



Liebert HPC-L

Freecooling and Air Cooled Chillers with Double Screw Compressors

User Manual

English, cod. 273774, rev. 14.03.2018



Caution

It is recommended that:

- the manual is retained for the entire service life of the machine;
- the user reads the manual carefully before carrying out any operations on the machine;
- the machine is used exclusively for the purpose for which it is intended; incorrect use of the machine shall release the manufacturer from any liability.

This manual has been prepared to enable the end- user to carry out only those operations that can done with the panels closed. Any operations that require the opening of doors or equipment panels must be carried out only by qualified personnel.

Each machine is equipped with an electric isolating device which allows the operator to work in conditions of safety. This device must always be used to eliminate risks during maintenance (electric shocks, scalds, automatic restarting, moving parts and remote control). The panel key supplied with the unit must be kept by the person responsible for maintenance.

For identification of the unit (model and serial no.) in case of the necessity for assistance or spare parts, read the identification labels affixed to the outside and inside of the unit.

IMPORTANT: This manual may be subject to modification; for complete and up- to- date information the user should always consult the manual supplied with the machine.

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1 - Introduction

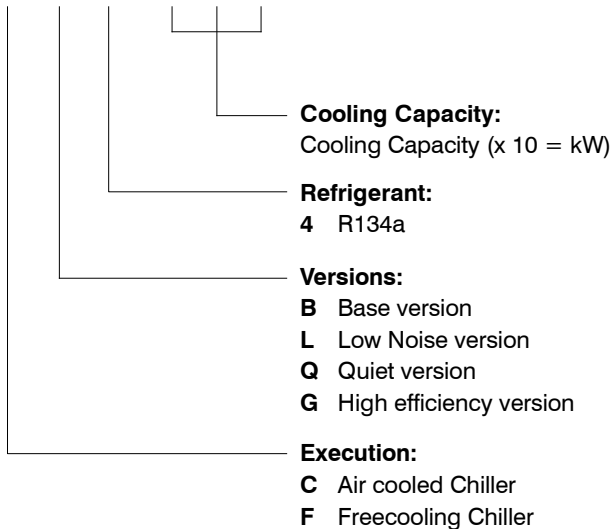
1.1 - Foreword

The handbook and all the documents supplied with the system are aimed at enabling both the installer and the operator to carry out correctly installation, control and maintenance operations on the chiller unit, without damaging it or harming the relevant staff. The handbook and the supplied documents are thus an aid for the skilled staff to arrange the special outfit so as to install, operate and maintain the machine correctly according to the local norms in force.

The handbooks, wiring diagrams and documents enclosed to the machine must be read and kept for the whole system life.

The **Liebert HPC- L** air cooled chillers can be identified as follows:

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1.2 - Responsibility

Vertiv accepts no present or future responsibility for damage to persons, things or to the machine itself due to operators' negligence, failing to comply with the installation, operation and maintenance instructions of this handbook, failed application of the safety norms in force for the system and the qualified staff charged with the operation and maintenance.

1.3 - General description

Liebert HPC- L units with air- cooled condensers, have been designed and manufactured for producing chilled water. They are also available in versions with a built- in freecooling module and pump unit installed on the machine; the chilling units can be equipped with several options indicated in the price list. The **Liebert HPC- L** product line has been designed considering the state- of- the- art techniques available nowadays in the industry, and includes all the components necessary for automatic and efficient operation. Each unit is completely factory assembled; after evacuation, the necessary quantity of refrigerant is added to the refrigerant circuits and the unit is tested. All of the units are equipped with two independent refrigerating circuits, each one composed of: an air- cooled condenser, a semi- hermetic screw compressor, a tube evaporator and lines. The components of the liquid line are the charging valves, the filter- dryers, the solenoid valve, the shut- off valve, the moisture indicator and the thermostatic expansion valve; a discharge line valve is installed on the compressor, while they are optional on the suction line. The hydraulic circuit is made up of grooved hydraulic lines

connected by joints (Victaulic type), a flow switch and, in the freecooling versions, chilled- water coils and a three- way valve. The semi- hermetic screw compressors are complete with the following protection/safety devices: oil heater, internal safety valve according to EN 60335- 2- 34, oil sight glass, electronic protection controlling the temperature of the motor windings, the oil temperature and the screw rotating direction. The **Liebert HPC- L** water chillers are controlled by the "iCOM" microprocessor, managing all of the unit operating conditions. The user can change and/or modify the operating parameters through the display keyboard installed on the electrical panel. The electrical control board is equipped with all the safety and operating devices needed for reliable automatic operation. The compressor motors are equipped with protection on all the three phases and are started by their three- pole contactors.

2 - Preliminary operations

2.1 - Packing removal

Remove the polythene package caring not to damage the unit. Dispose of the package materials delivering them to specialized collection or recycling centers (comply with the local norms in force).

2.2 - Inspection

All the units are assembled and wired in the producing factory. Before shipment they are charged with the necessary quantities of refrigerant and oil and then tested under the operating conditions required by the customer. The freecooling coils are supplied dry to avoid possible problems due to the frost in the storage period. Immediately inspect the machine carefully on delivery to check for damage during transportation or missing components; possible claims must be made immediately to the carrier and the factory or its representative.

2.3 - Operating limits

Refer to the table "Tab. 3 - Operating limit" showing the limits for each model; contact your dealer for different values.

2.3.1 - Outer air temperature

The units are designed to operate at:

- Min. temperatures:
 - 25° C for the freecooling models
 - 10° C for the Chiller models
- Max. temperatures:
 - depending on the model as indicated in the table "Tab. 3".

Such limits are considered for new machines or machines that have been correctly installed and maintained.

The units are designed to be stored at:

- Temperatures: - 10 / +45° C
- Humidity: 80% R.H., not condensing

2.3.2 - Water circuit

The water delivery is indicated in the table "Tab. 3 - Operating limit". Higher delivery values can cause corrosion and vibrations inside the tube nest heat exchanger. The min. allowed water delivery corresponds to a max. thermal change of about 8° C. Tougher operating conditions can activate the safety devices locking the unit.

Temperature of the exiting water from 4° C to 15° C.

The water max. return temperature with full load unit is 20° C; higher return temperatures are allowed only at the start.

The "G" versions admit maximum water outlet temperature of 20° C and maximum return water temperature of 26° C when the units are at full load.

The max. allowed glycol percentage is 50% (35% with pump units).

The min. glycol percentage needed depends on the min. room air temperatures in the installation place.

The max. hydraulic operating pressure is 6 barg; make sure this limit is independent of the presence / absence of pumps fitted in the unit. It is necessary to check the max. pump static head (indicated on the pump's name plate) and pressurize the water circuit not more than 6 barg (max. pump static head).

2.3.3 - Power supply

Electrical panel designed according to CEI EN 60204- 1 "Safety of machinery - Electrical equipment of machines".

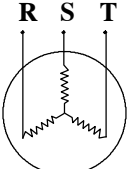
- Voltage: in standard operating conditions, from 0.9 to 1.1 times the rated voltage.
- Frequency: from 0.99 to 1.01 times the rated frequency continuously.
- Voltage unbalance: must be lower than 2%.

The Fig. a shows a calculation example of the voltage unbalance.

Fig. a - Example of calculating phase to phase variability

1) The 400 V supply has the following variability:

RS = 388 V
ST = 401 V
RT = 402 V



2) The average voltage is:

$$\frac{388 + 401 + 402}{3} = 397$$

3) The maximum deviation from the average is:

$$402 - 397 = 5 \text{ V}$$

4) The phase to phase variability is:

$$\frac{5}{397} \times 100 = 1.26 \text{ (acceptable)}$$

NOTE:

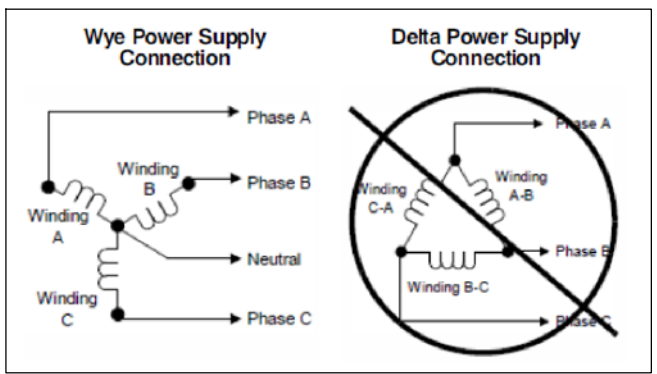
Three-phase electric power

Requirements:

The **Liebert HPC- L** units are equipped with electrical devices (EC motors, power supplies module, inverter pumps, control devices, etc.) that are designed to operate properly with Star-connected power (Wye) with earthed neutral (TN or TT system).

Three-phase distribution Delta-connected (Δ) or Star-connected power (Wye) without ground or floating ground (IT) contact Vertiv

Wye (Y) vs. Delta (Δ) power supply connection diagram.



Acceptable power supply (TT, TN-S, TN-C, TN-C-S systems):

- 400V Wye with solidly grounded neutral (230V line to ground).

Unacceptable power supply:

- 400V Wye without ground connection or with high-resistance (or impedance) ground (IT).
- 400V Δ without ground or with high-resistance (or impedance) ground (IT).
- 400V Δ with corner ground or with grounded center-tapped.

2.4 - Sound pressure levels

Tab. 4 - "Sound pressure levels" shows the noise data for the units in standard configuration (without pumps), operating continuously and measured according to the ISO 3744 norm, in free field conditions.

The highest noise levels are detected on the coil side.

Note:

Avoid positioning in areas with possible reverberation of the sound waves, which can adversely effect the noise levels.

2.5 - Transport

- If the unit is shipped with a container, for extracting, follow the instructions placed on the front panel;
- Handle the unit by lifting it with a crane from above;
- The lifting holes are positioned in the frame's base (when lifting use spreader bars to protect the side, see Fig. 3 and Fig. 4).

N.B.:

Place the lifting tubes (optional) in the holes in the base indicated with "LIFT HERE". Lock the ends of the tubes in position with the ring nut, as shown in Fig. 3 and Fig. 4, using 60 mm span.

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.

2.6 - Foundations

- The unit must be placed on a level surface which will support its weight.
- If necessary, position the unit on suitable anti- vibration supports (see Fig. 5) that can be supplied as an option (in rubber or spring- type).
- **Attention**
Position the anti- vibration supports on the ground, lower the chiller on them and at the end fix the anti- vibration supports to the chiller itself.
- Refer to the manual "Installation of the spring anti- vibration supports" for their correct positioning.
- When positioned, level the chiller and bolt it to the floor.

Note:

For weight distribution see Fig. 6 - Support positions and loads.

Note:

The weights and their distribution refer to standard units without options; if the pump assemblies, recuperators or other options are installed on the machine, add the weights of the installed accessories to those of the standard units.

2.7 - Service area

- In order to allow free air flow and maintenance of the unit, a minimum area must be left free of obstructions around the unit (see Fig. 1 Service areas).
- The hot air expelled by the fans must be allowed to rise unimpeded by obstacles for a minimum height of 2.5m.

- Avoid recirculation of hot air between suction and delivery, otherwise the unit performance may be impaired or the standard operation can be interrupted.

3 - Installation

3.1 - Hydraulic connections

3.1.1 - Hydraulic circuit construction (Fig. b)

The piping must be connected to the chiller as shown in Fig. b. Construct a chilled water circuit as described below, see Fig. b:

- 1) Place shut- off valves within the circuit to allow servicing.
- 2) Install a pump system calculated for the flow rate required at a pressure head equal to the sum of all the pressure drops (see project data).
The refrigerating units can be equipped, upon request, with pumps having delivery and head as indicated in Tab. 6.
- 3) Install manometers at the chiller inlet/outlet.
- 4) Install thermometers at the chiller inlet/outlet.
- 5) Connect the pipes to the chiller by flexible joints to avoid transmitting vibrations and to balance the thermal expansion; proceed in the same way as with the pump assembly outside the chiller.
- 6) It is useful to include a water pressure switch to give an early warning of low water pressure.
- 7) Place a mesh filter at the inlets of the pump and of the water chiller (can be supplied as an optional accessory not fitted). If the fluid contains particles larger than 1 mm (0,04 inch), it is recommend to install a strainer with a size of 16- 20 mesh (number of openings per inch) before the exchanger. The particles could otherwise block the channels, causing bad performance, increased pressure drop and risk of freezing.
- 8) Install, at the highest points in the circuit, apparatus which allows the bleeding of air and also the filling of glycol.
- 9) Place a drain valve at the lowest points in the circuit.
- 10) Install a water fill group including the following:
 - a) filling meter;
 - b) manometer
 - c) non return valve
 - d) air separator
 - e) removable supply tube, **which must be disconnected after each charge/topping up.**
- 11) For maximum protection ensure that all tubing exposed to low outdoor temperatures is fitted with anti- freeze heaters and insulated using closed cell synthetic rubber (elastomer).
- 12) The circuit must include an expansion tank (with safety valve) with suitable capacity.

Note:

If the water chiller is complete with the expansion tank (supplied as an option), check if the capacity is enough or possibly install a second tank in the circuit (see par. 8.3).

Follow the indications in Fig. d for the correct sizing.

Note:

The whole circuit must contain a water volume suitable for the capacity of the installed refrigerating unit. Check if the inertial capacity given by the sum of the hydraulic volume inside the machine and the system volume is sufficient, or possibly install a tank in the circuit. Follow the indications in Fig. c for the correct sizing.

Note:

The hydraulic circuit must ensure a constant water delivery to the evaporator in every operating condition. Otherwise, the

compressors can break due to repeated returns of liquid refrigerant on their suction.

Note:

In case of a double pump, do not install motorized shut- off valves on the water outlet configured as normally closed in stand- by status, because of the presence of check valves.

On the contrary, it is possible to install these motorized valves on the water inlets.

3.1.2 - Additional of water and ethylene glycol

Very Important:

Add water and ethylene glycol in the circuit with a % depending on the min. temperature of the outside air expected in the installation site. Do not exceed the nominal operating pressure of the circuit's components.

Notes:

- To avoid stratification run the circulation pump for at least 30 mins. after adding any glycol. If the pumps are fitted on the chiller, they have to be run all together.
- Water glycol fluid mixture has to be circulated inside the chiller hydraulic parts including freecooling coils and by- pass pipes; in order to do it move the 3- way valve on both positions for the time necessary.
- After adding water to the hydraulic circuit **always disconnected the water supply coming from the sanitary circuit**; this avoids the danger of glycol entering the sanitary water circuit.
- After any topping- up of water check the concentration and add glycol if necessary.

3.1.3 - Water- glycol mixture

Water- glycol mixtures are used as the thermal carrier fluid in very cold climates or with temperatures below zero degrees centigrade.

Determine the % ethylene glycol which must be added to the water, with the assistance of Tab. a.

Tab. a - Ethylene glycol to be added to water (% in weight of total mixture)

Ethylene glycol (% in weight)	0	10	20	30	40	50
Freezing temperature, C (°)	0	- 4.4	- 9.9	- 16.6	- 25.2	- 37.2
Mixture density at 20 °C (°), kg/l	-	1.017	1.033	1.048	1.064	1.080

(*) Values are for Clariant Antifrogen N. For different brands, check manufacturer's data.

For the water charges in the circuit refer to the Tab. 2 - Internal hydraulic volume.

ALWAYS CHARGE THE HYDRAULIC CIRCUIT WITH THE REQUIRED GLYCOL % NECESSARY FOR THE MIN. AMBIENT TEMPERATURE OF THE INSTALLATION SITE, FAILING TO COMPLY WITH THIS INSTRUCTION SHALL INVALIDATE THE UNIT WARRANTY.

3.2 - Connection of the safety valve discharge

On the refrigerating circuit safety valves are installed on the high and low pressure sides: the discharge of these valves must be conveyed outside through a suitable pipe, having a diameter of at least that of the valve discharge, without burdening the valve body; convey the discharge to areas where the jet cannot harm people.

3.2.1 - Protection and cleaning of the evaporator and components of hydraulic circuit

It is the user's responsibility to establish the quality of the water and make sure that this is compatible with the materials used in

the hydraulic components and exchangers. The quality of water may significantly affect the operation and the life of the exchangers. The first step in the planning the treatment of the water is chemical analysis, which must be performed by qualified personnel from specialist organizations. Exchangers cleaning may be performed only with chemical method, using commercially- available products with a dual action, that is, the removal of the scale and the prevention of corrosion.

In the chiller with pumps and in all freecooling units, water quality has to be in accordance with VDI 2035.

In tower water, the tendency to form deposits may be high: to reduce this phenomenon, there are various types of water softening treatments available, including the use of ion exchange resins.

The oxygen dissolved in water increases the rate of corrosion. The main factors causing corrosion are sulphur and carbon dioxide acids (see the Langelier and Ryznar indices). A combined effect of fouling due to dust and organic material provides a support for bacteria, fungi and algae; the growth of organisms may produce an oxygen gradient and this results in rather severe pitting of the metallic surface. The phenomenon of corrosion is obviously related to the material used on the liquid side of the heat exchanger. The following table shows the reference values for corrosion on copper, these values must be considered as guidelines to avoid corrosion.

In winter, if the system is stopped, the water inside the exchangers can freeze damaging the system irreparably; thus,

it is recommended to use glycol mixtures (see following paragraphs: please consider the different outputs and absorption by the chiller, the pump sizing and the performance of the system terminals/conditioners) or drain the system completely, using the suitable cocks arranged in the exchangers and in the circuit, trying to drain the water residues blowing air in the lines.

Tab. b - Water component for corrosion limit on Copper

pH	-	7.5 ÷ 9.0
SO₄	ppm	< 100
HCO₃/ SO₄	-	> 10
Total hardness	dH	4.5 ÷ 8.5
CJ-	ppm	< 50
PO₄³⁻	ppm	< 2.0
NH₃	ppm	< 0.5
Free Chlorine	ppm	< 0.5
Fe³⁺	ppm	< 0.5
Mn⁺⁺	ppm	< 0.05
CO₂	ppm	< 50
H₂S	ppb	< 50
Temperature	°C	< 65
Oxygen content	ppm	< 0.1

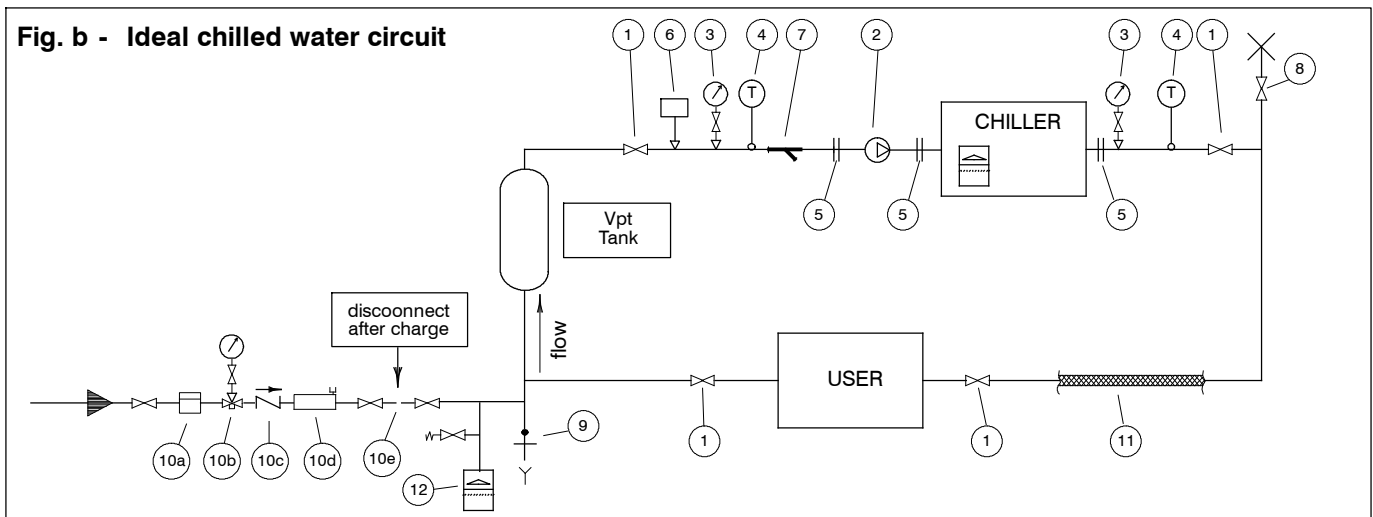


Fig. c - Inertial tank sizing

The total optimal hydraulic value of the system where the **Liebert HPC- L** chiller is installed can be calculated by the following ratio:

$$V = \frac{43 \times Rt}{Xd}$$

where:

- V=min. required total water volume expressed in liters
- Rt=refrigerating capacity expressed in kW
- Xd=differential band set on the control and expressed in degrees centigrade

Please note that the min. required total water volume (V) must be at least equal to the sum of the hydraulic volume of the **Liebert HPC- L** chiller (Vm) plus the volume of the hydraulic circuit connected to it (Vpc); if this condition is not complied with, it is necessary to install an inertial tank (Vpt, as indicated in the Fig. b *ideal chilled water circuit*) with a volume at least equal to the following value: $V_{pt} = V - V_m - V_{pc}$

Fig. d - Sizing of the expansion tank

The total volume of the expansion tank is calculated with the following ratio:

$$V = \frac{C \times e}{1 - \frac{P_i}{P_f}}$$

where:

- C=quantity of water inside the system expressed in liters
- e=water expansion coefficient, with water at 10 °C as a reference
- Pi=absolute pressure of initial charging, equivalent to the tank pre- charge pressure (typical value 2.5 bara)
- Pf=absolute final tolerated pressure, lower than the operating pressure or than the safety valve calibration pressure (typical value 4.0 bara).

Use the values of the water expansion coefficient indicated in the table below:

T [°C]	Density	Expansion coefficient "e" H2O	"e" 10% glycol	"e" 20% glycol	"e" 30% glycol	"e" 40% glycol	"e" 50% glycol
	[kg/m ³]						
10	999.6	0.001	0.003	0.005	0.007	0.013	0.015
20	997.9	0.002	0.005	0.008	0.010	0.015	0.018
30	995.6	0.004	0.007	0.011	0.013	0.017	0.020
40	992.2	0.008	0.011	0.014	0.016	0.021	0.024
50	988.1	0.012	0.015	0.018	0.021	0.025	0.028

3.3 - Electrical connections

- 1) Before wiring, check that:
 - the electrical components are in good conditions;
 - all terminal screws are well tightened;
 - the supply voltage and frequency comply with those indicated on the unit and within the tolerances indicated in the paragraph "Operating limits";
 - the max. unbalance between the phases does not exceed the value indicated in the paragraph "Operating limits".
- 2) Connection of the supply cable:

The units are equipped with two electrical panels. The installer must arrange two connection points, one for the master panel and one for the slave panel.

 - Choose a supply cable (three- pole type, with ground) according to:
 - the local norms;
 - the system absorption (FLA unit);
 - the system voltage;
 - installation type;
 - cable length;
 - upstream protection.

After opening the passage in the structural works (pre- cut, see from Fig. 7 to Fig. 22) for the supply line inlet, restore the original protection degree with suitable accessories for the wiring and junction boxes.

Install the cable avoiding carefully to touch the hot parts. Connect the cable to the inlet terminal board (disconnecting switch terminals for phases, ground bar for PE conductor).

After having connected the cable, restore the protections against direct contacts.



Fig. e - Example of connection with the disconnecting switch with 2 cable terminals and ground bar.



Fig. f - Restore the polycarbonate protection.



Fig. g - Restore the IP degree with cable clamps.

3) The system/line cable protection is to be arranged by the customer.

Use a protection with differential switch. If the system is equipped with EC type fans and/or pumps with inverters, use a B type switch.

4) Ethernet cable connection.

The control can be connected with a remote display (ColdFire) through an Ethernet network cable (see HW user handbook). The connection must be made in the master panel, that is the one equipped with the network switch.

- Fasten the cable to the clamp- holding plates and make it pass through the first free hole on the panel bottom (arrange a cable clamp).

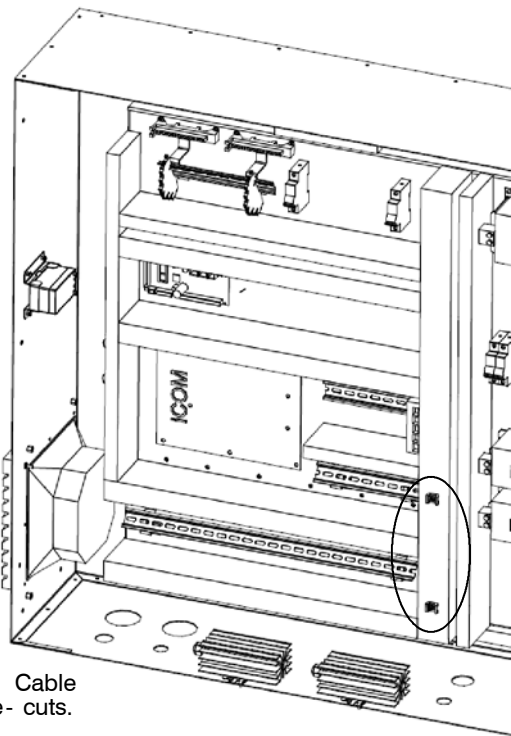


Fig. h - Cable passage pre- cuts.

- After opening the passage in the structural works (pre- cut, see from Fig. 7 to Fig. 22) opposite the supply line inlet, restore the original protection degree with suitable accessories for the wiring and junction boxes.
 - The cable must be protected by a sheath.
- 5) Connection of the clean contacts for the machine status signals. Each panel forming the unit (master / sub- unit) has clean contact for the machine status signals. The clean contacts can be used only with PELV type sources, as described by the norm CEI EN 60204- 1 "Safety of machinery - Electrical equipment of machines". The table below shows the available terminals and their meaning (refer to the wiring diagrams for further information). The cable passage must be arranged as described in the previous point. Ethernet cable connection.

Contatti puliti a disposizione - Free contacts available		
400	Allarme generale - Alim. B off General Alarm - Supply B off	→ 400-401 NC
401		
402		
300	Aviso - Alim. B off Warning - Supply B off	→ 300-301 NC
301		
302		
450	Compressore in funzione Compressor ON	→ 450-451 NC
451		
458	Pompa in funzione Pump ON	→ 458-459 NC
459		
500	Allarme compressore Compressor alarm	→ 500-501 NO Alarm - Unit OFF
501		
502	Allarme alta temp. acqua Alarm high water temp.	→ 502-503 NO Alarm - Unit OFF
503		
504	Allarme alta pressione High pressure alarm	→ 504-505 NO Alarm - Unit OFF
505		
506	Allarme flusso acqua Water flow alarm	→ 504-505 NO Alarm - Unit OFF
507		
602	Contatt. compress. incollato Compr. Contactor melted	→ 602-603 NC Alarm
603		
606	Allarme ventil. condens. Condensaer fan failure	→ 606-607 NO Alarm - Unit OFF
607		
230	Apertura valvola FC NG FC valve NG opening	→ 230-231 NC
231		
232		
233		
232	Chiusura valvola FC NG FC valve NG closing	→ 230-232 NC
233		
233	Pompa NG in funzione NH pump ON	→ 230-233 NC
230		
Contatti in ingresso - Input contact		
484	On-off remoto Remote on-off	Supply voltage 24V AC
485		

Note:

The power supply should never be disconnected, except when performing maintenance. Operate (open) the main switch before carrying out any maintenance work on electrical components.

Note:

It is forbidden to work on the electrical components without using insulating platforms, and in the presence of water or fog or mist.

Note:

The supply to the external pump assembly must be made before starting the chiller and must be kept on as long as the chiller is in use. Incorrect operation will cause the unit to lock- out because of the internal protections (flow switch intervention).

Note:

The compressors are equipped with an electronic protection device blocking their start if the phase sequence is not correct, or stopping their operation if a thermal relay intervenes. This device is essential for the integrity of the mechanical and electrical components of the compressors. Reset the standard functions by isolating this device and removing the causes of the lock-out.

Note:

The chillers are equipped with their own microprocessor control adjustment. The use of there mote ON- OFF input (located in the electric panel terminal board) as a system temperature control element is forbidden.



Dry contact 602- 603 NC during alarm state (opposite logic to the others) signals compressor's contactor melted: It has to be managed by the customer switching the unit's power supply OFF. Before switching the unit ON, check the compressor and their contactor conditions.

4 - Start- up and operation

4.1 - Initial check

Caution:

The operation has to be carried out by a qualified technician with an experience and know- how on chiller units, iCOM control board and software.

Before the checks below make sure the unit power supply line is disconnected at the start. Make sure the disconnection device is locked and the suitable warning plate for no operation is applied on the start handle. Before operating on the electrical connections, make sure there is no voltage through a voltmeter or a phase detector.

Some components (electronic pumps, EC fans, compressor's capacitors, soft- start, inverter) may remain at high voltage for a short period after the power supply removal. Wait minimum 5 min before removing their electrical box panels and accessing their parts under tension.

- 1) Check all the cable connections particularly the main power connections on the power fuses, contactors and MCB.
- 2) Check that all thermal protections are calibrated according to the electrical data tables reported in the wiring diagram.
- 3) Check all water connections.
- 4) Open the discharge valve (and the suction valve, if installed) of the compressor and the shut- off valve on the liquid line.
- 5) Ensure that the intake pressure is higher than 2.0 bar for R134a: if this is not the case, prolong pre- heating of the compressor (see Fig. 26 - Refrigerant circuits) and check that the refrigerant shut- off valve is properly sealed.
- 6) Open all isolating valves and/or water ball valve
- 7) In case of climates with temperatures below 0 °C, make sure the chilled water circuit is filled with the correct concentration of water/glycol.
- 8) Bleed all air out of the chilled water circuit.
- 9) Verify the water flow rate and its direction.
- 10) Ensure the thermal load is sufficient for the start- up.
- 11) Record the functional data on the Start-Up certificate.

Caution:

The outer air temperature probe must be positioned in the shade and protected against the weather.

Caution:

Now set the handle of the door- lock general knife switch to the position "0"; it is now possible to supply the unit electrically closing the disconnection device upstream the power supply line.

4.2 - First start- up (or after a long stop)

Caution:

Before the following operations, make sure all protections on the units have been reset; set the handle of the door- lock general knife switch to the position "1", check of the display LED switched on and check again by a voltmeter or tester if the voltage and phase difference fall within the indicated limits.

Operate as follows:

- 1) **At least 8 hours before the start- up, power the crankcase heaters by setting the operating knife switch ON. Make sure the auxiliary circuit has been powered and check the operation (a fault due to an incorrect procedure will invalidate the compressor guarantee).**
- 2) Open the valves of the refrigerating circuit that had been closed before the initial check.
- 3) Check the machinery supplying the thermal load connected with the unit and start the system pump/s.
- 4) **MAKE SURE THE COMPRESSOR OIL HAS BEEN HEATED FOR AT LEAST 8 HOURS;** start the unit only then.
- 5) Make sure the fans rotate in the correct direction (counterclockwise): check the electrical connections, if necessary.

- 6) Make sure the pumps rotate in the correct direction.
- 7) **During the unit start- up a temperature of the water/glycol inlet higher than 20° C is allowed. Under standard operating conditions check that the limits indicated in paragraph 2.1 are not exceeded.**
- 8) Check the correct operation of the control and safety devices.
- 9) Check the outlet temperature of the chilled water (check if the set- point set on the control is reached).
- 10) Check the compressor oil level.
- 11) With the compressor at full load, check there are no bubbles visible in the flow indicator. If there are any, charge the unit according to par. 5.
- 12) In the electrical panel a lead battery is present to manage properly the EEV in case of a power failure. It is normally charged enough to pass properly the production test. In case the unit has been left without a power for a long period, the level of charge could be reduced.
If after power ON the iCOM control should generate EEV 1/2 battery failure warning, wait approx 24h before charging the battery. This will give necessary time for a recharge. If after this time the warning event is still present, replace the battery with a new one.

4.3 - Starting and stopping

ALWAYS ENSURE THAT THE COMPRESSOR OIL HAS BEEN PREHEATED.

FOR BRIEF STOPPAGES MAINTAIN THE SUPPLY TO THE CRANKCASE HEATER.

- Start the unit setting the Microprocessor switch **ON**.
- Stop the unit setting the Microprocessor switch **OFF**.
- In case of long stops, cut the machine off setting the Microprocessor switch **OFF**.
In this case the compressor crankcase heaters remain powered.
- For seasonal shutdown of the unit operate the main switch located on the main electrical power supply. This will disconnect the compressor crankcase heaters. Machine restart must be managed as in § 4.2 "Initial startup (or following a long interruption)".
- The unit can tolerate short periods without power due to a blackout without the fast start function (up to four hours), with automatic restart without the need to repeat the procedure described in § 4.2 "Initial startup (or following a long interruption)".
- The unit can tolerate short periods without power due to a blackout with the fast start function (up to one hour), with automatic restart without the need to repeat the procedure described in § 4.2 "Initial startup (or following a long interruption)".

4.4 - Chiller serving special plant

The units are capable of cooling a water- glycol mixture to temperatures close to 0 °C without the need for significant modifications. In the case of modification, the set values of the safety and control components must also be modified. This can be carried out in the factory (at the time of testing) or at the time of installation, only by qualified and authorised personnel.

4.5 - Freecooling

The freecooling is a system of pre- cooling and/or cooling the water/glycol mixture using ambient air ("freecooling") when the latter is at a temperature below the return mixture temperature. If the outside temperature is sufficiently low to dissipate the entire heat load, the refrigeration compressors automatically switch off, and the mixture's temperature is controlled by the fan speed adjustment.

If the mixture temperature is too high for freecooling, the compressors will operate as long as necessary to ensure the correct water/glycol mixture temperature.

4.6 - Freecooling No Glycol execution

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

The following equipment is installed inside the chiller:

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

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

- Plate exchanger, recovering the freecooling capacity and separating the user water circuit from the freecooling glycol fluid circuit.
- Glycol fluid circulation pump complete with shut- off valves.
- Three- way valve for switching between freecooling and no freecooling operation.
- Hydraulic circuit complete with expansion tank, safety valve, vent valve, loading and unloading valves, tray for accidental glycol spilling collection.
- Heaters (to protect the piping and the heat exchanger) controlled by independent electronic thermostats.

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

Tab. c - Technical features and performance

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

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

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

For further information refer to hydraulic circuits drawings, overall dimensions and No Glycol dedicated manual.

4.7 - Freecooling versions: Three- way valve



Water quality has to be in accordance with VDI 2035 in order to assure valve functionality; max. working pressure is 6 Bar.

- Electric board complete with switch for the pump, three- way valve, heater control electronic thermostats, terminal board for the connection to the digital outputs for controlling pump and 3- way valve on the machine.
- Electric board preset for auxiliary circuit power supply by UPS.
- Cavities for fitting temperatures probes on the machine.

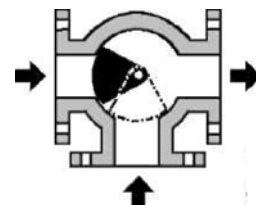
Three hydraulic modules have been selected to be combined with each unit according to the dimensions of the freecooling coils: the 900 kW module is combined with the 12- fan units, the 1200 kW module with the 16- fan units and the 1400 kW module with the 20- fan units.

The separated module can be installed up to a max. distance of about 10 m from the **Liebert HPC- L** hydraulic connections; beyond this distance, the temperature probes cannot be fitted and the expected performance cannot be ensured.

Connections by the customer:

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

Shutter valve position is shown by cutting reference on the valve end of the valve shaft (when the servo is disassembled) and by pin indicator mounted on the motor body.



Actuator running time (90° angle rotation) is 90 seconds. In the following pictures it is shown manual unlocking instruction

(it is necessary to follow this instruction when the hydraulic circuit is filled with glycol).



UNLOCK

To unlock the actuator open the top cover and push the activation button.

4.8 - Microprocessor control

Consult the "iCOM" Service Manual.

5 - Refrigerant and oil charge

All work on pipes or components of the refrigerating circuit under pressure must be exclusively made by qualified staff, competent in such works.

5.1 - Refrigerant charge

WHILE REPAIRING THE REFRIGERATING CIRCUIT RECOVER ALL THE REFRIGERANT IN A CONTAINER: DO NOT ALLOW IT TO ESCAPE. NEVER USE THE COMPRESSOR FOR THE SYSTEM VACUUM (THIS INVALIDATES THE WARRANTY).

- The unit is delivered charged according to the Tab. 5- Refrigerant charge.

Warning for the refrigerant charge:

- Ensure there are no water leaks.
- Check the refrigerant charge in the refrigerating circuit: a unit originally charged by the manufacturer with R134a cannot be charged with other gas; possibly apply to the Technical Support Department.
- Charge with the compressor in operation, connecting the cylinder with the charge connector after the thermostatic expansion valve.
Drain the connection pipe between the cylinder and the charging point; tighten the seal joint and then start charging the unit. It is imperative that the cylinder is weighed both before and after the operation.
- Charge the unit until the bubbles in the sight glass have disappeared and the working conditions of the entire refrigeration circuit have returned to normal (sub- cooling and superheating within the limits indicated below).
- Measure the superheat as follows:
 - 1) Detect the temperature on the suction line, close to the bulb of the thermostatic expansion valve, using a contact thermometer.
 - 2) Connect a pressure gauge (by max. a 30- cm pipe) with the Schraeder connection and read the corresponding saturated evaporating temperature.
 - 3) The superheat is the difference between the two readings.

- Verify that the superheat is 5- 8 °C.
- Measure the sub- cooling as follows:
 - 1) Detect the temperature on the liquid line using a contact thermometer.
 - 2) Connect a pressure gauge (by max. a 30- cm pipe) with the Schraeder connection on the liquid line and read the corresponding saturated condensing temperature.
 - 3) The sub- cooling is the difference between the two readings.

- Verify that at the condenser outlet, sub- cooling is 3- 5 °C.

IT IS IMPORTANT TO CARRY OUT CHARGING CORRECTLY. An excess of refrigerant causes an increase in sub- cooling and consequent operating difficulties in the hot season; a shortage of charge generates an increase in superheating and possible compressor stoppages. Whenever work is carried out on the unit, ensure afterwards that the working conditions are correct, checking sub- cooling and superheating. Check the oil level in each compressor, after a short operating time.

5.2 - Oil charge

Contact the Technical Support Department for the specifications of the oil to be used for topping up; the oil changes according to the type of used refrigerant.

NEVER MIX DIFFERENT OILS TOGETHER. CLEAN THE PIPING COMPLETELY BEFORE CHANGING THE TYPE OF OIL USED.

TOP- UPS OF UPTO 20- 30% OF THE TOTAL AMOUNT OF OIL CONTAINED IN THE COMPRESSOR CRANKCASE ARE PERMITTED; FOR LARGER PERCENTAGES CONTACT THE TECHNICAL SUPPORT DEPARTMENT.

5.2.1 - Procedure for oil topping- up



If there has been any loss of oil then this must be topped up as follows:

- 1) Take a clean, dry, transparent container (with volume calibrations) and fill it with at least twice the amount of oil required.
- 2) Isolate the compressor by closing the delivery and suction cocks (or the one on the liquid line).
- 3) Connect to the fittings on the compressor body (Schraeder valves) and empty it of refrigerant until atmospheric pressure (1 bara) is reaching.
- 4) Using a pipe, connect the oil container to the oil service cock on the lower central part of the compressor.
- 5) Open the oil service cock lifting the container, so that the oil flows by gravity.
- 6) Charge the required quantity of oil (make sure the tube always remains below the oil level).
- 7) Close the oil service cock, open the shut- off cocks of the compressor and on the refrigerating circuit and restore the drained refrigerant charge.

6 - Calibration

The water chiller has been already tested and calibrated by the manufacturer. The following setting values are suggested in the field.

R134a

COMPONENT	SETTING	NOTES
<p>Low pressure switch (LP) (managed by electronic control iCOM)</p>	<p>Operation with R134a (standard factory setting): START : 1.2 bar DIFF. : 0.1 bar STOP : 1.1 bar</p>	
<p>High pressure switch (HP)</p>	<p>Operation with R134a (standard factory setting B- L- Q versions): STOP : 18 bar START : 14 bar DIFF. : 4 bar (fixed)</p> <p>Operation with R134a (standard factory setting G version): STOP : 20 bar START : 16 bar DIFF. : 4 bar (fixed)</p>	

Note 1: The second high pressure switch must be set 0.5 bar lower than the indicated settings; both the pressure switches have a fixed differential equal to 4 bar.

Note 2: The value of the parameter "HP warning" to be set in the iCOM control must be 1,0 bar lower than the min. setting of the high pressure switch.

The settings for the safety valves installed on the R134a machine are indicated below:

SETTING	SAFETY VALVE
20.0 bar	HP side (B, L and Q versions)
22.0 bar	HP side (G version)
12.0 bar	LP side

6.1 - Electronic expansion valve EEV

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

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

The operating parameters and their programming in the microprocessor dedicated to the EEV control are described in the suitable manual available on the machine.

The valve has already been factory- set and superheat should be reset only when it is not between 5° C and 8° C or the oil foam is present (visible on compressor's oil sight glass),

THIS OPERATION MUST BE PERFORMED BY AN EXPERIENCED REFRIGERATION TECHNICIAN.

Before beginning this calibration make sure the refrigerant charge is correct: this is obtained through the sub- cooling (4° C - 8° C, as specified in par. 5.1).

Compressor's suction pressure, temperature and superheat could be read from iCOM control display as described in the suitable iCOM manual available with the machine

CHANGE SUPERHEAT SETPOINT ONLY WHEN RELEVANT COMPRESSOR IS OFF. IT IS NOT ALLOWED TO CHANGE EEV SUPERHEAT SETPOINT WHEN THE RELEVANT COMPRESSOR IS RUNNING.

If the superheat is too low, there is a risk of poor lubrication and consequent breakage of the compressor as a result of pressure shock caused by liquid slugging.

If the superheat is too high the output of the system is limited and the compressor overheats.

Note:

In the electrical panel a lead battery is present to manage properly the EEV in case of a power failure.

6.2 - Environment protection

A misuse or an incorrect calibration of the unit leads to increased energy consumption, resulting in an economic and environmental damage. Use the freecooling function, if available.

7 - Maintenance

The Maintenance Programme below must be carried out by a qualified technician, preferably working under a maintenance contract.

Caution:

Before proceeding with the maintenance checks below make sure the unit power supply line is disconnected through the QSA and QSB switches. The disconnection device must be locked and a suitable warning sign with NO OPERATION must be applied on the start handle. Before operating the electrical connections, make sure there is no voltage passing through a voltmeter or a phase detector. Some components (electronic pumps, EC fans, compressor's capacitors, soft- start, inverter) may remain at high voltage for a short period after the power supply removal. Wait minimum 5 min. before removing their electrical box panels and accessing their parts under tension. Before any intervention on the unit or accessing the inner components, always ensure the machine is turned off. The front part of the compressor and the delivery pipe are very hot: be

careful when operating nearby. Be very careful when operating close to the finned coils, as the fins are very sharp. Do not remove the fan protection grille before having shut the whole machine off; do not insert foreign objects through the fan protection grille. After the maintenance interventions, always close the unit by refitting the relevant panels, fastened by the fixing screws.

7.1 - Coil cleaning procedures

The obstructions provided by powder, pollution etc. accumulated between the coils fins can be removed by means of a pressure washer.

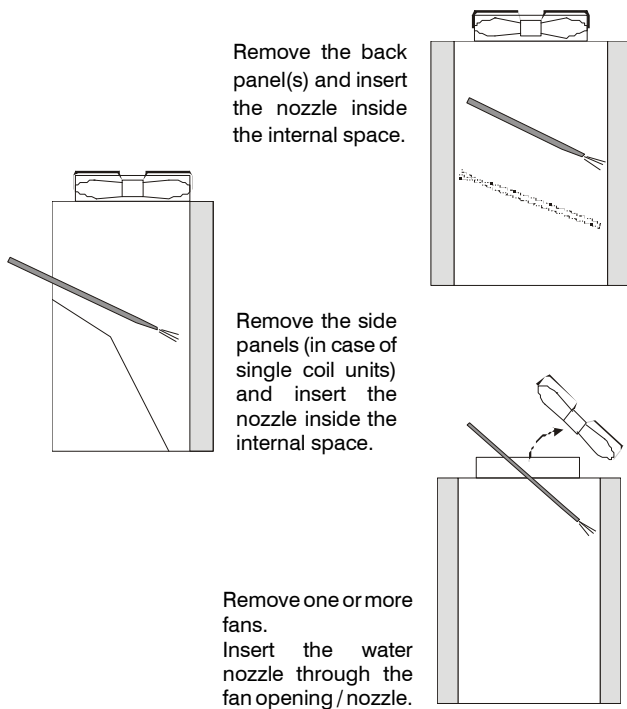
This operation shall be periodically executed.

Before operating:

- 1) disconnect the unit from the electrical power supply;
- 2) remove the air filters;
- 3) wait until the fans are completely stopped;
- 4) ensure that the fans impellers cannot move for any reason (e.g.: wind). Block them mechanically to avoid accidental contacts with the rotating blades.

The high pressure water flow shall be the contrary of the air flow direction and parallel to the coil fins.

In order to achieve this result, introduce the water nozzle in the internal space of the unit, following these possible strategies:



In case of greasy obstructions, a specific neutral degreasing product can be used to ease the process.

After the cleaning operation, re-assemble the parts previously removed and unblock the blocked fans before reconnecting to the electrical power supply.

7.2 - Compressor maintenance schedule - checks and tests

To protect against reverse rotation when stopped, a check valve is incorporated under the compressor's delivery valve. If the compressor runs in reverse direction for more than 5 sec. after switch-off, the valve may be damaged and should be replaced. Check the correct functioning every 5000 compressor working hours.

Screw compressors are equipped with fatigue resistant bearings, therefore replacement is not necessary provided that the refrigerant circuits are operated under standard conditions within the operating limits and respecting the indicated maintenance schedule. Bearing wear detection is to be carried

out by sound analysis. The recommended inspection interval is every 10.000 compressor working hours. For preventive maintenance, the recommended interval for replacing the bearings is every 40,000 working hours of the compressors. Anyway, under the standard operating conditions of the **Liebert HPC- L** units (resulting from the air-conditioning application where the condensation is mainly lower than 50°C in one operating year) the life limits of the bearings are not reached. Due to occasional variations of the compressor standard operating conditions, such as: lack of oil, moisture in the refrigerant, insufficient superheating or thermal overload, the bearings may need to be replaced.

Please contact our Service department if it's necessary to replace the compressor's bearings: it's avoid to open the screw compressor out from authorized workshops.

7.3 - Lubrication - pump

The bearings of motors up to 11 kW are greased for life and require no lubrication.

The bearings of motors of 11 kW and up must be greased in accordance with the indications on the motor nameplate.

The motor should be lubricated with a lithium-based grease meeting the following specifications:

- NLGI grade 2 or 3.
- Viscosity of basic oil: 70 to 150 cSt at 40° C (~ +104° F).
- Temperature range: - 30° C (~ - 22° F) to 140° C (~ +284° F) during continuous operation.

7.4 - Spare parts

The use of original spare parts is recommended.

When placing an order refer to "Component List" enclosed with the machine and quote the unit model no. and serial no.

7.5 - Dismantling the unit

The machine has been designed and built to ensure continuous operation. The working life of some of the main components, such as the fans and the compressors, depends on the maintenance that they receive.



The unit contains substances and components hazardous for the environment (electronic components, refrigerating gases and oils). At the end of the useful life, when the unit is dismantled, the operation must be carried out by specialized refrigerating technicians.

The unit must be delivered to suitable centers specialized for the collection and disposal of equipment containing hazardous substances. The refrigerating fluid and the lubricating oil inside the circuit must be recovered according to the laws in force in the relevant country.

Maintenance programme - Monthly check

FANS	<ul style="list-style-type: none"> • Check that the fan rotates freely without any abnormal noise, and ensure that the bearing is not running hot. • Also check the current absorption.
CONDENSER AND AIR FILTER	<ul style="list-style-type: none"> • Check the conditions of the filters (if they are supplied); if necessary clean them (including the electric board ventilation filter). • Check the condenser coils, cleaning if necessary (see coil cleaning procedures, par.7.1)
CONTROL	<ul style="list-style-type: none"> • Check that the control equipment, LEDs and display are operating correctly. • Check the supply voltage. • Check the operation of the cover heaters. • Check the operation of the solenoid valves. • Check the conditions of the remote control switch contacts. • Check the operation of the evaporator resistance.
ELECTRICAL CIRCUIT	<ul style="list-style-type: none"> • Check the electrical supply on all phases. • Ensure that all electrical connections are tight.
REFRIGERATION CIRCUIT	<ul style="list-style-type: none"> • Check the condensing and the evaporating pressures (to be done by a refrigeration technician). • Check the compressor's current absorption, the delivery temperature and possible unusual noises. • Check the freon charge by means of the sight glass. • Check that the safety devices operate correctly. • Check the correct operation of the thermostatic valve (superheat between 5- 8 °C) • Check that the oil level indicated by the compressor sight glass is higher than the min. value.
CHILLED WATER CIRCUIT	<ul style="list-style-type: none"> • Ensure that there are no water leaks. • Bleed any air out of the hydraulic circuit using the bleed valve on the chilled water coil. • Verify the correct water flow inlet. • Check the inlet - outlet liquid temperature and pressure. • Check the correct operation of the three- way valve (if installed) • Check if the system is charged with the specified glycol percentage and that no ice has formed in the hydraulic circuit. • Check the evaporator cleanliness.

+¹* Regulation (EU) no. 517/2014 (F- gas)

+¹* .1 Introduction

Stationary air conditioners placed into the European Community market and operating with fluorinated greenhouse gases (F-gas, such as R407C, R134a, R410A), have to comply with the F- gas Regulation (EU) No. 517/2014.

This Regulation is in force since Jan 1, 2015 and it replaces the Re. (EU) no. 342/2006.

This document summarizes the obligations for the operators that are responsible for the equipment during all its operative life until its disposal.

+¹* .2 Normative References

F-gas	517/2014	Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006
Certified personnel and Companies	2015/2067	Commission Implementing Regulation (EU) 2015/2067 of 17 November 2015 establishing, pursuant to Regulation (EU) No 517/2014 of the European Parliament and of the Council, minimum requirements and the conditions for mutual recognition for the certification of natural persons as regards stationary refrigeration, air conditioning and heat pump equipment, and refrigeration units of refrigerated trucks and trailers, containing fluorinated greenhouse gases and for the certification of companies as regards stationary refrigeration, air conditioning and heat pump equipment, containing fluorinated greenhouse gases
Leak check air conditioning	1516/2007	Commission Regulation No 1516/2007 of 19 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases
Leak check fire protection systems	1497/2007	Commission Regulation No 1497/2007 of 18 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, standard leakage checking requirements for stationary fire protection systems containing certain fluorinated greenhouse gases

From 01/01/2017 to be replaced by:

Commission Implementing Regulation (EU) 2015/2068 of 17 November 2015 establishing, pursuant to Regulation (EU) No 517/2014 of the European Parliament and of the Council, the format of labels for products and equipment containing fluorinated greenhouse gases

+¹* .3 Fluorinated Greenhouse Gases

Following notes have to be considered when operating with the above mentioned equipments:

- Fluorinated greenhouse gases are covered by the Kyoto Protocol.
- The fluorinated greenhouse gases in this equipment should not be vented to the atmosphere.
- Referring to the value noted in Annex I and Annex IV of Regulation (EU) No 517/2014 here below the global warming potential (GWP) of some major F- gases or mixtures:
 - R-134a GWP 1430
 - R-407C GWP 1774
 - R-410A GWP 2088

NOTE: *the refrigerants as R22 are not F-gas and their relevant regulation is Reg. (EU) no. 1005/2009.*

+^{1*} .4 Operators

+^{1*} .1 Definitions

- Operator, according to Regulation 517/2014 Article 2, point 8, means the natural or legal person exercising actual power over the technical functioning of products and equipment covered by this Regulation.
- The State may, in defined, specific situations, designate the owner as being responsible for the operator's obligations.
- Where large installations are involved, service companies are contracted to carry out maintenance or servicing. In these cases the determination of the operator depends on the contractual and practical arrangements between the parties.

+^{1*} .2 Obligations

Operators of stationary air conditioners, which contain fluorinated greenhouse gases, shall, using all measures which are technically feasible and do not entail disproportionate cost:

- Prevent leakage of these gases and as soon as possible repair any detected leakage.
- Ensure that they are checked for leakage by certified personnel.
- Ensure for putting in place arrangements for the proper recovery by certified personnel.
- According to Regulation 517/2014 the operators shall ensure that the equipment is checked for leaks as following:
 - Case 1** - Non-sealed equipment contains less than 5 tonnes of CO₂ equivalent of fluorinated greenhouse gases.
 - ▶ Leakage test not required
 - Case 2** - Hermetically sealed equipment contains less than 10 tonnes of CO₂ equivalent of fluorinated greenhouse gases.
 - ▶ Leakage test not required
 - Case 3**
 - ▶ **Leakage test required:** check the equipment for leaks with the minimum frequency given in the following table:

X = Tonnes of CO ₂ Equivalent	Y = equivalent amount of refrigerant [kg]			Minimum frequency for leak check	
	R134a	R410A	R407C	with leakage detection	without leakage detection
$5 \leq X < 50$	$3,5 \leq Y < 35$	$2,4 \leq Y < 24$	$2,8 \leq Y < 28$	12 Months	24 Months
$50 \leq X < 500$	$35 \leq Y < 350$	$24 \leq Y < 240$	$28 \leq Y < 282$	6 Months	12 Months
$X \geq 500$	$Y \geq 350$	$Y \geq 240$	$Y \geq 282$	3 Months	12 Months

- Recovery for the purpose of recycling, reclamation or destruction of the fluorinated greenhouse gases, pursuant to Art. 8 of the Regulation 517/2014 shall take place before the final disposal of that equipment and, when appropriate, during its servicing and maintenance.

+^{1*} .5 Leakage Detection

The manufacturer approves the following leakage check methods according to Reg. 1516/2007 and Reg. 1497/2007:

Method	Specifications
a Check of circuits and components representing a risk of leakage with gas detection devices adapted to the refrigerant in the system	Gas detection devices shall be checked every 12 months to ensure their proper functioning. The sensitivity of portable gas detection devices shall be at least five grams per year.
b Application of ultraviolet (UV) detection fluid or suitable dye in the circuit	The method shall only be undertaken by personnel certified to undertake activities which entail breaking into the refrigeration circuit containing fluorinated greenhouse gases.
c Proprietary bubble solutions/soapsuds	---

+^{1*}.6 Labelling

The label applied on the unit (see *Onboard Label*) is designed to fill-in the relevant amounts of refrigerant according to Regulation 1494/2007 (2015/2068):

- a Where fluorinated greenhouse gas is foreseen to be added to the equipment outside of the manufacturing site at the point of installation, a dedicated label accommodates notation of both the quantity (kg) pre-charged in the manufacturing plant and of the quantity charged at the installation site as well as the resulting total quantity of F-gas as a combination of the above mentioned quantities, in a manner which conforms to the legibility and indelibility. Our split units are usually not pre-charged on factory, in this case the total quantity of refrigerant charged in the unit has to be written in the relevant label, during the commissioning operation at the installation site. All of the quantities of must be given both as mass of refrigerant [kg] and as Tonnes of CO2 Equivalent. Use the following rule for computation:

$$\text{Tonnes of CO2} = \frac{\text{kg of refrigerant} \times \text{GWP of refrigerant}}{1000}$$

where:

Refrigerant	GWP
R-134a	1430
R-407C	1774
R-410A	2088

- b Our packaged units (not split) operating with f - gas are usually full charged on factory and the total amount of refrigerant charge is already reported on the label. In this case, the label has no need of further written information.
- c In general, the above mentioned information has been located in the main nameplate of relevant unit.
- d For equipment with double refrigeration circuits, in regards to differentiates requirements on the basis of the quantity of F-gas contained, the required information about refrigerant charge quantities has to be listed separately for each individual circuit
- e For equipments with separate indoor and outdoor sections connected by refrigerant piping, the label information will be on that part of the equipment which is initially charged with the refrigerant. In case of a split system (separate indoor and outdoor sections) without a factory pre-charge of refrigerant, the mandatory label information will be on that part of the product or equipment which contains the most suitable service points for charging or recovering the fluorinated greenhouse gas(es).

NOTE: *Safety data sheets of F-gases used in the products are available on demand.*

+^{1*}.7 Record Keeping

Operators of equipment which is required to be checked for leaks (see *7.6.5 Leakage Detection*), shall establish and maintain records for each piece of such equipment specifying the following information:

- a the quantity and type of fluorinated greenhouse gases installed
- b the quantities of fluorinated greenhouse gases added during installation, maintenance or servicing or due to leakage
- c whether the quantities of installed fluorinated greenhouse gases have been recycled or reclaimed, including the name and address of the recycling or reclamation facility and, where applicable, the certificate number
- d the quantity of fluorinated greenhouse gases recovered
- e the identity of the undertaking which installed, serviced, maintained and where applicable repaired or decommissioned the equipment, including, where applicable, the number of its certificate
- f the dates and results of the leak checks carried out (see *7.6.5 Leakage Detection*)
- g if the equipment was decommissioned, the measures taken to recover and dispose of the fluorinated greenhouse gases

Unless the records are stored in a database set up by the competent authorities of the Member States the following rules apply:

- a the operators shall keep the records for at least five years
- b undertakings carrying out activities for operators shall keep copies of the records for at least five years

8 - Options and Accessories

8.1 - Pumps Group

All the models can be equipped with twin water circulating pumps mounted on-board and factory piped. It is possible to select the pump type (low or high head) on each unit, both in the standard version and in the one with inverter and integrated electronic adjustment. All pumps are dynamically balanced according to ISO 1940 class 6.3. The electronic pump adjustment algorithm enables to modulate the pump speed to keep the delivery steady through the evaporator even if the hydraulic load changes; in this way, a significant energy saving is achieved and varies depending on the applications. In particular, in the Freecooling units this benefit is obtained above all in summer, when the Freecooling coil is short-circuited. The programming of the adjustment set of the electronic pump can be made in factory or in the installation site thanks to a simple remote control; in case of doubt, contact your dealer.



8.2 - Water chiller with partial heat recovery (20%)

This option enables the recovery of up to 20% of the heat normally rejected by the condensers.

The system does not require any adjustment and is made up of plate heat exchangers installed on each circuit before the condenser. The exchangers are protected by a suitable anti-frost heater that operates when the system is stopped. It is recommended to install a safety valve in the hydraulic circuit to avoid hazards due to overpressures, if there is no water flow in the recuperator.

The water temperature at the recuperator inlet (in stable operating conditions) must be in the range of 25 to 45 °C, with a differential of between 3.5 and 8 °C.

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

8.3 - Hydraulic kit

Made up of an expansion tank (pre-charged at 1.5 bar, max. operating pressure 10 bar) and a safety valve set at 5 bar. Their position in the hydraulic circuit is illustrated in figures from Fig. 27 to Fig. 32.

Expansion tank volumes: 12 litres + 12 litres

It is recommended that the total required expansion tank capacity is always checked, depending on the unit's internal hydraulic volume, the user circuit volume, the glycol percentage in the mixture, and the expected maximum temperature variation of the mixture.

8.4 - Economiser

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

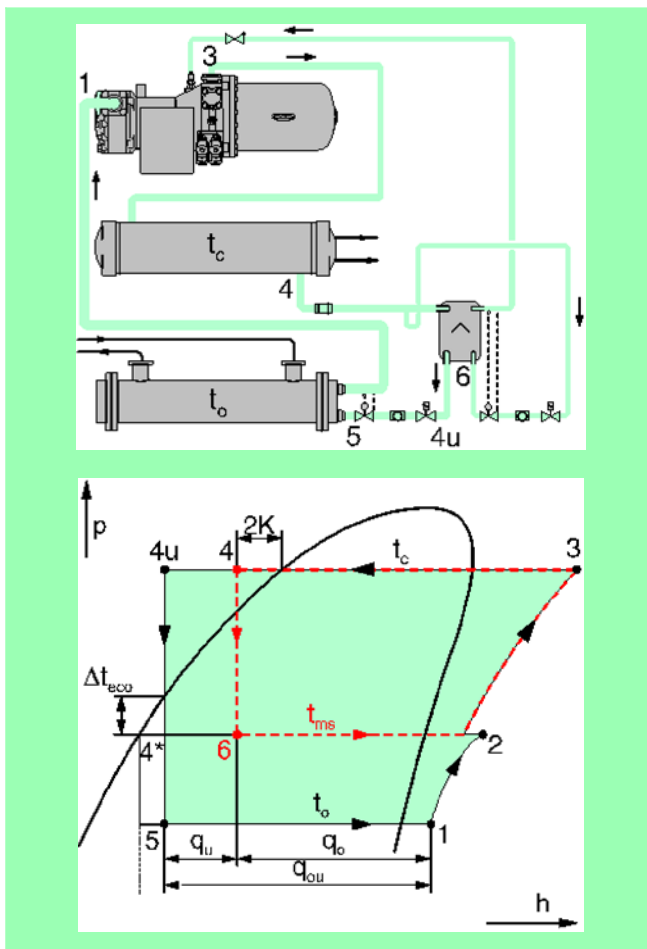
By this operation system, the liquid refrigerant is cooled by a heat exchanger (sub-cooler).

When a sub-cooler is used, some of the refrigerant mass (ECO flow rate) is separated from the condenser mass after the condenser (4).

This ECO mass is thus expanded at an intermediate pressure (t_{ms}).

The ECO mass evaporates inside the sub-cooler and enters the compressor through the economizer opening.

The evaporator mass flow rate is sub-cooled by the exchanger at a lower liquid temperature (4u).



The intermediate pressure at the economizer changes depending on the type of compressor, on the operating conditions (evaporations and condensation temperatures) and on the ECO flow rate.

The additional sub-cooling of the liquid involves a significant increase of the cooling capacity.

From certain operating conditions, the electric absorption by the compressor increases less proportionally than the cooling capacity (improving the machine efficiency), as the compression process occurs at a better efficiency level due to the positive contribution of the fresh gas portion sucked through the ECO opening.

A further feature of the economizer circuit in the **Liebert HPC - L** units is the slide valve for 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.

The operation enabling/disabling of the economiser cycle is carried out by the microprocessor through opening the relevant solenoid valve (see refrigerating schemes Fig. 26), after the machine has reached stable operating conditions and the condensation saturated pressure falls within a range $35^{\circ}\text{C} < T_{\text{cond}} < 58^{\circ}\text{C}$. Check the correct operation of the thermal expansion valve of the economiser circuit (with the same procedures indicated in par. 6.1) checking that the overheating ranges between 5 and 8°C .

Caution:

The expansion valves do not feature MOP, thus injection saturated pressure in a range between 10 and 30°C can be read as a rule.

8.5 - Energy meter (optional)

For a full description check the manual available with the unit.

Device parameters are set in the factory.

They can show:

- currents;
- tensions;
- powers;
- peak or average values;
- energy values.



8.6 - Water inlet manifolds

Some kits are available as option to aid the connection with the two evaporator inlet connections, thus making a single hydraulic connection point available.

For all Freecooling No- Glycol versions it is necessary to order the manifold kit; heater resistors are included.

Namely:

Cod. 486064 - Manifold kit for Chiller.

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

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

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

Cod. 486065 - Manifold kit for Chiller.

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

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

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

Cod. 486066 - Manifold kit for Chiller.

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

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

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

Cod. 486067 - Manifold kit for Chiller and Freecooling.

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

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

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

Cod. 486068 - Manifold kit for Chiller and Freecooling.

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

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

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

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

9 - Electrical panel and chiller control

The electrical panel is designed, constructed and tested in compliance with IEC standards (EN60204- 1). Each unit includes two symmetric electric boards, each one interlocked to half machine; they both must be electrically power supplied.

The unit is adjusted by two independent microprocessor boards (Master and Subunit) installed on each electric board and reciprocally connected by network. During the standard operation, the Master board exchanges information with the Subunit board; the display connected with the Master board enables to read and set parameters, while the one of the Subunit board enables only to display them. All analog/digital inputs and outputs for ensuring the independent and autonomous operation of half machine in case of alarm, if there is a problem on the outer power supply mains, on a machine component, on an electronic board or on the communication network are connected on each microprocessor board.

The main electric board - where the Master board is fitted, is on the left side of the hydraulic connection front in machines without pumps, while on the right side of the hydraulic connection front in machines with pumps.

In the units with asymmetric compressors and/or with electronic pump (if this option is installed) the main electric board, where the Master board is fitted, is located on the same side of the machine as the components.

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

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

Main features:

- power supply, 400V ±10% / 3Ph + N + PE / 50Hz (for the main supply); 230V / 1Ph + N + PE / 50Hz (for the UPS supply, optional for fast- start feature);
- 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 (star/delta);
- timing for star- delta 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 $\cos \varphi$ 0,95 – 0,93 (optional);
- volt- free contacts to remote indication of:
 - compressors in operation 1/2;
 - pump(s) in operation 1/2;
 - general alarm;
 - warning alarm;
 - compressor alarm 1/2;
 - high temperature inlet/outlet water alarm;
 - high pressure 1/2
 - water flow alarm;
 - compressor's contactors melted (mandatory to be properly managed by the customer);
 - condenser fan failure 1/2;
 - external input for remote ON/OFF.

Tab. 1 - Electrical characteristics

Models CG4 069 - 122 (R134a)		069	075	081	087	093	100	107	122
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating power input ⁽¹⁾ Master + Subunit	kW	219	239	262	280	298	317	329	397
OA ⁽¹⁾ (without PFC) Master + Subunit	A	390	410	444	474	506	533	551	665
cosφ ⁽¹⁾ (without PFC)	-	0.83	0.84		0.85			0.86	
OA ⁽¹⁾ (with PFC)	A	340	370	405	430	456	484	502	615
cosφ ⁽¹⁾ (with PFC)	-		0.93		0.94		0.95	0.94	0.93
Max. power input Master	kW	262	271		296	299		302	376
FLA Master	A	394	444		474	479		483	604
cosφ (without PFC) Master	-	0.96	0.88				0.90		
FLA (with PFC) Master	A	384	425		452	456		461	580
cosφ (with PFC) Master	-	0.98	0.92			0.95			0.93
LRA Master	A	610	674		829	834		838	955
Max. fuse (gG/aM) Master	A	800/800							
Ring terminals with hole Master	mm	12							
Line screw fixing Master	Nm	30 - 44							
Max. power input Subunit	kW	262		271		299		302	376
FLA Subunit	A	394		444		479		483	604
cosφ (without PFC) Subunit	-	0.96		0.88				0.90	
FLA (with PFC) Subunit	A	384		425		456		461	580
cosφ (with PFC) Subunit	-	0.98		0.92		0.95			0.93
LRA Subunit	A	610		674		834		838	955
Max. fuse (gG/aM) Subunit	A	800/800							
Ring terminals with hole Subunit	mm	12							
Line screw fixing Subunit	Nm	50 - 75							
Control power supply (only for option Fast- Start)	V/Ph/Hz	230 (400V) / 2Ph + PE / 50Hz							
Pmax Master - Subunit	kW	0,3 x 2							
Imax Master - Subunit	A	1,3 (0,75) x 2							
Cable section min./max. Master - Subunit	mm ²	1,5 / 10 x2							
Max. fuse (gG/aM)	A	40							
Line screw fixing	Nm	1							
Compressor - Power input ⁽¹⁾ Master + Subunit	kW	195	215	238	256	269	288	295	359
Compressor - Nominal current ⁽¹⁾ Master + Subunit	A	342	372	406	436	460	487	498	604

Models CG4 069 - 122 (R134a)										
	069	075	081	087	093	100	107	122		
Compressor Master - Max. current	A	370	420		450			566		
Compressor Master - LRA	A	586	650		805			917		
Compressor Subunit - Max. current	A	370	420		450			566		
Compressor Subunit - LRA	A	586	650		805			917		
Fans number	-	10			12		14	16		
EC fans 900 - Power input	kW		2.4							
EC fans 900 - Nominal current	A		3.8							
EC fans 900 - Max. current	A		4.8							
Standard head pressure pump model (opt.)	-			NB80- 160/147				NB80 - 160/151		
Standard head pressure pump - Nominal power P2	kW		11					15		
Standard head pressure pump - Motor power P1	kW		12.1					16.4		
Standard head pressure pump - Max. current	A		19.4					26.3		
Standard head pressure pump - LRA	A	135.8		136				184		
High head pressure pump model (opt.)	-			NB80- 160/151				NB80 - 160/161		
High head pressure pump - Nominal power P2	kW		15					18.5		
High head pressure pump - Motor power P1	kW		16.4					20.1		
High head pressure pump - Max. current	A		26.3					31.5		
High head pressure pump - LRA	A		184					221		

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.

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



Models CB4 069 - 140 (R134a)										
Power supply Master / Subunit										
V/Ph/Hz										
400V / 3Ph + PE / 50Hz										
	069	075	081	087	093	100	107	122	140	
Operating power input ⁽¹⁾ Master + Subunit	223	244	268	287	305	325	336	400	420	
OA ⁽¹⁾ (without PFC) Master + Subunit	380	410	446	482	520	552	572	678	724	
cos ϕ ⁽¹⁾ (without PFC)	0.85	0.86	0.87	0.86	0.85	0.85			0.84	
OA ⁽¹⁾ (with PFC)	353	384	420	449	479	509	526	631	668	
cos ϕ ⁽¹⁾ (with PFC)	0.91			0.92					0.91	
Max. power input Master	167	187	216	219	237	239	274	302		
FLA Master	306	336	346	351	391	396	454	499		
cos ϕ (without PFC) Master	0.79	0.81	0.90	0.90	0.87					
FLA (with PFC) Master	289	320	331	337	371	376	434	476		
cos ϕ (with PFC) Master	0.83	0.85	0.94	0.94	0.92			0.91	0.92	
LRA Master	462	491	612	617	681	686	846	969		
Max. fuse (gG/aM) Master	500/450				800/800					
Ring terminals with hole Master	10				12					
Line screw fixing Master	30- 44				50- 75					
Max. power input Subunit	167	187	219	239	274	302				
FLA Subunit	306	336	346	351	396	454	499			
cos ϕ (without PFC) Subunit	0.79	0.81	0.90	0.90	0.87					
FLA (with PFC) Subunit	289	320	331	337	371	376	434	476		
cos ϕ (with PFC) Subunit	0.83	0.85	0.94	0.94	0.92			0.91	0.92	
LRA Subunit	462	491	612	617	681	686	846	969		
Max. fuse (gG/aM) Subunit	500/450				800/800					
Ring terminals with hole Subunit	10				12					
Line screw fixing Subunit	30- 44				50- 75					
Control power supply (only for opt. Fast- Start)					230 (400)V / 2Ph + PE / 50Hz					
Pmax Master - Subunit					0,3 x 2					
lmax Master - Subunit					1,3 (0,75) x 2					
Cable section min./max. Master - Subunit					1,5 / 10 x 2					
Max. fuse (gG/aM)					40					
Line screw fixing					1					
Compressor - Power input ⁽¹⁾ Master+Subunit	200	221	245	264	277	297	304	363	374	
Compressor - Nom. current ⁽¹⁾ Master+Subunit	330	360	396	432	460	492	502	598	624	
Compressor Master - Max. current	280	310	320	360	360	413	447			
Compressor Master - LRA	436	465	566	650	805	917				

Models CB4 069 - 140 (R134a)		069	075	081	087	093	100	107	122	140
Compressor Subunit - Max. current	A	280	310			320		360	413	447
Compressor Subunit - LRA	A	436	465			586		650	805	917
Fans number	-		10			12		14	16	20
AC fans 900 - Power input	kW					2.3				
AC fans 900 - Nominal current	A					5.0				
AC fans 900 - Max. current	A					5.2				
EC fans 900 - Power input (opt.)	kW					1.8				
EC fans 900 - Nominal current (opt.)	A					2.9				
EC fans 900 - Max. current (opt.)	A					4.8				
Standard head pressure pump model (opt.)	-				NB80 - 160/147				NB80 - 160/151	NB80 - 160/161
Std. head pressure pump - Nominal power P2	kW				11				15	18.5
Std. head pressure pump - Motor power P1	kW				12.1				16.4	20.1
Standard head pressure pump - Max. current	A				19.4				26.3	31.5
Standard head pressure pump - LRA	A	135.8			136				184	221
High head pressure pump model (opt.)	-				NB80 - 160/151				NB80 - 160/161	NB80 - 160/167
High head pressure pump - Nom. power P2	kW				15				18.5	22
High head pressure pump - Motor power P1	kW				16.4				20.1	23.4
High head pressure pump - Max. current	A				26.3				31.5	38
High head pressure pump - LRA	A				184				221	274

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.

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



Models CL4 068 - 139 (R134a)										
		068	074	080	086	092	099	106	121	139
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz								
Operating power input ⁽¹⁾ Master + Subunit	kW	221	243	260	278	288	305	325	382	418
OA ⁽¹⁾ (without PFC) Master + Subunit	A	375	406	432	466	494	521	552	648	712
cos ϕ ⁽¹⁾ (without PFC)	-	0.85	0.86	0.87	0.86	0.84	0.85			
OA ⁽¹⁾ (with PFC)	A	348	381	407	434	453	477	506	601	658
cos ϕ ⁽¹⁾ (with PFC)	-	0.92								
Max. power input Master	kW	167	187	189	218	220	238	238	273	296
FLA Master	A	303	333	337	347	351	391	391	452	486
cos ϕ (without PFC) Master	-	0.79	0.81		0.90		0.88		0.87	0.88
FLA (with PFC) Master	A	287	318	322	333	337	371	371	431	463
cos ϕ (with PFC) Master	-	0.84	0.85		0.94		0.92		0.91	0.92
LRA Master	A	459	488	492	613	617	681	681	844	956
Max. fuse (gG/aM) Master	A	500/450								
Ring terminals with hole Master	mm	10								
Line screw fixing Master	Nm	30- 44								
Max. power input Subunit	kW	165	167	189	220		238	238	273	296
FLA Subunit	A	300	303	337	351	351	391	391	452	486
cos ϕ (without PFC) Subunit	-	0.79	0.81		0.90		0.88		0.87	0.88
FLA (with PFC) Subunit	A	283	287	322	337	337	371	371	431	463
cos ϕ (with PFC) Subunit	-	0.84	0.85		0.94		0.92		0.91	0.92
LRA Subunit	A	456	459	492	617	617	681	681	844	956
Max. fuse (gG/aM) Subunit	A	500/450								
Ring terminals with hole Subunit	mm	10								
Line screw fixing Subunit	Nm	30- 44								
Control power supply (only for opt. Fast- Start)	V/Ph/Hz	230 (400)V / 2Ph + PE / 50Hz								
Pmax Master - Subunit	kW	0,3 x 2								
lmax Master - Subunit	A	1,3 (0,75) x 2								
Cable section min./max. Master - Subunit	mm ²	1,5 / 10 x 2								
Max. fuse (gG/aM)	A	40								
Line screw fixing	Nm	1								
Compressor - Power input ⁽¹⁾ Master+Subunit	kW	201	223	236	254	261	278	298	348	384
Compressor - Nom. current ⁽¹⁾ Master + Subunit	A	332	363	382	416	436	463	494	576	640
Compressor Master - Max. current	A	280	310		320	360		413	447	
Compressor Master - LRA	A	436	465		586	650		805	917	

Models CL4 068 - 139 (R134a)										
	068	074	080	086	092	099	106	121	139	
Compressor Subunit - Max. current	A	280	310		320		360	413	447	
Compressor Subunit - LRA	A	436	465		586		650	805	917	
Fans number	-	12	14		16			20		
AC fans 900 - Power input	kW				1.7					
AC fans 900 - Nominal current	A				3.6					
AC fans 900 - Max. current	A				3.9					
EC fans 800 - Power input (opt.)	kW				1.4					
EC fans 800 - Nominal current (opt.)	A				2.0					
EC fans 800 - Max. current (opt.)	A				3.9					
Standard head pressure pump model (opt.)	-		NB80 - 160/147					NB80 - 160/151	NB80 - 160/161	
Standard head pressure pump - Nominal power P2	kW		11					15	18.5	
Standard head pressure pump - Motor power P1	kW		12.1					16.4	20.1	
Standard head pressure pump - Max. current	A		19.4					26.3	31.5	
Standard head pressure pump - LRA	A	135.8		136				184	221	
High head pressure pump model (opt.)	-		NB80 - 160/151					NB80 - 160/161	NB80 - 160/167	
High head pressure pump - Nom. power P2	kW		15					18.5	22	
High head pressure pump - Motor power P1	kW		16.4					20.1	23.4	
High head pressure pump - Max. current	A		26.3					31.5	38	
High head pressure pump - LRA	A		184					221	274	

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.

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



Models CQ4 068 - 139 (R134a)										
	068	074	080	086	092	099	106	121	139	
Power supply Master / Subunit	V/Ph/Hz									
Operating power input ⁽¹⁾ Master + Subunit	222	248	263	282	288	309	333	385	426	
OA ⁽¹⁾ (without PFC) Master + Subunit	364	402	422	458	476	509	546	630	700	
cosφ ⁽¹⁾ (without PFC)	0.88	0.89	0.90	0.89	0.87			0.88		
OA ⁽¹⁾ (with PFC)	341	379	400	430	440	471	506	589	653	
cosφ ⁽¹⁾ (with PFC)	0.94		0.95		0.94	0.95		0.94		
Max. power input Master	160	180	181	210	211	229	229	262	285	
FLA Master	288	318	320	330	331	371	371	427	461	
cosφ (without PFC) Master	0.80	0.82	0.82	0.92	0.92	0.89		0.89		
FLA (with PFC) Master	272	303	304	315	317	351	351	406	438	
cosφ (with PFC) Master	0.85	0.86	0.86	0.96	0.96	0.94		0.93	0.94	
LRA Master	444	473	475	596	597	661	661	819	931	
Max. fuse (gG/aM) Master	500/450									800/800
Ring terminals with hole Master	10									12
Line screw fixing Master	30 - 44									50 - 75
Max. power input Subunit	159	160	181	181	211	211	229	262	285	
FLA Subunit	287	288	320	320	331	331	371	427	461	
cosφ (without PFC) Subunit	0.80	0.80	0.82	0.82	0.92	0.92		0.89		
FLA (with PFC) Subunit	271	272	304	304	317	317	351	406	438	
cosφ (with PFC) Subunit	0.85	0.85	0.86	0.86	0.96	0.96	0.94	0.93	0.94	
LRA Subunit	443	444	475	475	597	597	661	819	931	
Max. fuse (gG/aM) Subunit										800/800
Ring terminals with hole Subunit										12
Line screw fixing Subunit										50 - 75
Control power supply (only for option Fast- Start)										230 (400)V / 2Ph + PE / 50Hz
Pmax Master - Subunit										0.3 x 2
lmax Master - Subunit										1,3 (0,75) x 2
Cable section min./max. Master - Subunit										1,5 / 10 x 2
Max. fuse (gG/aM)										40
Line screw fixing										1
Compressor - Power input ⁽¹⁾ Master + Subunit	214	240	253	272	277	298	322	371	412	
Compressor - Nominal current ⁽¹⁾ Master + Subunit	352	390	408	444	460	493	530	610	680	
Compressor Master - Max. current	280	310	310	320	320	360	360	413	447	
Compressor Master - LRA	436	465	465	586	586	650	650	805	917	

Models CQ4 068 - 139 (R134a)										
	068	074	080	086	092	099	106	121	139	
Compressor Subunit - Max. current	A	280	310		320		360	413	447	
Compressor Subunit - LRA	A	436	465		586		650	805	917	
Fans number	-	12	14		16		20			
EC fans 900 - Power input	kW				0.7					
EC fans 900 - Nominal current	A				1.0					
EC fans 900 - Max. current	A				1.4					
Standard head pressure pump model (opt.)	-		NB80 - 160/147					NB80 - 160/151	NB80 - 160/161	
Standard head pressure pump - Nominal power P2	kW		11					15	18.5	
Standard head pressure pump - Motor power P1	kW		12.1					16.4	20.1	
Standard head pressure pump - Max. current	A		19.4					26.3	31.5	
Standard head pressure pump - LRA	A	135.8		136				184	221	
High head pressure pump model (opt.)	-		NB80 - 160/151					NB80 - 160/161	NB80 - 160/167	
High head pressure pump - Nominal power P2	kW		15					18.5	22	
High head pressure pump - Motor power P1	kW		16.4					20.1	23.4	
High head pressure pump - Max. current	A		26.3					31.5	38	
High head pressure pump - LRA	A		184					221	274	

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.

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



Models FG4 069 - 122 (R134a)									
		069	075	081	087	093	100	107	122
Power supply Master / Subunit	V/Ph/Hz	400V / 3Ph + PE / 50Hz							
Operating power input ⁽¹⁾ Master + Subunit	kW	238	261	287	307	327	328	350	438
OA ⁽¹⁾ (without PFC) Master + Subunit	A	407	439	479	513	547	550	582	724
cosφ ⁽¹⁾ (without PFC)	-	0.84			0.86			0.87	
OA ⁽¹⁾ (with PFC)	A	368	401	442	470	499	501	534	675
cosφ ⁽¹⁾ (with PFC)	-	0.93		0.94		0.95	0.94	0.95	0.94
Max. power input Master	kW	265		274		299		306	376
FLA Master	A	399		449		479		488	604
cosφ (without PFC) Master	-	0.96		0.88			0.90		
FLA (with PFC) Master	A	389		429		456		466	560
cosφ (with PFC) Master	-	0.98		0.92		0.95			0.93
LRA Master	A	615		679		834		843	955
Max. fuse (gG/aM) Master	A	500/450				800/800			
Ring terminals with hole Master	mm	10				12			
Line screw fixing Master	Nm	30 - 44				50 - 75			
Max. power input Subunit	kW		265		274		299	306	376
FLA Subunit	A		399		449		479	488	604
cosφ (without PFC) Subunit	-		0.96		0.88			0.90	
FLA (with PFC) Subunit	A		389		429		456	466	580
cosφ (with PFC) Subunit	-		0.98		0.92		0.95		0.93
LRA Subunit	A		615		679		834	843	955
Max. fuse (gG/aM) Subunit	A					800/800			
Ring terminals with hole Subunit	mm				12				
Line screw fixing Subunit	Nm				50 - 75				
Control power supply (only for option Fast- Start)	V/Ph/Hz	230 (400)V / 2Ph + PE / 50Hz							
Pmax Master - Subunit	kW	0,3 x 2							
Imax Master - Subunit	A	1,3 (0,75) x 2							
Cable section min./max. Master - Subunit	mm ²	1,5 / 10 x 2							
Max. fuse (gG/aM)	A	40							
Line screw fixing	Nm	1							
Compressor - Power input ⁽¹⁾ Master + Subunit	kW	210	233	259	279	299	291	313	401
Compressor - Nominal current ⁽¹⁾ Master + Subunit	A	364	396	436	470	504	492	524	666
Compressor Master - Max. current	A	370		420			450		566
Compressor Master - LRA	A	586		650			805		917

Models FG4 069 - 122 (R134a)		069	075	081	087	093	100	107	122
Compressor Subunit - Max. current	A	370	420				450		566
Compressor Subunit - LRA	A	586	650				805		917
Fans number	-		12					16	
EC fans 900 - Power input	kW				2.3				
EC fans 900 - Nominal current	A				3.6				
EC fans 900 - Max. current	A				4.8				
Standard head pressure pump model (opt.)	-			NB80 - 160/161			NB80 - 200/178		NB80 - 160/167
Standard head pressure pump - Nominal power P2	kW		18.5				30		22
Standard head pressure pump - Motor power P1	kW		20.1				32.1		23.4
Standard head pressure pump - Max. current	A		31.5				52		38
Standard head pressure pump - LRA	A		221				364		274
High head pressure pump model (opt.)	-			NB80 - 160/167			NB80 - 200/188		NB80 - 200/178
High head pressure pump - Nominal power P2	kW		22				30		
High head pressure pump - Motor power P1	kW		23.4				32.1		
High head pressure pump - Max. current	A		38				52		
High head pressure pump - LRA	A		274				364		
NG - Standard head pressure pump model (opt.)	-				NB80 - 160/147				NB80 - 160/151
NG - Standard head pressure pump - Nominal power P2	kW		11						15
NG - Standard head pressure pump - Motor power P1	kW		12.1						16.4
NG - Standard head pressure pump - Max. current	A		19.4						26.3
NG - Standard head pressure pump - LRA	A		136						184
NG - High head pressure pump model (opt.)	-				NB80 - 160/151				NB80 - 160/161
NG - High head pressure pump - Nominal power P2	kW		15						18.5
NG - High head pressure pump - Motor power P1	kW		16.4						20.1
NG - High head pressure pump - Max. current	A		26.3						31.5
NG - High head pressure pump - LRA	A		184						221

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.

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



Models FB4 069 - 140 (R134a)												
	V/Ph/Hz	400V / 3Ph + PE / 50Hz										
		069	075	081	087	093	100	107	122	140		
Power supply Master / Subunit												
Operating power input ⁽¹⁾ Master + Subunit	kW	244	268	295	317	337						
OA ⁽¹⁾ (without PFC) Master + Subunit	A	415	449	489	529	569						
cos ϕ ⁽¹⁾ (without PFC)	-	0.85	0.86	0.87	0.86							
OA ⁽¹⁾ (with PFC)	A	388	423	463	497	529						
cos ϕ ⁽¹⁾ (with PFC)	-	0.91				0.92						
Max. power input Master	kW	170	190	190	219		242			274		302
FLA Master	A	311	341	341	351		401			454		499
cos ϕ (without PFC) Master	-	0.79	0.80	0.80	0.90					0.87		
FLA (with PFC) Master	A	295	325	325	337		381			434		476
cos ϕ (with PFC) Master	-	0.83	0.84	0.84	0.94		0.92			0.91		0.92
LRA Master	A	467	496	496	617		691			846		969
Max. fuse (gG/aM) Master	A	500/450								800/800		
Ring terminals with hole Master	mm	10								12		
Line screw fixing Master	Nm	30- 44								50- 75		
Max. power input Subunit	kW	170		190		219		224		242		274
FLA Subunit	A	311		341		351		361		401		454
cos ϕ (without PFC) Subunit	-	0.79		0.80		0.90		0.89		0.87		
FLA (with PFC) Subunit	A	295		325		337		347		381		434
cos ϕ (with PFC) Subunit	-	0.83		0.84		0.94		0.93		0.92		0.92
LRA Subunit	A	467		496		617		627		691		969
Max. fuse (gG/aM) Subunit	A	500/450								800/800		
Ring terminals with hole Subunit	mm	10								12		
Line screw fixing Subunit	Nm	30- 44								50- 75		
Control power supply (only for opt. Fast- Start)	V/Ph/Hz									230 (400)V / 2Ph + PE / 50Hz		
Pmax Master - Subunit	kW									0,3 x 2		
Imax Master - Subunit	A									1,3 (0,75) x 2		
Cable section min./max. Master - Subunit	mm ²									1,5 / 10 x 2		
Max. fuse (gG/aM)	A									40		
Line screw fixing	Nm									1		
Compressor - Power input ⁽¹⁾ Master + Subunit	kW	215	239	266	288	308	299	299	322	405	414	414
Compressor - Nom. current ⁽¹⁾ Master + Subunit	A	354	388	428	468	508	494	494	530	662	684	684
Compressor Master - Max. current	A	280	310	310	320	320	360	360	413	447	447	447
Compressor Master - LRA	A	436	465	465	586		650	650	805	917	917	917
Compressor Subunit - Max. current	A	280	310	310	320	320	360	360	413	447	447	447
Compressor Subunit - LRA	A	436	465	465	586		650	650	805	917	917	917

Models FB4 069 - 140 (R134a)		069	075	081	087	093	100	107	122	140
Fans number	-			12				16		20
AC fans 900 - Power input	kW					2.4				
AC fans 900 - Nominal current	A					5.1				
AC fans 900 - Max. current	A					5.2				
EC fans 900 - Power input (opt.)	kW					1.9				
EC fans 900 - Nominal current (opt.)	A					3.0				
EC fans 900 - Max. current (opt.)	A					4.8				
Standard head pressure pump model (opt.)	-			NB80 - 160/161			NB80 - 200/178		NB80 - 160/167	
Standard head pressure pump - Nominal power P2	kW			18.5			30		22	
Standard head pressure pump - Motor power P1	kW			20.1			32.1		23.4	
Standard head pressure pump - Max. current	A			31.5			52		38	
Standard head pressure pump - LRA	A	220.5		221			364		274	
High head pressure pump model (opt.)	-			NB80 - 160/167			NB80 - 200/188		NB80 - 200/178	
High head pressure pump - Nom. power P2	kW			22				30		
High head pressure pump - Motor power P1	kW			23.4				32.1		
High head pressure pump - Max. current	A			38				52		
High head pressure pump - LRA	A			273.6				364		
NG - Standard head pressure pump model (opt.)	-			NB80 - 160/147					NB80 - 160/151	NB80 - 160/161
NG - Standard head pressure pump - Nominal power P2	kW			11					15	18.5
NG - Standard head pressure pump - Motor power P1	kW			12.1					16.4	20.1
NG - Standard head pressure pump - Max. current	A			19.4					26.3	31.5
NG - Standard head pressure pump - LRA	A			136					184	221
NG - High head pressure pump model (opt.)	-			NB80 - 160/151					NB80 - 160/161	NB80 - 160/167
NG - High head pressure pump - Nom. power P2	kW			15					18.5	22
NG - High head pressure pump - Motor power P1	kW			16.4					20.1	23.4
NG - High head pressure pump - Max. current	A			26.3					31.5	38
NG - High head pressure pump - LRA	A			184					221	274

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.

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



Models FL4 068 - 139 (R134a)										
	068	074	080	086	092	099	106	121	139	
Power supply Master / Subunit	V/Ph/Hz									
Operating power input ⁽¹⁾ Master + Subunit	243	269	298	296	315	336	362	417	459	400V / 3Ph + PE / 50Hz
OA ⁽¹⁾ (without PFC) Master + Subunit	408	446	490	497	535	567	607	700	774	
cos ϕ ⁽¹⁾ (without PFC)	0.86	0.87	0.88	0.86	0.85			0.86		
OA ⁽¹⁾ (with PFC)	381	420	465	464	495	524	562	654	721	
cos ϕ ⁽¹⁾ (with PFC)			0.92				0.93		0.92	
Max. power input Master	170	190	224	224		242		279	302	
FLA Master	311	341	361	361	401	401	465	499		
cos ϕ (without PFC) Master	0.79	0.80	0.89	0.89			0.87			
FLA (with PFC) Master	295	325	347	347	381	381	444	476		
cos ϕ (with PFC) Master	0.83	0.84	0.93	0.93	0.92	0.92	0.91	0.92		
LRA Master	467	496	627	627	691	691	857	969		
Max. fuse (gG/aM) Master	500/450					800/800				
Ring terminals with hole Master	10					12				
Line screw fixing Master	30- 44					50- 75				
Max. power input Subunit	170	190	195	195	224	224	242	279	302	
FLA Subunit	311	341	351	351	361	361	401	465	499	
cos ϕ (without PFC) Subunit	0.79	0.80	0.80	0.80	0.89	0.89	0.87			
FLA (with PFC) Subunit	295	325	335	335	347	347	381	444	476	
cos ϕ (with PFC) Subunit	0.83	0.84	0.84	0.84	0.93	0.93	0.92	0.91	0.92	
LRA Subunit	467	496	506	506	627	627	691	857	969	
Max. fuse (gG/aM) Subunit	500/450					800/800				
Ring terminals with hole Subunit	10					12				
Line screw fixing Subunit	30- 44					50- 75				
Control power supply (only for opt. Fast- Start)	V/Ph/Hz									
Pmax Master - Subunit	kW									
Imax Master - Subunit	A									
Cable section min./max. Master - Subunit	mm ²									
Max. fuse (gG/aM)	A									
Line screw fixing	Nim									
Compressor - Power input ⁽¹⁾ Master + Subunit	221	247	276	267	286	307	333	381	423	
Compressor - Nom. current ⁽¹⁾ Master + Subunit	362	400	444	436	474	506	546	624	698	
Compressor Master - Max. current	280	310	320	320	360	360	413	447		
Compressor Master - LRA	436	465	586	586	650	650	805	917		
Compressor Subunit - Max. current	280	310	310	310	320	320	360	413	447	
Compressor Subunit - LRA	436	465	465	465	586	586	650	805	917	

Models FL4 068 - 139 (R134a)		068	074	080	086	092	099	106	121	139
Fans number	-	12				16			20	
AC fans 800 - Power input	kW					1.8				
AC fans 800 - Nominal current	A					3.8				
AC fans 800 - Max. current	A					5.2				
EC fans 800 - Power input (opt.)	kW					1.5				
EC fans 800 - Nominal current (opt.)	A					2.0				
EC fans 800 - Max. current (opt.)	A					4.8				
Standard head pressure pump model (opt.)	-		NB80 - 160/161				NB80 - 200/178		NB80 - 160/167	
Standard head pressure pump - Nominal power P2	kW		18.5				30		22	
Standard head pressure pump - Motor power P1	kW		20.1				32.1		23.4	
Standard head pressure pump - Max. current	A		31.5				52		38	
Standard head pressure pump - LRA	A	220.5	221				364		274	
High head pressure pump model (opt.)	-		NB80 - 160/167				NB80 - 200/188		NB80 - 200/178	
High head pressure pump - Nom. power P2	kW		22						30	
High head pressure pump - Motor power P1	kW		23.4						32.1	
High head pressure pump - Max. current	A		38						52	
High head pressure pump - LRA	A		273.6						364	
NG - Standard head pressure pump model (opt.)	-		NB80 - 160/147						NB80 - 160/151	NB80 - 160/161
NG - Standard head pressure pump - Nominal power P2	kW		11						15	18.5
NG - Standard head pressure pump - Motor power P1	kW		12.1						16.4	20.1
NG - Standard head pressure pump - Max. current	A		19.4						26.3	31.5
NG - Standard head pressure pump - LRA	A		136						184	221
NG - High head pressure pump model (opt.)	-		NB80 - 160/151						NB80 - 160/161	NB80 - 160/167
NG - High head pressure pump - Nom. power P2	kW		15						18.5	22
NG - High head pressure pump - Motor power P1	kW		16.4						20.1	23.4
NG - High head pressure pump - Max. current	A		26.3						31.5	38
NG - High head pressure pump - LRA	A		184						221	274

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.

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

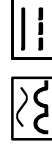


Models FQ4 068 - 139 (R134a)										
	068	074	080	086	092	099	106	121	139	
Power supply Master / Subunit	V/Ph/Hz									
Operating power input ⁽¹⁾ Master + Subunit	245	276	311	298	318	344	376	434	472	400V / 3Ph + PE / 50Hz
OA ⁽¹⁾ (without PFC) Master + Subunit	400	444	496	483	522	561	612	704	770	
cosφ ⁽¹⁾ (without PFC)	0.89	0.90	0.91	0.89	0.88	0.88	0.89		0.88	
OA ⁽¹⁾ (with PFC)	377	422	474	455	487	524	572	664	723	
cosφ ⁽¹⁾ (with PFC)	0.94		0.95		0.94		0.95		0.94	
Max. power input Master	174	194	194	230	230	248	248	286	309	
FLA Master	309	339	339	358	358	398	398	461	495	
cosφ (without PFC) Master	0.82	0.83	0.83	0.93	0.93			0.90		
FLA (with PFC) Master	292	323	323	344	344	378	378	440	472	
cosφ (with PFC) Master	0.86	0.87	0.87	0.96	0.96	0.95	0.95	0.94	0.95	
LRA Master	465	494	494	624	624	688	688	853	965	
Max. fuse (gG/aM) Master	500/450									800/800
Ring terminals with hole Master	10									12
Line screw fixing Master	30- 44									50- 75
Max. power input Subunit	174	194	194	201	230	248	248	286	309	
FLA Subunit	309	339	339	348	358	398	398	461	495	
cosφ (without PFC) Subunit	0.82	0.83	0.83	0.93	0.93			0.90		
FLA (with PFC) Subunit	292	323	323	332	344	378	378	440	472	
cosφ (with PFC) Subunit	0.86	0.87	0.87	0.96	0.96	0.95	0.95	0.94	0.95	
LRA Subunit	465	494	494	503	624	688	688	853	965	
Max. fuse (gG/aM) Subunit										800/800
Ring terminals with hole Subunit										12
Line screw fixing Subunit										50- 75
Control power supply (only for option Fast- Start)	230 (400)V / 2Ph + PE / 50Hz									
Pmax Master - Subunit	0,3 x 2									
Imax Master - Subunit	1,3 (0,75) x 2									
Cable section min./max. Master - Subunit	1,5 / 10 x 2									
Max. fuse (gG/aM)	40									
Line screw fixing	1									
Compressor - Power input ⁽¹⁾ Master + Subunit	237	268	303	287	307	333	365	420	458	
Compressor - Nominal current ⁽¹⁾ Master + Subunit	388	432	484	467	506	545	596	684	750	
Compressor Master - Max. current	280	310	310	320	320	360	360	413	447	
Compressor Master - LRA	436	465	465	586	586	650	650	805	917	
Compressor Subunit - Max. current	280	310	310	310	320	360	360	413	447	
Compressor Subunit - LRA	436	465	465	465	586	650	650	805	917	

Models FQ4 068 - 139 (R134a)										
	068	074	080	086	092	099	106	121	139	
Fans number		12			16				20	
EC fans 900 - Power input					0.7					
EC fans 900 - Nominal current					1.0					
EC fans 900 - Max. current					4.8					
Standard head pressure pump model (opt.)			NB80 - 160/161			NB80 - 200/178		NB80 - 160/167		
Standard head pressure pump - Nominal power P2			18.5			30		22		
Standard head pressure pump - Motor power P1			20.1			32.1		23.4		
Standard head pressure pump - Max. current			31.5			52		38		
Standard head pressure pump - LRA			221			364		274		
High head pressure pump model (opt.)			NB80 - 160/167			NB80 - 200/188		NB80 - 200/178		
High head pressure pump - Nominal power P2			22					30		
High head pressure pump - Motor power P1			23.4					32.1		
High head pressure pump - Max. current			38					52		
High head pressure pump - LRA			274			364				
NG - Standard head pressure pump model (opt.)				NB80 - 160/147				NB80 - 160/151	NB80 - 160/161	
NG - Standard head pressure pump - Nominal power P2				11				15	18.5	
NG - Standard head pressure pump - Motor power P1				12.1				16.4	20.1	
NG - Standard head pressure pump - Max. current				19.4				26.3	31.5	
NG - Standard head pressure pump - LRA				136				184	221	
NG - High head pressure pump model (opt.)				NB80 - 160/151				NB80 - 160/161	NB80 - 160/167	
NG - High head pressure pump - Nominal power P2				15				18.5	22	
NG - High head pressure pump - Motor power P1				16.4				20.1	23.4	
NG - High head pressure pump - Max. current				26.3				31.5	38	
NG - High head pressure pump - LRA				184				221	274	

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

OA, FLA, LRA are calculated for unit without pumps and with fans as standard configuration.
 If the unit with EC - FAN or inverter pump is connected to an electric installation where an earthleakage circuit breaker (ELCB) is used as additional protection, the circuit breaker must be of a type marked with the following symbols. (This circuit breaker is type B).



Tab. 2 - Internal hydraulic volume

HPC- L

HPC- L + Freecooling

MODEL: HPC- L		UNIT VOLUME (l)	MODEL: HPC- L + Freecooling		UNIT VOLUME (l)
CG4 / CB4	069	414	FG4 / FB4	069	906
	075	414		075	906
	081	372		081	864
	087	372		087	864
	093	372		093	924
	100	372		100	1048
	107	446		107	1122
	122	620		122	1391
	140	606		140	1497
CL4 / CQ4	068	414	FL4 / FQ4	080	864
	074	414		086	988
	080	372		092	1048
	086	372		099	1048
	092	372		106	1122
	099	372		099	1048
	106	446		106	1122
	121	620		121	1511
	139	606		139	1497

Note:

Add the tank's volume for the units with optional buffer tank.

Tab. 3 - Operating range

HPC- L (R134a)

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

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

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

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

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

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

In the units with asymmetrical compressors, the indicated outdoor air temperature max. limit are referred to each refrigerating circuit.

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

HPC- L + Freecooling (R134a)

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

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

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

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

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

Notes: The units are equipped with automatic capacity reduction system to avoid the machine lock before reaching the indicated outdoor air temperature max. limits.

In the units with economizer option, such device is disabled before reaching the indicated outdoor air temperature max. limits.

In the units with asymmetrical compressors, the indicated outdoor air temperature max. limit are referred to each refrigerating circuit.

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

Tab. 4 - Sound pressure level

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 at 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.

SPL - HPC- L

Models CG4	Total [dB(A)]	Models CB4	Total [dB(A)]	Models CL4	Total [dB(A)]	Models CQ4	Total [dB(A)]
CG4 069.E	83.5	CB4 069.E	79.5	CL4 068.E	73.0	CQ4 068.E	65.0
CG4 075.E	83.5	CB4 075.E	79.5	CL4 074.E	73.0	CQ4 074.E	65.0
CG4 081.E	83.5	CB4 081.E	79.5	CL4 080.E	73.5	CQ4 080.E	65.5
CG4 087.E	83.5	CB4 087.E	79.5	CL4 086.E	73.5	CQ4 086.E	65.5
CG4 093.E	84.0	CB4 093.E	80.0	CL4 092.E	74.0	CQ4 092.E	66.0
CG4 100.E	84.0	CB4 100.E	80.0	CL4 099.E	74.0	CQ4 099.E	66.0
CG4 107.E	84.5	CB4 107.E	80.5	CL4 106.E	74.0	CQ4 106.E	66.0
CG4 122	85.0	CB4 122	81.0	CL4 121	75.0	CQ4 121	67.0
-	-	CB4 140	82.0	CL4 139	75.0	CQ4 139	67.0

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

SPL - HPC- L + Freecooling

Models FG4	Total [dB(A)]	Models FB4	Total [dB(A)]	Models FL4	Total [dB(A)]	Models FQ4	Total [dB(A)]
FG4 069.E	84.0	FB4 069.E	80.0	FL4 068.E	73.0	FQ4 068	65.5
FG4 075.E	84.0	FB4 075.E	80.0	FL4 074	73.0	FQ4 074	65.5
FG4 081.E	84.0	FB4 081	80.0	FL4 080	73.0	FQ4 080	65.5
FG4 087	84.0	FB4 087	80.0	FL4 086.E	74.0	FQ4 086	66.0
FG4 093	84.0	FB4 093	80.0	FL4 092.E	74.0	FQ4 092	66.0
FG4 100.E	85.0	FB4 100.E	81.0	FL4 099.E	74.0	FQ4 099	66.0
FG4 107.E	85.0	FB4 107.E	81.0	FL4 106	74.0	FQ4 106	66.0
FG4 122	85.0	FB4 122	81.0	FL4 121	75.0	FQ4 121	67.0
-	-	FB4 140	82.0	FL4 139	75.0	FQ4 139	67.0

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

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

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

Tab. 5 - Refrigerant and oil charge

CG4 / CB4 (R134a)

MODEL		069	075	081	087	093	100	107	122	140
Refrigerant charge (each circuit)	[kg]	117	117	125	125/130	130	130	146	168	202
Oil charge (each circuit)	[lt]	30	30	30	30	30	30	30	32	32

CL4 / CQ4 (R134a)

MODEL		068	074	080	086	092	099	106	121	139
Refrigerant charge (each circuit)	[kg]	117	117	135	135/140	160	160	168	202	202
Oil charge (each circuit)	[lt]	30	30	30	30	30	30	30	32	32

FG4 / FB4 (R134a)

MODEL		069	075	081	087	093	100	107	122	140
Refrigerant charge (each circuit)	[kg]	120	120	129	129/136	136	160	168	176	202
Oil charge (each circuit)	[lt]	30	30	30	30	30	30	30	32	32

FL4 / FQ4 (R134a)

MODEL		068	074	080	086	092	099	106	121	139
Refrigerant charge (each circuit)	[kg]	120	120	129	155/160	160	160	168	202	202
Oil charge (each circuit)	[lt]	30	30	30	30	30	30	30	32	32

Tab. 6 - Pump group characteristics

HPC- L - Standard head pressure (R134a)

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

(*) - According to ISO 3744

HPC- L - High head pressure (R134a)

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

(*) - According to ISO 3744

HPC- L + Freecooling - Standard head pressure (R134a)

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

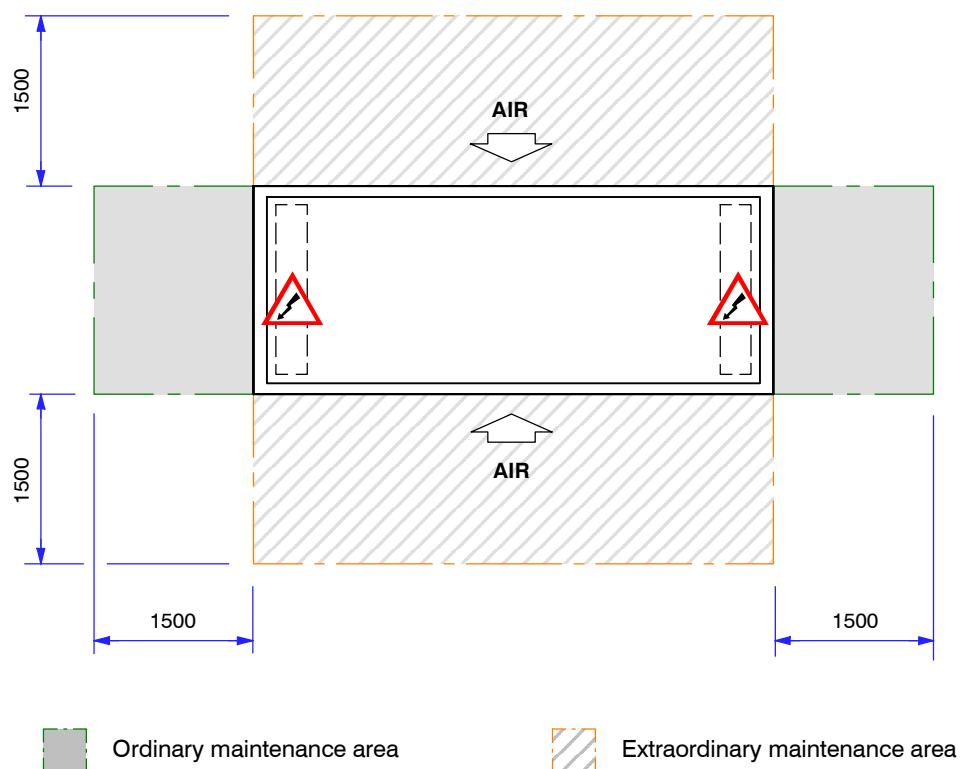
(*) - According to ISO 3744

HPC- L + Freecooling - High head pressure (R134a)

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

(*) - According to ISO 3744

Fig. 1 - Service areas (top view)

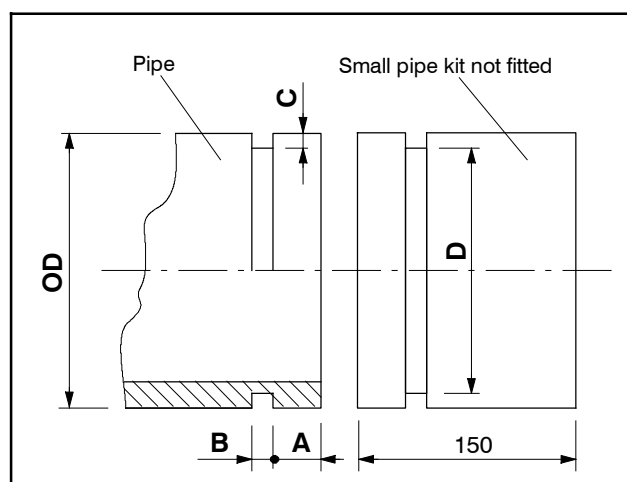


Notes:

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

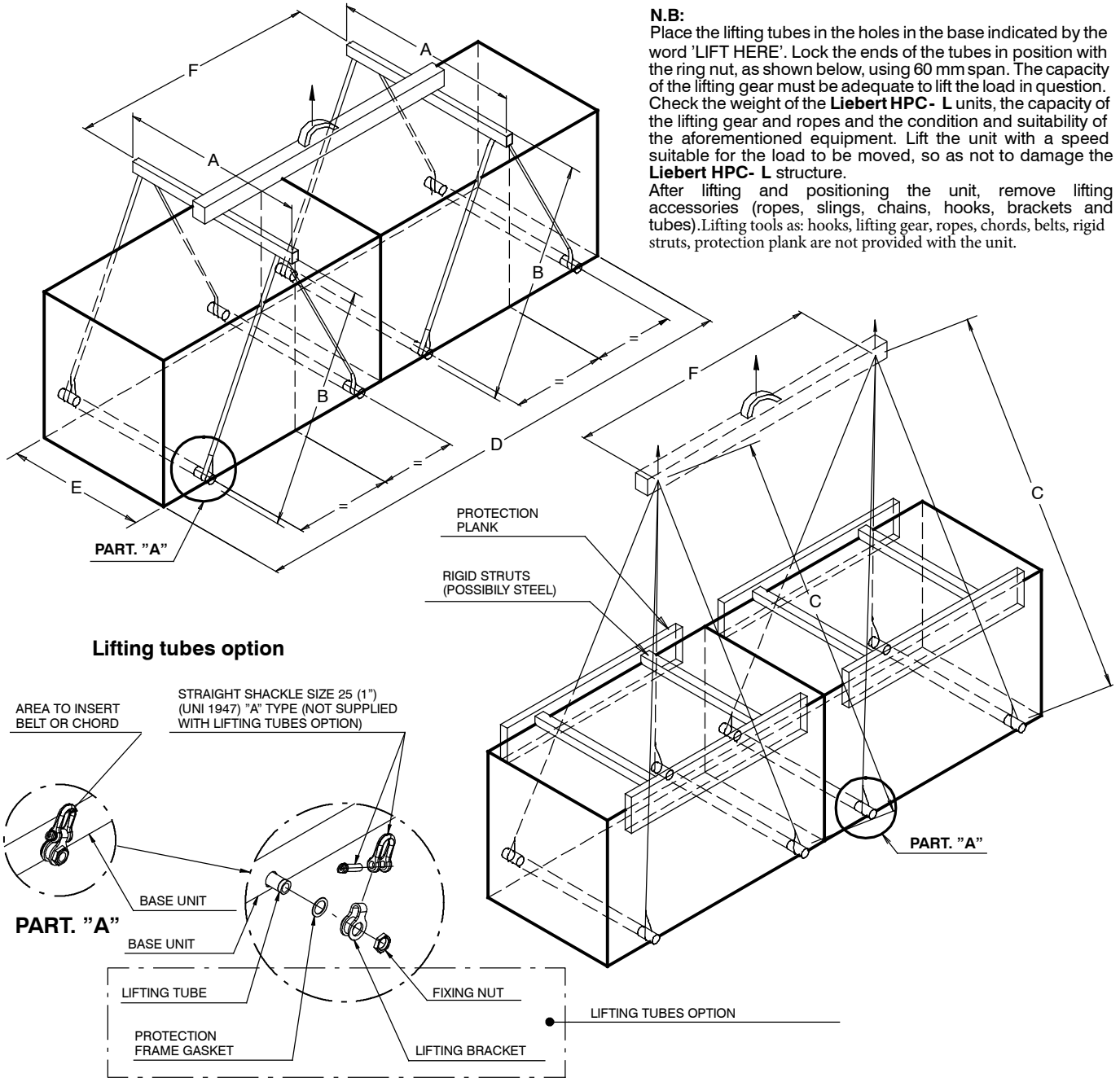
Fig. 2 - Victaulic connection system

		DIMENSIONS			
	Ø	4"	5"	6"	8"
OD	DN	100	125	150	200
	Ø mm	114,3	139,7	168,3	219,1
A	mm	15,88	15,88	15,88	19,05
	Tolerance	±0,77	±0,77	±0,77	±0,77
B	mm	9,53	9,53	9,53	11,13
	Tolerance	±0,77	±0,77	±0,77	±0,77
C	mm	2,11	2,13	2,16	2,34
D	Ø mm	110,08	135,50	163,96	214,4
	mm	- 0,51	- 0,56	- 0,56	- 0,64
	Tolerance	+0,00	+0,00	+0,00	+0,00



For welded hydraulic connection use the "line sections" supplied, otherwise directly connect grooved lines with the Victaulic- type joints of the unit, taking care to suitably grease the joint gaskets.

Fig. 3 - Lifting instructions with tubes



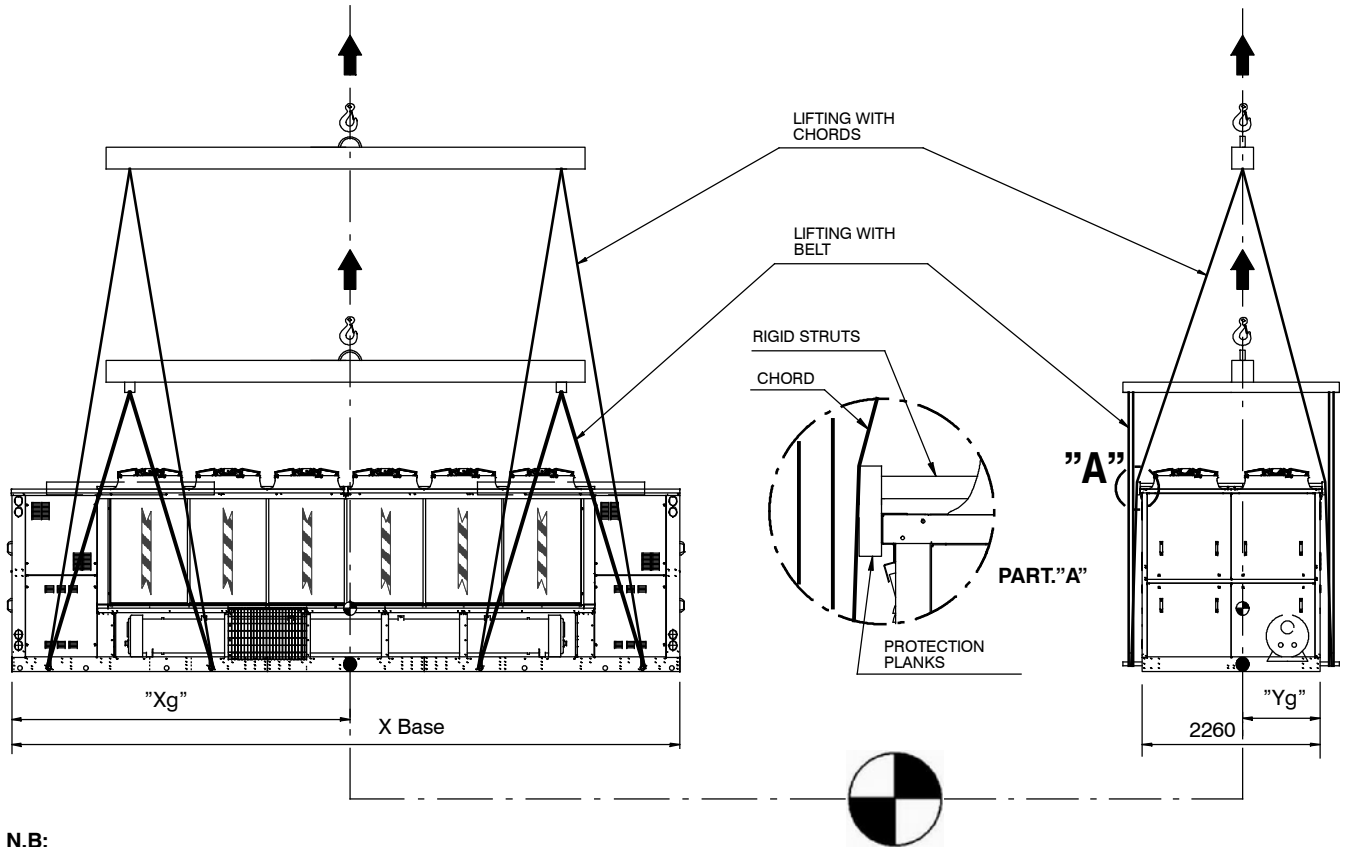
N.B:
 Place the lifting tubes in the holes in the base indicated by the word 'LIFT HERE'. Lock the ends of the tubes in position with the ring nut, as shown below, using 60 mm span. The capacity of the lifting gear must be adequate to lift the load in question. Check the weight of the **Liebert HPC- L** units, the capacity of the lifting gear and ropes and the condition and suitability of the aforementioned equipment. Lift the unit with a speed suitable for the load to be moved, so as not to damage the **Liebert HPC- L** structure.
 After lifting and positioning the unit, remove lifting accessories (ropes, slings, chains, hooks, brackets and tubes). Lifting tools as: hooks, lifting gear, ropes, chords, belts, rigid struts, protection plank are not provided with the unit.

Lifting tubes option

Lifting

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

Fig. 4 - Lifting instructions with chords / belt



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

Shipping weight and unit baricentre position (with and without pumps) - Chiller version

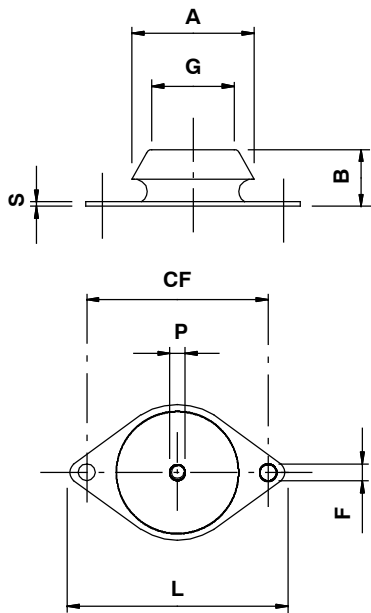
Models	X base (mm)	Unit without pumps			Unit with pumps		
		"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)	"Xg" (mm)	"Yg" (mm)	Shipping weight (kg)
CG4 / CB4 069	8482	4250	1020	8686	4249	1046	9287
CG4 / CB4 075	8482	4246	1020	8694	4245	1046	9297
CG4 / CB4 081	8482	4250	1015	8815	4249	1041	9416
CG4 / CB4 087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

Shipping weight and unit baricentre position (with and without pumps) - Freecooling version

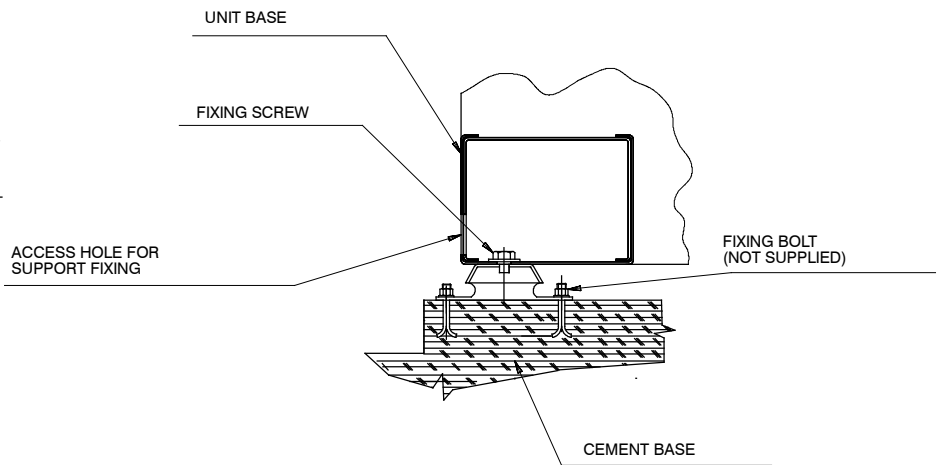
Models	X base (mm)	Unit without pumps			Unit with pumps		
		“Xg” (mm)	“Yg” (mm)	Shipping weight (kg)	“Xg” (mm)	“Yg” (mm)	Shipping weight (kg)
FG4 / FB4 069	9478	4746	1045	10630	4746	1064	11135
FG4 / FB4 075	9478	4742	1045	10640	4742	1064	11145
FG4 / FB4 081	9478	4746	1041	10763	4746	1060	11268
FG4 /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

Fig. 5 - Rubber anti- vibration support

Rubber support dimensions



Rubber support installation



Single support code

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

Rubber support (Chiller)

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

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

Rubber support (Freecooling)

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

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

Rubber support (No Glycol group)

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

Weight distribution - unit without pumps (Chiller)

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

Weight distribution - unit without pumps (Freecooling)

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

Weight distribution - unit with pumps (Chiller)

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

Weight distribution - unit with pumps (Freecooling)

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

Overall dimensions (mm) and connections

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

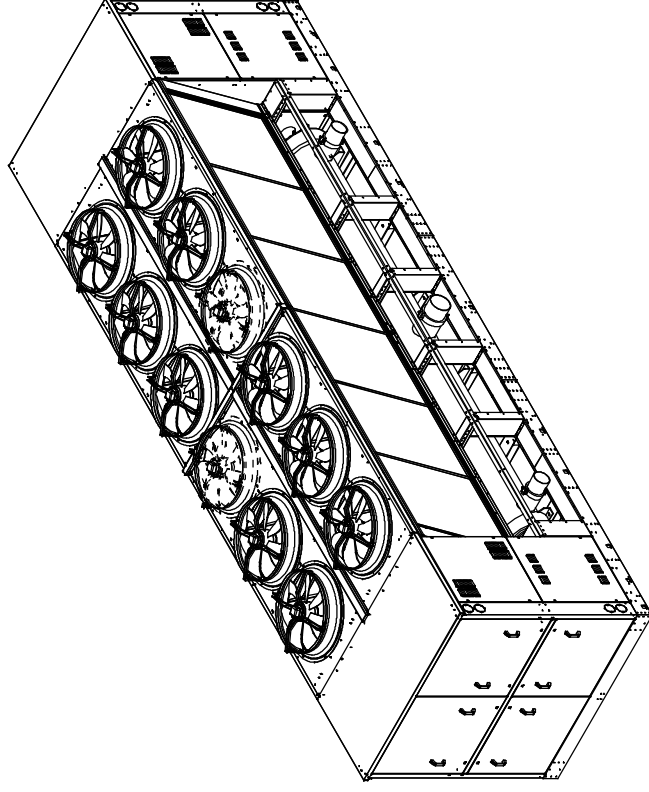
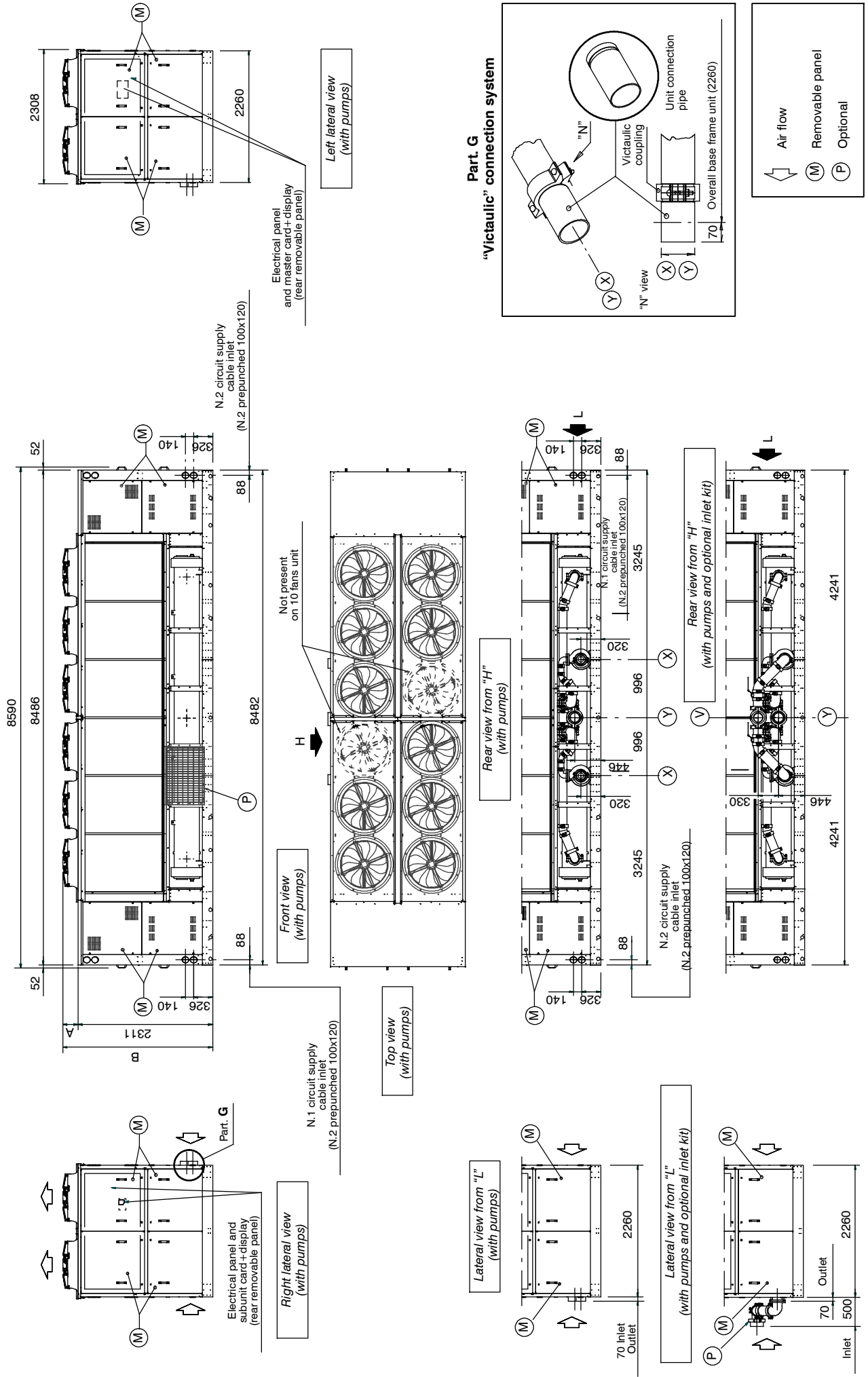


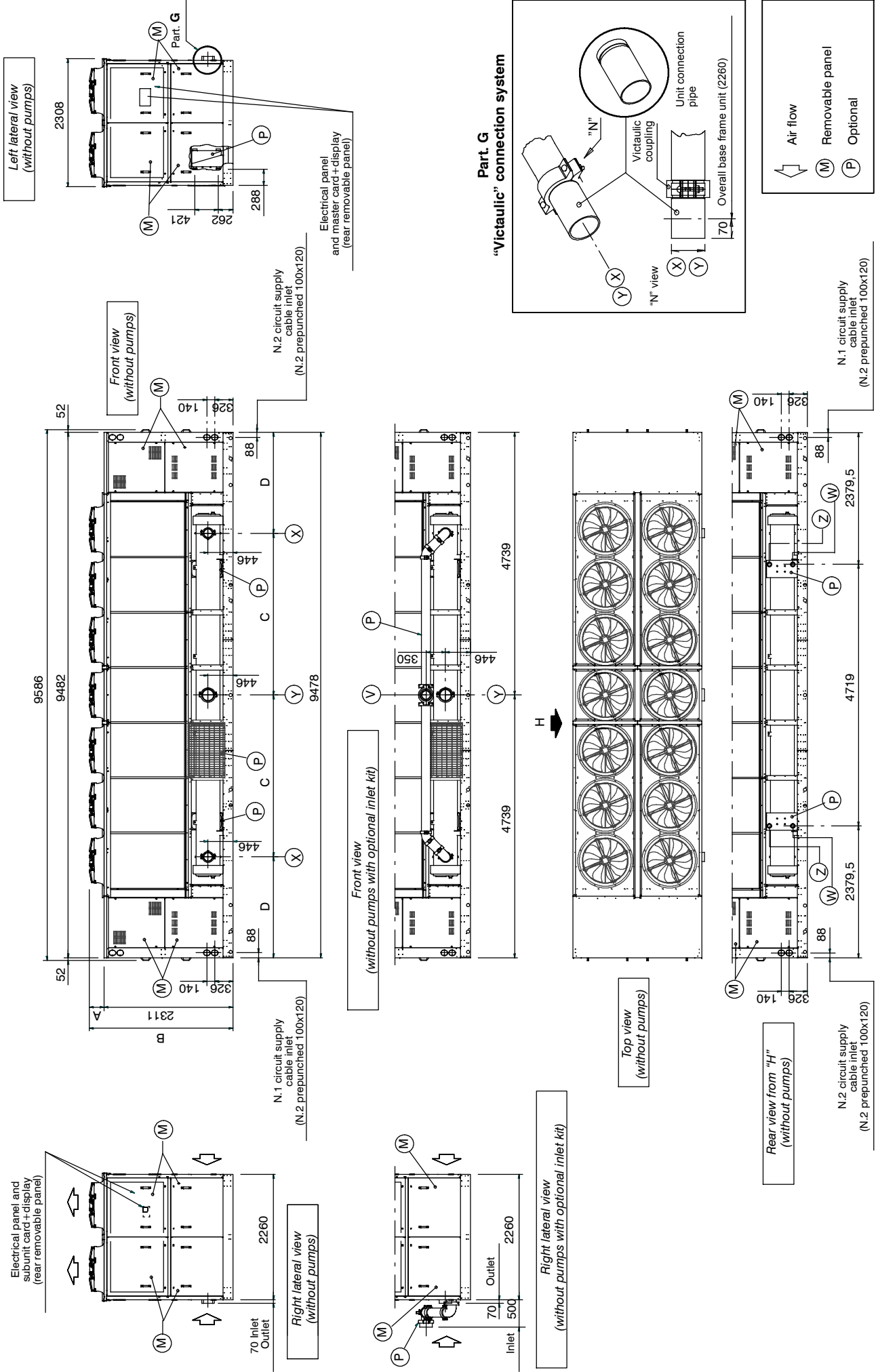
Fig. 8 - Liebert HPC- L - CG4/CB4/CL4/CQ4 with pumps (10- 12 fans)



Overall dimensions (mm) and connections

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

Fig. 9 - Liebert HPC- L - CG4/CB4/CL4/CQ4 without pumps (14 fans)



Overall dimensions (mm) and connections

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

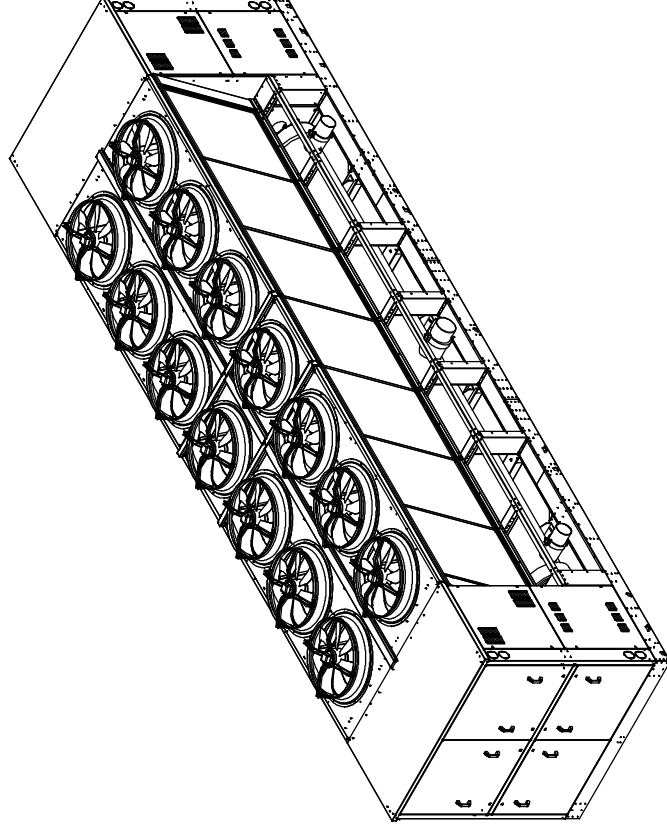
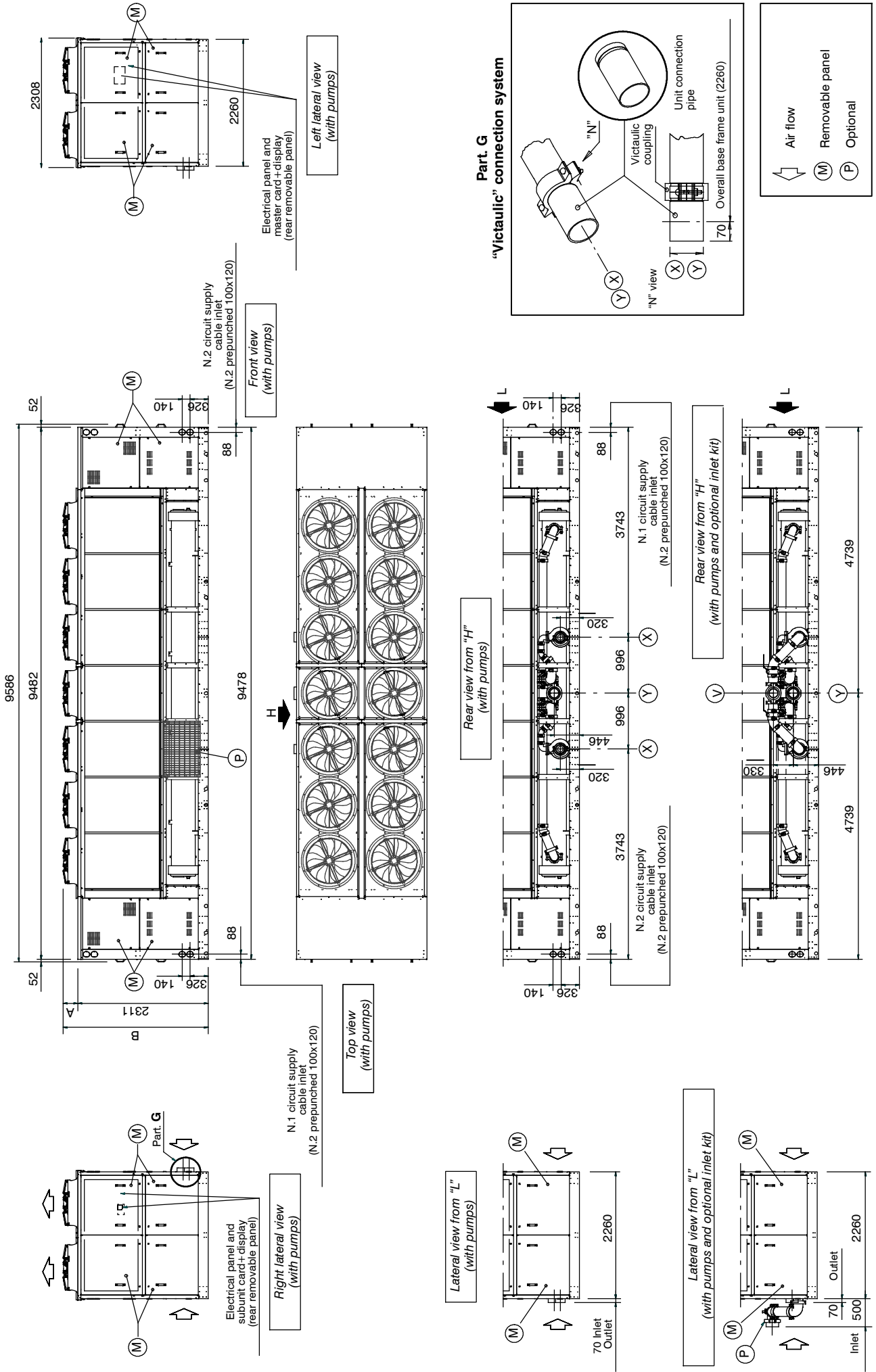


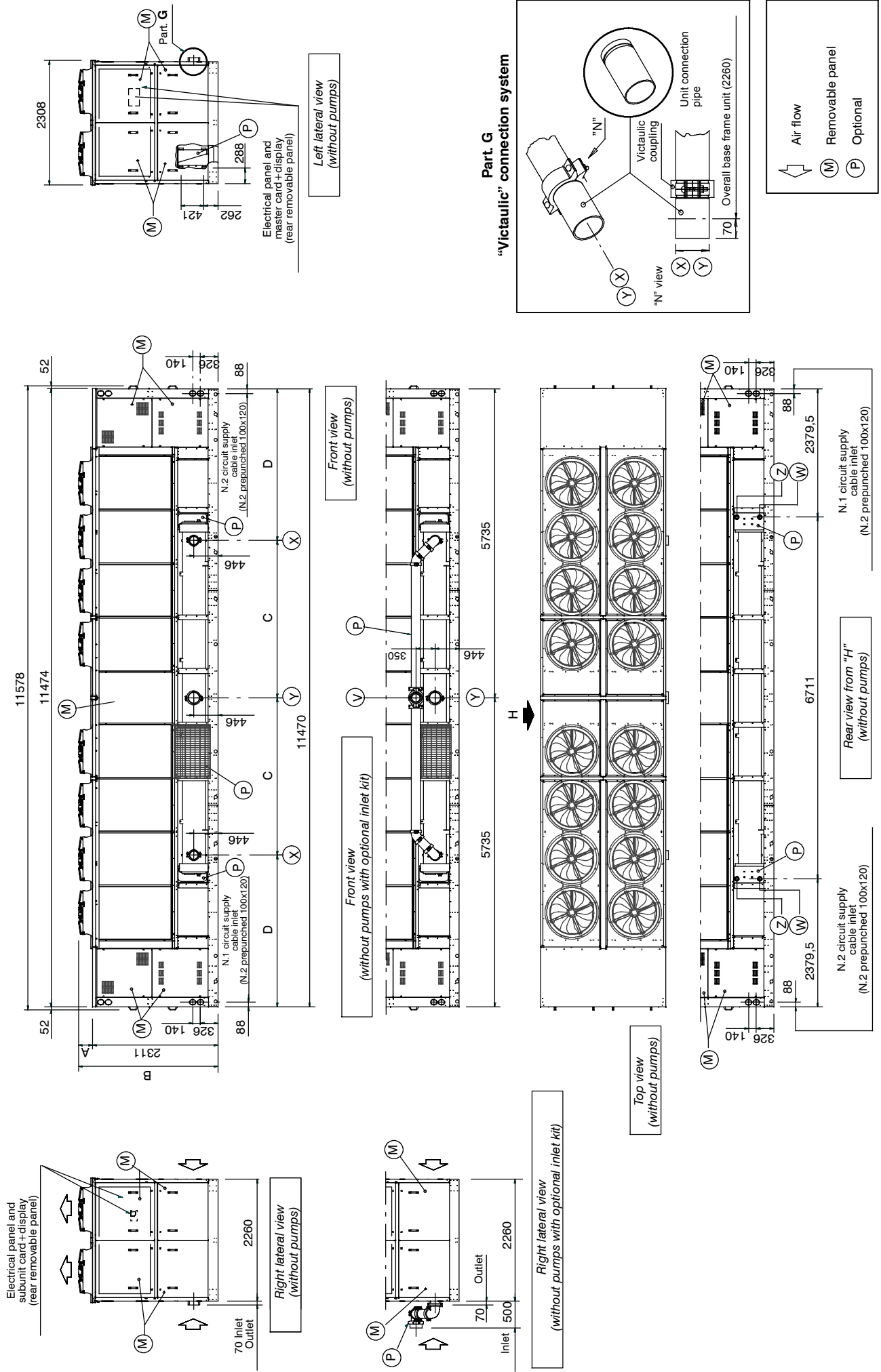
Fig. 10 - Liebert HPC- L - CG4/CB4/CL4/CQ4 with pumps (14 fans)



Overall dimensions (mm) and connections

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

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



Overall dimensions (mm) and connections

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

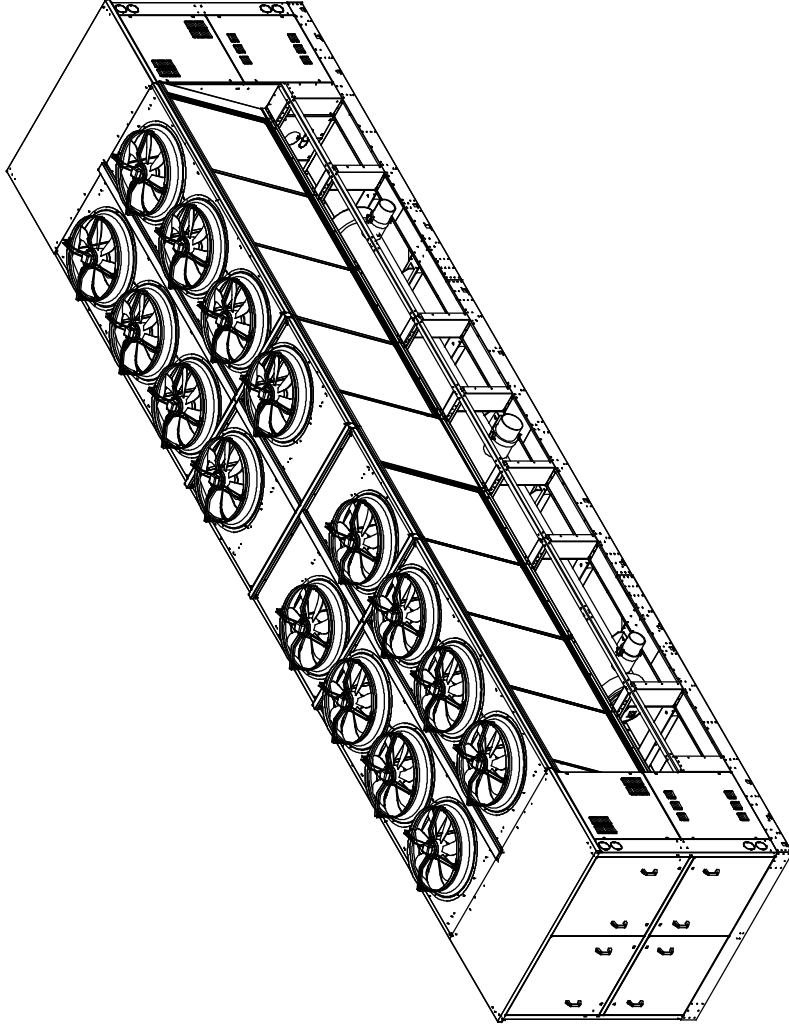
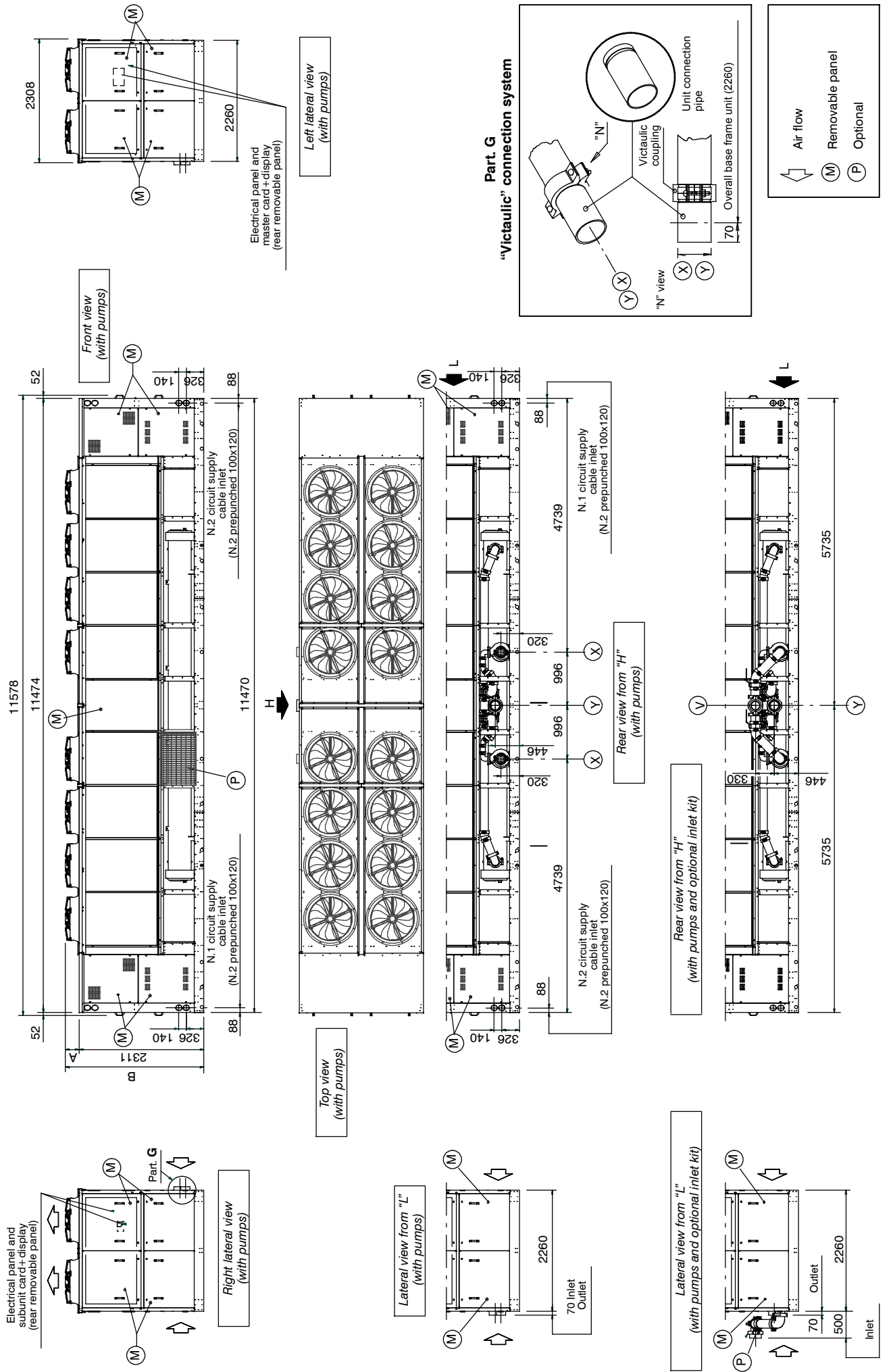


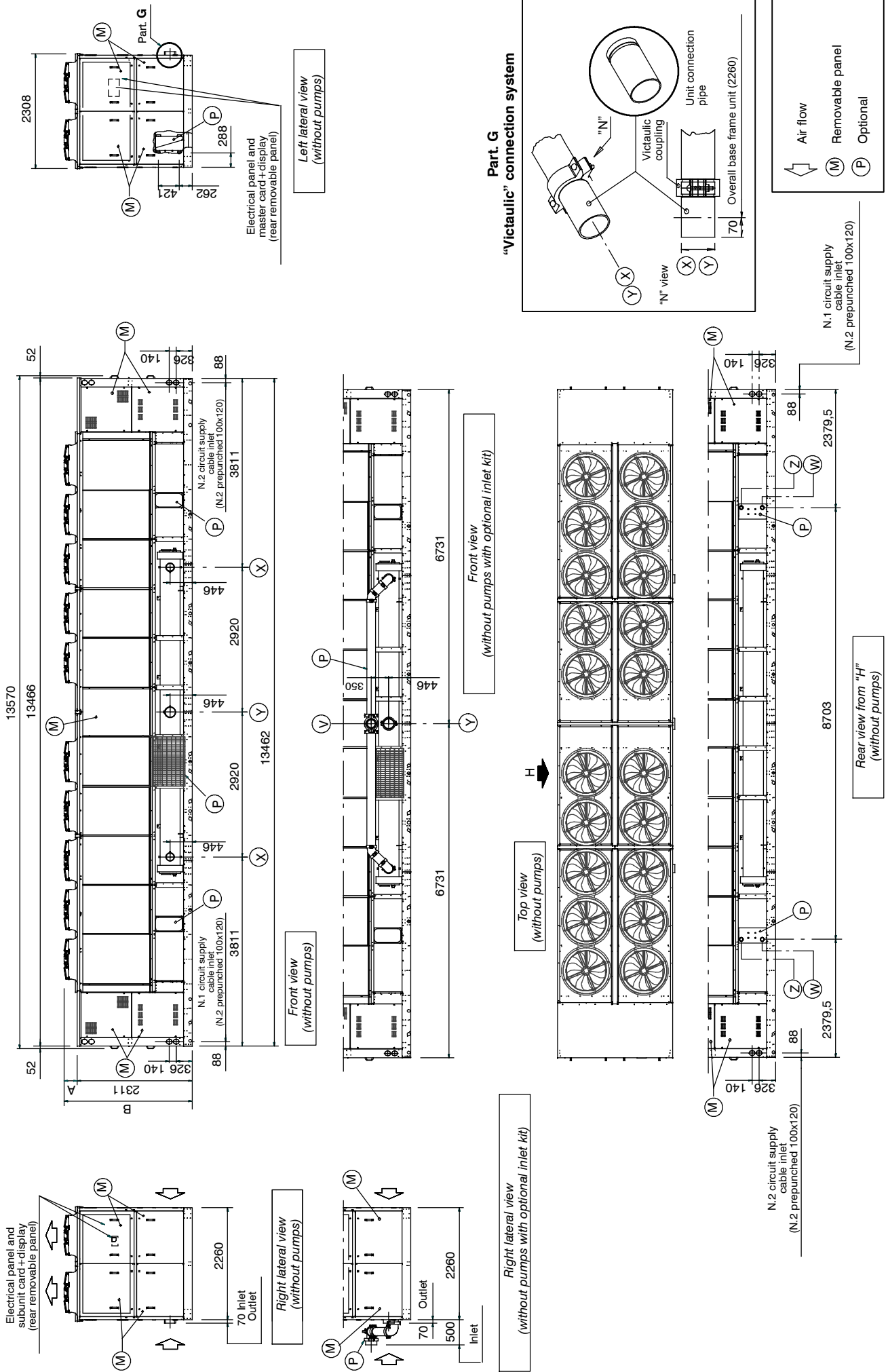
Fig. 12 - Liebert HPC- L - CG4/CB4/CL4/CQ4 with pumps (16 fans)



Overall dimensions (mm) and connections

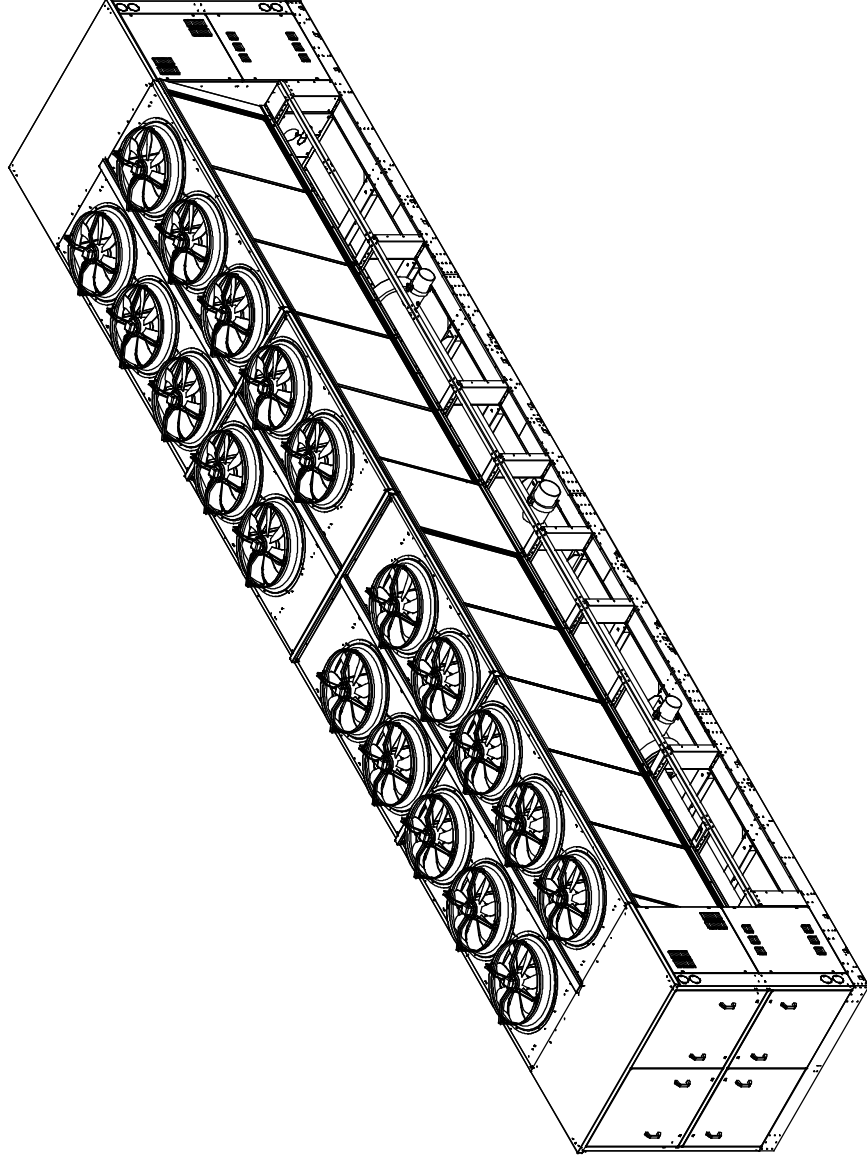
Model	N. Fans	EC fans		AC fans		Chilled water connections		
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"X" Inlet (Standard)	"Y" Inlet (Optional)	"Y" Outlet
CG4 122	16	270	2581	260	2571	DN150 - 6" - 168.3mm 2 X	DN200 - 8" - 219.1mm 1 X	DN200 - 8" - 219.1mm 1 X
CB4 122								
CL4 092 - 099								
CQ4 092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

Fig. 13 - Liebert HPC- L - CG4/CB4/CL4/CQ4 without pumps (20 fans)



Overall dimensions (mm) and connections

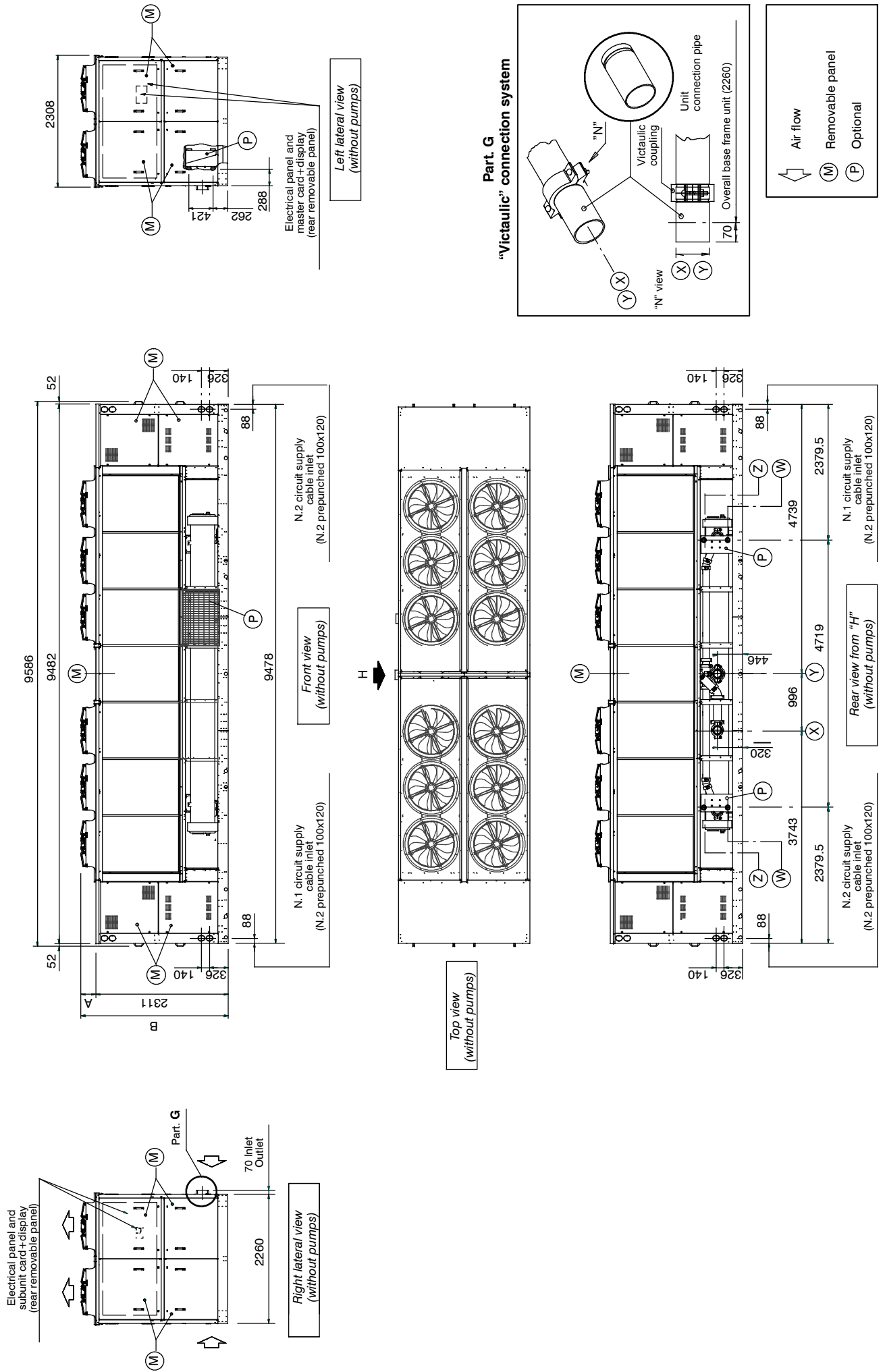
Model	N. Fans	EC fans			AC fans		Chilled water connections			Partial heat recovery water connections (opt. not available with pumps)	
		"A" (mm)	"B" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"X" Inlet (Standard)	"Y" Inlet (Optional)	"V" Inlet (Optional)	"W" Inlet	"Z" Outlet
CB4 140	20	270	2581	260	2571	2 x DN150 - 6" - 168.3mm	1 x DN200 - 8" - 219.1mm	1 x DN200 - 8" - 219.1mm	2 x G 2 1/2" B (ISO 228/1) Male	1 x DN200 - 8" - 219.1mm	2 x G 2 1/2" B (ISO 228/1) Male
CL4 121 - 139		288	2599								
CQ4 121 - 139		292	2543								



Overall dimensions (mm) and connections

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

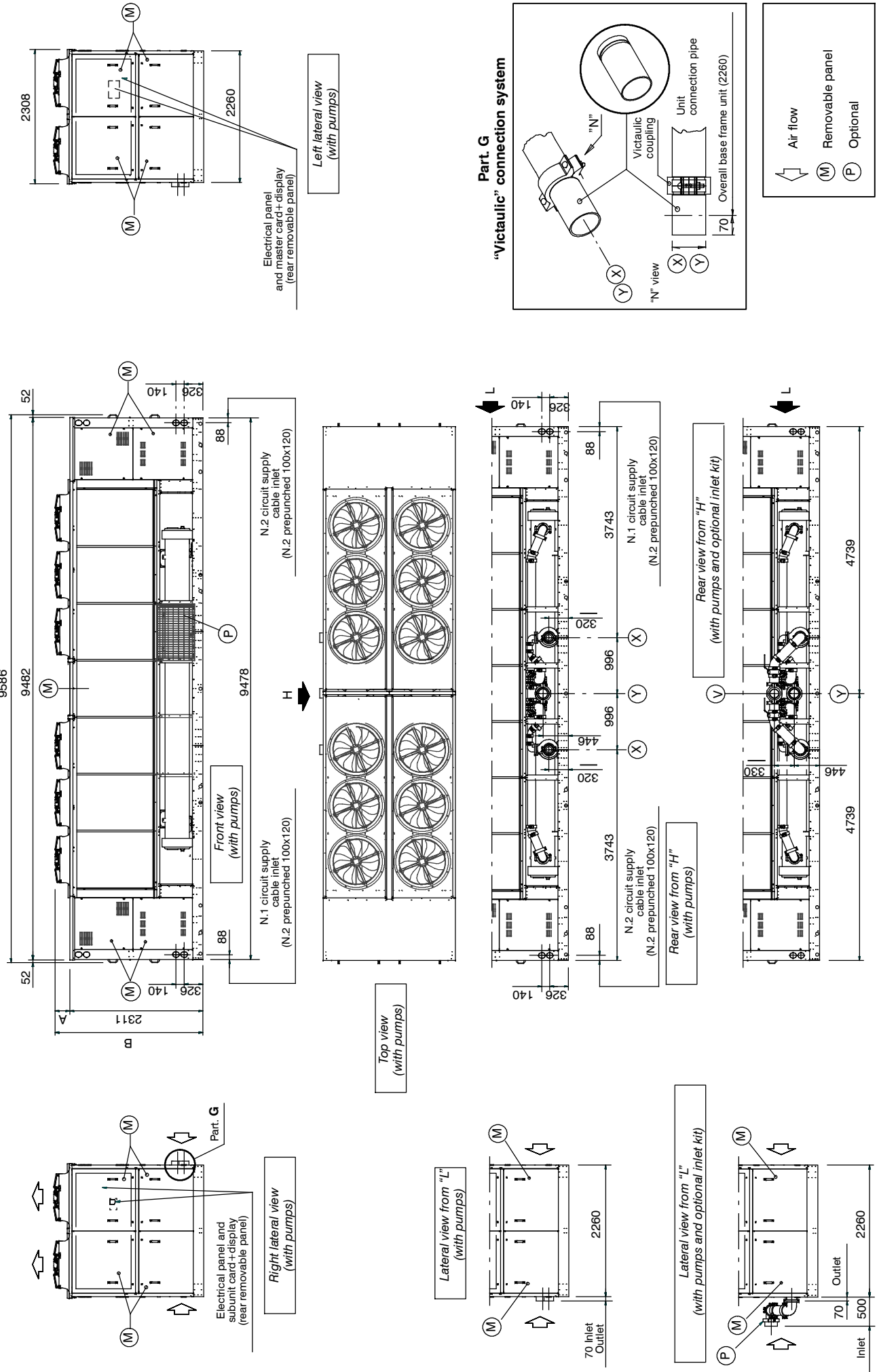
Fig. 15 - Liebert HPC- L + Freecooling - FG4/FB4/FL4/FQ4 without pumps (12 fans)



Overall dimensions (mm) and connections

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

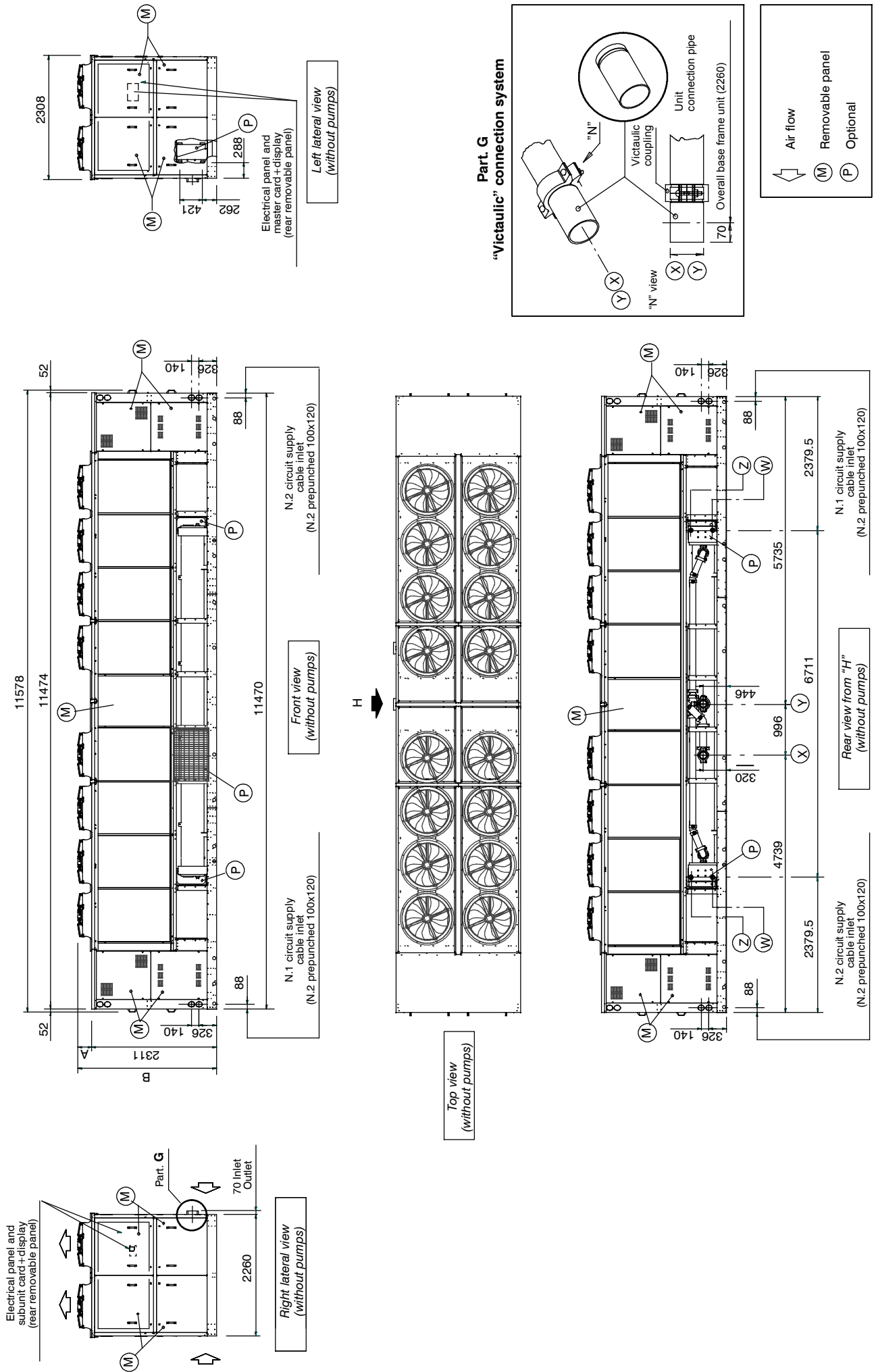
Fig. 16 - Liebert HPC- L + Freecooling - FG4/FB4/FL4/FQ4 with pumps (12 fans)



Overall dimensions (mm) and connections

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

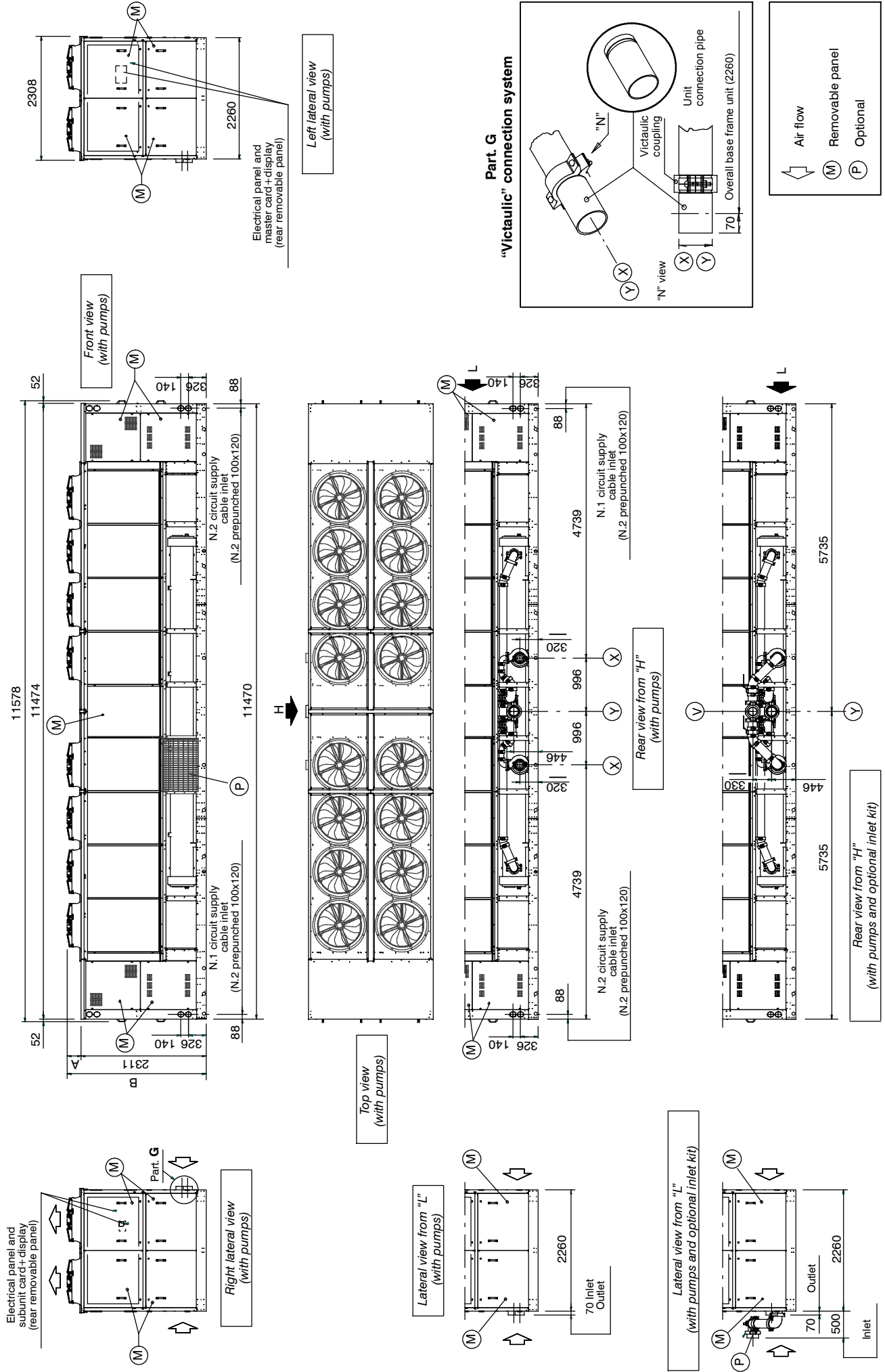
Fig. 17 - Liebert HPC- L + Freecooling - FG4/FB4/FL4/FQ4 without pumps (16 fans)



Overall dimensions (mm) and connections

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

Fig. 18 - Liebert HPC- L + Freecooling - FG4/FB4/FL4/FQ4 with pumps (16 fans)



Overall dimensions (mm) and connections

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

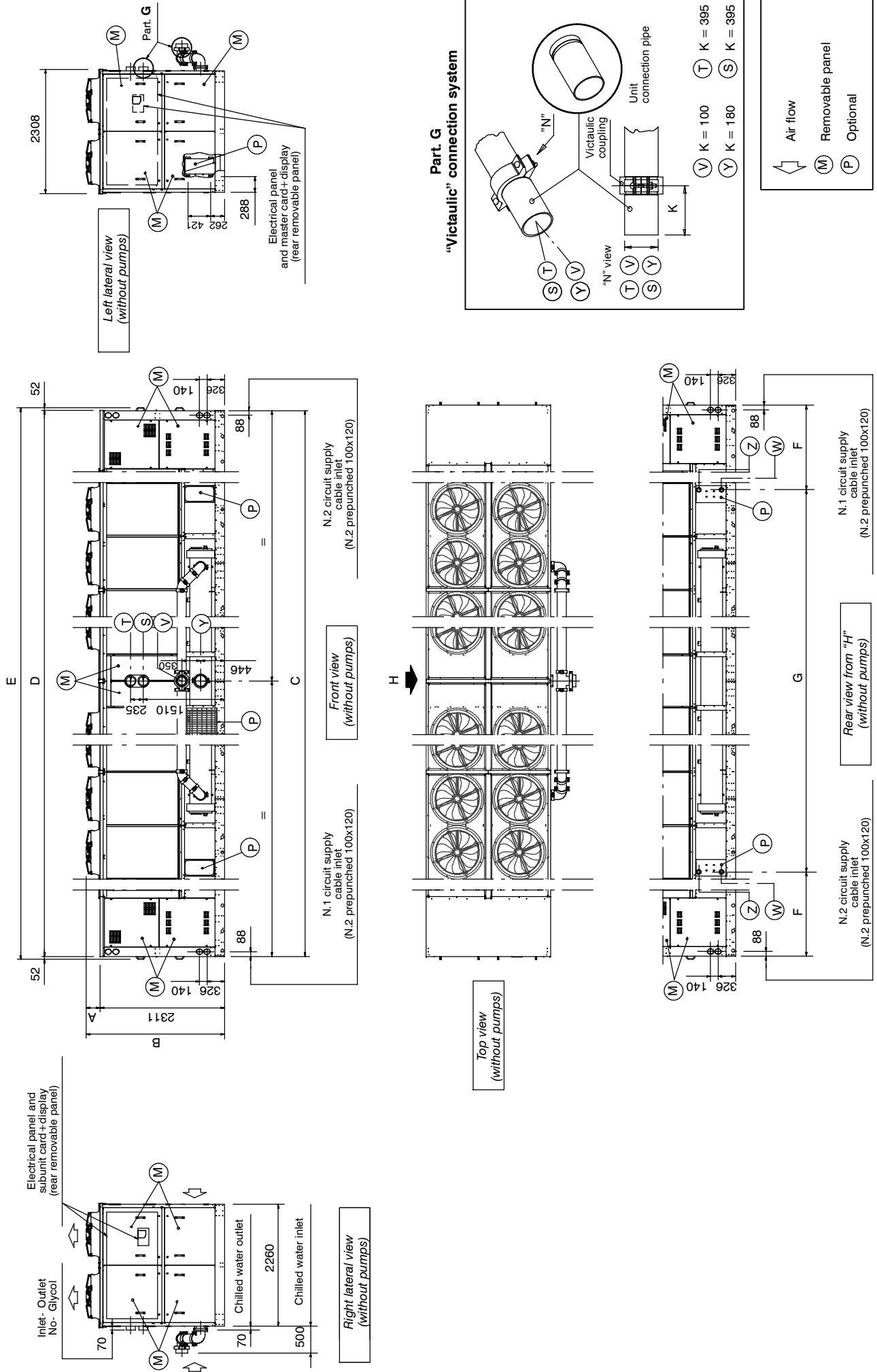
Overall dimensions (mm) and connections

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

Overall dimensions (mm) and connections

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

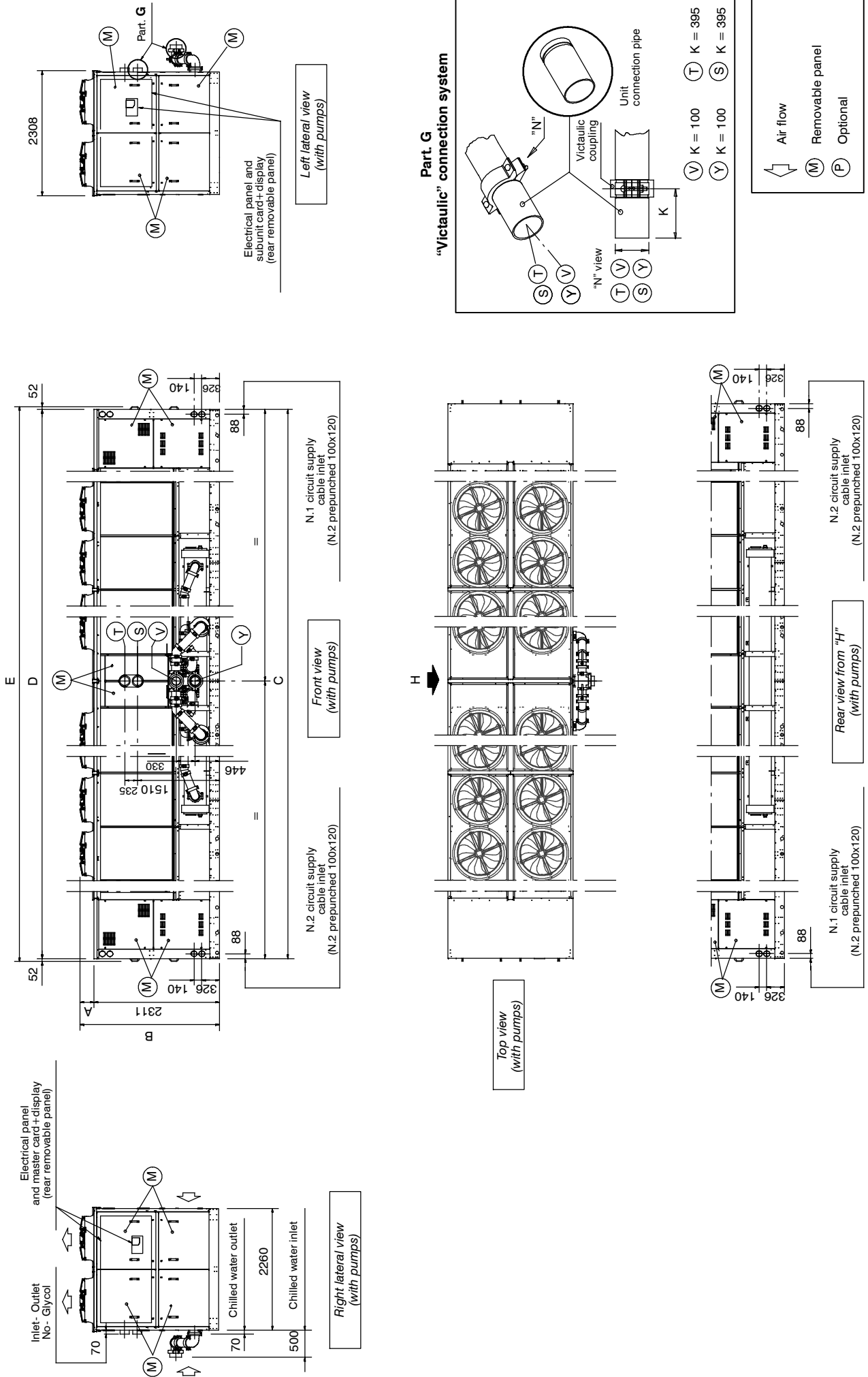
Fig. 21 - Liebert HPC- L + Freecooling - FG4/FB4/FL4/FQ4 - No Glycol - without pumps



Overall dimensions (mm) and connections

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

Fig. 22 - Liebert HPC- L + Freecooling - FG4/FB4/FL4/FQ4 - No Glycol - with pumps



Overall dimensions (mm) and connections

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

Fig. 23 - Overall unit dimensions with lifting tubes option

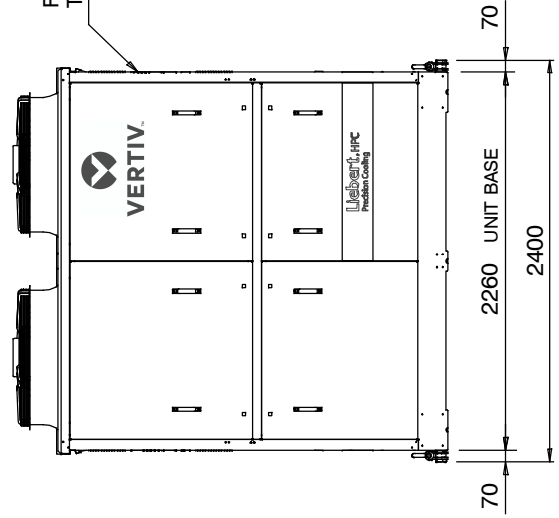


Fig. 24 - No Glycol group dimensions

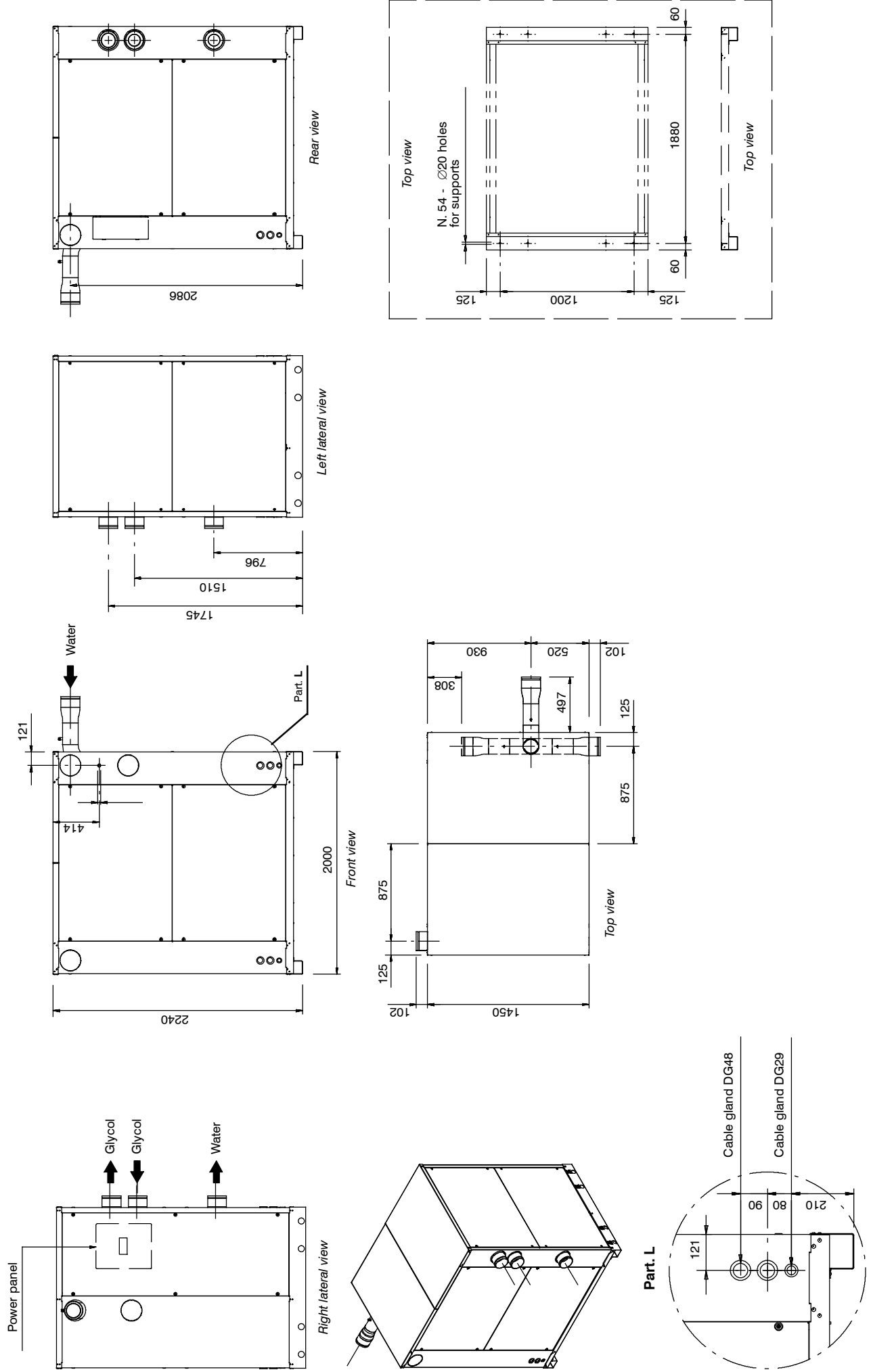
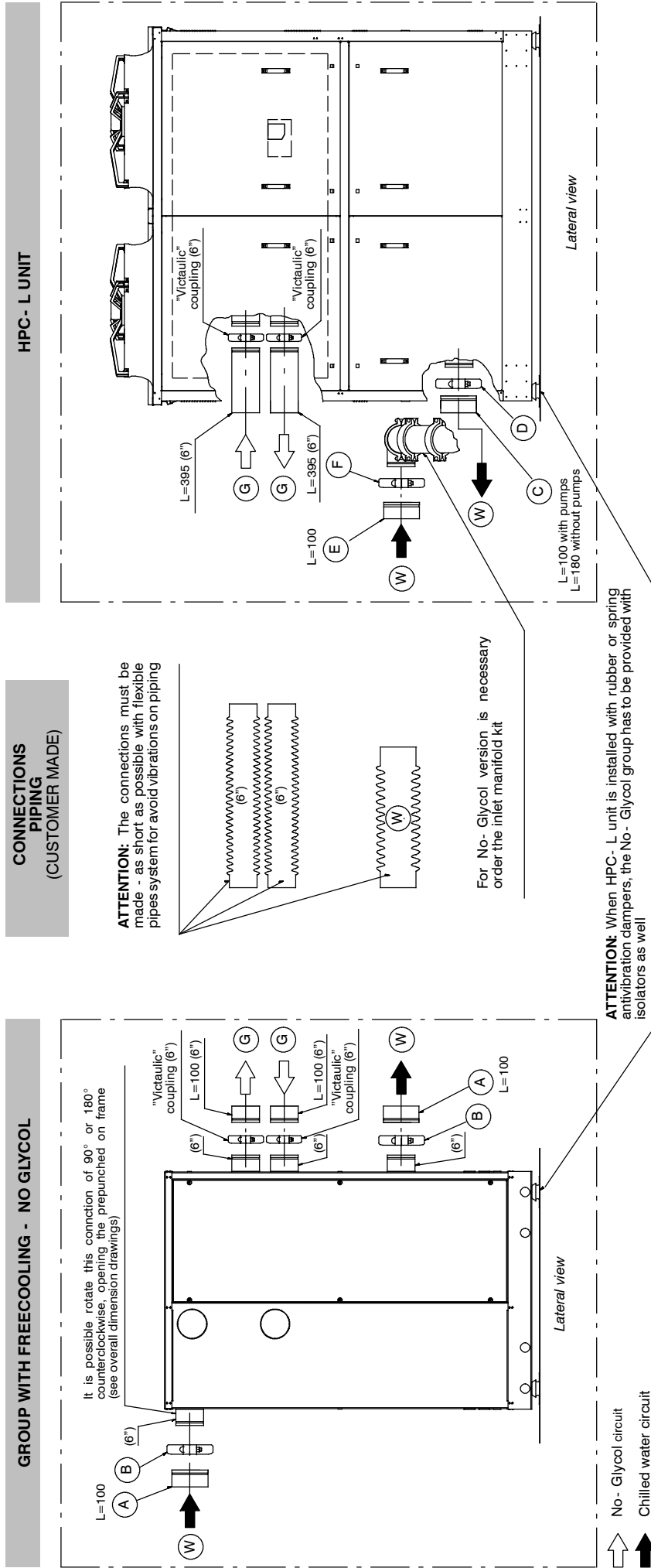


Fig. 25 - Liebert HPC- L + Freecooling - No Glycol group connection



HPC- L unit connections with freecooling / No Glycol group

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

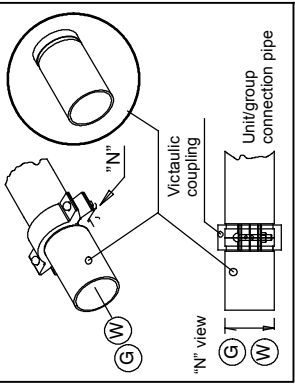
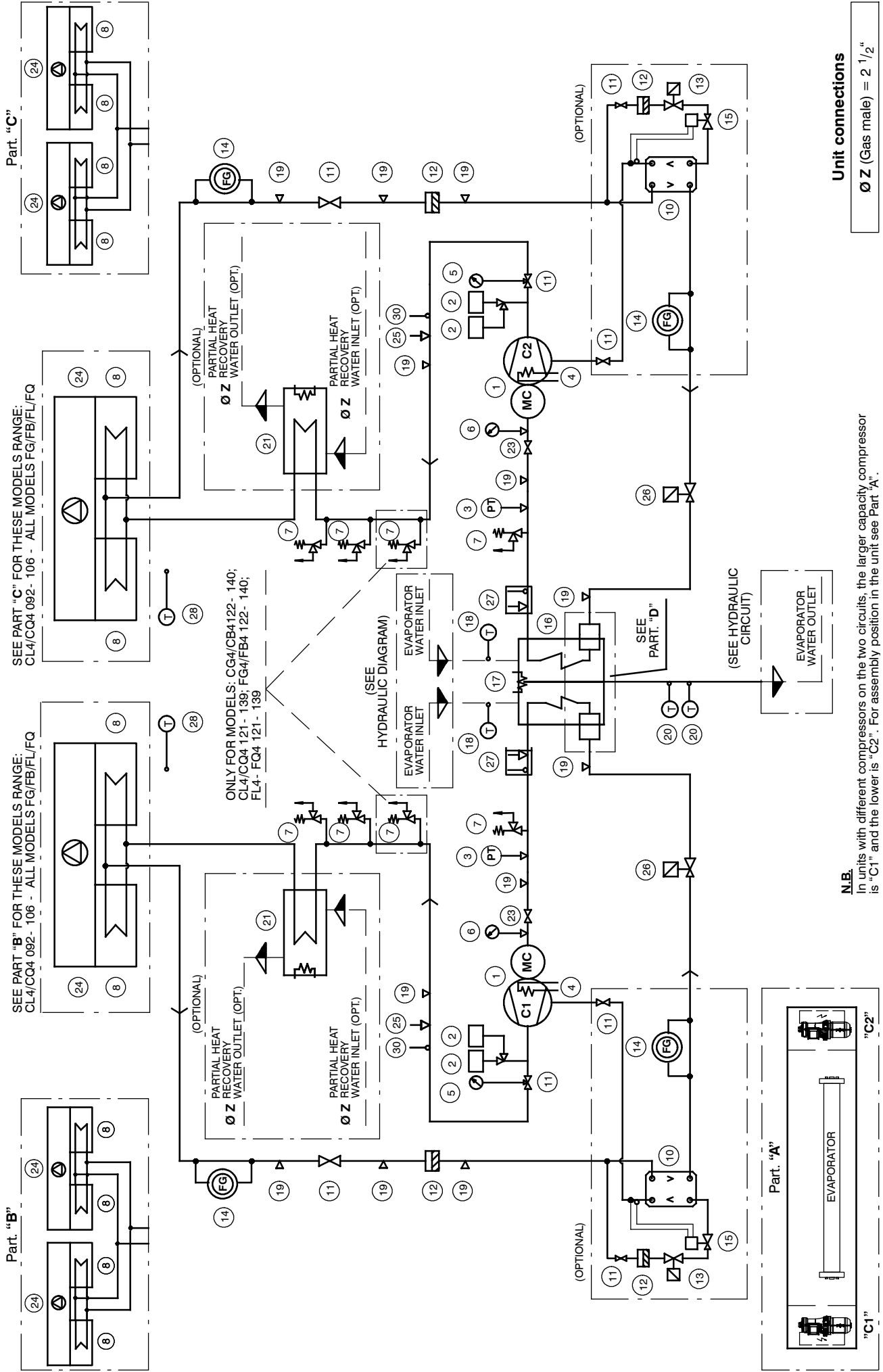


Fig. 26 - Refrigerant Circuit

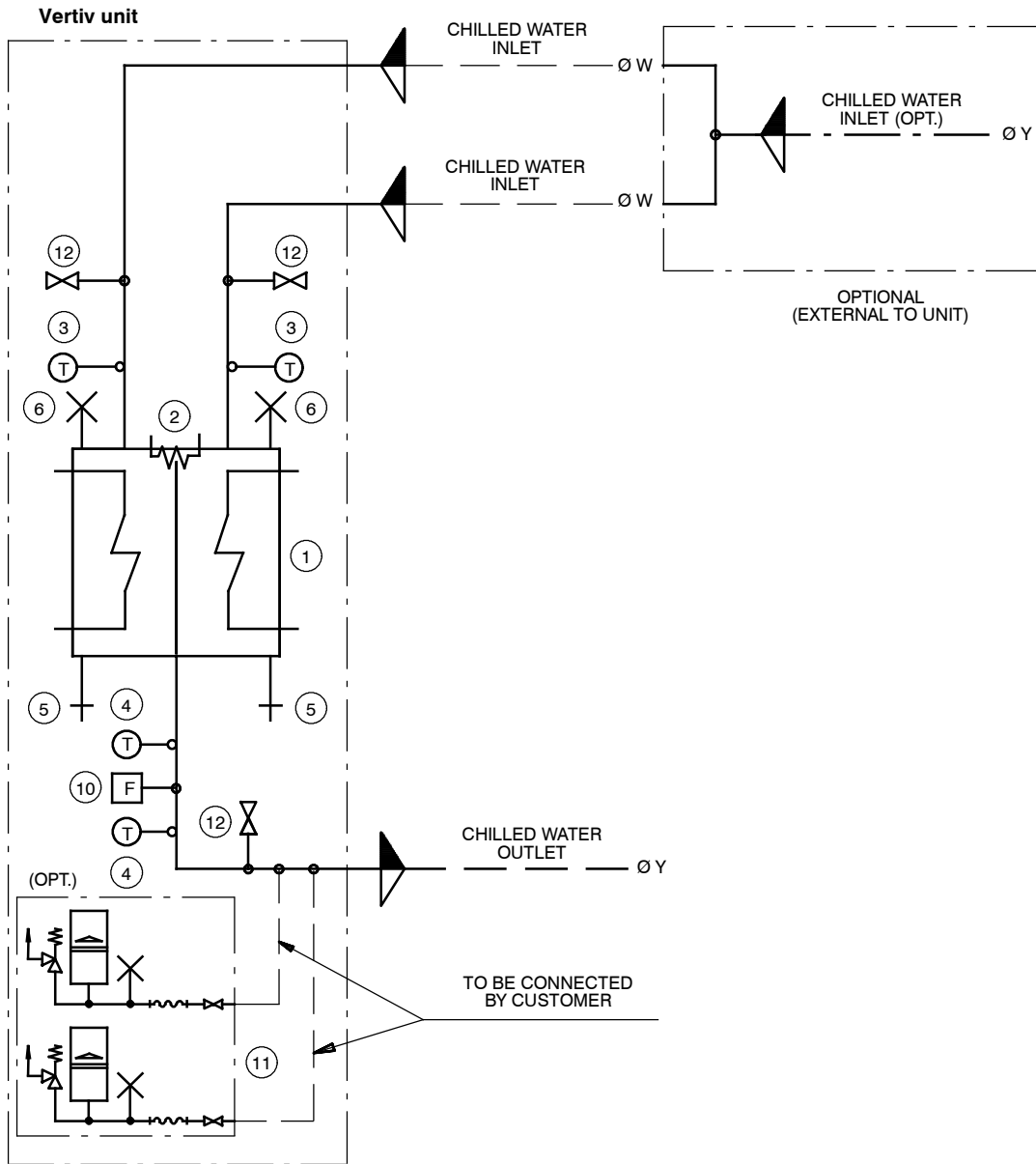


N.B.
In units with different compressors on the two circuits, the larger capacity compressor is "C1" and the lower is "C2". For assembly position in the unit see Part "A".

Refrigerant components

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

Fig. 27 - Hydraulic circuit (without pumps)



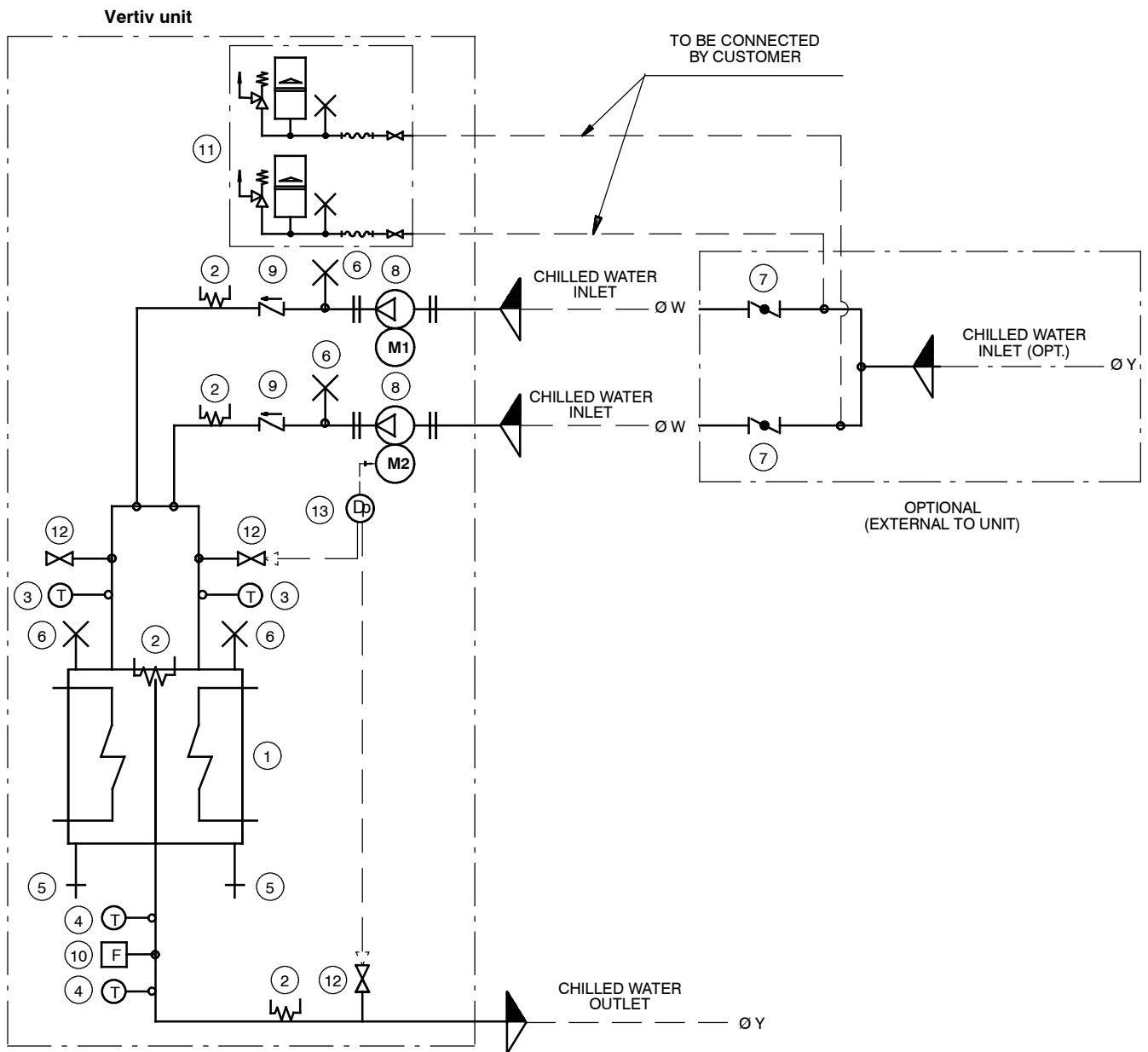
Hydraulic components

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

Unit connections

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

Fig. 28 - Hydraulic circuit (with pumps)



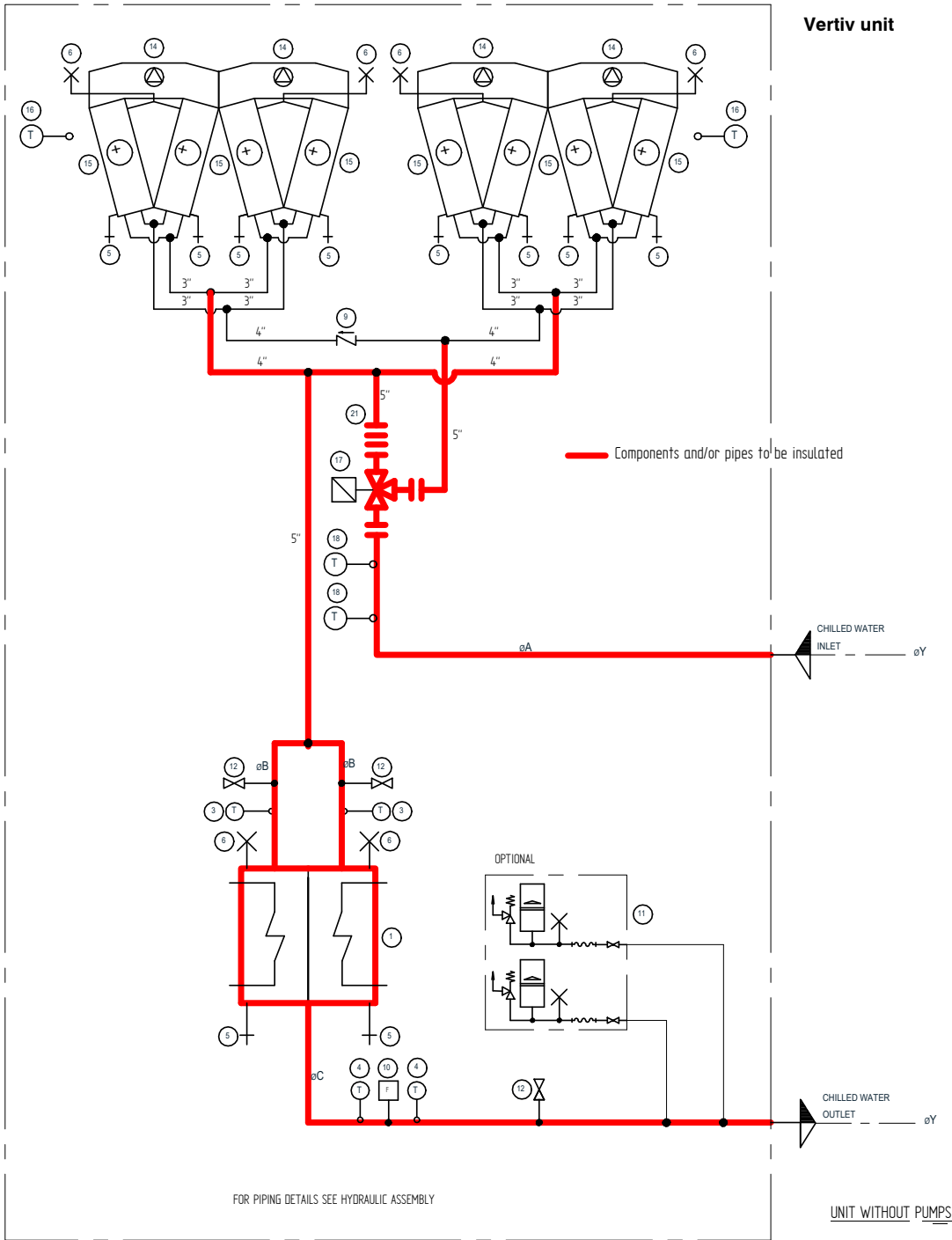
Hydraulic components

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

Unit connections

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

Fig. 29 - Hydraulic circuit (with freecooling without pumps)



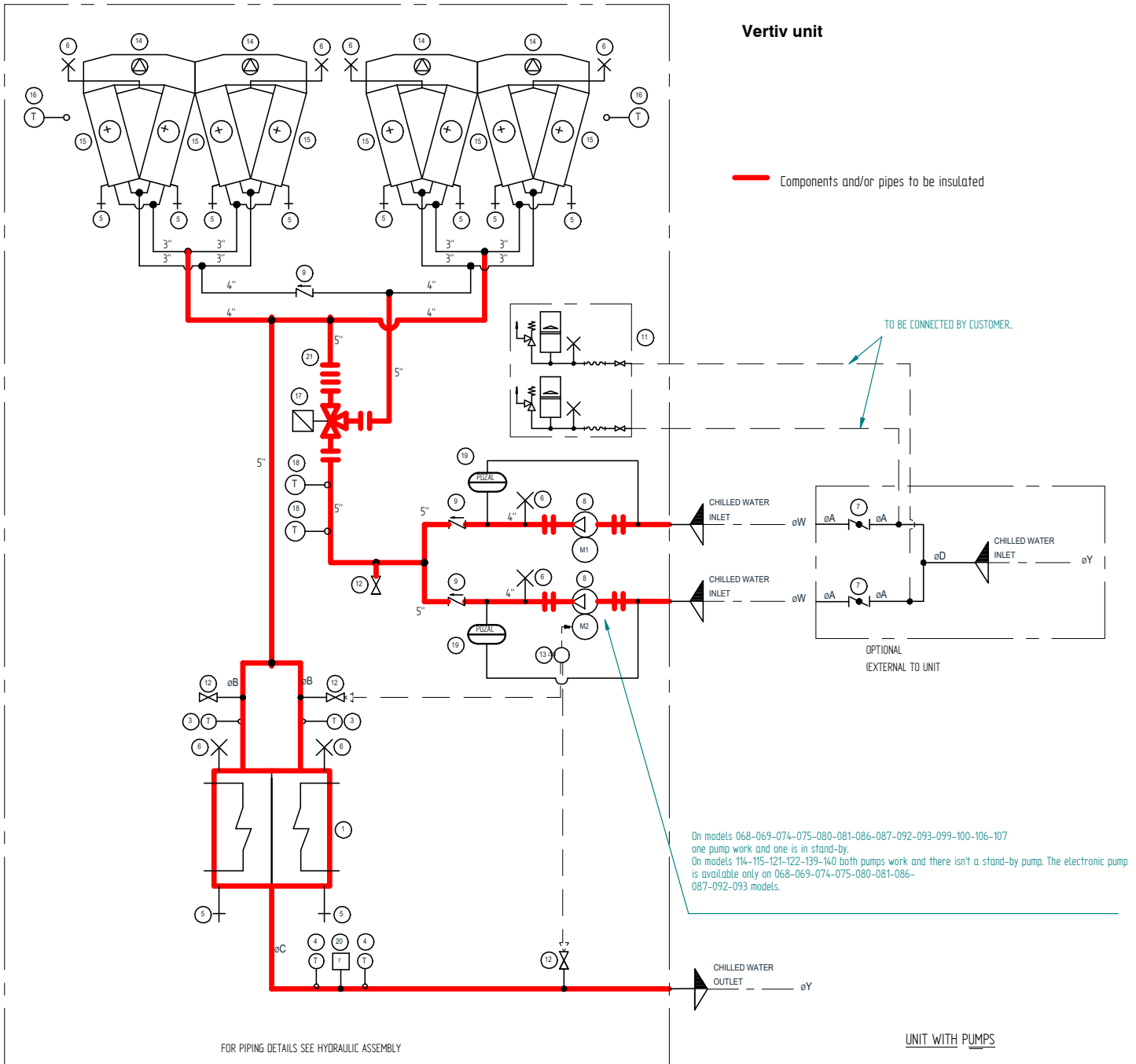
Hydraulic components

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

Unit connections

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

Fig. 30 - Hydraulic circuit (with freecooling with pumps)



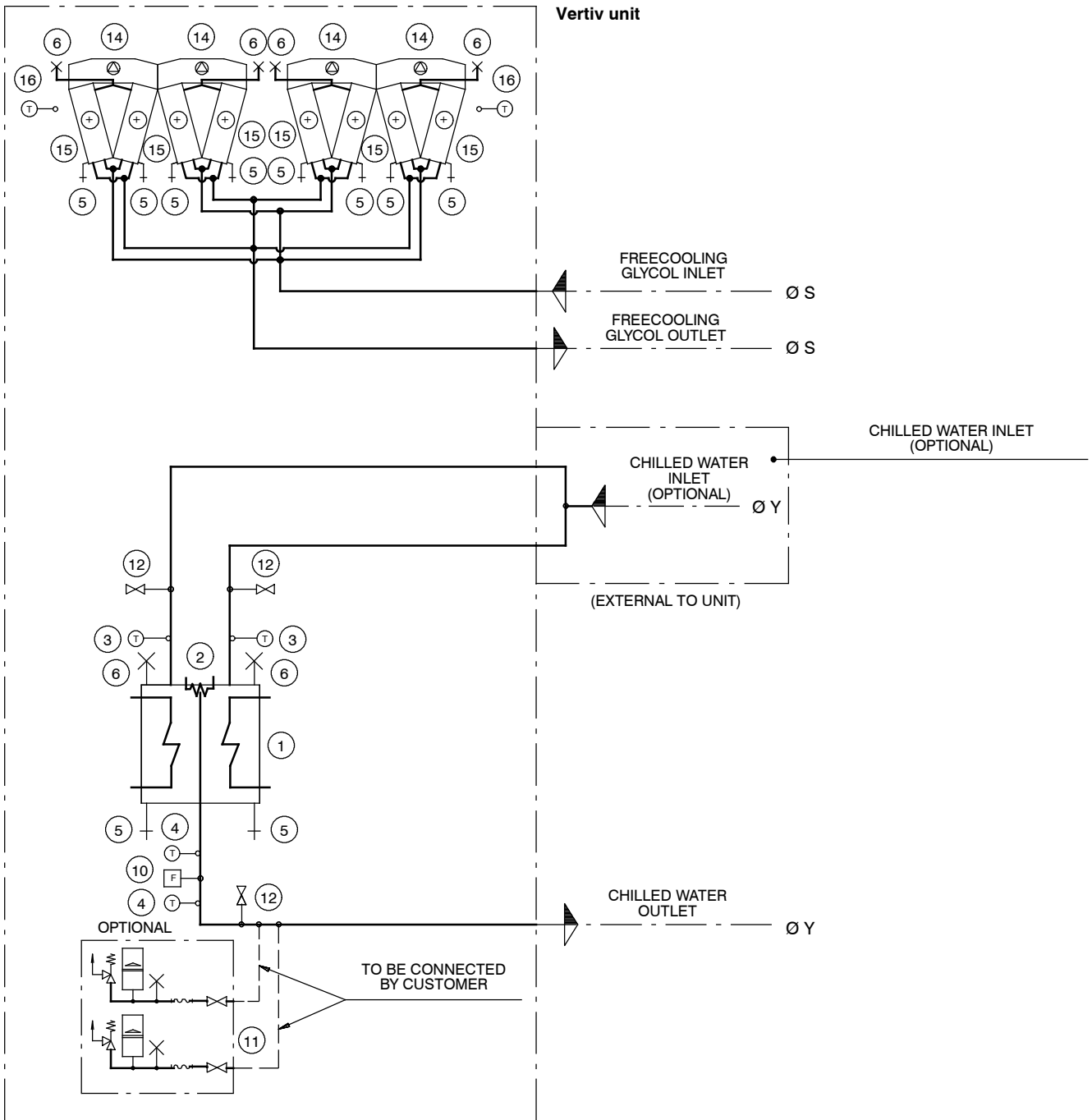
Hydraulic components

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

Unit connections

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

Fig. 31 - Hydraulic circuit (with freecooling - No Glycol- without pumps)



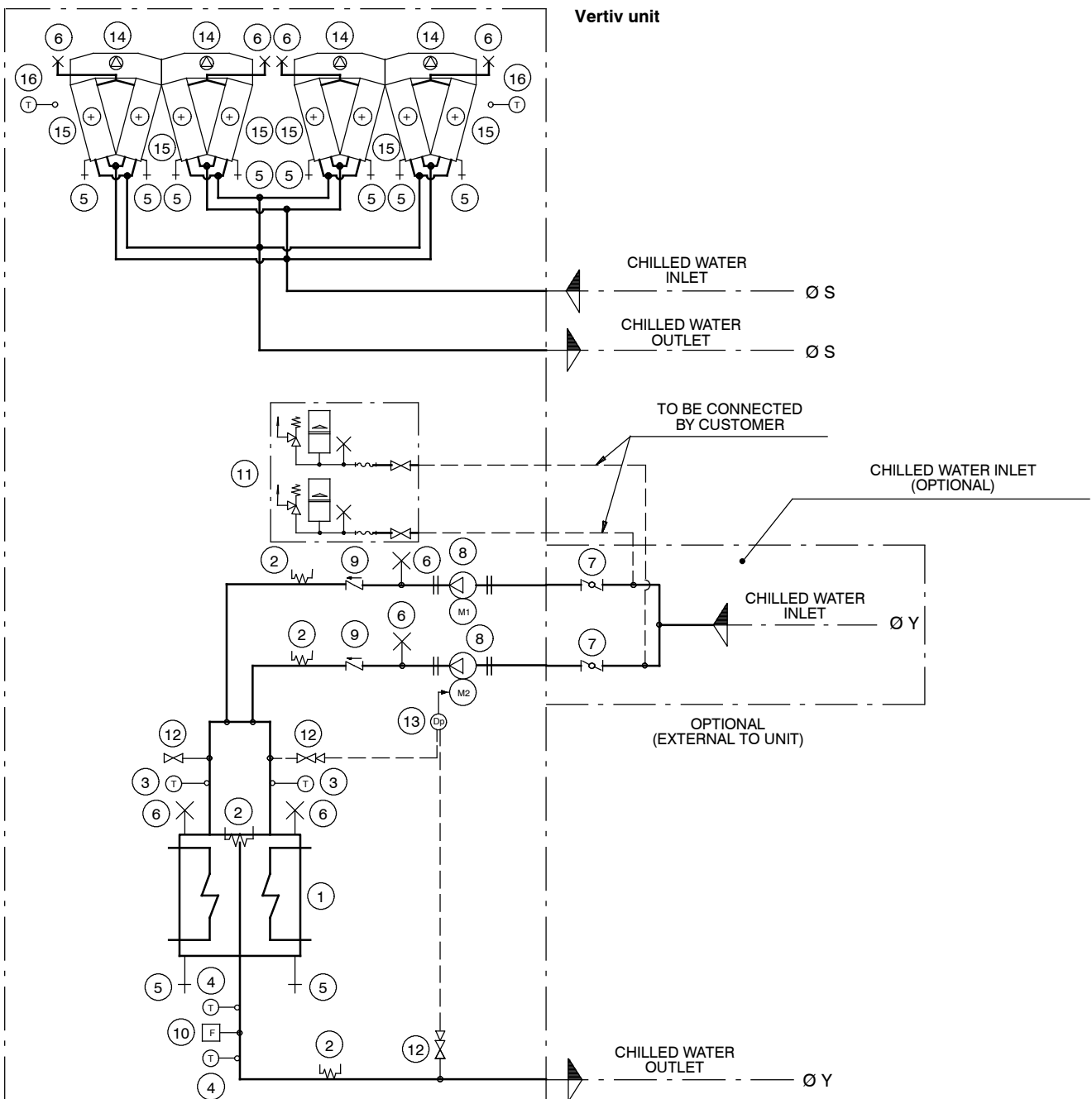
Hydraulic components

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

Unit connections

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

Fig. 32 - Hydraulic circuit (with freecooling - No Glycol- with pumps)



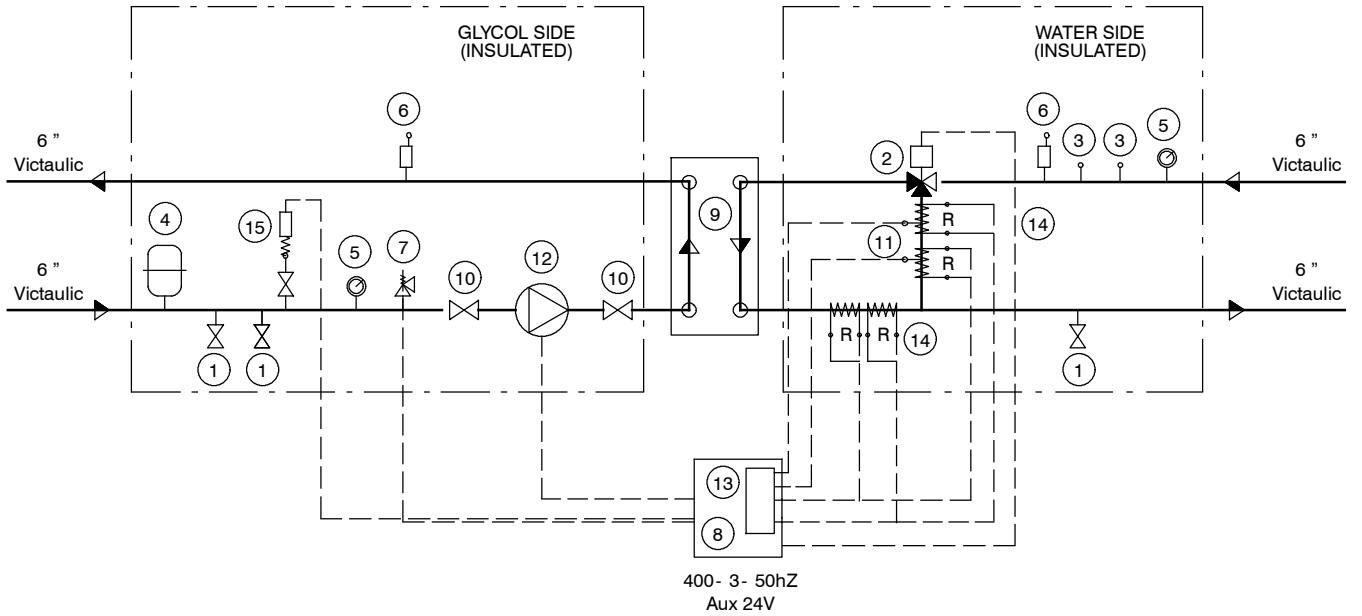
Hydraulic components

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

Unit connections

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

Fig. 33 - Hydraulic circuit (No Glycol unit)



Hydraulic components

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



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