	87.0
CQ4058.E – FQ4058	88.0	90.0	88.0	87.0	83.0	77.0	69.0	65.0	88.0
CQ4066.E – FQ4066	88.0	90.0	88.0	87.0	83.0	77.0	69.0	65.0	88.0

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

Sound Levels

Tab. 8g – SPL CG4 – FG4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CG4036.E – FG4036.E	72.0	76.0	77.0	77.0	74.0	73.0	67.0	52.0	79.5
CG4039.E – FG4039.E	72.0	76.0	77.0	77.0	74.0	73.0	67.0	52.0	79.5
CG4046.E – FG4046.E	72.0	76.0	78.0	77.0	75.0	73.0	68.0	53.0	80.0
CG4052.E – FG4052.E	72.0	76.0	78.0	77.0	75.0	73.0	68.0	53.0	80.0
CG4058.E – FG4058.E	73.0	77.0	79.0	78.0	76.0	74.0	69.0	54.0	81.0
CG4066.E – FG4066.E	73.0	77.0	79.0	78.0	76.0	74.0	69.0	54.0	81.0

Tab. 8h – PWL CG4 – FG4

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CG4036.E – FG4036.E	92.5	96.5	97.5	97.5	94.5	93.5	87.5	72.5	100.0
CG4039.E – FG4039.E	92.5	96.5	97.5	97.5	94.5	93.5	87.5	72.5	100.0
CG4046.E – FG4046.E	93.0	97.0	99.0	98.0	96.0	94.0	89.0	74.0	101.0
CG4052.E – FG4052.E	93.0	97.0	99.0	98.0	96.0	94.0	89.0	74.0	101.0
CG4058.E – FG4058.E	94.0	98.0	100.0	99.0	97.0	95.0	90.0	75.0	102.0
CG4066.E – FG4066.E	94.0	98.0	100.0	99.0	97.0	95.0	90.0	75.0	102.0

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

The unit sound level in the versions "B"and "L" is lowered by 3 dB(A) in standard operating conditions with outlet water 7° C and outdoor air lower than 30° C by suitable measures, such as:

- better sound insulation of the compressors compartment (only for "B" version);
- automatic fan speed reduction with special control set (for "B"and "L" versions).

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

9 Electrical Data

Tab. 9a – Electrical data – CB4 031.E–078.E

Models CB4		031.E	036.E	039.E	046.E	052.E	058.E	066.E	078.E
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz							
OA (1)	A	180	204	223	239	279	319	358	407
FLA	A	279	319	355	351	405	443	479	581
LRA (Compressor part winding start)	A	445	525	616	635	743	859	930	–
LRA (Special compressor star delta start)	A	318	367	422	436	523	607	686	695
Compressors – Power input (1)	kW	87	101	117	122	140	156	181	222
Compressors – Nominal current (1)	A	150	172	192	198	238	268	306	346
Single compressor – Max. current	A	124	144	162	155	182	196	214	260
Fans number	N.	6	6	6	8	8	10	10	12
AC fans – Power input	kW	2,4							
AC fans – Nominal current	A	5,1							
AC fans – Max. current	A	5,3							
EC fans – Power input (EC option)	kW	1,8							
EC fans – Nominal current (EC option)	A	2,9							
Std. head pressure pump model (Option)	–	65–125/120–110			65–125/127			65–125/137	80–160/147
Std. head pressure pump – Motor power	kW	4,0	4,0	4,0	5,5	5,5	5,5	7,5	11,0
Std. head pressure pump – Max. current	A	8,0	8,0	8,0	11,2	11,2	11,2	15,2	21,4
High head pressure pump model (Option)	–	65–125/127			65–125/137			65–125/144	80–160/151
High head pressure pump – Motor power	kW	5,5	5,5	5,5	7,5	7,5	7,5	11,0	15,0
High head pressure pump – Max. current	A	11,2	11,2	11,2	15,2	15,2	15,2	19,4	28,0

(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) equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Tab. 9b – Electrical data – CL4 031.E–078.E

Models CL4		031.E	036.E	039.E	046.E	052.E	058.E	066.E	078.E
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz							
OA (1)	A	174	195	218	228	273	305	342	400
FLA	A	270	310	354	340	401	429	472	564
LRA (Compressor part winding start)	A	436	516	615	624	739	845	923	–
LRA (Special compressor star delta start)	A	309	358	421	425	519	593	679	678
Compressors – Power input (1)	kW	89	101	114	122	139	157	175	228
Compressors – Nominal current (1)	A	152	174	188	198	236	268	298	356
Single compressor – Max. current	A	124	144	162	155	182	196	214	260
Fans number	N.	6	6	8	8	10	10	12	12
AC fans – Power input	kW	1,7							
AC fans – Nominal current	A	3,7							
AC fans – Max. current	A	4,1							
EC fans – Power input (EC option)	kW	1,4							
EC fans – Nominal current (EC option)	A	2,0							
Std. head pressure pump model (Option)	–	65–125/120–110			65–125/127			65–125/137	80–160/147
Std. head pressure pump – Motor power	kW	4,0	4,0	4,0	5,5	5,5	5,5	7,5	11,0
Std. head pressure pump – Max. current	A	8,0	8,0	8,0	11,2	11,2	11,2	15,2	21,4
High head pressure pump model (Option)	–	65–125/127			65–125/137			65–125/144	80–160/151
High head pressure pump – Motor power	kW	5,5	5,5	5,5	7,5	7,5	7,5	11,0	15,0
High head pressure pump – Max. current	A	11,2	11,2	11,2	15,2	15,2	15,2	19,4	28,0

(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) equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Electrical Data

Tab. 9c – Electrical data – CQ4 031.E–066.E

Models CQ4		031.E	036.E	039.E	046.E	052.E	058.E	066.E
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz						
OA (1)	A	163	180	201	211	254	281	327
FLA	A	254	296	332	320	374	404	440
LRA (Compressor part winding start)	A	420	502	593	604	712	820	891
LRA (Special compressor star delta start)	A	293	344	399	405	492	568	630
Compressors – Power input (1)	kW	92	101	118	124	145	158	187
Compressors – Nominal current (1)	A	158	172	194	202	244	270	316
Single compressor – Max. current	A	124	144	162	155	182	196	214
Fans number	N.	6	8	8	10	10	12	12
AC fans – Power input (AC option)	kW	1,1						
AC fans – Nominal current (AC option)	A	2,1						
AC fans – Max. Current (AC option)	A	2,3						
EC fans – Power input	kW	0,7						
EC fans – Nominal current	A	1,0						
Std. head pressure pump model (Option)	–	65–125/120–110			65–125/127			65–125/137
Std. head pressure pump – Motor power	kW	4,0	4,0	4,0	5,5	5,5	5,5	7,5
Std. head pressure pump – Max. current	A	8,0	8,0	8,0	11,2	11,2	11,2	15,2
High head pressure pump model (Option)	–	65–125/127			65–125/137			65–125/144
High head pressure pump – Motor power	kW	5,5	5,5	5,5	7,5	7,5	7,5	11,0
High head pressure pump – Max. current	A	11,2	11,2	11,2	15,2	15,2	15,2	19,4

(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) equivalent to standard fans; such operating conditions are determined by the factory–set microprocessor control signal.

Tab. 9d – Electrical data – CG4 036.E–066.E

Models CG4		036.E	039.E	046.E	052.E	058.E	066.E
Power supply	V/Ph/Hz	400V / 3PH / 50Hz					
OA (1)	A	193	215	247	276	300	331
FLA	A	355	371	470	530	524	566
LRA (Compressor part winding start)	A	616	680	866	949	950	1035
LRA (Special compressor star delta start)	A	422	465	613	673	689	746
Compressors – Power input (1)	kW	95	109	115	132	144	168
Compressors – Nominal current (1)	A	162	184	210	238	254	284
Single compressor – Max. current	A	162	170	216	246	239	260
Fans number	N.	8	8	10	10	12	12
AC fans – Power input (AC option)	kW	2,5					
AC fans – Nominal current (AC option)	A	3.8					
AC fans – Max. Current (AC option)	A	2,4					
EC fans – Power input	kW	5,1					
EC fans – Nominal current	A	5,3					
Std. head pressure pump model (Option)	–	65–125/120–110		65–125/127			65–125/137
Std. head pressure pump – Motor power	kW	4,0	4,0	5,5	5,5	5,5	7,5
Std. head pressure pump – Max. current	A	8,0	8,0	11,2	11,2	11,2	15,2
High head pressure pump model (Option)	–	65–125/127		65–125/137			65–125/144
High head pressure pump – Motor power	kW	5,5	5,5	7,5	7,5	7,5	11,0
High head pressure pump – Max. current	A	11,2	11,2	15,2	15,2	15,2	19,4

(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 nominal conditions (RPM/air delivery); such operating conditions are determined by the factory–set microprocessor control signal.

Electrical Data

Tab. 9e – Electrical data – FB4 031–078

Models FB4		031.E	036	039	046.E	052	058.E	066	078
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz							
OA (1)	A	187	211	239	249	297	333	384	438
FLA	A	279	319	355	352	406	444	480	582
LRA (Compressor part winding start)	A	445	525	616	636	744	860	931	–
LRA (Special compressor star delta start)	A	318	367	422	437	524	608	687	696
Compressors – Power input (1)	kW	91	106	127	128	152	166	197	242
Compressors – Nominal current (1)	A	156	180	208	208	254	282	330	376
Single compressor – Max. current	A	124	144	162	155	182	196	214	260
Fans number	N.	6	6	6	8	8	10	10	12
AC fans – Power input	kW	2,4							
AC fans – Nominal current	A	5,2							
AC fans – Max. current	A	5,3							
EC fans – Power input (EC option)	kW	1,8							
EC fans – Nominal current (EC option)	A	2,9							
Std. head pressure pump model (Option)	–	65–125/137	65–125/144				65–160/157	65–160/173	80–160/167
Std. head pressure pump – Motor power	kW	7,5	11,0	11,0	11,0	11,0	11,0	15,0	22,0
Std. head pressure pump – Max. current	A	15,2	19,4	19,4	19,4	19,4	19,4	26,3	42,0
High head pressure pump model (Option)	–	65–125/144	65–160/157				65–160/173	65–160/177	80–160/177
High head pressure pump – Motor power	kW	11,0	11,0	11,0	11,0	11,0	15,0	18,5	30,0
High head pressure pump – Max. current	A	19,4	19,4	19,4	19,4	19,4	26,3	31,5	52,0

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

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

Tab. 9f – Electrical data – FL4 031–078

Models FL4		031.E	036	039.E	046	052.E	058	066	078
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz							
OA (1)	A	181	207	228	244	286	325	367	432
FLA	A	271	311	354	340	402	430	474	566
LRA (Compressor part winding start)	A	437	517	615	624	740	846	925	–
LRA (Special compressor star delta start)	A	310	359	421	425	520	594	681	680
Compressors – Power input (1)	kW	93	109	120	132	147	170	191	249
Compressors – Nominal current (1)	A	158	184	196	214	248	288	322	386
Single compressor – Max. current	A	124	144	162	155	182	196	214	260
Fans number	N.	6	6	8	8	10	10	12	12
AC fans – Power input	kW	1,8							
AC fans – Nominal current	A	3,8							
AC fans – Max. current	A	4,1							
EC fans – Power input (EC option)	kW	1,4							
EC fans – Nominal current (EC option)	A	2,0							
Std. head pressure pump model (Option)	–	65–125/137	65–125/144				65–160/157	65–160/173	80–160/167
Std. head pressure pump – Motor power	kW	7,5	11,0	11,0	11,0	11,0	11,0	15,0	22,0
Std. head pressure pump – Max. current	A	15,2	19,4	19,4	19,4	19,4	19,4	26,3	42,0
High head pressure pump model (Option)	–	65–125/144	65–160/157				65–160/173	65–160/177	80–160/177
High head pressure pump – Motor power	kW	11,0	11,0	11,0	11,0	11,0	15,0	18,5	30,0
High head pressure pump – Max. current	A	19,4	19,4	19,4	19,4	19,4	26,3	31,5	52,0

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

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

Electrical Data

Tab. 9g – Electrical data – FQ4 031–066

Models FQ4		031	036.E	039	046.E	052	058	066
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz						
OA (1)	A	173	188	215	224	272	300	353
FLA	A	254	296	332	320	374	404	440
LRA (Compressor part winding start)	A	420	502	593	604	712	820	891
LRA (Special compressor star delta start)	A	293	344	399	405	492	568	647
Compressors – Power input (1)	kW	99	106	127	132	157	171	204
Compressors – Nominal current (1)	A	166	180	206	214	262	288	342
Single compressor – Max. current	A	124	144	162	155	182	196	214
Fans number	N.	6	8	8	10	10	12	12
AC fans – Power input (AC option)	kW	1,2						
AC fans – Nominal current (AC option)	A	2,2						
AC fans – Max. current (AC option)	A	2,3						
EC fans – Power input	kW	0,7						
EC fans – Nominal current	A	3,9						
Std. head pressure pump model (Option)	–	65–125/137	65–125/144				65–160/157	65–160/173
Std. head pressure pump – Motor power	kW	7,5	11,0	11,0	11,0	11,0	11,0	15,0
Std. head pressure pump – Max. current	A	15,2	19,4	19,4	19,4	19,4	19,4	26,3
High head pressure pump model (Option)	–	65–125/144	65–160/157				65–160/173	65–160/177
High head pressure pump – Motor power	kW	11,0	11,0	11,0	11,0	11,0	15,0	18,5
High head pressure pump – Max. current	A	19,4	19,4	19,4	19,4	19,4	26,3	31,5

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

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

Tab. 9h – Electrical data – FG4 036.E–066.E

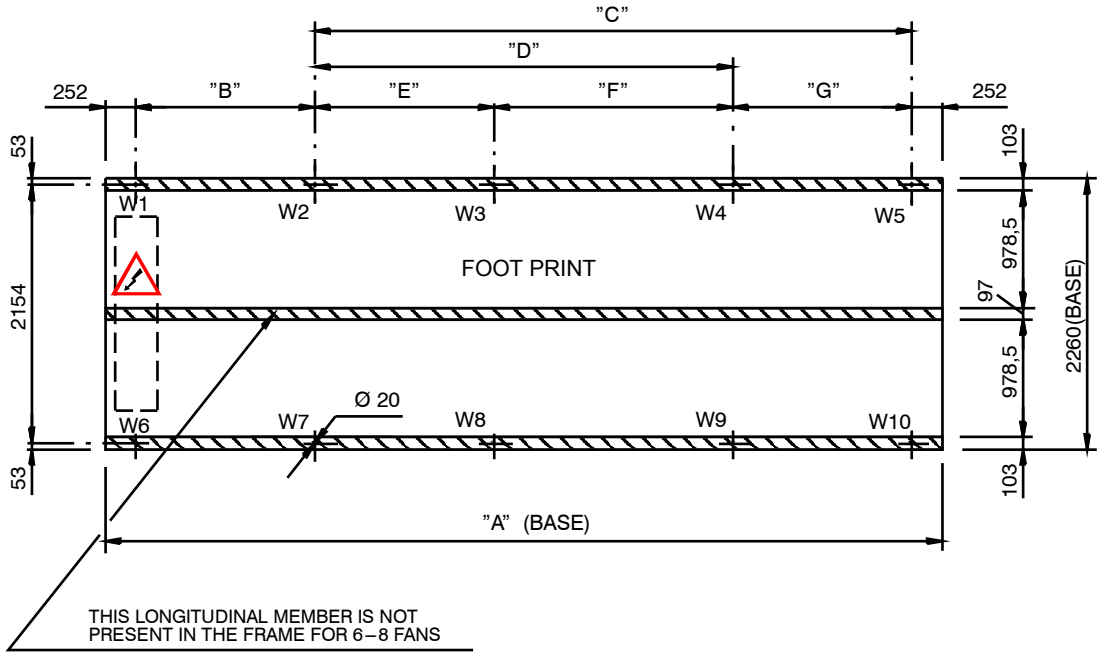
Models FG4		036.E	039.E	046.E	052.E	058.E	066.E
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz					
OA (1)	A	198	226	256	290	315	352
FLA	A	355	371	471	531	525	567
LRA (Compressor part winding start)	A	616	680	867	950	951	1036
LRA (Special compressor star delta start)	A	422	465	614	674	690	747
Compressors – Power input (1)	kW	99	116	120	142	154	182
Compressors – Nominal current (1)	A	166	194	216	250	268	306
Single compressor – Max. current	A	162	170	216	246	239	260
Fans number	N.	8	8	10	10	12	12
AC fans – Power input (AC option)	kW	2,4					
AC fans – Nominal current (AC option)	A	5,2					
AC fans – Max. current (AC option)	A	5,3					
EC fans – Power input	kW	2,5					
EC fans – Nominal current	A	3,9					
Std. head pressure pump model (Option)	–	65–125/144				65–160/157	65–160/173
Std. head pressure pump – Motor power	kW	11	11	11	11	11	15
Std. head pressure pump – Max. current	A	19,4	19,4	19,4	19,4	19,4	26,3
High head pressure pump model (Option)	–	65–160/157				65–160/173	65–160/177
High head pressure pump – Motor power	kW	11,0	11,0	11,0	11,0	15,0	18,5
High head pressure pump – Max. current	A	19,4	19,4	19,4	19,4	26,3	31,5

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

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

10 Application Consideration

Fig. 10a – Support positions and loads



Tab. 10a – Dimensions

Models	Size	Fans nr.	Dimensions (mm)						
			"A"	"B"	"C"	"D"	"E"	"F"	"G"
CB4/FB4	031–036–039	6	3990	1494	1992	–	–	–	–
CL4/FL4	031–036								
CQ4/FQ4	031								
CB4/FB4	046–052	8	4986	1494	–	1494	–	–	1494
CL4/FL4	039–046								
CQ4/FQ4	036–039								
CG4/FG4	036–039								
CB4/FB4	058–066	10	5982	1245	–	–	1245	1494	1494
CL4/FL4	052–058								
CQ4/FQ4	046–052								
CG4/FG4	046–052								
CB4/FB4	078	12	6978	1494	–	–	1494	1992	1494
CL4/FL4	066–078								
CQ4/FQ4	058–066								
CG4/FG4	058–066								

Application Consideration

Tab. 10b – Operating weight distribution – Unit without pumps (Chiller)

Models	Weight distribution (kg)										Total (kg)
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
CB4031.E	784	529	–	–	529	787	531	–	–	531	3691
CB4036.E	787	539	–	–	539	791	542	–	–	542	3740
CB4039.E	791	549	–	–	549	794	551	–	–	551	3785
CB4046.E	858	858	–	403	403	857	857	–	402	402	5040
CB4052.E	868	868	–	416	416	867	867	–	415	415	5132
CB4058.E	851	851	466	466	466	821	821	449	449	449	6089
CB4066.E	856	856	466	466	466	826	826	450	450	450	6112
CB4078.E	1031	1031	482	482	482	992	992	464	464	464	6884
CL4031.E	789	512	–	–	512	792	514	–	–	514	3633
CL4036.E	792	522	–	–	522	795	524	–	–	524	3679
CL4039.E	694	694	–	360	360	696	696	–	361	361	4222
CL4046.E	854	854	–	379	379	853	853	–	379	379	4930
CL4052.E	845	845	440	440	440	814	814	424	424	424	5910
CL4058.E	848	848	441	441	441	817	817	425	425	425	5928
CL4066.E	981	981	448	448	448	938	938	429	429	429	6469
CL4078.E	1024	1024	452	452	452	984	984	434	434	434	6674
CQ4031.E	821	523	–	–	523	825	525	–	–	525	3742
CQ4036.E	714	714	–	356	356	716	716	–	357	357	4286
CQ4039.E	719	719	–	362	362	721	721	–	364	364	4332
CQ4046.E	865	865	441	441	441	834	834	425	425	425	5996
CQ4052.E	870	870	442	442	442	838	838	426	426	426	6020
CQ4058.E	1001	1001	449	449	449	959	959	430	430	430	6557
CQ4066.E	1007	1007	449	449	449	964	964	430	430	430	6579
CG4036.E	737	737	–	380	380	740	740	–	381	381	4476
CG4039.E	742	742	–	387	387	744	744	–	388	388	4522
CG4046.E	894	894	467	467	467	863	863	451	451	451	6268
CG4052.E	899	899	467	467	467	868	868	451	451	451	6288
CG4058.E	1026	1026	479	479	479	984	984	460	460	460	6837
CG4066.E	1031	1031	479	479	479	989	989	459	459	459	6854

Tab. 10c – Operating weight distribution – Unit with pumps (Chiller)

Models	Weight distribution (kg)										Total (kg)
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
CB4031.E	673	673	–	–	552	751	751	–	–	616	4016
CB4036.E	679	679	–	–	564	757	757	–	–	629	4065
CB4039.E	685	685	–	–	575	763	763	–	–	640	4111
CB4046.E	812	812	–	475	475	898	898	–	525	525	5420
CB4052.E	823	823	–	488	488	908	908	–	539	539	5516
CB4058.E	812	812	503	503	503	872	872	540	540	540	6497
CB4066.E	811	811	522	522	522	885	885	569	569	569	6665
CB4078.E	968	968	553	553	553	1062	1062	607	607	607	7540
CL4031.E	669	669	–	–	529	748	748	–	–	592	3955
CL4036.E	675	675	–	–	542	754	754	–	–	605	4005
CL4039.E	657	657	–	421	421	728	728	–	467	467	4546
CL4046.E	807	807	–	453	453	894	894	–	502	502	5312
CL4052.E	805	805	477	477	477	867	867	514	514	514	6317
CL4058.E	808	808	479	479	479	869	869	515	515	515	6336
CL4066.E	920	920	504	504	504	1005	1005	551	551	551	7015
CL4078.E	959	959	524	524	524	1055	1055	576	576	576	7328
CQ4031.E	694	694	–	–	535	774	774	–	–	596	4067
CQ4036.E	677	677	–	417	417	749	749	–	462	462	4610
CQ4039.E	681	681	–	424	424	754	754	–	469	469	4656
CQ4046.E	824	824	479	479	479	886	886	515	515	515	6402
CQ4052.E	829	829	480	480	480	891	891	516	516	516	6428
CQ4058.E	948	948	486	486	486	1019	1019	523	523	523	6961
CQ4066.E	946	946	506	506	506	1032	1032	552	552	552	7130
CG4036.E	700	700	–	441	441	772	772	–	486	486	4798
CG4039.E	705	705	–	448	448	777	777	–	493	493	4846
CG4046.E	854	854	505	505	505	916	916	541	541	541	6678
CG4052.E	859	859	505	505	505	921	921	541	541	541	6698
CG4058.E	973	973	516	516	516	1043	1043	553	553	553	7239
CG4066.E	971	971	535	535	535	1056	1056	582	582	582	7405

Tab. 10d – Operating weight distribution – Unit without pumps (Freecooling)

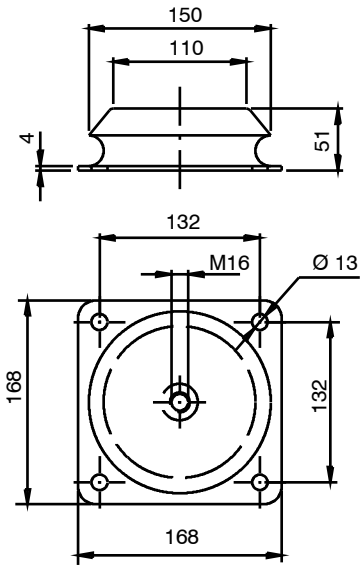
Models	Weight distribution (kg)										Total (kg)
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
FB4031.E	774	774	–	–	610	776	776	–	–	612	4322
FB4036	780	780	–	–	622	782	782	–	–	625	4371
FB4039	785	785	–	–	634	788	788	–	–	636	4416
FB4046.E	938	938	–	526	526	936	936	–	526	526	5852
FB4052	948	948	–	539	539	947	947	–	539	539	5946
FB4058.E	883	883	595	595	595	882	882	595	595	595	7100
FB4066	886	886	602	602	602	885	885	602	602	602	7154
FB4078	1081	1081	630	630	630	1081	1081	630	630	630	8104
FL4031.E	770	770	–	–	587	773	773	–	–	589	4262
FL4036	776	776	–	–	599	779	779	–	–	601	4310
FL4039.E	774	774	–	470	470	776	776	–	471	471	4982
FL4046	933	933	–	503	503	932	932	–	503	503	5742
FL4052.E	877	877	569	569	569	876	876	569	569	569	6920
FL4058	880	880	571	571	571	879	879	570	570	570	6941
FL4066	1027	1027	599	599	599	1026	1026	598	598	598	7697
FL4078	1073	1073	600	600	600	1073	1073	600	600	600	7892
FQ4031	876	653	–	–	653	879	655	–	–	655	4371
FQ4036.E	794	794	–	465	465	797	797	–	467	467	5046
FQ4039	799	799	–	472	472	802	802	–	473	473	5092
FQ4046.E	897	897	571	571	571	896	896	571	571	571	7012
FQ4052	902	902	571	571	571	901	901	571	571	571	7032
FQ4058	1052	1052	587	587	587	1051	1051	587	587	587	7728
FQ4066	1053	1053	600	600	600	1052	1052	599	599	599	7807
FG4036.E	818	818	–	489	489	820	820	–	491	491	5236
FG4039.E	822	822	–	496	496	825	825	–	498	498	5282
FG4046.E	926	926	596	596	596	925	925	596	596	596	7278
FG4052.E	931	931	597	597	597	930	930	596	596	596	7301
FG4058.E	1077	1077	617	617	617	1076	1076	617	617	617	8008
FG4066.E	1078	1078	630	630	630	1078	1078	629	629	629	8089

Tab. 10e – Operating weight distribution – Unit with pumps (Freecooling)

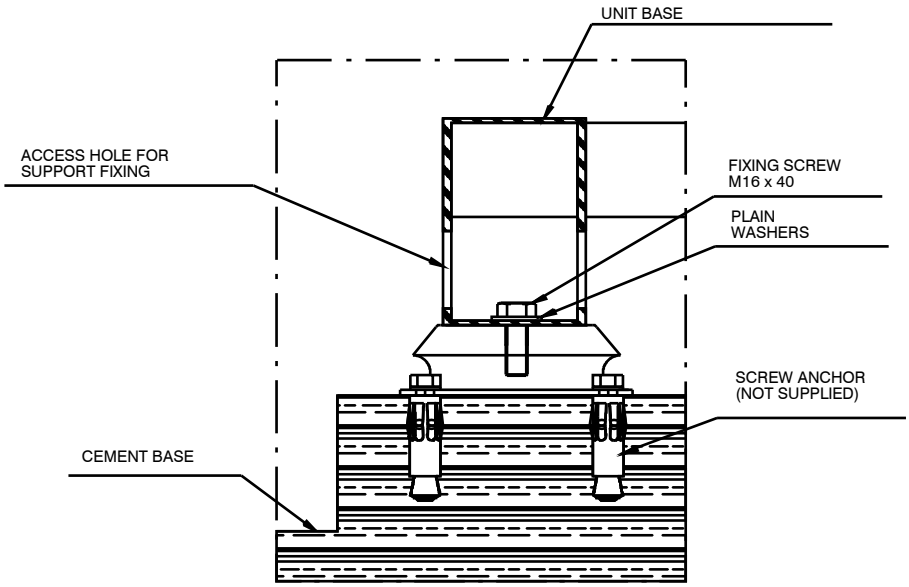
Models	Weight distribution (kg)										Total (kg)
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	
FB4031.E	744	744	–	–	718	866	866	–	–	835	4773
FB4036	750	750	–	–	730	872	872	–	–	848	4822
FB4039	756	756	–	–	741	878	878	–	–	860	4869
FB4046.E	877	877	–	602	602	994	994	–	683	683	6312
FB4052	887	887	–	615	615	1004	1004	–	696	696	6404
FB4058.E	856	856	649	649	649	942	942	715	715	715	7688
FB4066	857	857	660	660	660	949	949	731	731	731	7785
FB4078	1030	1030	717	717	717	1151	1151	802	802	802	8919
FL4031.E	740	740	–	–	695	863	863	–	–	811	4712
FL4036	746	746	–	–	708	869	869	–	–	824	4762
FL4039.E	721	721	–	548	548	824	824	–	626	626	5438
FL4046	871	871	–	580	580	990	990	–	659	659	6200
FL4052.E	851	851	620	620	620	937	937	683	683	683	7485
FL4058	852	852	625	625	625	940	940	690	690	690	7529
FL4066	988	988	656	656	656	1095	1095	727	727	727	8315
FL4078	1021	1021	688	688	688	1144	1144	771	771	771	8707
FQ4031	765	765	–	–	701	888	888	–	–	815	4822
FQ4036.E	741	741	–	544	544	845	845	–	620	620	5500
FQ4039	746	746	–	551	551	850	850	–	627	627	5548
FQ4046.E	870	870	622	622	622	957	957	684	684	684	7572
FQ4052	875	875	623	623	623	962	962	685	685	685	7598
FQ4058	1015	1015	643	643	643	1113	1113	706	706	706	8303
FQ4066	1014	1014	658	658	658	1121	1121	728	728	728	8428
FG4036.E	765	765	–	568	568	868	868	–	645	645	5692
FG4039.E	769	769	–	575	575	872	872	–	652	652	5736
FG4046.E	900	900	648	648	648	986	986	710	710	710	7846
FG4052.E	904	904	648	648	648	991	991	710	710	710	7864
FG4058.E	1040	1040	673	673	673	1137	1137	736	736	736	8581
FG4066.E	1039	1039	687	687	687	1146	1146	758	758	758	8705

Fig. 10b – Rubber anti–vibration support (cod. 270343)

Rubber support dimensions



Rubber support installation



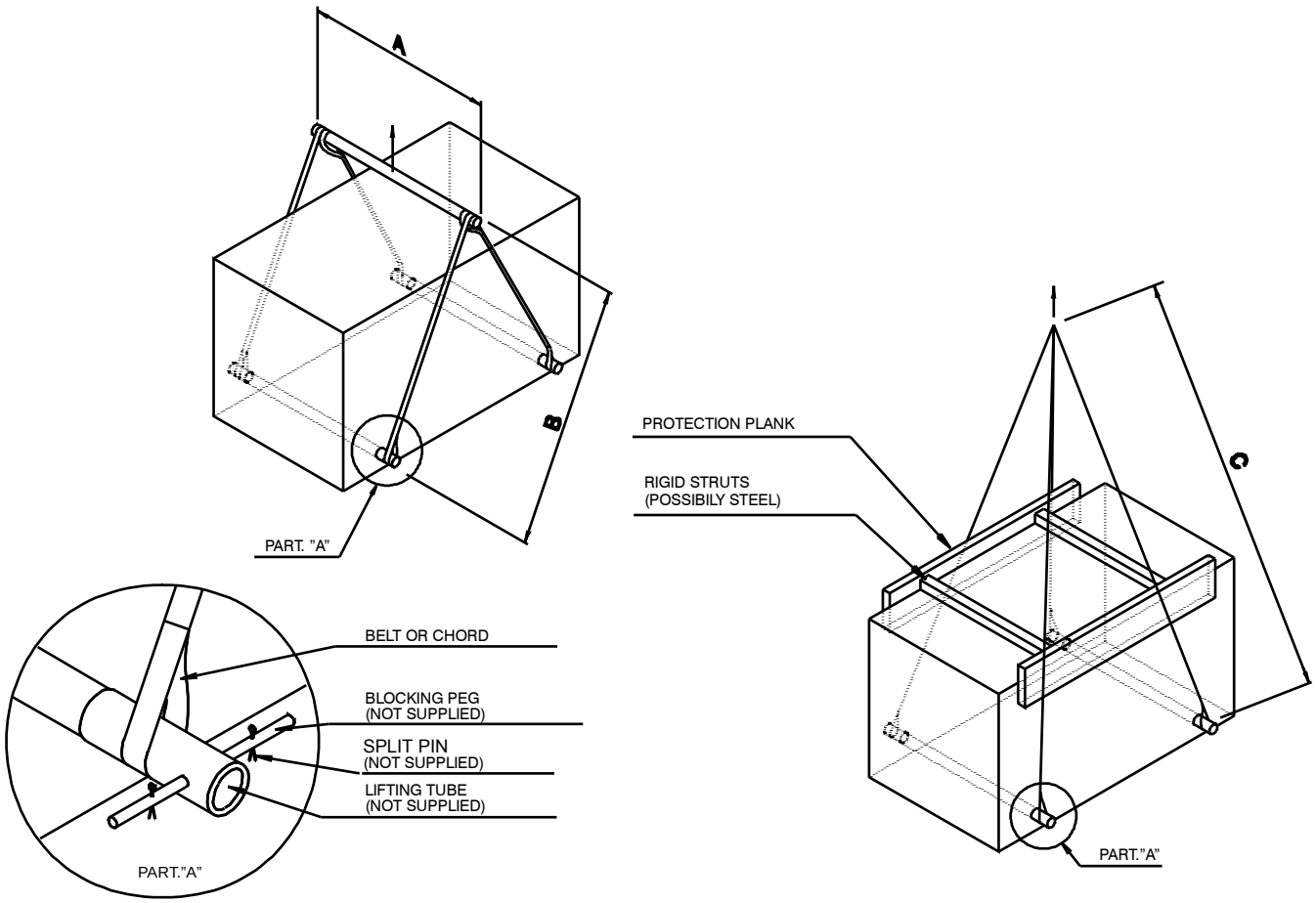
Tab. 10f – Rubber support

Unit	Size	Fans nr.	Configuration	Support kit code	Single support code	Kit support pieces
CB4/FB4	**031–036–039**	6	With or without pumps	489032	270343	6
CL4/FL4	**031–036**					
CQ4/FQ4	**031**					
CB4/FB4	**046–052**	8		489033		8
CL4/FL4	**039–046**					
CQ4/FQ4	**036–039**					
CG4/FG4	**036–039**					
CB4/FB4	**058–066**	10		489034		10
CL4/FL4	**052–058**					
CQ4/FQ4	**046–052**					
CG4/FG4	**046–052**					
CB4/FB4	**078**	12				
CL4/FL4	**066–078**					
CQ4/FQ4	**058–066**					
CG4/FG4	**058–066**					

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

Application Consideration

Fig. 10c – Lifting instructions



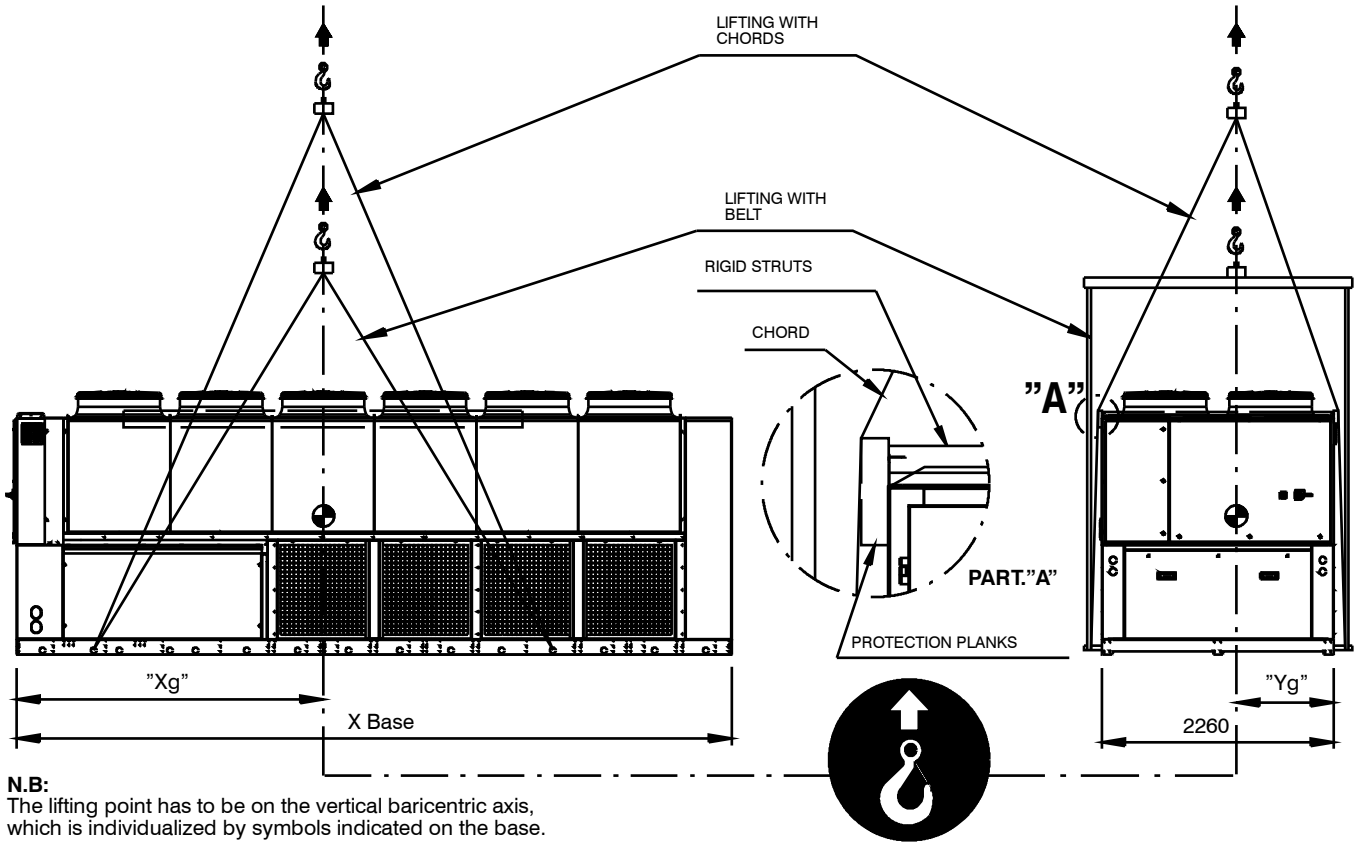
N.B: Place the lifting tubes in the holes in the base indicated by the word 'LIFT HERE'. Lock the ends of the tubes in position with the locking pins and split pins as shown above.
The capacity of the lifting gear must be adequate to lift the load in question. Check the weight of the units, the capacity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

Tab. 10g – Lifting

Models	Fans nr.	A (mm)	B (mm)	C (mm)
CB4/FB4 031–036–039–046–052 **CL4/FB4 031–036–039–046** **CQ4/FQ4 031–036–039** **CG4/FG4 036–039**	6 – 8	2800	≃ 4000	≃ 10000
CB4/FB4 058–066–078 **CL4/FL4 052–058–066–078** **CQ4/FQ4 046–052–058–066** **CG4/FG4 046–052–058–066**	10 – 12	2800	≃ 5500	≃ 10000

Application Consideration

Fig. 10d – Lifting baricentric axis



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

Tab. 10h – Shipping weight and unit baricentre position (Chiller)

Models	X base (mm)	Unit without pumps			Unit with pumps		
		"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)	"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)
CB4031.E	3990	1639	1128	3625	1759	1075	3943
CB4036.E	3990	1648	1128	3667	1766	1075	3985
CB4039.E	3990	1651	1128	3707	1768	1075	4025
CB4046.E	4986	1895	1131	4931	2048	1081	5299
CB4052.E	4986	1903	1131	5010	2054	1082	5379
CB4058.E	5982	2304	1142	5764	2415	1096	6153
CB4066.E	5982	2301	1142	5792	2451	1087	6328
CB4078.E	6978	2573	1142	6497	2785	1085	7116
CL4031.E	3990	1614	1128	3567	1738	1074	3885
CL4036.E	3990	1624	1128	3606	1745	1074	3924
CL4039.E	4986	1965	1128	4134	2116	1079	4449
CL4046.E	4986	1857	1131	4821	2017	1080	5189
CL4052.E	5982	2254	1143	5575	2371	1095	5964
CL4058.E	5982	2257	1143	5604	2374	1095	5993
CL4066.E	6978	2562	1144	6121	2758	1088	6654
CL4078.E	6978	2511	1143	6287	2735	1084	6906
CQ4031.E	3990	1604	1128	3676	1725	1075	3994
CQ4036.E	4986	1943	1128	4203	2094	1080	4518
CQ4039.E	4986	1946	1128	4244	2095	1080	4559
CQ4046.E	5982	2236	1142	5657	2354	1095	6046
CQ4052.E	5982	2234	1142	5685	2351	1096	6074
CQ4058.E	6978	2543	1144	6203	2686	1097	6590
CQ4066.E	6978	2539	1144	6231	2733	1088	6764
CG4036.E	4986	1969	1128	4393	2111	1082	4708
CG4039.E	4986	1972	1128	4434	2113	1082	4749
CG4046.E	5982	2261	1142	5927	2372	1097	6316
CG4052.E	5982	2258	1142	5955	2369	1097	6344
CG4058.E	6978	2589	1144	6483	2724	1098	6870
CG4066.E	6978	2585	1144	6511	2767	1090	7044

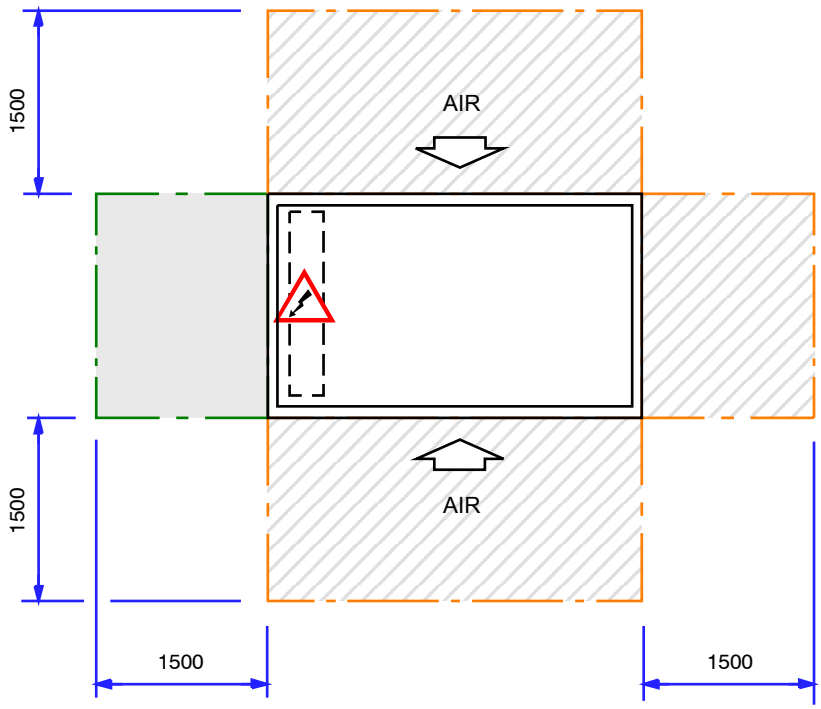
Application Consideration

Tab. 10i – Shipping weight and unit baricentre position (Freecooling)

Models	X base (mm)	Unit without pumps			Unit with pumps		
		"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)	"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)
FB4031.E	3990	1723	1128	4095	1855	1050	4548
FB4036	3990	1730	1128	4137	1860	1051	4588
FB4039	3990	1732	1128	4177	1861	1051	4628
FB4046.E	4986	2002	1131	5526	2160	1065	5984
FB4052	4986	2008	1131	5607	2164	1066	6065
FB4058.E	5982	2458	1131	6517	2578	1082	7069
FB4066	5982	2461	1131	6558	2588	1079	7149
FB4078	6978	2764	1130	7391	2973	1075	8153
FL4031.E	3990	1702	1128	4035	1839	1049	4488
FL4036	3990	1710	1128	4076	1843	1050	4527
FL4039.E	4986	2065	1128	4694	2241	1060	5142
FL4046	4986	1971	1131	5416	2135	1064	5874
FL4052.E	5982	2419	1131	6328	2538	1082	6854
FL4058	5982	2420	1131	6357	2546	1081	6909
FL4066	6978	2770	1131	7023	2930	1080	7603
FL4078	6978	2715	1130	7181	2934	1073	7943
FQ4031	3990	1690	1128	4144	1824	1051	4597
FQ4036.E	4986	2044	1128	4763	2219	1061	5211
FQ4039	4986	2046	1128	4804	2220	1061	5252
FQ4046.E	5982	2401	1131	6410	2520	1083	6936
FQ4052	5982	2399	1131	6438	2517	1083	6964
FQ4058	6978	2735	1131	7073	2887	1084	7613
FQ4066	6978	2747	1131	7133	2906	1081	7713
FG4036.E	4986	2063	1128	4953	2230	1063	5401
FG4039.E	4986	2065	1128	4994	2231	1064	5442
FG4046.E	5982	2416	1131	6680	2530	1084	7206
FG4052.E	5982	2413	1131	6708	2526	1084	7234
FG4058.E	6978	2768	1130	7353	2913	1086	7893
FG4066.E	6978	2779	1130	7413	2930	1083	7993

Fig. 10e – Service areas (Top view)

Unit with 2 compressors



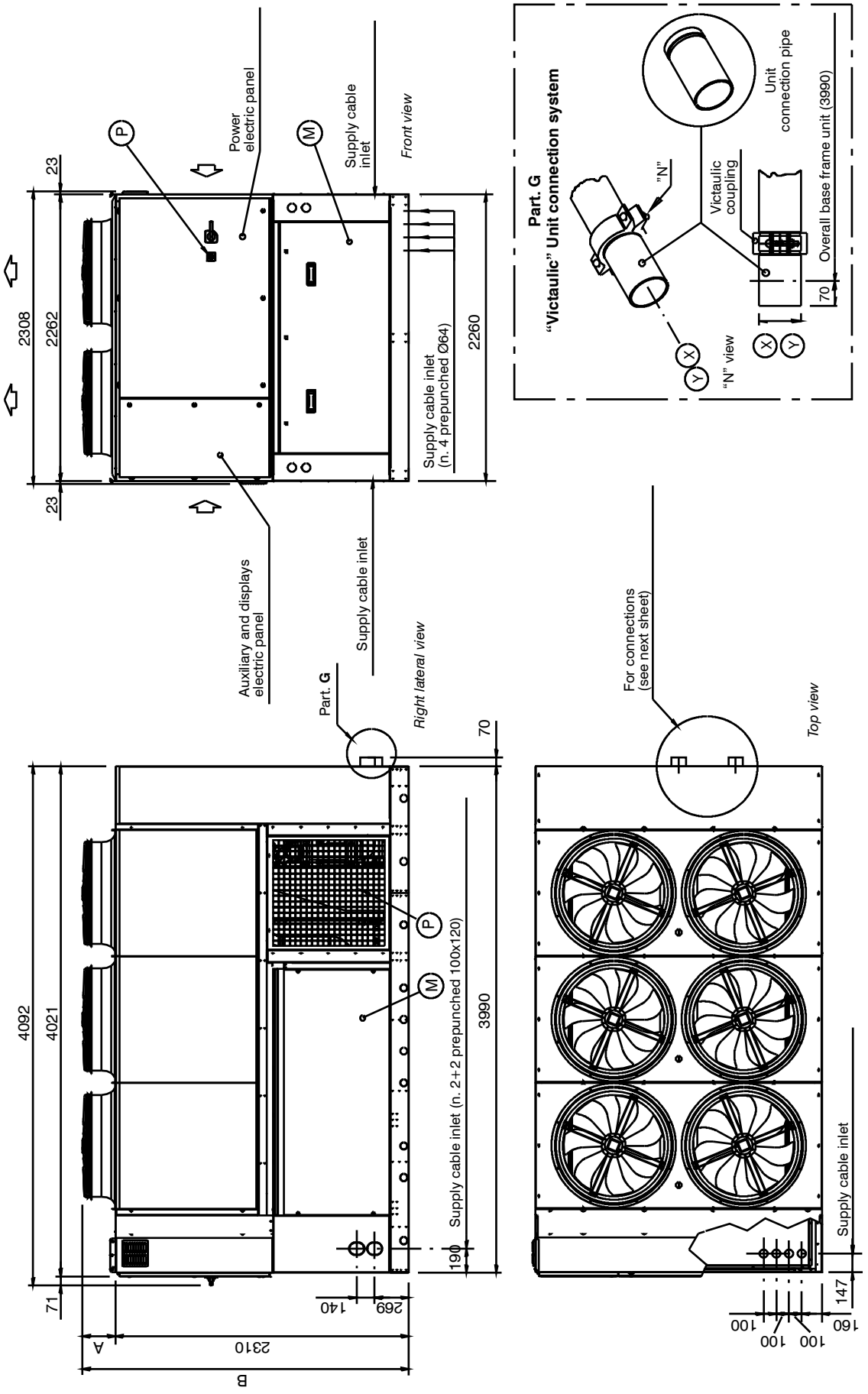
Ordinary maintenance area

Extraordinary maintenance area

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

11 Dimensional Data

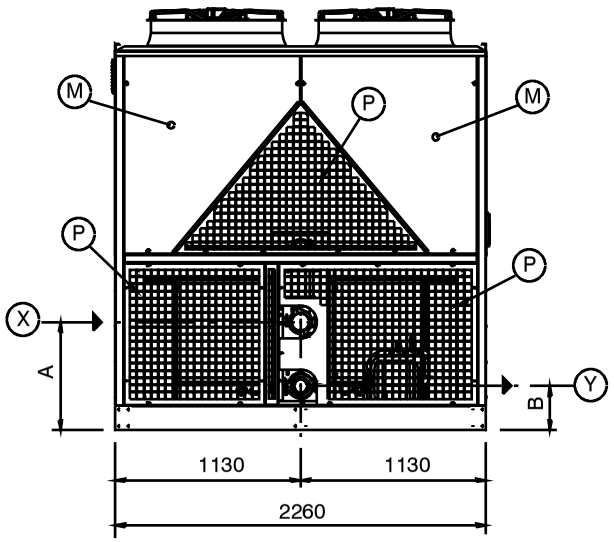
Fig. 11a -- Liebert HPC--M (6 fans)



Models	Fans n.	EC fans		AC fans		Chilled water connections	
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"X" Inlet	"Y" Outlet
CB4 031–036–039 CL4 031–036 CQ4 031 FB4 031–036–039 FL4 031–036 FQ4 031	6	290	2600	260	2570	VICTAULIC DN100–4"–114,3	

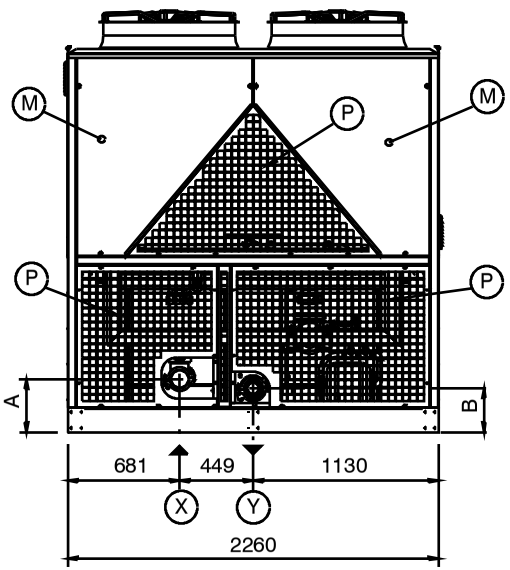
Fig. 11b -- Liebert HPC--M (6 fans)

Chiller version without pumps



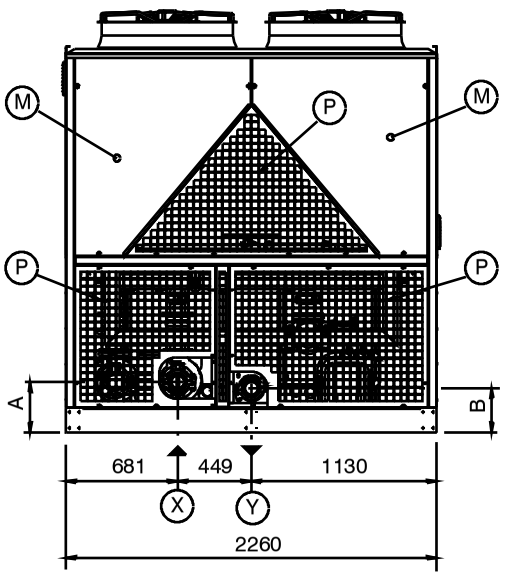
Rear view

Freecooling version without pumps



Rear view

Chiller/Freecooling version with pumps



Rear view

Models		Without pumps		With standard pumps		With high pressure pumps	
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)
Chiller version	**CB4 031–036–039 CL4 031–036 CQ4 031**	658	268	306	268	306	268
Freecooling version	**FB4 031 FL4 031 FQ4 031**	324		306		331	
	FB4 036–039 FL4 036	306		331		331	

Ⓜ Removable panel

Ⓟ Optional

Dimensional Data

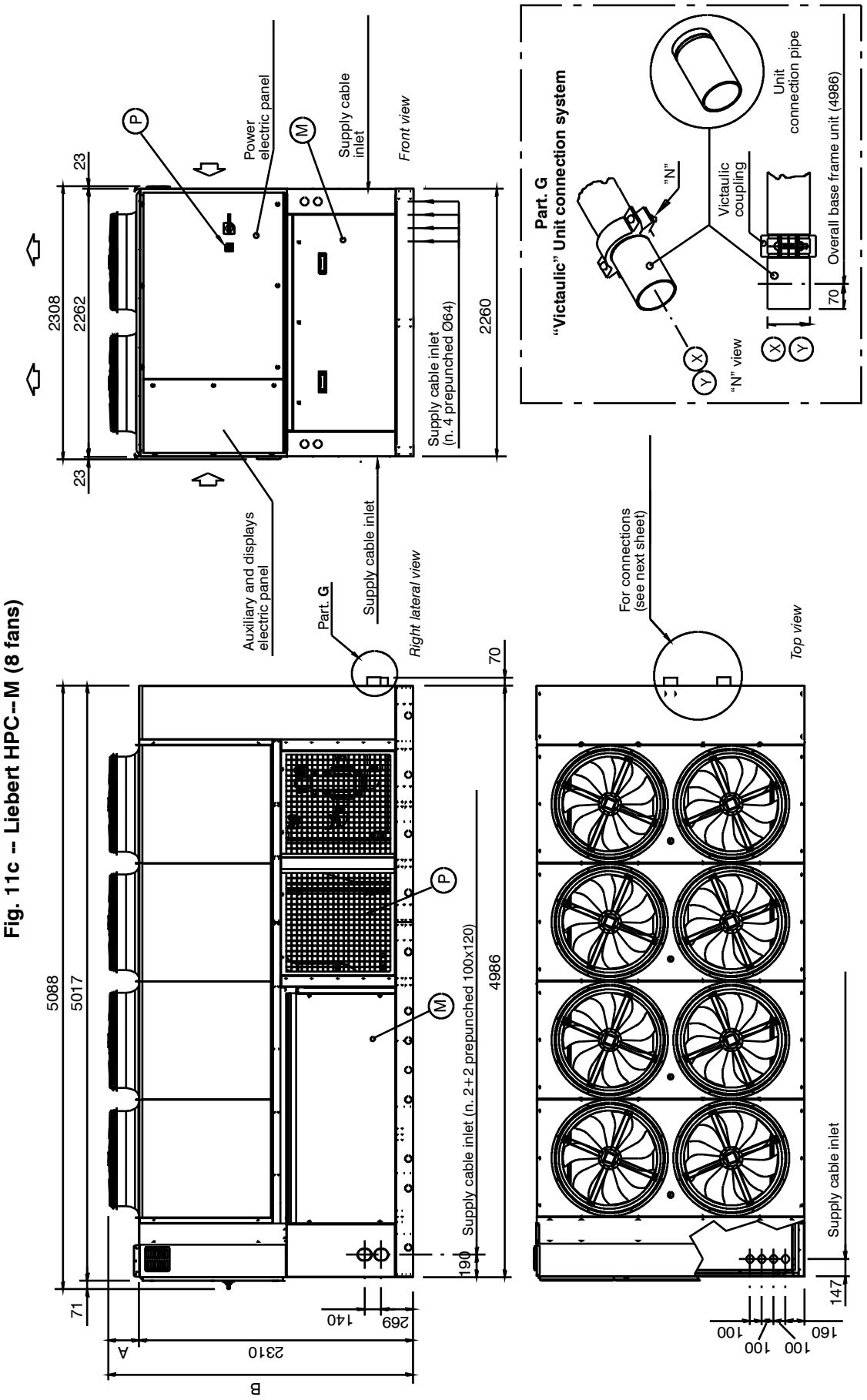
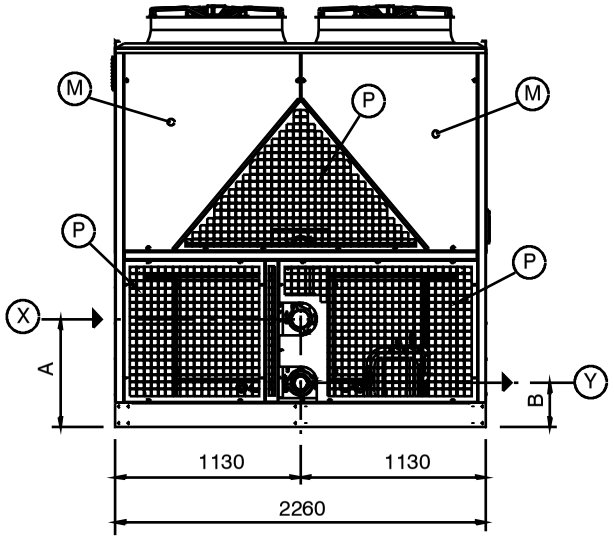


Fig. 11c -- Liebert HPC--M (8 fans)

Models	Fans n.	EC fans		AC fans		Chilled water connections	
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"X" Inlet	"Y" Outlet
CL4 039 CQ4 036–039 CG4 036–039 FL4 039 FQ4 036–039 FG4 036–039	8	290	2600	260	2570	VICTAULIC DN100–4"–114,3	
CB4 046–052 CL4 046 FB4 046–052 FL4 046						VICTAULIC DN125–5"–139,7	

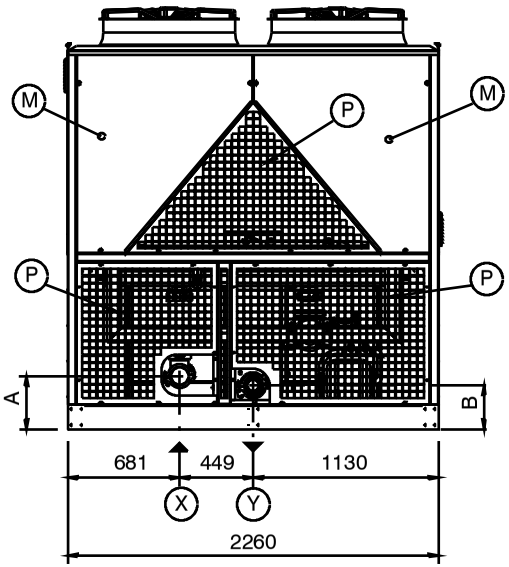
Fig. 11d -- Liebert HPC--M (8 fans)

Chiller version without pumps



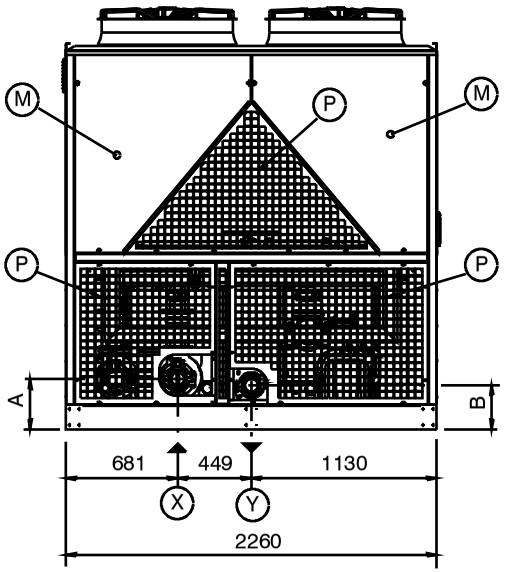
Rear view

Freecooling version without pumps



Rear view

Chiller/Freecooling version with pumps



Rear view

Models		Without pumps		With standard pumps		With high pressure pumps	
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)
Chiller version	**CB4 046–052 CL4 039–046 CQ4 036–039 CG4 036–039**	658	268	306	268	306	268
Freecooling version	**FB4 046–052 FL4 039–046 FQ4 036–039 FG4 036–039**	331		331		331	

(M) Removable panel

(P) Optional

Dimensional Data

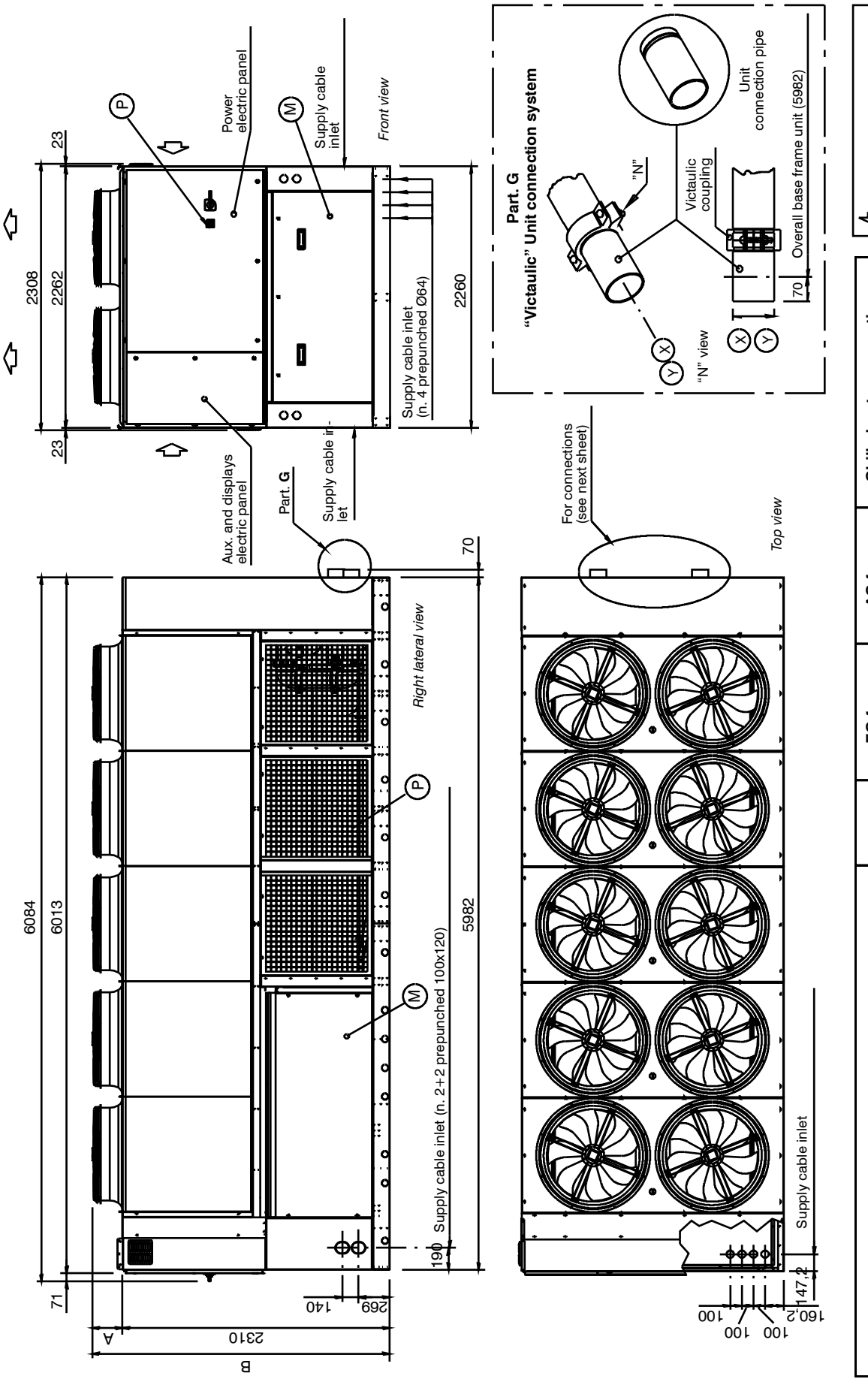
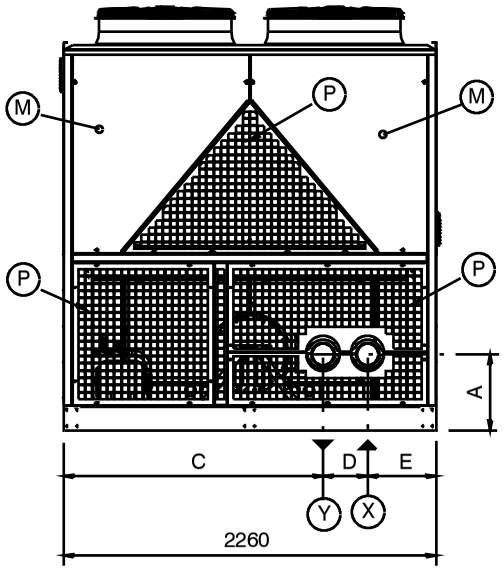


Fig. 11e -- Liebert HPC--M (10 fans)

Models	Fans n.	EC fans		AC fans		Chilled water connections	
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"X" Inlet	"Y" Outlet
CB4 058–066 CL4 052–058 CQ4 046–052 CG4 046–052 FB4 058–066 FL4 052–058 FQ4 046–052 FG4 046–052	10	290	2600	260	2570	VICTAULIC DN125–5"–139,7	

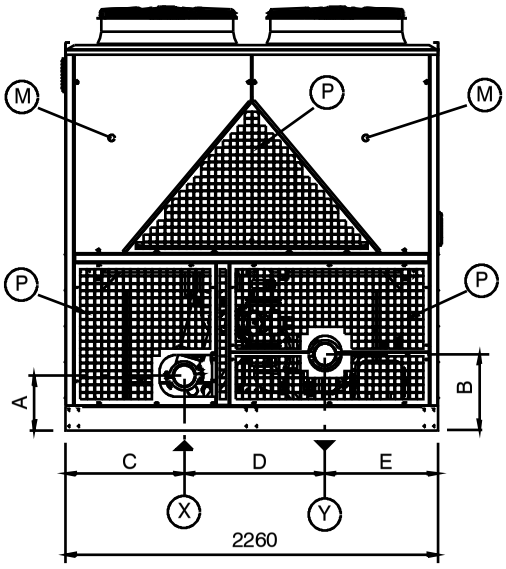
Fig. 11f -- Liebert HPC--M (10 fans)

Chiller version without pumps



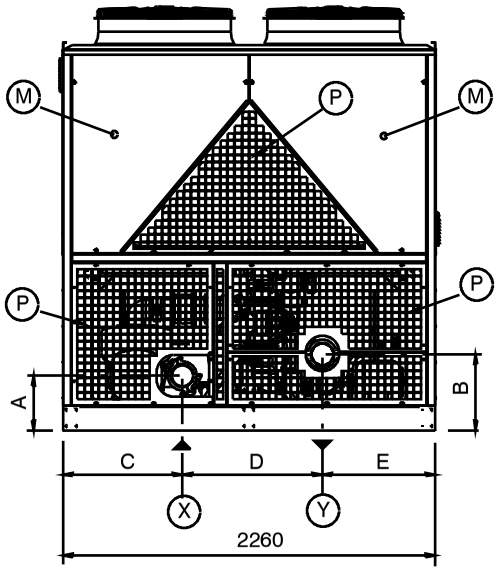
Rear view

Freecooling version without pumps



Rear view

Chiller/Freecooling version with pumps



Rear view

Models		Without pumps					With standard pumps					With high pressure pumps				
		"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm)	"E" (mm)	"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm)	"E" (mm)	"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm)	"E" (mm)
Chiller version	**CB4 058 CL4 052–058 CQ4 046–052 CG4 046–052**	461	–	1574	271	415	306	461	712	862	686	306	461	712	862	686
	CB4 066											331				
Freecooling version	**FL4 052 FQ4 046–052 FG4 046–052**	331	461	720	879	661	331		725	874	661			725	874	661
	FB4 058 FL4 058			722	877											
	FB4 066			725	874											

Ⓜ Removable panel

Ⓟ Optional

Dimensional Data

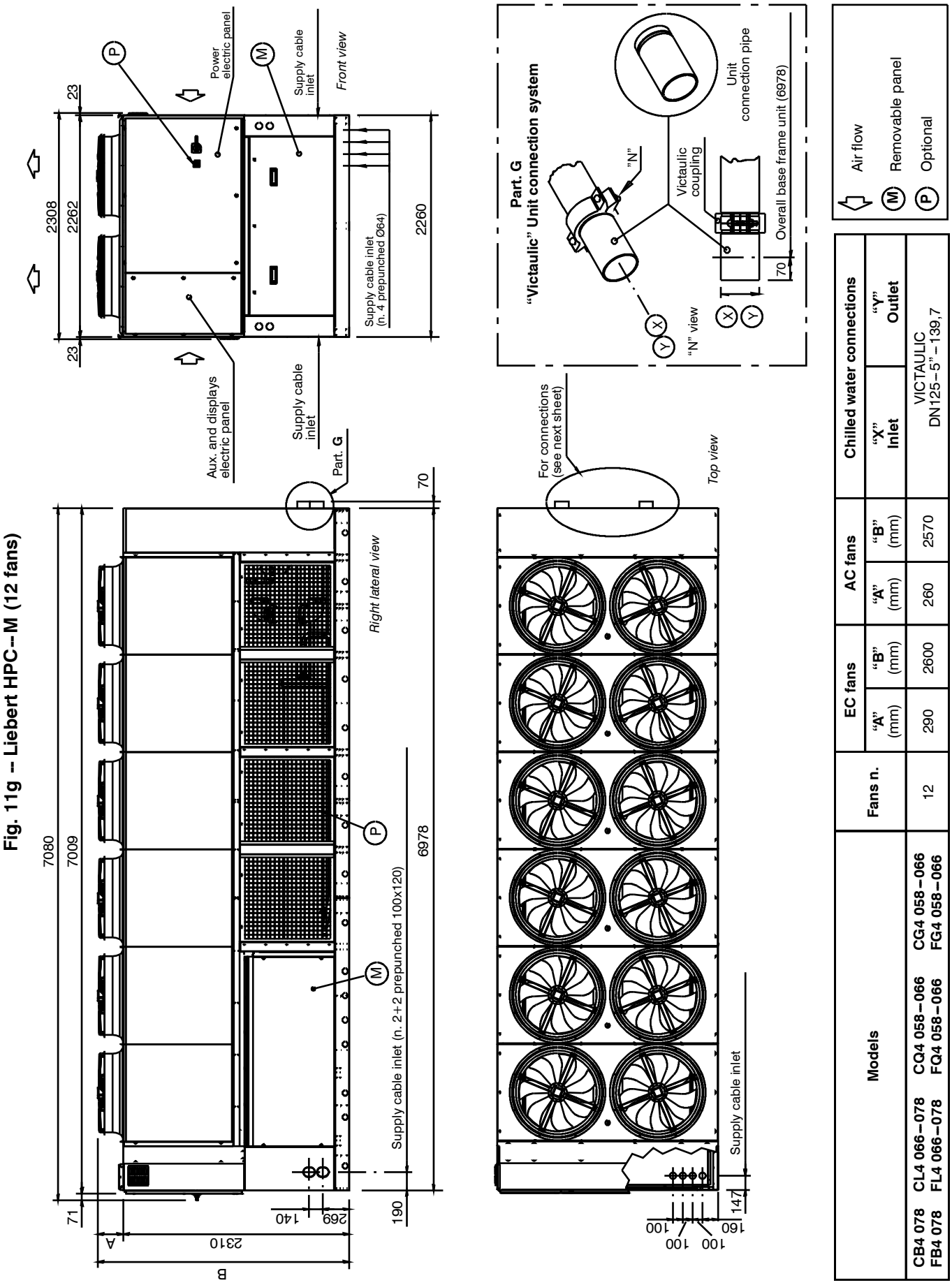
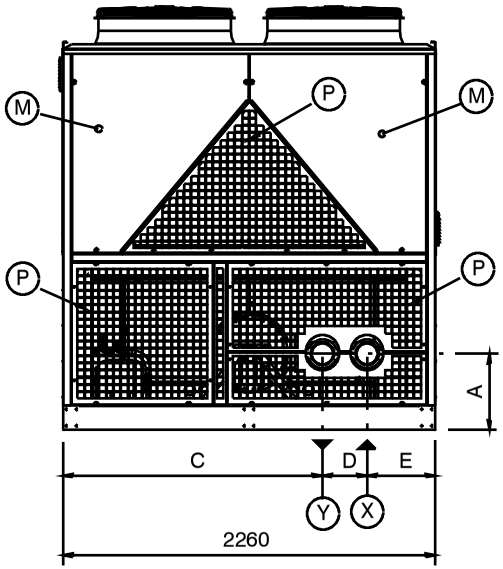


Fig. 11g -- Liebert HPC--M (12 fans)

Models	Fans n.	EC fans		AC fans		Chilled water connections	
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"X" Inlet	"Y" Outlet
CB4 078 CL4 066–078 CQ4 058–066 CG4 058–066 FB4 078 FL4 066–078 FQ4 058–066 FG4 058–066	12	290	2600	260	2570	VICTAULIC DN125–5"–139,7	

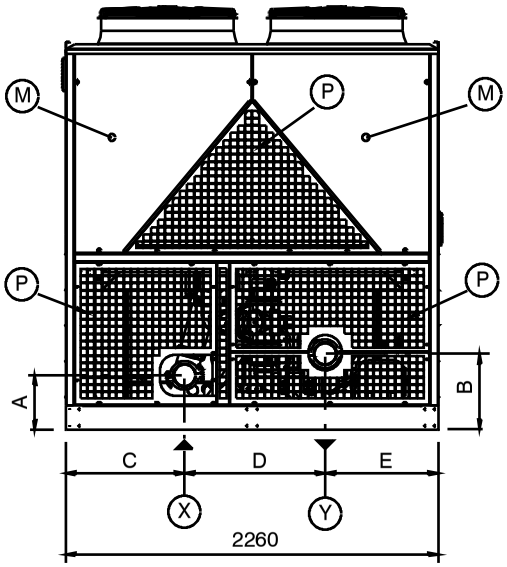
Fig. 11h – Liebert HPC--M (12 fans)

Chiller version without pumps



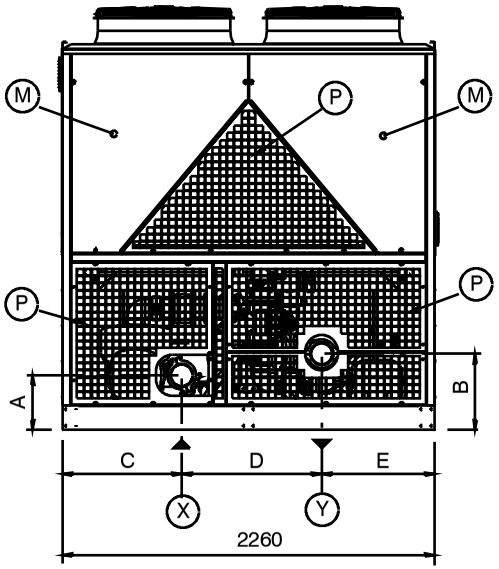
Rear view

Freecooling version without pumps



Rear view

Chiller/Freecooling version with pumps



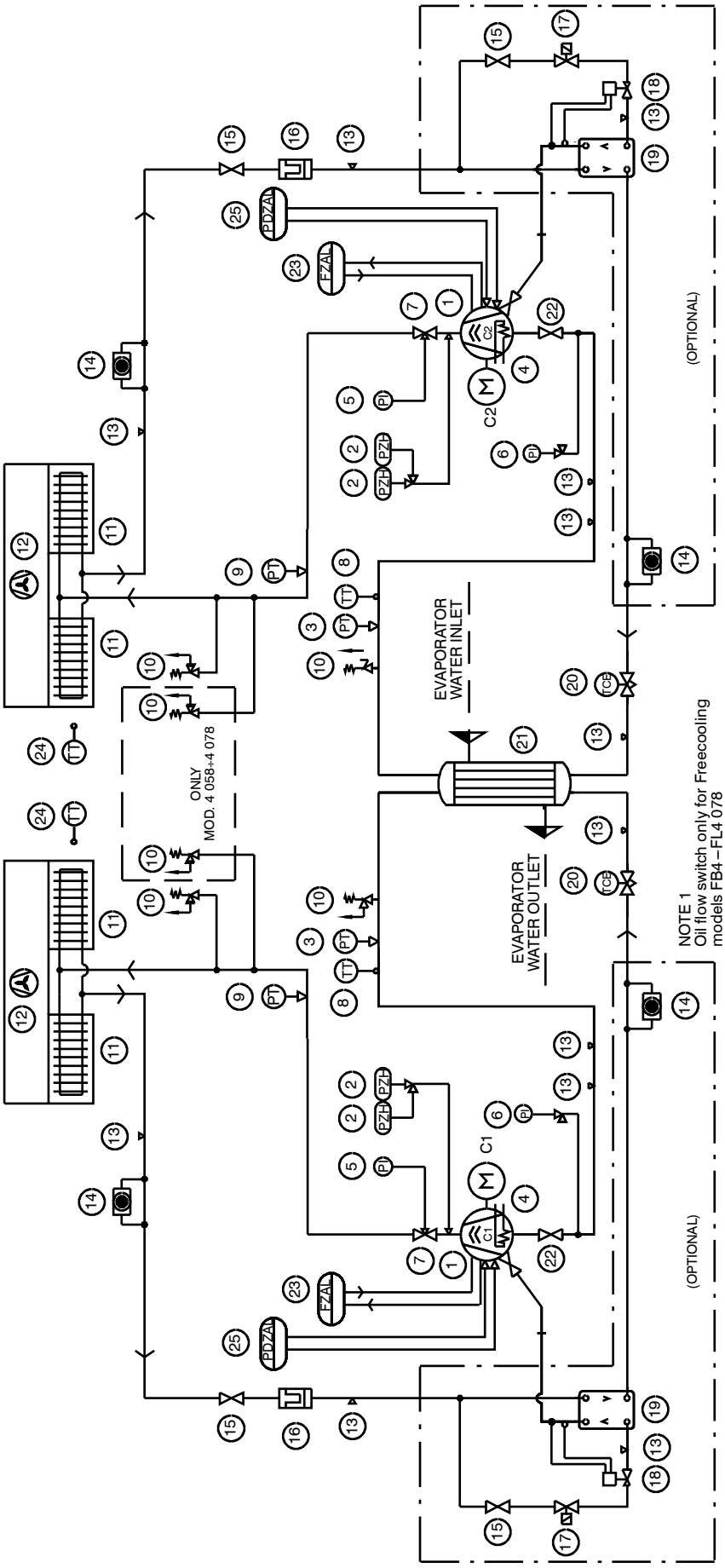
Rear view

Models		Without pumps					With standard pumps					With high pressure pumps				
		"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm)	"E" (mm)	"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm)	"E" (mm)	"A" (mm)	"B" (mm)	"C" (mm)	"D" (mm)	"E" (mm)
Chiller version	**CQ4 058** **CG4 058**	461	–	1574	270	416	306	461	712	861	686	306	461	712	862	686
	CL4 066 **CQ4 066** **CG4 066**											331				
	CB4 078 **CL4 078**						331		725	849				725	849	
Freecooling version	**FQ4 058** **FG4 058**	331	461	712	887	661				874	661				874	661
	FL4 066 **FQ4 066** **FG4 066**			738	861											
	FB4 078 **FL4 078**	356		770	829				770	829		356		773	826	

M Removable panel

P Optional

12 Refrigerant Circuit



Pos.	Description	Pos.	Description
1	Compressor	14	Sight glass
2	High pressure switch *(HP)*	15	Shut–Off valve
3	Transducer pressure sensor *(Low pressure control)*	16	Filter dryer
4	Crankcase heater	17	Shut–Off solenoid valve
5	High pressure manometer	18	Thermostatic valve
6	Low pressure manometer	19	Economizer *(Optional)*
7	Discharge valve	20	Electronic expansion valve
8	Thermostatic temperature sensor	21	Evaporator
9	Transducer pressure sensor *(High pressure control)*	22	Suction valve *(Optional)*
10	Safety valve	23	Oil flow switch *(See NOTE 1)*
11	Condenser	24	External air temperature sensor
12	Condenser fans	25	Oil differential pressure switch *(See NOTE 2)*
13	Charge connection		

13 Hydraulic Circuit

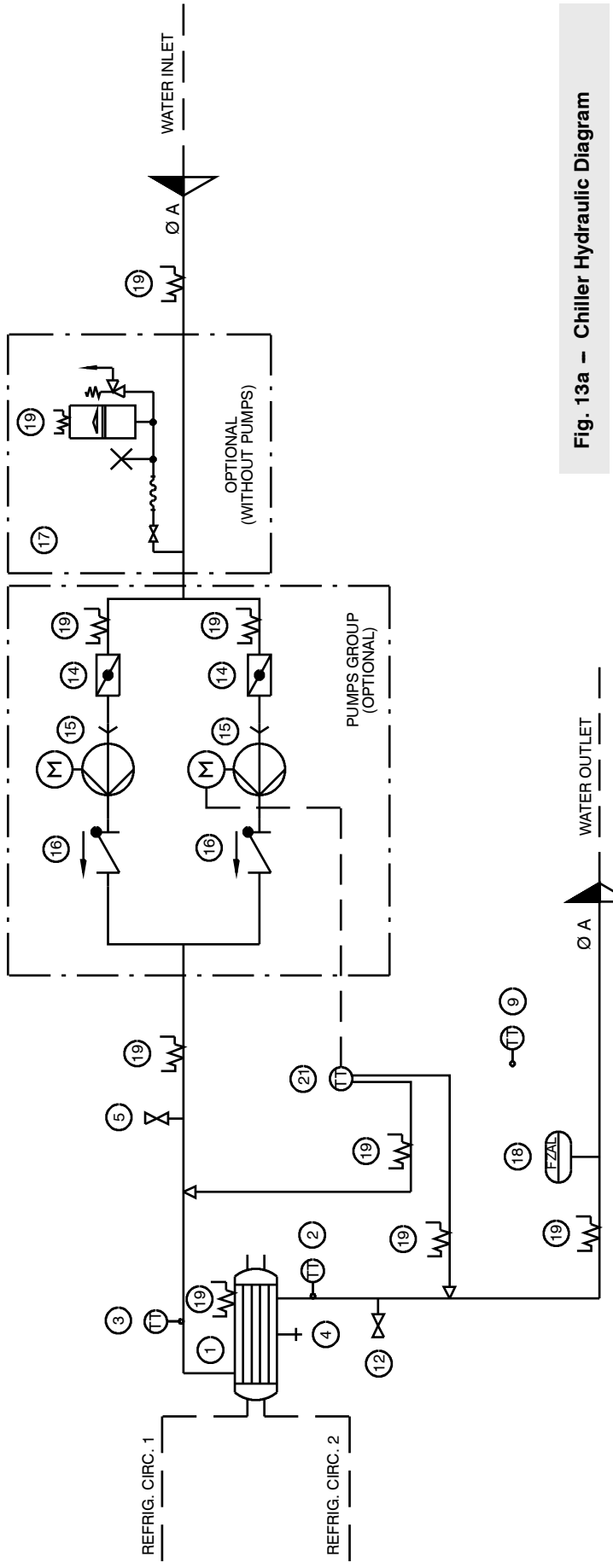


Fig. 13a – Chiller Hydraulic Diagram

Tab. 13a – Hydraulic components

Pos.	Description
1	Evaporator
2	Evaporator water outlet sensor/antifreeze
3	Evaporator water inlet sensor
4	Discharge valve
5	Manual air valve
6	–
7	–
8	–
9	Air temperature sensor
10	–
11	–
12	Service valve with cap
13	–
14	Butterfly valve
15	Pump
16	No return valve
17	Kit expansion vessel – Safety valve – Manual air valve – Flex. Pipe – Valve
18	Flow switch
19	Antifreeze electrical heater *(Opt.)*
20	–
21	Water differential pressure transducer *(Only with electronic pump)*

Tab. 13b – Unit connections

Model		Victaulic connection		Welded connection
		Ø A	DN	Ø mm
CB4 – CL4 – CQ4	031 036 039	4”	100	114,3
CG4	036 039			
CB4 – CL4 – CQ4 – CG4	046 052 058 066	5”	125	139,7
CB4 – CL4	078			

Hydraulic Circuit

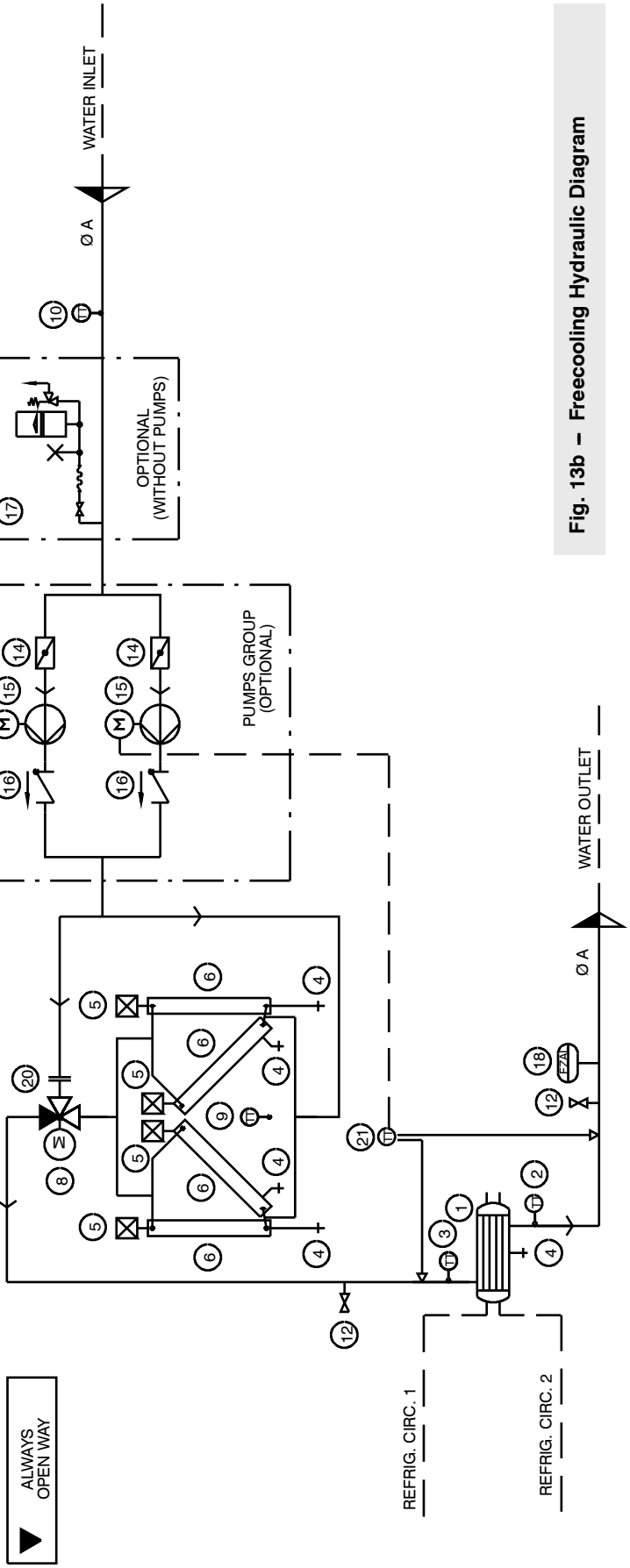


Fig. 13b – Freecooling Hydraulic Diagram

Tab. 13c – Hydraulic components

Pos.	Description
1	Evaporator
2	Evaporator water outlet sensor/antifreeze
3	Evaporator water inlet sensor
4	Discharge valve
5	Manual air valve
6	Freecooling coil
7	–
8	3 way valve
9	Air temperature sensor
10	Control freecooling thermostat sensor
11	–
12	Service valve with cap
13	–
14	Butterfly valve
15	Pump
16	No return valve
17	Kit expansion vessel – Safety valve – Manual air valve – Flex. Pipe – Valve
18	Flow switch
19	–
20	Calibrate baffle
21	Water differential pressure transducer *(Only with electronic pump)*

Tab. 13d – Unit connections

Model		Victaulic connection		Welded connection
		Ø A	DN	Ø mm
FB4 – FL4 – FQ4	031 036 039	4”	100	114,3
FG4	036 039			
FB4 – FL4 – FQ4 – FG4	046 052 058 066	5”	125	139,7
FB4 – FL4	078			

14 Accessories

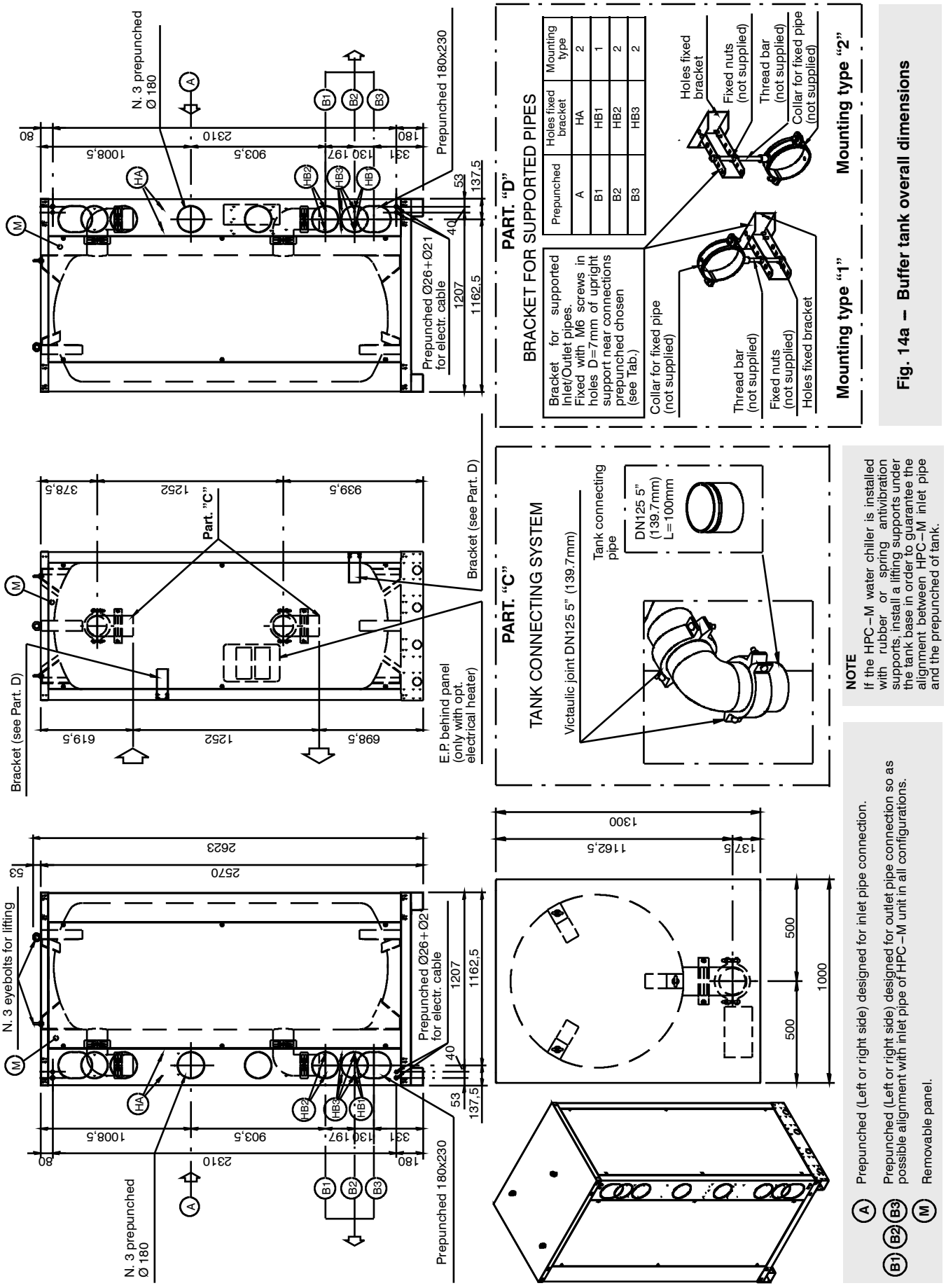
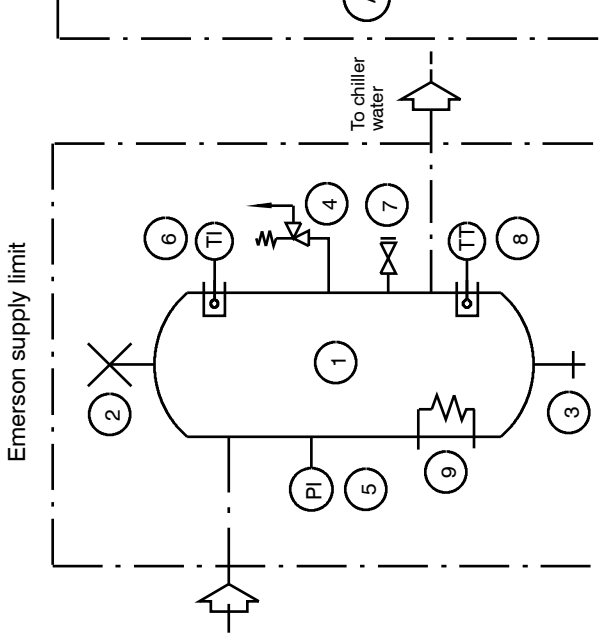


Fig. 14a – Buffer tank overall dimensions

NOTE
If the HPC–M water chiller is installed with rubber or spring antivibration supports, install a lifting supports under the tank base in order to guarantee the alignment between HPC–M inlet pipe and the prepunched of tank.

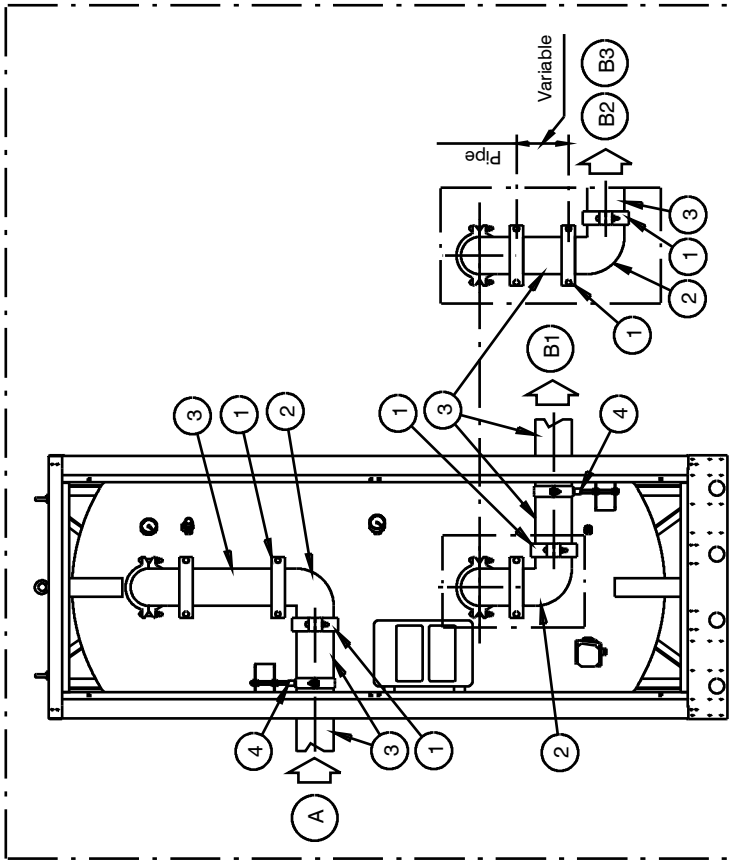
(A) Prepunched (Left or right side) designed for inlet pipe connection.
(B1) (B2) (B3) Prepunched (Left or right side) designed for outlet pipe connection so as possible alignment with inlet pipe of HPC–M unit in all configurations.
(M) Removable panel.

Fig. 14b – Buffer tank hydraulic circuit



Pos.	Description
1	Buffer tank
2	Manual air valve
3	Discharge valve
4	Safety valve
5	Manometer
6	Thermometer
7	Service valve with cap
8	Temperature sensor (opt.) (*)
9	Electrical heater (opt.) (*)
(*)	Present only with opt. Electrical heater

Fig. 14d – Example tank pipes connecting



Pos.	Description
1	Victaulic joint DN125 5” (139.7mm)
2	Victaulic elbow 90° DN125 5” (139.7mm)
3	Pipe DN125 5” (139.7mm)
4	Collar for fixed pipe + Thread bar (see Part. D)
	All this material is not provided.

Fig. 14c – Buffer tank lifting

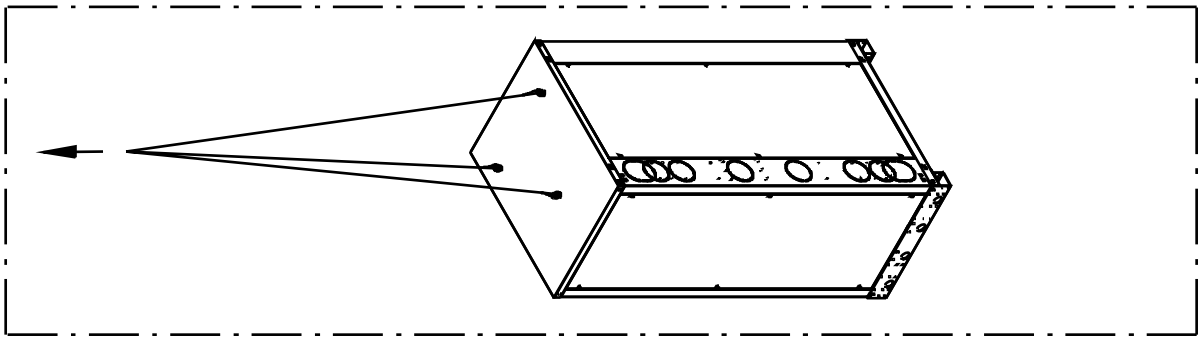
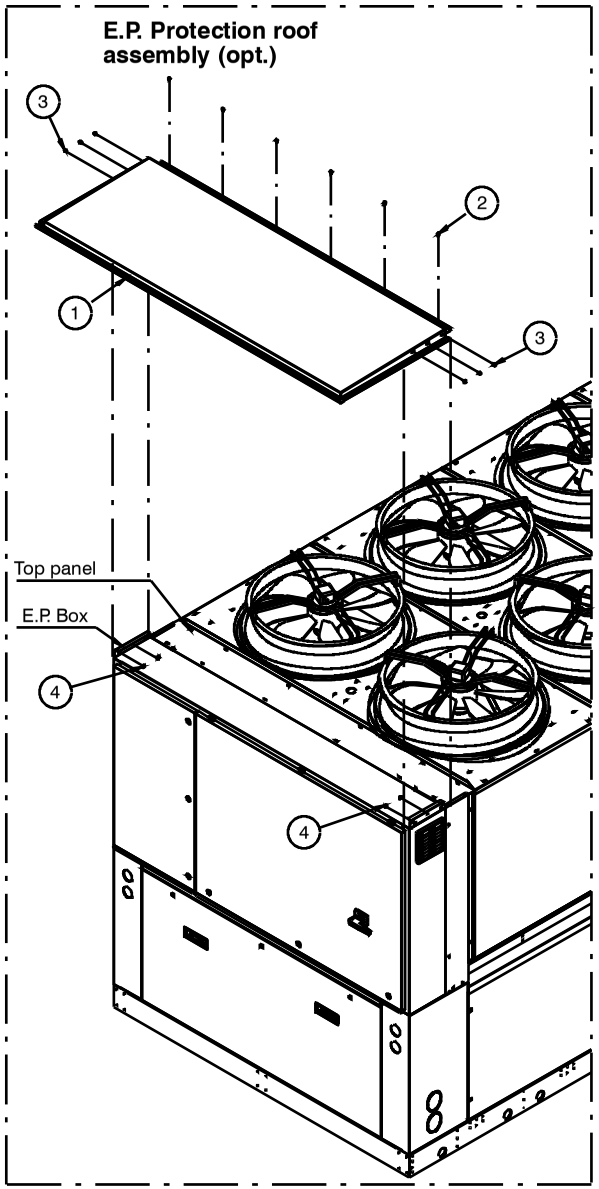
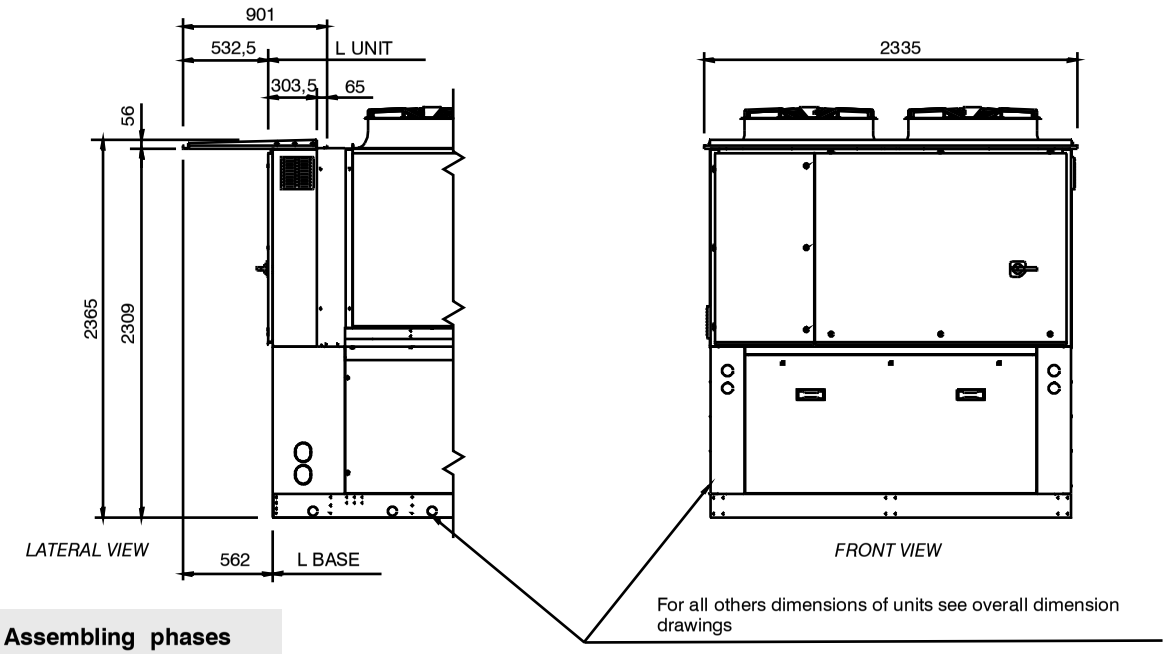


Fig. 14e – Electrical panel protection roof assembly (Opt.)

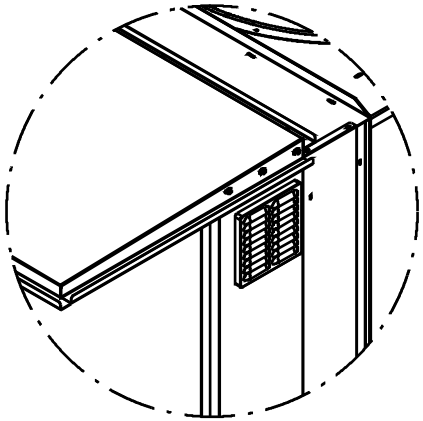


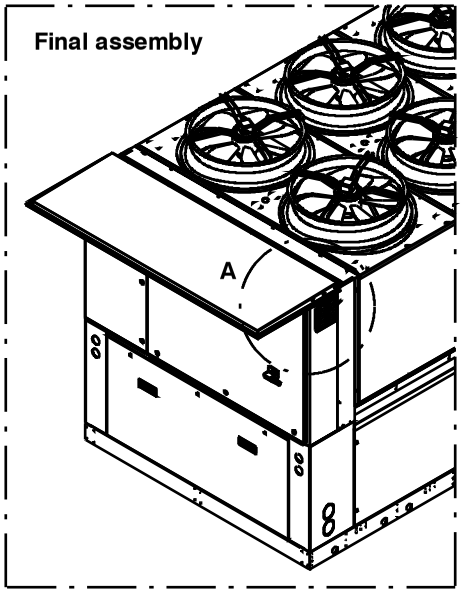


Assembling phases

- Install N. 6 square caged nut M6 (Pos. 4) on square holes 8.3x8.3 in the top of E.P. Box.
- Put on unit E.P. Protection roof (Pos. 1) and fix it on square caged nut with N. 3+3 screws M6x16 (Pos. 3) in coincidence of the 20x7 slots.
- Fix E.P. Protection roof in the rear zone, perforating with N. 6 self–drilling screws 4.8x16 (Pos. 2) the top panel in coincidence with 20x6 slots.

PART. "A"





Pos.	Description	Qty.
1	E.P. Protection roof	1
2	Hexagonal head self–drilling screw with collar 4.8x16 galv.	6
3	Serrated hexagon flange screw M6x16 galv.	6
4	Square caged nut galv. (1.7–2.5mm)	6

Fabbricante – Manufacturer – Hersteller – Fabricant – Fabricante
Fabricante – Tillverkare – Fabrikant – Valmistaja – Produsent
Fabrikant – Κατασκεναστηζ – Producent

Emerson Network Power S.r.l. – Zona Industriale Tognana
Via Leonardo da Vinci, 16/18 – 35028 Piove di Sacco – Padova (Italy)

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.:

2006/42/EC; 2004/108/EC; 2006/95/EC; 97/23/EC

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, flexibility and efficiency.

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 9719 045

United States
1050 Dearborn Drive
P.O. Box 29186
Columbus, OH 43229
Tel: +1 6148880246

Asia
29/F The Orient Square Building
F. Ortigas Jr. Road, Ortigas Centre
Pasig City 1605 Philippines
Tel: +63 2 620 3600
Fax: +63 2 730 9572

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