



# Liebert HPC-S

017-032

Air Cooled Chillers with Scroll compressor/s

Product Documentation

English, cod. 273566, rev. 13.06.2019



## Liebert HPC- S 017- 032

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**Liebert HPC-S 017-032** is the new **Vertiv** product line of air-cooled water chillers, from **160 to 350 kW**, designed to combine the best performance in terms of efficiency and reliability with the lowest impact on the environment and to offer a flexible solution for each different application requirement of this product.

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

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

With **@connectivity**, a highly sophisticated way to let the system components communicate, **Liebert HPC-S 017- 032** is part of the network created for an improved operations management system and significant energy saving.

## Liebert HPC- S 017- 032

Solutions Committed to your Business



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

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



**Liebert HPC- S 017- 032** units are CE marked as they comply with the European directives concerning mechanical, electrical, electromagnetic and pressure equipment safety.

# 1

## Features and Benefits

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### Reliability and Low Environmental Impact

#### Reliability

The **Liebert HPC- S 017- 032** series is equipped with four hermetic scroll compressors, which represent state-of-the-art technology in this sector. They have been designed and optimized for air-cooled water chillers within air conditioning applications.

The high volumetric efficiency ensures excellent performances of the **Liebert HPC- S 017- 032** units at full load operation and especially at partial load, thanks to the interlaced-circuit design of the condenser coil.

Extremely low noise operation and the absence of vibrations aid the installation of the unit in city sites requiring strict noise limits.

The wide operating range, bearing lubrication, component oversizing, absence of vibrations and few moving parts, together with the resistance to liquid slugging and compressor electronic control integrated with the machine microprocessor enhance the well-known characteristics of operating reliability and long life typical of this compressors type.

Furthermore, **Liebert HPC- S 017- 032** tandem-compressor design with two independent refrigeration circuits allows maximum internal redundancy and thus system reliability. All **Liebert HPC- S 017- 032** units are run tested at the factory before shipment.



#### High outdoor temperature

The oversizing of heat exchangers and the wide operating range of the scroll compressors permit the use of **Liebert HPC- S 017- 032** units in high temperature environments as well, up to 46° C at 100% full load.

#### Resistance to liquid slugging

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

#### Low Sound Emission

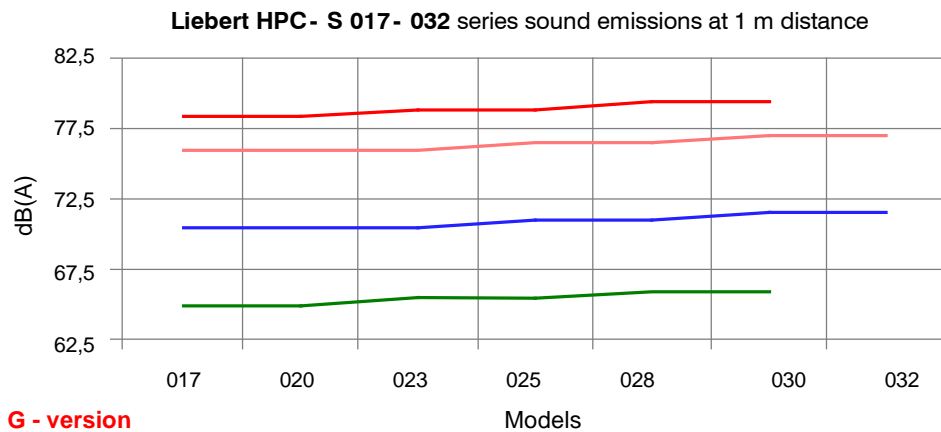
The **Liebert HPC- S 017- 032** series is characterized by unrivalled low sound emissions, in particular the models of the "G" version equipped with the "Quiet" kit (Digit 7=2 and 11=4).

Compressors supported on anti-vibration mounts and positioned in a closed compartment, common to all versions; fans specifically designed to reduce the sound emissions and a special compressor casing on unit configuration.

All the models are equipped with stepless fan speed control, (optional without freecooling), thanks to a special algorithm on the iCOM board, the fan speed could be kept to the minimum.

It is possible to reach even lower sound emissions with EC fans (electronically commutated fans), which especially during reduced speed operation, allow noise levels around 50% lower than the values measured at the same conditions with traditional fans.

# Features and Benefits



**G - version**

**B - version**

**B - version + 800 + CJ**

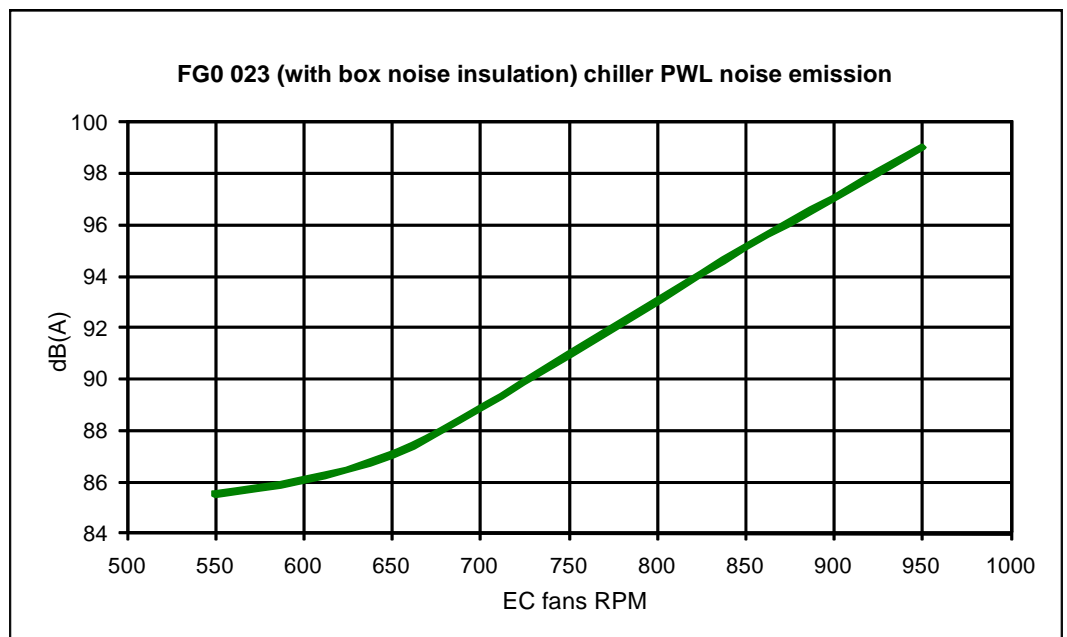
**G - version + 800 + CJ + Box**

**800** = 800 mm fans diameter;

**CJ** = Compressor noise insulation Jacket;

**Box** = Box noise insulation.

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



## Unequaled Efficiency and Energy Saving

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

## Freecooling Module

The "Freecooling" execution allows **Liebert HPC- S 017- 032** to take advantage of low outdoor air temperatures in the water cooling process in order to save energy, by avoiding compressors running.

A three- way valve arrangement permits the coolant to be diverted via the additional heat exchangers before being fed into the cooling evaporator.

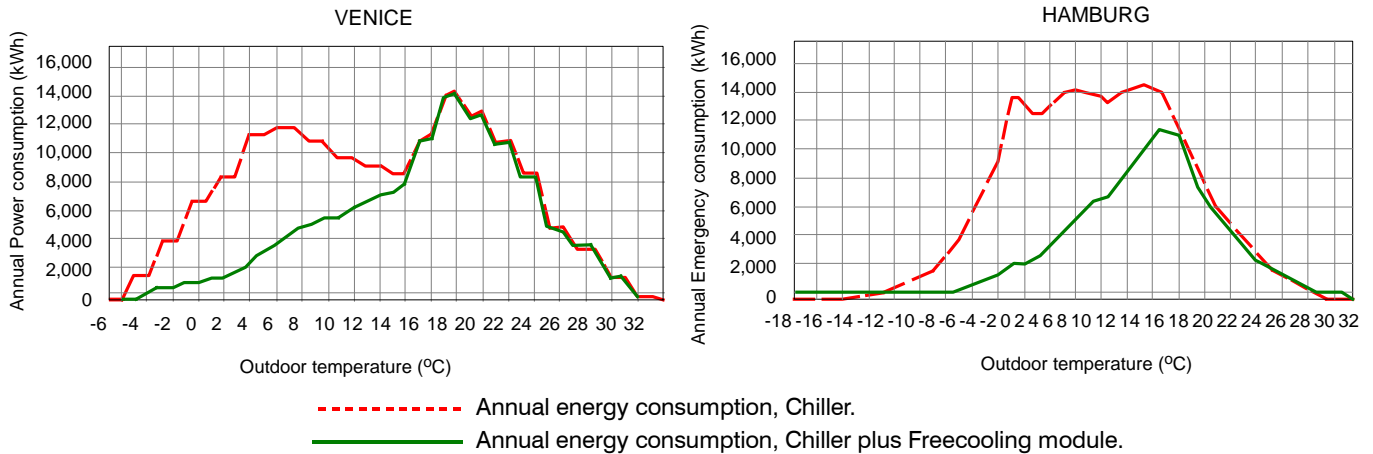
This means that even if the outside ambient temperature is not low enough to provide the complete cool-

# Features and Benefits

ing load, a significant contribution to the running costs of the system can be made whenever the ambient temperatures falls below the coolant inlet temperature.

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

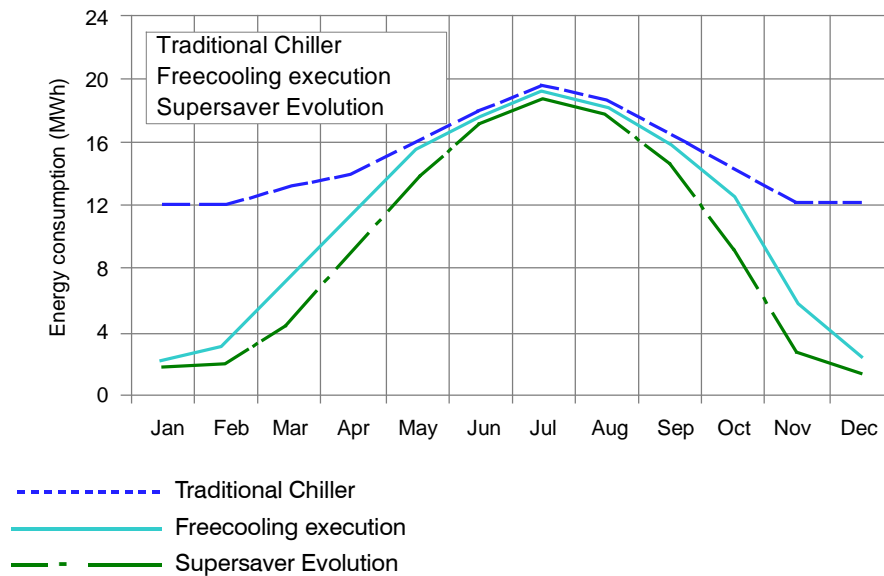
The different strategies adopted by the proprietary microprocessor control in managing the various components, fans - compressors - regulation valves, and operating modes, mechanical and/or free cooling, together with the compressors' partialisation ensure typical energy savings greater than 30%.



## Seasonal Efficiency

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

Annual power consumption. Comparison among the systems:



# Features and Benefits

## Integration with Indoor Air Conditioners

### Supersaver Evolution System

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

Through @connectivity the information on the cooling needs of the air conditioners is available to the **Liebert HPC- S 017- 032** units, that will manage their resources (compressors and free cooling) in the most efficient way in order to save additional energy.

This solution does not require any modification, mechanical or electrical thus avoiding additional components and regulation algorithms which could undermine the reliability of the system.

### @ Connectivity

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

The solution is @connectivity,

which is a highly sophisticated way to let the system components (the Air-Conditioners as well as the **Liebert HPC- S 017- 032** units, Chiller and Freecooling executions) talk to each other.

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

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

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

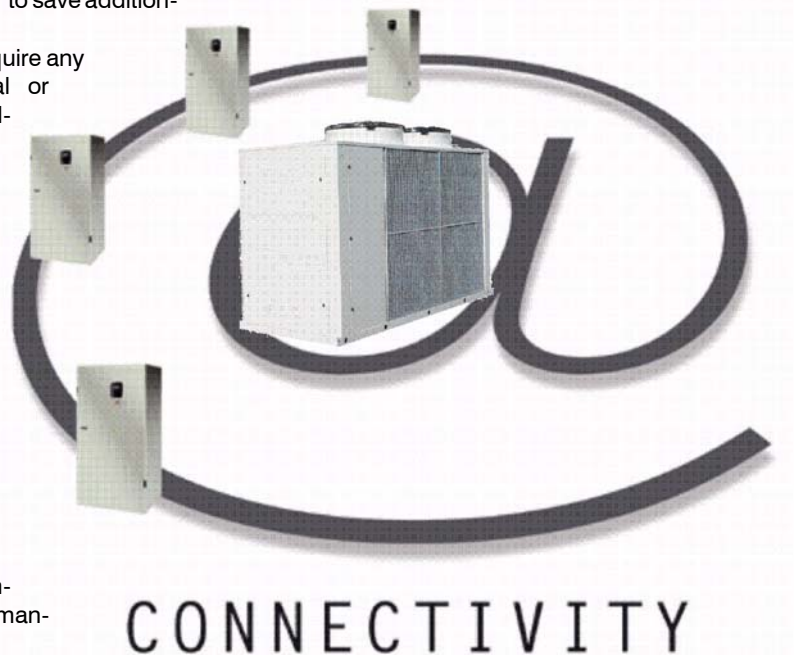
To build up Hironet connection between the room units and the **Liebert HPC- S 017- 032** units. The network can be only 1 (if the distance and the number of units allow this) or it can be split in several networks.

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

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

### Flexibility: Hydronic Module

In order to match different kinds of installations and applications, **Liebert HPC- S 017- 032** units are available with a hydronic module, which can be adapted/adjusted depending on the specific requests. Based on this philosophy, the units can be equipped with everything that is needed for the correct installation and, in this way, reduce the complexity of the commissioning: 1 or 2 circulating pumps, water filter





## Features and Benefits

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kit, safety valve, expansion vessel, flow switch. With all these elements included inside the unit, it is just a matter of connecting the chiller to the system. In particular, a buffer tank (whose capacity is 1000 litres for all the models) is available in two different configurations: hydraulically and mechanically connected to the unit (whose length is now increased) or shipped loose for those installations which require more flexibility.

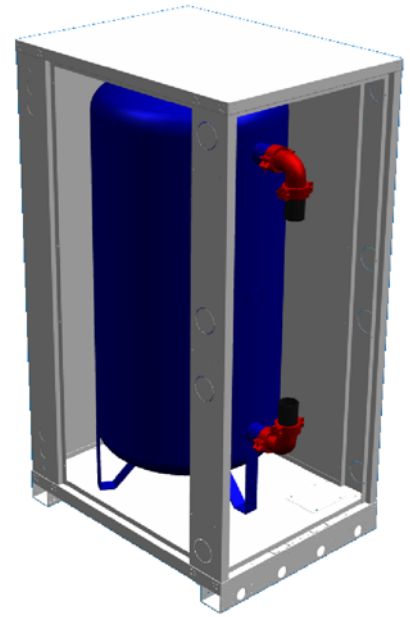
But, if some or all of these components are already present in the hydraulic line, **Liebert HPC- S 017- 032** can be equipped only with what is not already connected in the system. This level of flexibility allows true customization of the unit.

### Compactness: Small Footprint

The **Liebert HPC- S 017- 032** series achieves the high efficiency performance and low sound emission previously described with a compactness which is one the highest in its category.

This result is possible thanks to the high quality components selected and a design which takes into consideration the different aspects and needs of a chiller installation.

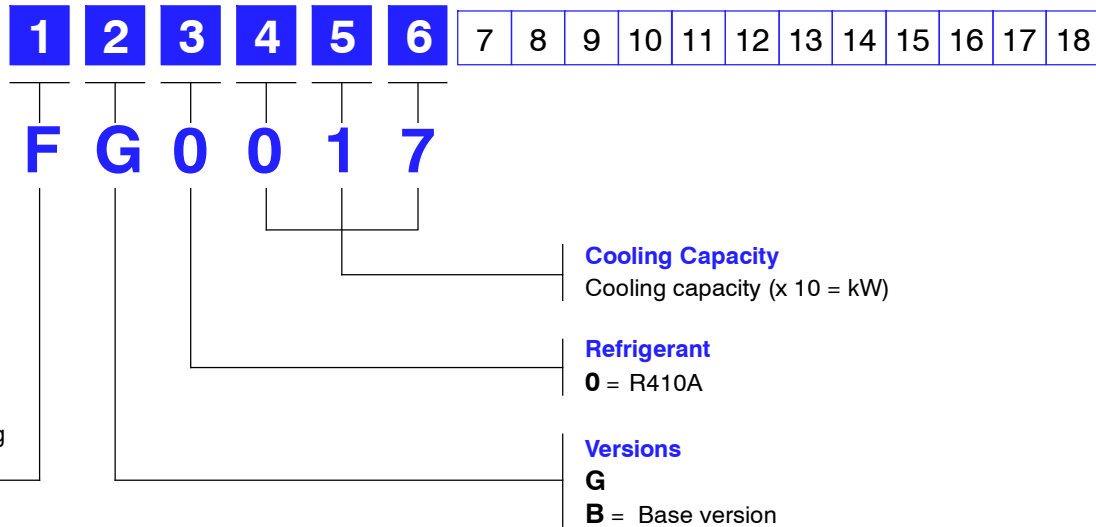
In this way the installation area can be optimized, leaving more space for other building elements. Combining this aspect with the possibility of including all of the hydronic components inside the unit, **Liebert HPC- S 017- 032** series is really a leader in terms of easy and compact installation



# 2

## Model Number Description

### Model Nomenclature / Digit Numbers



### Liebert HPC- S 017- 032

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

##### Base unit main features

- Structure and bearing base in galvanized steel sheet section, with powder-painting and suitable thickness;
- 4 steps capacity control; hermetic scroll compressors;
- Axial fans with modulating fan speed control;
- 2 independent refrigeration circuits;
- HP and LP gauges;
- Electronic expansion valve (EEV)
- 1 water circuit with flow switch;
- 1 evaporator plate heat exchanger;
- International approval 2014/68/EU-PED;
- Electric panel CE compliant and complete with filtered air ventilation, safety equipments, fan motors protection, fuses and protection thermal relays for compressors, power supply 400V/3Ph/50Hz (RST+ PE):
- iCOM board / display control;
- Main switch on each electric board;
- Antiscratch plastic film packaging;
- Color "Grey" (RAL7032).

#### Digit 7 - Display and Switch

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

#### Digit 8 - Soft starter

- 0** = None  
**1** = With soft starter

#### Digit 9 - Monitoring

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

#### Digit 10 - Tank

- 0** = None  
**1** = With tank  
**2** = With tank and electric heaters

#### Digit 11 - Fans and noise options

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

#### Digit 12 - Pumps group / Hydraulic kit

- 0** = No pump / No hydraulic kit  
**1** = No pump / With hydraulic kit  
**2** = 1 standard head pump / With hydraulic kit  
**3** = 1 high head pump / With hydraulic kit  
**4** = 2 standard head pumps / With hydraulic kit  
**5** = 2 high head pumps / With hydraulic kit  
**6** = 1 inverter pump / With hydraulic kit

#### Digit 13 - Free

#### Digit 14 - Electric panel options

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

#### Digit 15 - Evaporator electric heaters

- 0** = None  
**1** = With evaporator heating resistor  
**2** = With evaporator and pipes heating resistor

#### Digit 16 - Compressor power factor capacitors

- 0** = None  
**1** = With compressor power factor capacitors

#### Digit 17 - Condensing coil filter

- 0** = None  
**1** = With coil metal filter

#### Digit 18 - Special request

- 0** = None  
**X** = As specified

# Model Number Description

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## Unit Options

- Integrated lifting bars (removable after shipment)

## Kits / Accessories shipped loose

- Anti-vibrating mounts (spring or rubber)
- Coldfire on IP40 box
- 1000 lt buffer tank on separate cabinet
- Water filter
- Water check valve

## Configuration Rules

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

### Rule valid for all Chiller and Freecooling versions:

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

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

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

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

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

# 3

## Operating Range

### Working Limits

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

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

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

The Minimum water flow allowed corresponds to a maximum temperature difference of 8° C.

More extreme operating conditions would activate safety devices and the unit would be stopped.

The outlet water temperature must range from 4° C to 15° C.

The maximum allowed water return temperature, when the unit is in full operation, is 20° C; return temperatures over 20° C are allowed only during start- up.

The "G" version with EC fans 900mm (digit 11 = 3) admit Maximum Outlet Water Temperature of 20° C and Maximum Water Return Temperature of 26° C when the units are at full power.

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

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

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

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

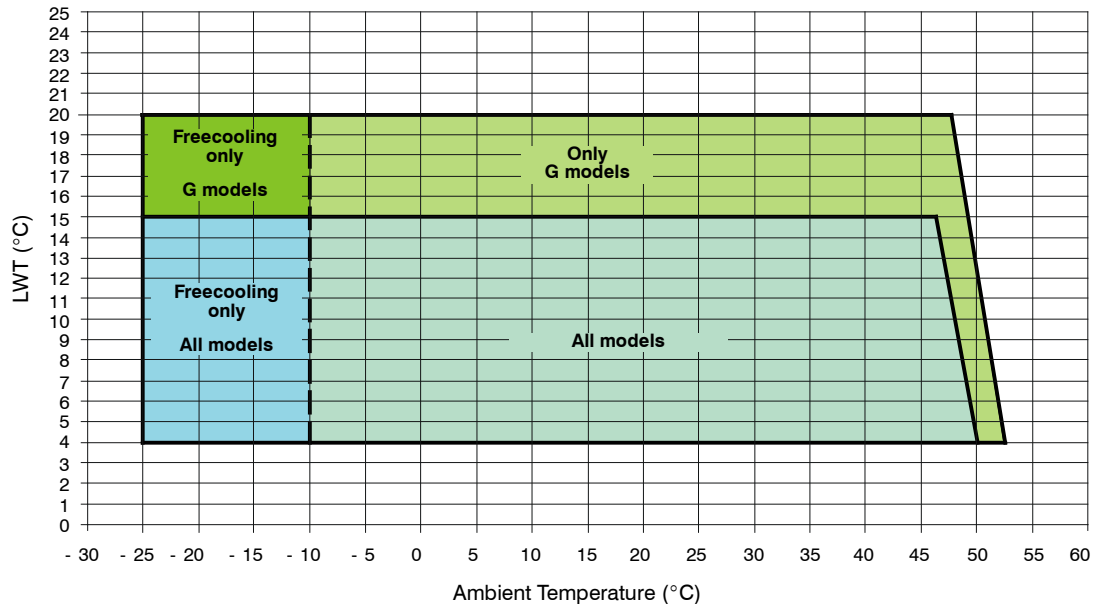
See "Operation range" table reporting the limits for each model; for different values ask your agent.

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

Unit storage conditions:

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

**Average HPC- S 017- 032 Working Limits**



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

# Operating Range

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

Models: CB0 017- 032		017	020	023	025	028	030	032
<b>Operating range</b>								
Max. outdoor temperature <sup>(1)</sup>	°C	50.0	48.0	47.5	49.0	48.5	48.0	48.0
<b>Safety devices settings</b>								
High pressure switch <sup>(1)</sup>	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	in				3/4" G			
Low pressure switch	barg				5.0			

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

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

Models: CB0 017- 032		017	020	023	025	028	030	032
<b>Operating range</b>								
Max. outdoor temperature <sup>(1)</sup>	°C	48.0	46.5	46.0	47.0	47.0	47.0	46.5
<b>Safety devices settings</b>								
High pressure switch <sup>(1)</sup>	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	in				3/4" G			
Low pressure switch	barg				5.0			

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

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

Models: CG0 017- 030		017	020	023	025	028	030
<b>Operating range</b>							
Max. outdoor temperature <sup>(1)</sup>	°C	51.0	51.0	51.0	51.5	51.0	51.0
<b>Safety devices settings</b>							
High pressure switch <sup>(1)</sup>	barg				42		
High pressure safety valve	barg				45		
HP safety valves (each circuit)	Nr.				1		
High pressure safety valve connection	in				3/4" G		
Low pressure switch	barg				5.0		

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

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

Models: CG0 017- 030		017	020	023	025	028	030
<b>Operating range</b>							
Max. outdoor temperature <sup>(1)</sup>	°C	45.5	45.0	46.0	46.0	46.0	45.0
<b>Safety devices settings</b>							
High pressure switch <sup>(1)</sup>	barg				42		
High pressure safety valve	barg				45		
HP safety valves (each circuit)	Nr.				1		
High pressure safety valve connection	in				3/4" G		
Low pressure switch	barg				5.0		

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

# Operating Range

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

Models: FB0 017- 032		017	020	023	025	028	030	032
<b>Operating range</b>								
Max. outdoor temperature <sup>(1)</sup>	°C	48.0	46.0	45.0	47.0	46.0	46.0	45.5
<b>Safety devices settings</b>								
High pressure switch <sup>(1)</sup>	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	in				3/4" G			
Low pressure switch	barg				5.0			

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

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

Models: FB0 017- 032		017	020	023	025	028	030	032
<b>Operating range</b>								
Max. outdoor temperature <sup>(1)</sup>	°C	46.5	44.5	43.5	45.5	44.5	45.0	44.0
<b>Safety devices settings</b>								
High pressure switch <sup>(1)</sup>	barg				42			
High pressure safety valve	barg				45			
HP safety valves (each circuit)	Nr.				1			
High pressure safety valve connection	in				3/4" G			
Low pressure switch	barg				5.0			

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

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

Models: FG0 017- 030		017	020	023	025	028	030
<b>Operating range</b>							
Max. outdoor temperature <sup>(1)</sup>	°C	49.0	48.0	49.5	49.0	49.5	48.5
<b>Safety devices settings</b>							
High pressure switch <sup>(1)</sup>	barg				42		
High pressure safety valve	barg				45		
HP safety valves (each circuit)	Nr.				1		
High pressure safety valve connection	in				3/4" G		
Low pressure switch	barg				5.0		

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

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

Models: FG0 017- 030		017	020	023	025	028	030
<b>Operating range</b>							
Max. outdoor temperature <sup>(1)</sup>	°C	43.0	42.5	42.0	43.0	43.5	43.0
<b>Safety devices settings</b>							
High pressure switch <sup>(1)</sup>	barg				42		
High pressure safety valve	barg				45		
HP safety valves (each circuit)	Nr.				1		
High pressure safety valve connection	in				3/4" G		
Low pressure switch	barg				5.0		

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

# 4

## Technical Data

Tab. 4a - Technical Data - CB0 017- 032 - AC 900

CB0 model with AC 900 mm fans - R410A		CB0017	CB0020	CB0023	CB0025	CB0028	CB0030	CB0032
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	163.3	178.5	205.8	228.9	261.4	294.6	333.6
Compressors power input	kW	49.9	59.0	68.4	73.7	82.7	94.6	106.7
Total power input	kW	57.0	66.1	75.5	83.2	92.2	106.5	118.6
Unit EER	-	2.86	2.70	2.72	2.75	2.83	2.77	2.81
Water flow	m <sup>3</sup> /h	28.07	30.68	35.43	39.36	44.94	50.67	57.39
Water pressure drop	kPa	43	51	47	57	50	63	63
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(2)</sup>	dB(A)	76			76.5		77	
PWL (Sound Power Level) <sup>(3)</sup>	dB(A)	95			96		97	
<b>Refrigeration circuit</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	17	21	23	26	26
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	30 + 30
<b>Fans</b>								
Number of fans	No	3			4		5	
Type	-	Axial						
Wheel nominal diameter	mm	900						
RPM	1/min	875						
Nominal power input (each fan)	kW	2.4						
Fans power input	kW	7.1			9.5		11.9	
Air flow rate	m <sup>3</sup> /h	59055		56529	78740	75372	98425	94215
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Braze plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6		7.2	9.8		12.4	
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 1.8						
Face area	m <sup>2</sup>	5.94			7.92		9.90	
Internal volume (each circuit)	l	21.5			28.7		35.9	
<b>Water connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	11		13	17		22	
<b>Dimensions</b>								
Length	mm	3828			4828		5828	
Depth	mm	1300						
Height	mm	2500						
<b>Weights</b>								
Net weight	kg	1608	1758	1813	2242	2305	2620	2678
Operating weight	kg	1618	1768	1824	2254	2320	2634	2698

**Notes:**

- (1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
- (2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
- (3) - With outdoor temperature 35 °C; calculated according to ISO 3744.

# Technical Data

**Tab. 4b - Technical Data - CB0 017- 032 - AC 800**

CB0 model with AC 800 mm fans - R410A		CB0017	CB0020	CB0023	CB0025	CB0028	CB0030	CB0032
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	159.9	174.4	200.5	224.0	255.4	287.9	325.4
Compressors power input	kW	51.5	61.1	70.9	76.2	85.6	97.8	110.6
Total power input	kW	56.7	66.3	76.1	83.2	92.6	106.5	119.3
Unit EER	-	2.82	2.63	2.63	2.69	2.76	2.70	2.73
Water flow	m <sup>3</sup> /h	27.49	30.00	34.56	38.54	43.94	49.54	56.00
Water pressure drop	kPa	42	49	45	55	48	60	60
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(2)</sup>	dB(A)	70.5			71.0		71.5	
PWL (Sound Power Level) <sup>(3)</sup>	dB(A)	89.5			90.5		91.5	
<b>Refrigeration circuit</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	17	21	23	26	
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	30 + 30
<b>Fans</b>								
Number of fans	No	3			4		5	
Type	-	Axial						
Wheel nominal diameter	mm	800						
RPM	1/min	890						
Nominal power input (each fan)	kW	1.7						
Fans power input	kW	5.2			7.0		8.7	
Air flow rate	m <sup>3</sup> /h	51450		49764	68600	66352	85828	82940
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Brazen plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6		7.2		9.8		12.4
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 1.8						
Face area	m <sup>2</sup>	5.94			7.92		9.90	
Internal volume (each circuit)	l	21.5			28.7		35.9	
<b>Water connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	11		13		17		22
<b>Dimensions</b>								
Length	mm	3828			4828		5828	
Depth	mm	1300						
Height	mm	2500						
<b>Weights</b>								
Net weight	kg	1569	1719	1774	2190	2253	2555	2613
Operating weight	kg	1579	1729	1785	2202	2268	2569	2633

**Notes:**

- (1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
- (2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
- (3) - With outdoor temperature 35 °C; calculated according to ISO 3744.



# Technical Data

**Tab. 4c - Technical Data - CG0 017- 030 - EC 900**

CG0 model with EC 900 mm fans - R410A		CG0017	CG0020	CG0023	CG0025	CG0028	CG0030	-
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	165.7	185.5	216.4	237.2	270.8	305.9	
Compressors power input	kW	48.8	55.5	63.3	69.5	78.3	89.1	
Total power input	kW	56.9	63.7	74.1	80.5	91.8	102.8	
Unit EER	-	2.91	2.91	2.92	2.95	2.95	2.98	
Water flow	m <sup>3</sup> /h	28.47	31.85	37.20	40.76	46.53	52.58	
Water pressure drop	kPa	44	55	51	61	53	67	
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(2)</sup>	dB(A)	78.5		79.0		79.5		
PWL (Sound Power Level) <sup>(3)</sup>	dB(A)	97.5		98.5		99.5		
<b>Refrigeration circuit</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	20	21	25	26	
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	
<b>Fans</b>								
Number of fans	No	3		4		5		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	900						
RPM	1/min	995						
Nominal power input (each fan)	kW	2.70	2.74	2.70	2.74	2.70	2.74	
Fans power input	kW	8.1	8.2	10.8	11.0	13.5	13.7	
Air flow rate	m <sup>3</sup> /h	66465	63711	88620	84948	110775	106185	
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Brazen plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6		7.2		9.8		
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 1.8						
Face area	m <sup>2</sup>	5.94		7.92		9.9		
Internal volume (each circuit)	l	21.5		28.7		35.9		
<b>Water connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	11		13		17		
<b>Dimensions</b>								
Length	mm	3828		4828		5828		
Depth	mm	1300						
Height	mm	2529						
<b>Weights</b>								
Net weight	kg	1610	1760	2098	2248	2592	2630	
Operating weight	kg	1618	1770	2110	2262	2608	2644	

**Notes:**

- (1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
- (2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
- (3) - With outdoor temperature 35 °C; calculated according to ISO 3744.

# Technical Data

Tab. 4d - Technical Data - CG0 017- 030 - EC 800

CG0 model with EC 800 mm fans - R410A		CG0017	CG0020	CG0023	CG0025	CG0028	CG0030	-
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	153.2	170.1	200.8	218.8	251.3	281.1	
Compressors power input	kW	54.6	63.4	70.8	78.9	87.6	101.3	
Total power input	kW	56.8	65.6	73.7	81.8	91.3	105.0	
Unit EER	-	2.70	2.59	2.72	2.67	2.75	2.68	
Water flow	m <sup>3</sup> /h	26.38	29.29	34.59	37.69	43.24	48.41	
Water pressure drop	kPa	39	47	45	52	46	57	
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(2)</sup>	dB(A)	65.0		65.5		66.0		
PWL (Sound Power Level) <sup>(3)</sup>	dB(A)	84		85		86		
<b>Refrigeration circuit</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	20	21	25	26	
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	
<b>Fans</b>								
Number of fans	No	3		4		5		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	800						
RPM	1/min	715						
Nominal power input (each fan)	kW	0.7						
Fans power input	kW	2.2		2.9		3.7		
Air flow rate	m <sup>3</sup> /h	40893	39600	54524	52800	68155	66000	
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Brazen plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6		7.2		9.8		
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3 / 1.8						
Face area	m <sup>2</sup>	5.94		7.92		9.90		
Internal volume (each circuit)	l	21.5		28.7		35.9		
<b>Water connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	11		13		17		
<b>Dimensions</b>								
Length	mm	3828		4828		5828		
Depth	mm	1300						
Height	mm	2472						
<b>Weights</b>								
Net weight	kg	1568	1718	2042	2192	2522	2560	
Operating weight	kg	1576	1728	2054	2206	2538	2574	

**Notes:**

- (1) - At the following standard conditions: power supply 400V/3Ph/50Hz; outdoor temperature 35 °C; water inlet/outlet temperature 12/7 °C; ethylene glycol 0%.
- (2) - Measured with outdoor temperature 35 °C; 1m from the unit; free field conditions; according to ISO 3744.
- (3) - With outdoor temperature 35 °C; calculated according to ISO 3744.

# Technical Data

**Tab. 4e - Technical Data - FB0 017- 032 - AC 900**

FB0 model with AC 900 mm fans - R410A		FB0017	FB0020	FB0023	FB0025	FB0028	FB0030	FB0032
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	168.5	183.6	209.8	235.8	268.0	303.6	341.1
Freecooling capacity <sup>(2)</sup>	kW	98.8	101.0	100.0	133.1	132.1	171.6	169.3
Compressors power input	kW	52.2	62.0	72.7	77.2	87.7	99.2	113.5
Total power input	kW	59.5	69.3	80.0	86.9	97.4	111.3	125.6
Unit EER	-	2.83	2.65	2.62	2.71	2.75	2.73	2.72
Fluid flow	m <sup>3</sup> /h	31.73	34.62	39.60	44.43	50.53	57.23	64.34
Hydraulic pressure drop	kPa	123	143	152	143	146	206	231
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(3)</sup>	dB(A)	76.0			76.5		77.0	
PWL (Sound Power Level) <sup>(4)</sup>	dB(A)	95			96		97	
<b>Refrigeration circuits</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	17	21	23	26	26
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	30 + 30
<b>Fans</b>								
Number of fans	No	3			4		5	
Type	-	Axial						
Wheel nominal diameter	mm	900						
RPM	1/min	865						
Nominal power input (each fan)	kW	7.3			9.7		12.1	
Fans power input	kW	7.3			9.7		12.1	
Air flow rate	m <sup>3</sup> /h	52134		48750	69512	65000	86890	81250
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Brazen plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6		7.2	9.8		12.4	
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/1.8						
Face area	m <sup>2</sup>	5.94			7.92		9.90	
Internal volume (each circuit)	l	21.5		28.7		35.9		
<b>Freecooling coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/2.5						
Face area	m <sup>2</sup>	5.94			7.92		9.90	
<b>Hydraulic connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	107	109	126	130	147	151	
<b>Dimensions</b>								
Length	mm	3828			4828		5828	
Depth	mm	1300						
Height	mm	2500						
<b>Weights</b>								
Net weight	kg	1867	2017	2072	2558	2621	2993	3051
Operating weight	kg	1972	2124	2178	2682	2748	3138	3200

**Notes:**

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

# Technical Data

Tab. 4f - Technical Data - FB0 017- 032 - AC 800

FB0 model with AC 800 mm fans - R410A		FB0017	FB0020	FB0023	FB0025	FB0028	FB0030	FB0032
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	165.5	179.9	205.5	231.1	262.7	297.4	334.5
Freecooling capacity <sup>(2)</sup>	kW	93.0	94.7	94.9	125.1	125.4	160.8	160.4
Compressors power input	kW	53.7	64.0	74.8	79.6	90.2	102.3	116.9
Total power input	kW	59.0	69.3	80.1	86.7	97.3	111.2	125.8
Unit EER	-	2.80	2.59	2.56	2.66	2.70	2.67	2.66
Fluid flow	m <sup>3</sup> /h	31.18	33.94	38.60	43.58	49.57	56.11	63.14
Hydraulic pressure drop	kPa	119	137	147	138	141	198	221
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(3)</sup>	dB(A)	70.5			71.0		71.5	
PWL (Sound Power Level) <sup>(4)</sup>	dB(A)	89.5			90.5		91.5	
<b>Refrigeration circuits</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	17	21	23	26	26
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	30 + 30
<b>Fans</b>								
Number of fans	No	3			4		5	
Type	-	Axial						
Wheel nominal diameter	mm	800						
RPM	1/min	880						
Nominal power input (each fan)	kW	1.8						
Fans power input	kW	5.3			7.1		8.9	
Air flow rate	m <sup>3</sup> /h	46731	44700	62308	59600	77885	74500	
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Brazen plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6	7.2	9.8	12.4			
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/1.8						
Face area	m <sup>2</sup>	5.94	7.92	9.90				
Internal volume (each circuit)	l	21.5	28.7	35.9				
<b>Freecooling coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/2.5						
Face area	m <sup>2</sup>	5.94	7.92	9.90				
<b>Hydraulic connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	107	109	126	130	147	151	
<b>Dimensions</b>								
Length	mm	3828	4828	5828				
Depth	mm	1300						
Height	mm	2500						
<b>Weights</b>								
Net weight	kg	1828	1978	2033	2506	2569	2928	2986
Operating weight	kg	1933	2085	2139	2630	2696	3073	3135

**Notes:**

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

# Technical Data

**Tab. 4g - Technical Data - FG0 017- 030 - EC 900**

FG0 model with EC 900 mm fans - R410A		FG0017	FG0020	FG0023	FG0025	FG0028	FG0030	-
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	171.8	189.4	224.4	242.7	281.5	312.9	
Freecooling capacity <sup>(2)</sup>	kW	105.5	102.1	139.6	134.6	179.5	173.5	
Compressors power input	kW	50.8	59.1	65.8	73.8	81.4	94.7	
Total power input	kW	59.1	67.3	76.8	84.8	95.2	108.4	
Unit EER	-	2.91	2.81	2.92	2.86	2.96	2.89	
Fluid flow	m <sup>3</sup> /h	32.33	35.66	42.22	45.68	52.97	58.93	
Hydraulic pressure drop	kPa	127	151	130	150	179	218	
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(3)</sup>	dB(A)	78.5		79.0		79.5		
PWL (Sound Power Level) <sup>(4)</sup>	dB(A)	97.5		98.5		99.5		
<b>Refrigeration circuits</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	20	21	25	26	
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	
<b>Fans</b>								
Number of fans	No	3		4		5		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	900						
RPM	1/min	985						
Nominal power input (each fan)	kW	2.8	2.7	2.8		2.7		
Fans power input	kW	8.3	8.2	11.0		13.8	13.7	
Air flow rate	m <sup>3</sup> /h	58872	52596	78496	70128	98120	87660	
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Brazen plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6		7.2		9.8		
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/1.8						
Face area	m <sup>2</sup>	5.94		7.92		9.90		
Internal volume (each circuit)	l	21.5		28.7		35.9		
<b>Freecooling coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/2.5						
Face area	m <sup>2</sup>	5.94		7.92		9.90		
<b>Hydraulic connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	107		126		147		
<b>Dimensions</b>								
Length	mm	3828		4828		5828		
Depth	mm	1300						
Height	mm	2529						
<b>Weights</b>								
Net weight	kg	1869	2019	2414	2564	2965	3003	
Operating weight	kg	1974	2124	2540	2688	3110	3150	

**Notes:**

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

# Technical Data

**Tab. 4h - Technical Data - FG0 017- 030 - EC 800**

FG0 model with EC 800 mm fans - R410A		FG0017	FG0020	FG0023	FG0025	FG0028	FG0030	-
<b>Performance <sup>(1)</sup></b>								
Cooling capacity	kW	157.7	174.4	206.8	224.7	259.5	288.5	
Freecooling capacity <sup>(2)</sup>	kW	81.2	81.4	107.6	107.6	137.7	137.9	
Compressors power input	kW	57.2	66.9	74.1	83.1	91.8	106.7	
Total power input	kW	59.5	69.2	77.1	86.1	95.6	110.5	
Unit EER	-	2.65	2.52	2.68	2.61	2.71	2.61	
Fluid flow	m <sup>3</sup> /h	29.78	32.78	39.05	42.22	48.98	54.22	
Hydraulic pressure drop	kPa	108	130	112	130	154	187	
<b>Sound level</b>								
SPL (Sound Pressure Level) <sup>(3)</sup>	dB(A)	65.0		65.5		66.0		
PWL (Sound Power Level) <sup>(4)</sup>	dB(A)	84		85		86		
<b>Refrigeration circuits</b>								
Number of refrigeration circuits	No	2						
Refrigerant charge (each circuit)	kg	15	16	20	21	25	26	
<b>Compressors</b>								
Number of compressors	No	2 + 2						
Type	-	Hermetic Scroll						
Nominal power (each compressor)	HP	15 + 15	15 + 20	15 + 25	20 + 25	25 + 25	25 + 30	
<b>Fans</b>								
Number of fans	No	3		4		5		
Type	-	Axial with EC motor						
Wheel nominal diameter	mm	800						
RPM	1/min	713						
Nominal power input (each fan)	kW	0.8						
Fans power input	kW	2.3		3.0		3.8		
Air flow rate	m <sup>3</sup> /h	37254	36140	49672	48187	62090	60233	
<b>Evaporator</b>								
Number of evaporators	No	1						
Type	-	Brazen plate heat exchanger						
Internal volume (each circuit, refrigerant side)	l	5.6		7.2		9.8		
<b>Condensing coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/1.8						
Face area	m <sup>2</sup>	5.94		7.92		9.90		
Internal volume (each circuit)	l	21.5		28.7		35.9		
<b>Freecooling coil</b>								
Material tubes / Fins	-	Copper / Aluminium						
Rows / Fins space	No/mm	3/2.5						
Face area	m <sup>2</sup>	5.94		7.92		9.90		
<b>Hydraulic connections</b>								
Diameters inlet / outlet	DN-inch	DN 80-3"						
Unit volume	l	107		126		147		
<b>Dimensions</b>								
Length	mm	3828		4828		5828		
Depth	mm	1300						
Height	mm	2472						
<b>Weights</b>								
Net weight	kg	1827	1977	2358	2508	2895	2933	
Operating weight	kg	1932	2082	2484	2632	3040	3080	

**Notes:**

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

## Construction and Panels

The **Liebert HPC- S 017- 032** small series is designed for outdoor installations, having maximum corrosion protection, with all panels being of heavy gauge, galvanised steel construction, polyester - powder painted in RAL7032.

The base is of 3 mm gauge galvanised steel channels, polyester - powder painted in RAL7032, interconnected using special rivets with elevated mechanical characteristics.

The inner hidden frame parts are constructed of galvanised steel.

Holes ( $\varnothing$  56 mm) are seated in the base, where the bars can be fit for lifting the unit.

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

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

The compartment cooling is ensured by a grille on the lower front closing panel.

The compressors are mounted on anti - vibration mounts to prevent vibration transmission to the structure; in the low noise and quiet versions, the compressors feature a shroud made up of sound - insulating and sound - absorbing materials.

## Refrigeration Circuit

All models are equipped with four compressors fitted two by two, in tandem, configured in independent refrigeration circuits.

Each circuit includes double safety pressure switch for high pressure, an electronic safety pressure switch for low pressure, an electronic expansion valve, filter-dryer with disposable anti-acid solid cartridge, moisture indicating sight glass, "HP" safety valves, charge connections 5/16" SAE - Flare, liquid line, manual shut-off valve; "HP" and "LP" pressure gauges.

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

## Refrigerant

The units are designed for being used with refrigerant R410A.

## Compressor

The **Liebert HPC- S 017- 032** series is equipped with four hermetic, scroll compressors specifically designed for application in refrigeration systems. Each compressor couple (tandem) is fitted in an independent refrigerant circuit to allow maximum redundancy and system reliability.

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

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

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

Each compressor is featured by:

- Optimized R410A design that ensures:
  - Higher EER.
  - Wide operating range: lower condensation and higher evaporation envelope gives more energy savings.

# Mechanical Specifications

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



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

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

The compressor is further equipped with:

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

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

## Electronic Expansion Valve

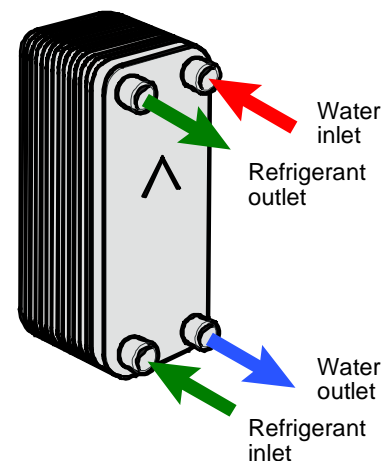
The electronic expansion valve used in -the **Liebert HPC-S 017-032** range enables accurate and min. possible control of the overheating of the gas sucked by the compressor under all load conditions, together with the operation at low condensation and high compressor unloading. Under such application conditions a mechanical expansion valve can never reach the performance ensured by an electronic expansion valve (with energy benefits) nor the functional stability, above all during the transients of the load variations (with benefits as for reliability). The final result of the application of the electronic expansion valve on **Liebert HPC-S 017- 032** is therefore an improved energy operating costs and a higher reliability, thanks to its special adjustment features above all on partial loads, conditions under which every chiller operates for most of the time.



## Evaporators

**Liebert HPC- S 017- 032** units are equipped with direct expansion, weld- brazed plate type evaporators, designed, constructed, tested (pressure test on both refrigerant and water sides) and documented to comply with PED 2014/68/EU standards. The corrugation (typical angle) and the design of each plate have been thoroughly analyzed and thus optimized to better meet the physical features of the refrigerant (R410A) and provide for an optimal refrigerant distribution. This means really outstanding performance in the thermal energy transfer.

They incorporate two refrigeration circuits and one water circuit. The plates are fabricated from seamless carbon stainless steel AISI 316, reciprocally welded with pure copper.





# Mechanical Specifications

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

The exchangers are of the "true dual" type, therefore the primary fluid (water) is always cooled in each channel by at least one refrigerant circuit, even when one of the two circuits is off.

They are externally insulated against condensate with closed cell elastomer.

The evaporators are connected with lines equipped with drainage and vent connections.

The evaporators are protected against freezing by a paddle- type flow switch and a standard antifreeze sensor directly managed by the microprocessor.

As an option, thermostatically controlled heaters are applied to prevent freezing with outdoor temperatures below 0°C without primary flow.

Temperature and pressure working limits and pressure test values are indicated in Tab. 5a .

**Tab. 5a - Working Limits**

Design Temp.	Design Pressure		Test Pressure		
	Min. / Max.	Refrigerant	Water	Refrigerant	Water
- 160 / +150 °C		45.0 bar	45.0 bar	74.0 bar	74.0 bar

## Condensers

The condensing coils design for R410A refrigerant are made of copper tubes and aluminum fins and are mounted in vertical configuration.

Copper tubes in staggered rows are mechanically expanded in order to have the best contact with fins. The aluminum fins are manufactured with a special high efficiency rusticate surface that increases the thermal exchange. They are always equipped with an additional subcooling circuit which allows to increase the refrigeration performances without losing the energy efficiency.

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

### Coated coil treatment (optional)

When Liebert® AFC model is working in harsh conditions, such as the sea coast and other corrosive environments, an added coating for coil protection is a must. According to environment characteristics, Vertiv serves different coating treatment as optional.

For not louvered fin coils: Pre-painted aluminum fin (polyester), which characteristics are

- Corrosion resistance: 1000 h according ASTM B117
- UV resistance: 500h according QUVA UVA 340

For all other air heat exchangers: ElectroFin® E-coat coating : a full immersion process where the fins are coated with the aid of electrical power. This guarantees that the complete surface is coated, of a 15-30 micron coating layer, even in the center of the fin.

- Corrosion resistance: 6000 h according ASTM B117
- ElectroFin® + UV top coat protection durability: C5 marine & C5 industrial according ISO 12944-6
- Heat transfer reduction: <1% according AHRI 410

NOTE: When ElectroFin® E-coat coating is chosen, it needs its own cleaning procedure (Annex: Procedures for cleaning ElectroFin E-coat coated coils) to grant its reliability and performance E-coat coating is a flexible epoxy polymer coating process engineered specifically for HVAC heat transfer coils.

## Hydraulic Circuit

The hydraulic circuit - with max. working pressure 6 bar - is made up of carbon steel pipes connected with grooved- end (Victaulic) fittings and couplings; gaskets are made of EPDM.

This arrangement permits compensation for thermal expansion, reduces noise and vibration propagating through hydraulic pipelines and facilitates ease of maintenance. The anti- condensate insulation of the hydraulic circuit is by closed cell synthetic elastomer.

The flow switch is a compulsory protection device for the unit fitted as standard on all units versions with or without recirculation pumps.



# Mechanical Specifications

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## Expansion Vessel and Safety Valve (Options)

These optional accessories are directly installed on the unit hydraulic circuit. The expansion vessel (charged at 1.5 bar, max. operating pressure 10 bar) has an 12- l volume, the safety valve is calibrated at 6 bar. Their installation positions are indicated in the hydraulic circuit scheme. It is recommended that the total expansion vessel capacity required be always checked, depending on the unit volume, the circuit volume, the glycol percentage in the mixture and the expected maximum temperature variation of the mixture.

## Freecooling Execution

**Liebert HPC- S 017- 032** models in the "Freecooling execution" are designed with an integrated free-cooling system consisting of:

- cooling coils with copper tubes and aluminium fins, mounted in vertical configuration;
- vent and drainage valves on the freecooling coils;
- low pressure drop three- way valve with modulating servo- control;
- calibrate orifice plate installed in the by-pass of the freecooling coils to maintain the circuit pressure drop when the position of the tree-way valve changes tu by-pass. This is in order to prevent big variations of the water flow to the evaporator (this component is not fitted in case inverter pump option is selected).

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

- direct expansion with compressors operation only; 100% water flow through the evaporator;
- direct expansion and Freecooling; 100% water flow first through the freecooling coils and then through the evaporator, with partial compressor operation;
- freecooling; 100% water flow through the freecooling coils and then through the evaporator, without compressors operation.

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

## Recirculating Pumps (Option)

All the models of the **Liebert HPC- S 017- 032** series can be equipped with one or two water circulating pumps, factory- piped.

On each **Liebert HPC- S 017- 032** unit it is possible to select the pump type and quantity (with high or low head) or with inverter, depending on the pressure available from the applications. They are suitable for operation with water- ethylene glycol mixture up to 35%- 65% by weight and mixture temperatures down to 4° C.

The pumps are of the close- coupled centrifugal type, direct driven, two pole electric motor, having IP 54 protection and Class F insulation, with IE3 efficiency according Energy using Products (EuP) motor directive (EC640/2009). The motors with this efficiency class (the highest) ensure a higher energy saving than the pump with lower efficiency class; further, they enable a more silent operation of the motor and can reach very high use limits of the room temperature (up to 60° C).

Pump casings and impellers are in cast iron EN- GJL 200, shafts are in stainless steel, the shaft seal is a unbalanced, mechanical shaft seal with dimensions according to DIN 24 960 and assembly length according to EN 12 756, brass neck ring permits ideal conditions for the use of water mixtures containing ethylene glycol.

The pump housing, the motor stool and the motor stator housing are electrocoated. The motor stool forms connection between the pump housing and the motor, and is equipped with a manual air vent screw for venting of the pump housing and the shaft seal chamber. The circulation of liquid through the duct of the air vent screw ensures lubrication and cooling of the shaft seal.

Between the outlets of the two chambers and the discharge flange, twin- head pumps have a non- return flap valve in EPDM rubber. The flap is opened by the flow of the pumped liquid and cuts off the port of the idle pump chamber.



# Mechanical Specifications

The electronic pump adjustment algorithm enables to modulate the pump speed to keep the water flow 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 control display fitted in the electrical panel; in case of doubt, contact your dealer.

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



## Fan Section

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

- **"G":** EC 6-pole motor, propeller diameter 900 mm, 900 rpm as standard, EC 8-pole motor, propeller diameter 800 mm, 700 rpm as option
- **"B" BASE:** AC (EC) 6-pole motor, propeller diameter 900 mm, 900 rpm as standard, AC (EC) 6-pole motor, propeller diameter 800 mm, 900 rpm as option.



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

Die cast aluminium blades with a sickle-shaped profile are used in order to improve the sound attenuation effect.

Fan speed control is achieved - as standard - by means of a continuous fan speed regulator. This ensures also to run the compressors always with optimum working efficiency.

## EC Fans

In all versions, as standard or alternative to the modulating adjustment (TRIAC), it is possible to choose fans with electronic switching motor, with the same aerodynamic performance as those installed in the selected unit, as well as the possibility of a fan modulating adjustment entirely managed by the microprocessor control. The EC technology includes a permanent magnet rotor combined with an electronic switching control of the stator magnetic field directly integrated in the motor (brushless motor). Such electronic switching device manages the fan rotation speed modulation. Compared to the traditional induction three-phase motors, the inner losses in the iron reduce by 60% and in the copper by 40%, with an electric absorption lower by 20-30% than those of a traditional fan with induction three-phase motor, getting the same aerodynamic performance. Further, while modulating the speed, the absorbed power can be equal to 50% than one of a traditional fan with phase cutoff adjustment (TRIAC).

A general noise reduction is further obtained, as the EC technology used for the adjustment does not cause magnetic vibrations, not even on special frequencies corresponding to certain rotation speeds. Finally, the decrease of pickup currents thanks to the EC technology and the absence of sliding contacts for the rotor supply significantly reduce the stresses that negatively influence the component life, increasing the machine overall reliability.



# Mechanical Specifications

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## Electrical Panel

The electrical panel is designed, constructed and tested in compliance with IEC standards (EN60204- 1). It is installed on the compressor compartment side and can be accessed through the unit right side panel; it has a degree of protection equivalent to IP54. It is possible to access the iCOM control display without switching the unit off, so as to aid maintenance operations.

The cooling of the electrical panel is achieved through forced ventilation, controlled by the microprocessors board . For low ambient temperatures (below - 5° C) it is possible to have an electric heater fitted inside (optional) and controlled as well by the microprocessor board.

### NOTE: Three-phase electric power

Requirements:

The **Liebert HPC- S 017- 032** 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 ( $\Delta$ ) or Star-connected power (Wye) without ground or floating ground (IT) contact **Vertiv**.

Main features:

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

## Packing

Units are shipped with plastic film protection.

## Warranty Clauses

The warranty does not apply for any damage or malfunction that may occur during or as a result of operation outside of the application range.

The warranty does not apply to the freecooling units for damage due to frost if the hydraulic circuit has not been charged with a water - glycol mixture with % suitable to the minimum temperatures in the application site. The company is not responsible for damage due to incorrect or improper use of the product and it reserves the right to change technical specifications without any prior notice.

## Final Tests and Reference Standards

The units are designed, manufactured and tested in compliance with the European directives 2006/42/EC; 2014/30/EU; 2014/35/EU; 2014/68/EU.

The machine is supplied with a final test certificate and a declaration of conformity with the norms.

All **Liebert HPC- S 017- 032** units are "CE" marked.

# Mechanical Specifications

## Accessories

### Pump Group

Available head pressure values are declared at the unit hydraulic connections and are referred to the nominal working conditions of each unit.

Please contact us for different fluid flow rates or head pressures. All pumps can work with up to 35% ethylene glycol percentage by weight.

In all chiller and freecooling models with double pumps, one pump is operating and one is in stand-by.

The indicated hydraulic performance refers to the inverter pump in their max. capacities (if available); obviously, they will adapt from such values to the hydraulic load required by the user circuit and by the chiller inner circuit; in case of freecooling unit, they will adapt their performance so as to keep the flow rate crossing the evaporator steady with relevant energy saving.



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

Models			017	020	023	025	028	030	032
CB0	Water Flow	m <sup>3</sup> /h	28.07	30.68	35.43	39.36	44.94	50.67	57.39
	Available Pressure Head	kPa	106	91	125	101	131	88	38
CG0	Water Flow	m <sup>3</sup> /h	28.48	31.85	37.20	40.76	46.53	52.58	-
	Available Pressure Head	kPa	105	83	115	92	120	71	-
Pump/s number		Nr.	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Pump Rotor Model		-	65-190/2	65-190/2	65-230/2	65-230/2	65-260/2	65-260/2	65-260/2
Nominal Motor Power		kW	2.2	2.2	3.0	3.0	4.0	4.0	4.0
Noise Level (*)		dB(A)	60	60	59	59	63	63	63

(\*) - According to ISO 3744

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

Models			017	020	023	025	028	030	032
CB0	Water Flow	m <sup>3</sup> /h	28.07	30.68	35.43	39.36	44.94	50.67	57.39
	Available Pressure Head	kPa	186	171	170	149	216	181	142
CG0	Water Flow	m <sup>3</sup> /h	28.48	31.85	37.20	40.76	46.53	52.58	-
	Available Pressure Head	kPa	184	165	161	140	208	167	-
Pump/s number		Nr.	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Pump Rotor Model		-	65-260/2	65-260/2	65-260/2	65-260/2	65-340/2	65-340/2	65-340/2
Nominal Motor Power		kW	4.0	4.0	4.0	4.0	5.5	5.5	5.5
Noise Level (*)		dB(A)	63	63	63	63	63	63	63

(\*) - According to ISO 3744

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

Models			017	020	023	025	028	030	032
FB0	30% glycol- water Mixture Flow	m <sup>3</sup> /h	31.73	34.62	39.60	44.43	50.53	57.23	64.34
	Available Pressure Head	kPa	96	69	130	125	97	100	37
FG0	30% glycol- water Mixture Flow	m <sup>3</sup> /h	32.33	35.66	42.22	45.68	52.97	58.93	-
	Available Pressure Head	kPa	91	59	145	115	51	80	-
Pump/s number		Nr.	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Pump Rotor Model		-	65-260/2	65-260/2	65-340/2	65-340/2	65-340/2	65-410/2	65-410/2
Nominal Motor Power		kW	4.0	4.0	5.5	5.5	5.5	7.5	7.5
Noise Level (*)		dB(A)	63	63	63	63	63	60	60

(\*) - According to ISO 3744

# Mechanical Specifications

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

Models		017	020	023	025	028	030	032	
<b>FB0</b>	30% glycol- water Mixture Flow	m <sup>3</sup> /h	31.73	34.62	39.60	44.43	50.53	57.23	64.34
	Available Pressure Head	kPa	172	146	219	216	191	170	117
<b>FG0</b>	30% glycol- water Mixture Flow	m <sup>3</sup> /h	32.33	35.66	42.22	45.68	52.97	58.93	-
	Available Pressure Head	kPa	168	137	235	206	148	152	-
Pump/s number	Nr.	1/2	1/2	1/2	1/2	1/2	1/2	1/2	
Pump Rotor Model	-	65-340/2	65-340/2	65-410/2	65-410/2	65-410/2	65-460/2	65-460/2	
Nominal Motor Power	kW	5.5	5.0	7.5	7.5	7.5	11.0	11.0	
Noise Level (*)	dB(A)	63	63	60	60	60	60	60	

(\*) - According to ISO 3744

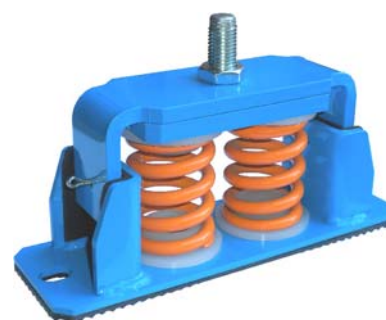
## Anti- Vibration Mounts

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

Spring vibration- damping support made of:

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

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



## Inertial Tank

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

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

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

Built in carbon steel and coated with anti- condensate insulation with PVC film proper for outdoor installation. It is installed inside a cabinet which can be supplied either already connected to the unit (mechanically and hydraulically jointed to it) or loose (completely separate from the unit).

### Technical Data:

- Internal volume: 1000 litres
- Net weight: 400 kg
- Working weight: 1400 kg

# Mechanical Specifications

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## Other Accessories

The following accessories can be installed as option:

- Coldfire display fitted on board (as special).
- Metal filters protecting the coils (recommended to aid the coil maintenance-cleaning).
- Tank, evaporator and piping heaters to protect these components against frost.
- Acoustic option (compressors noise insulation jacket and additional compressors box noise insulation) to be selected according fans speed/diameter in order to have the requested acoustic noise emission level.
- Compressor power factor capacitors: they are able to get "Cosfi" value equal to about 0.9 on the compressors, in rated operating conditions.
- Compressors electronic soft-starter: they are able to reduce inrush current on each single compressor by 45%.
- Monitoring card according to different communications standards.
- "Y"-shaped mechanical filter protecting the hydraulic circuit (recommended to aid the plate exchanger maintenance-cleaning).
- Certified integrated lifting bars (removable after shipment).
- Water check valves necessary for parallel multiple chiller (with one or two pumps fitted on board) hydraulic installation.
- Coldfire on IP40 box.

## Microprocessor Controls

### iCOM Control

**Liebert HPC- S 017- 032** models are controlled by **iCOM Large** (Fig. 6).

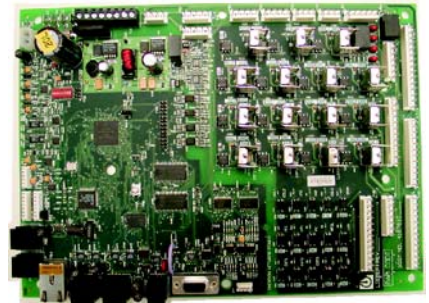
iCOM is the standard on- board control and its advanced features secure system optimisation and energy savings. Full management of the **Liebert HPC- S 017- 032** units is granted by the on board control iCOM, which allows the programming of temperature and pressure thresholds as well as the teamwork functionality through Ethernet network. User set- up can be done with a simple Operating Display that, through symbols and codes, ensures a reliable and flexible man- machine interface.

- The standard software of the **Liebert HPC- S 017- 032** Units includes special control algorithms that ensure real energy savings and enhance the reliability of the full system.
- Immediate set- up can be available through the "Unit Code" system. In case of re- configuration needs, the full configuration of the unit and recalculation of all the thresholds levels (which depend on the refrigerant type) are available by simply enabling the configuration Unit Code.
- Sequential auto- restart timer allows phased units restart after power failure.
- Pumps' durability is granted by a special auto- rotation start- up function.
- The record of the working hours of compressors, pumps and freecooling is easily available via the CDL iCOM display.
- Auto- selection of the best control strategy at different ambient temperatures is implemented in order to assure an optimised usage of the compressors and condensers fans.
- The "Ambient compensation" function can be enabled to make the unit set- point rise automatically during warm periods, permitting energy savings.
- For low noise versions with fan speed control there is a special algorithm which, together with the compressor management, keeps the fan speed on the lowest possible value.
- Compressors' Run/Stop time management is implemented in order to obtain the optimisation of compressors' operations either within the unit, or, in case of networking Ethernet, within the whole of the **Liebert HPC- S 017- 032** Units system.
- A special working mode can be established in combination with **Vertiv HPAC Units** to obtain the so called "Supersaver" system, that enhances the energy saving capabilities. The information on the cooling needs of the air conditioners is available to the **Liebert HPC- S 017- 032** units, that will manage its resources (compressors and freecooling) in the most efficient way in order to save additional energy.
- When used with Controls electronic expansion valves board, the **Liebert HPC- S 017- 032** provides the control of the superheat in the evaporator. In order to perform this control task, it requires the suction pressure and the suction gas temperature value. These signals can be received through two analogue inputs.
- All settings are protected through a 3- Level Password system.
- Input for Remote on- off and Volt- free contacts for simple remote monitoring of alarms and warnings are available.
- Up to 16 **Liebert HPC- S 017- 032** units can be easily linked together on a network to provide teamwork mode, stand- by operation and duty cycling without additional hardware. Reliability is not affected if there are problems on the data communication buses, because the units return automatically to the stand- alone mode.



**iCOM**

**Fig. 6**





## iCOM Technical Data

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

## CDL Graphic Display

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

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

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

- Large graphic display (320 x 240 pixel).
- System Window: system operation status at a glance.
- Self- explanatory Icons: they are used for the Menu- Layout of the CDL iCOM.
- Online Help: every single parameter has its own multi- page explanation.
- Status Report of the latest 200 event/messages of the unit/system.
- Four different Graphic Data Records.
- Timer and Date mode (electronic timer included in the software).
- Semi or full manual mode software management including all safety devices.
- 4- Level passwords system to protect all the settings.
- Ergonomic design for use also as portable device (start- up and "flying connections" by service personnel).
- Multi- language menu with on- the- fly language selection.



## CDL Technical Data

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

## Liebert HPC- S 017- 032 Connectivity

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

### Hirovisor IP software

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

### BMSs connections

The IS cards and other gateway represent the communication managers portfolio which allow the integration of the **Liebert HPC- S 017- 032** units into the most diffused Building Management Systems. The most diffused are: SNMP, HTTP, MODBUS and LONWORK.

### Alarm Board

The Alarm Board converts Alarms (high priority) or Warnings (lower priority) from iCom into Volt- free contacts (up to five, either normally open).

In this way, following Warnings/Alarms are separated: High or Low refrigerant pressure, High water temperature, Low water temperature, Pump failure, Compressor failure, etc.

### Correction Factors

#### Glycol mixture correction factors

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

The main parameters affected by the use of glycol mixtures are the following:

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

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

**Tab. 7a - Chiller Table - CB0 - CG0**

Ethylene glycol [% in weight]		0	10	20	30	40	50
Freezing temperature	°C	0	- 4,4	- 9,9	- 16,6	- 25,2	- 37,2
Refrigeration capacity correcting factor	F3	1	0,998	0,993	0,987	0,977	0,969
Mixture volume flow rate correcting factor	F4	1	1,046	1,080	1,098	1,150	1,210
Mixture side pressure drop correcting factor	F5	1	1,053	1,109	1,168	1,234	1,311
Compressor power input correcting factor	F6	1	0,998	0,997	0,995	0,992	0,990

**Tab. 7b - Freecooling Table - FB0 - FG0**

Ethylene glycol [% in weight]		0	10	20	30	40	50
Freezing temperature	°C	0	- 4,4	- 9,9	- 16,6	- 25,2	- 37,2
Refrigeration capacity correcting factor	F3	1,013	1,007	1,002	1	0,990	0,982
Mixture volume flow rate correcting factor	F4	0,911	0,926	0,956	1	1,048	1,102
Mixture side pressure drop correcting factor	F5	0,856	0,902	0,950	1	1,056	1,122
Compressor power input correcting factor	F6	1,005	1,003	1,002	1	0,997	0,995

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

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

#### Fouling correction factors

**Tab. 7c - Fouling correction factors**

Fouling factors [ $10^{-4} \text{ m}^2 \text{ °C/W}$ ]	Correction factors	
	F1a refrigeration capacity correction factor	F2a compressor power input correction factor
0,18	1	1
0,44	0,996	0,999
1,32	0,984	0,994

Unit performance reported in the tables are given for the condition exchanger with fouling factor corresponding at  $0,18 \times 10^{-4} \text{ m}^2 \text{ °C / W}$ . For different fouling factor values, performances should be corrected with the correction factors shown above. For optimum unit operation, proper water treatment must be maintained. Scaling and dirt in a system will vary significantly depending on local water conditions. Water treatment should be based on characteristics of the area's water. Improper or untreated water can lead to scale build up, erosion and corrosion in the evaporator.

Vertiv will not accept responsibility for poorly or improperly treated water.

#### Sea level correction factors

**Tab. 7d - Sea level correction factors**

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

Unit performance reported in the tables are given for sea level conditions.

For different altitude, performances should be corrected with the correction factors shown above.

# 8

## Sound Levels

### Sound Pressure and Power Levels

#### SPL

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

#### PWL

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

Tab. 8a - SPL CB0 - FB0 900AC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CB0 017 - FB0 017	84	80	76	73	72	68	60	52	76,0
CB0 020 - FB0 020	84	80	76	73	72	68	60	52	76,0
CB0 023 - FB0 023	84	80	76	73	72	68	60	52	76,0
CB0 025 - FB0 025	85	80	76	73	72	68	60	53	76,5
CB0 028 - FB0 028	85	80	76	73	72	68	60	53	76,5
CB0 030 - FB0 030	85	81	77	74	73	69	61	53	77,0
CB0 032 - FB0 032	85	81	77	74	73	69	61	53	77,0

Tab. 8b - PWL CB0 - FB0 900AC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CB0 017 - FB0 017	103	99	95	92	91	87	79	71	95,0
CB0 020 - FB0 020	103	99	95	92	91	87	79	71	95,0
CB0 023 - FB0 023	103	99	95	92	91	87	79	71	95,0
CB0 025 - FB0 025	104	100	96	93	92	88	80	72	96,0
CB0 028 - FB0 028	104	100	96	93	92	88	80	72	96,0
CB0 030 - FB0 030	105	101	97	94	93	89	81	73	97,0
CB0 032 - FB0 032	105	101	97	94	93	89	81	73	97,0

**Note:**

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

# Sound Levels

Tab. 8c - SPL CB0 - FB0 800AC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
"SPL" Sound pressure levels [dB]									
CB0 017 - FB0 017	79	74	71	70	66	60	52	45	70,5
CB0 020 - FB0 020	79	74	71	70	66	60	52	45	70,5
CB0 023 - FB0 023	79	74	71	70	66	60	52	45	70,5
CB0 025 - FB0 025	79	74	72	70	66	60	52	45	71,0
CB0 028 - FB0 028	79	74	72	70	66	60	52	45	71,0
CB0 030 - FB0 030	80	75	72	71	67	61	53	46	71,5
CB0 032 - FB0 032	80	75	72	71	67	61	53	46	71,5

Tab. 8d - PWL CB0 - FB0 800AC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
"PWL" Sound power levels [dB]									
CB0 017 - FB0 017	98	93	90	89	85	79	71	64	89,5
CB0 020 - FB0 020	98	93	90	89	85	79	71	64	89,5
CB0 023 - FB0 023	98	93	90	89	85	79	71	64	89,5
CB0 025 - FB0 025	99	94	91	90	86	80	72	65	90,5
CB0 028 - FB0 028	99	94	91	90	86	80	72	65	90,5
CB0 030 - FB0 030	100	95	92	91	87	81	73	66	91,5
CB0 032 - FB0 032	100	95	92	91	87	81	73	66	91,5

Note:

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

Tab. 8e - SPL CG0 - FG0 900EC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
"SPL" Sound pressure levels [dB]									
CG0 017 - FG0 017	87	82	78	75	74	70	62	55	78,5
CG0 020 - FG0 020	87	82	78	75	74	70	62	55	78,5
CG0 023 - FG0 023	87	83	79	76	75	71	63	55	79,0
CG0 025 - FG0 025	87	83	79	76	75	71	63	55	79,0
CG0 028 - FG0 028	88	83	79	76	75	71	63	56	79,5
CG0 030 - FG0 030	88	83	79	76	75	71	63	56	79,5

Tab. 8f - PWL CG0 - FG0 900EC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
"PWL" Sound power levels [dB]									
CG0 017 - FG0 017	106	101	97	94	93	89	81	74	97,5
CG0 020 - FG0 020	106	101	97	94	93	89	81	74	97,5
CG0 023 - FG0 023	107	102	98	95	94	90	82	75	98,5
CG0 025 - FG0 025	107	102	98	95	94	90	82	75	98,5
CG0 028 - FG0 028	108	103	99	96	95	91	83	76	99,5
CG0 030 - FG0 030	108	103	99	96	95	91	83	76	99,5

Note:

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

# Sound Levels

Tab. 8g - SPL CG0 - FG0 800EC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"SPL" Sound pressure levels [dB]								
CG0 017 - FG0 017	73	68	66	64	60	54	46	39	65,0
CG0 020 - FG0 020	73	68	66	64	60	54	46	39	65,0
CG0 023 - FG0 023	74	69	66	65	61	55	47	40	65,5
CG0 025 - FG0 025	74	69	66	65	61	55	47	40	65,5
CG0 028 - FG0 028	74	69	67	65	61	55	47	40	66,0
CG0 030 - FG0 030	74	69	67	65	61	55	47	40	66,0

Tab. 8h - PWL CG0 - FG0 800EC

Models	Octave band frequency [Hz]								Total [dB(A)]
	63	125	250	500	1000	2000	4000	8000	
	"PWL" Sound power levels [dB]								
CG0 017 - FG0 017	92	87	85	83	79	73	65	58	84,0
CG0 020 - FG0 020	92	87	85	83	79	73	65	58	84,0
CG0 023 - FG0 023	93	88	86	84	80	74	66	59	85,0
CG0 025 - FG0 025	93	88	86	84	80	74	66	59	85,0
CG0 028 - FG0 028	94	89	87	85	81	75	67	60	86,0
CG0 030 - FG0 030	94	89	87	85	81	75	67	60	86,0

**Note:**

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

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

# 9

## Electrical Data

**Tab. 9a - Electrical data - CB0 017- 032**

Models CB0		017	020	023	025	028	030	032
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz						
Total power input <sup>(1)</sup>	kW	57	66	76	83	92	107	119
OA <sup>(1)</sup> (without PFC)	A	111	121	135	146	164	188	210
cos $\phi$ <sup>(1)</sup> (without PFC)	-	0.74	0.79	0.81	0.82	0.81	0.82	
OA <sup>(1)</sup> (with PFC)	A	94	109	123	138	155	175	194
cos $\phi$ <sup>(1)</sup> (with PFC)	-	0.87	0.88	0.89	0.88	0.86	0.88	
Max. power input	kW	82	94	105	120	131	152	171
FLA	A	151	163	181	199	217	254	286
FLA (with PFC)		136	152	170	191	209	244	273
LRA	A	291	348	404	422	440	499	531
LRA (with compressor soft- start)	A	213	247	282	299	317	359	391
Compressors - Power input <sup>(1)</sup>	kW	50	59	68	74	83	95	107
Compressors - Nominal current <sup>(1)</sup>	A	96	106	120	126	144	162	184
Single compressor 1/3 - Max. current	A	34	40	49			65	
Single compressor 2/4 - Max. current	A	34			40	49		65
Fans number	Nr.	3			4		5	
AC fans 900 - Power input	kW	2.4						
AC fans 900 - Nominal current	A	5.1						
AC fans 900 - Max. current	A	5.15						
AC fans 800 - Power input (option)	kW	1.7						
AC fans 800 - Nominal current (option)	A	3.7						
AC fans 800 - Max. current (option)	A	3.9						
Std. head pressure pump model (option)	-	65- 190/2		65- 230/2		65- 260/2		
Std. head pressure pump - Nominal power	kW	2.2		3.0		4.0		
Std. head pressure pump - Motor power	kW	2.7		3.6		4.7		
Std. head pressure pump - Max. current	A	4.5		6.3		8.0		
High head pressure pump model (option)	-	65- 260/2				65- 340/2		
High head pressure pump - Nominal power	kW	4.0				5.5		
High head pressure pump - Motor power	kW	4.7				6.5		
High head pressure pump - Max. current	A	8.0				11.2		

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

**Tab. 9b - Electrical data - CG0 017- 030**

Models CG0		017	020	023	025	028	030
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz					
Total power input <sup>(1)</sup>	kW	57	64	74	80	92	103
OA <sup>(1)</sup> (without PFC)	A	107	115	132	139	158	176
cos $\phi$ <sup>(1)</sup> (without PFC)	-	0.77	0.80	0.81	0.83	0.84	0.85
OA <sup>(1)</sup> (with PFC)	A	91	102	120	130	149	164
cos $\phi$ <sup>(1)</sup> (with PFC)	-	0.90			0.89		0.90
Max. power input	kW	83	95	109	121	136	154
FLA	A	149	161	184	196	218	250
FLA (with PFC)	A	134	150	172	188	211	240
LRA	A	289	346	407	419	441	495
LRA (with compressor soft- start)	A	211	245	284	296	319	356
Compressors - Power input <sup>(1)</sup>	kW	49	56	63	70	78	89
Compressors - Nominal current <sup>(1)</sup>	A	96	100	114	122	136	154
Single compressor 1/3 - Max. current	A	34	40	49			65
Single compressor 2/4 - Max. current	A	34			40	49	
Fans number	Nr.	3		4		5	
EC fans 900 - Power input	kW	2.7					
EC fans 900 - Nominal current	A	4.2					
EC fans 900 - Max. current	A	4.4					
EC fans 800 - Power input (option)	kW	0.7					
EC fans 800 - Nominal current (option)	A	1.3					
EC fans 800 - Max. current (option)	A	1.4					
Std. head pressure pump model (option)	-	65- 190/2		65- 230/2		65- 260/2	
Std. head pressure pump - Nominal power	kW	2.2		3.0		4.0	
Std. head pressure pump - Motor power	kW	2.7		3.6		4.7	
Std. head pressure pump - Max. current	A	4.5		6.3		8.0	
High head pressure pump model (option)	-	65- 260/2				65- 340/2	
High head pressure pump - Nominal power	kW	4				5.5	
High head pressure pump - Motor power	kW	4.7		4.7		5.5	
High head pressure pump - Max. current	A	8.0				11.2	

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

# Electrical Data

**Tab. 9c - Electrical data - FB0 017- 032**

Models FB0		017	020	023	025	028	030	032	
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz							
Total power input <sup>(1)</sup>	kW	60	69	80	87	97	111	126	
OA <sup>(1)</sup> (without PFC)	A	116	126	143	153	169	194	218	
cosφ <sup>(1)</sup> (without PFC)	-	0.75	0.79	0.81	0.82	0.83			
OA <sup>(1)</sup> (with PFC)	A	99	113	131	144	160	182	203	
cosφ <sup>(1)</sup> (with PFC)	-	0.87	0.88		0.87	0.88		0.89	
Max. power input	kW	82	94	105	120	131	152	171	
FLA	A	151	163	181	199	217	254	286	
FLA(with PFC)	A	136	152	170	191	209	244	273	
LRA	A	291	348	404	422	440	499	531	
LRA (with compressor soft- start)	A	213	247	282	299	317	359	391	
Compressors - Power input <sup>(1)</sup>	kW	52	62	73	77	88	99	114	
Compressors - Nominal current <sup>(1)</sup>	A	100	110	126	130	148	168	192	
Single compressor 1/3 - Max. current	A	34	40	49			65		
Single compressor 2/4 - Max. current	A	34	34		40	49		65	
Fans number	Nr.	3	3		4		5		
AC fans 900 - Power input	kW					2.4			
AC fans 900 - Nominal current	A					5.2			
AC fans 900 - Max. current	A					5.2			
AC fans 800 - Power input (option)	kW					1.8			
AC fans 800 - Nominal current (option)	A					3.8			
AC fans 800 - Max. current (option)	A					3.9			
Std. head pressure pump model (option)	-	65- 260/2			65- 340/2		65- 410/2		
Std. head pressure pump - Nominal power	kW	4.0			5.5		7.5		
Std. head pressure pump - Motor power	kW	4.7			6.5		8.4		
Std. head pressure pump - Max. current	A	8.0			11.2		15.2		
High head pressure pump model (option)	-	65- 340/2			65- 410/2		65- 460/2		
High head pressure pump - Nominal power	kW	5.5			7.5		11.0		
High head pressure pump - Motor power	kW	6.5			8.4		13.3		
High head pressure pump - Max. current	A	11.2			15.2		21.4		

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

**Tab. 9d - Electrical data - FG0 017- 030**

Models FG0		017	020	023	025	028	030	
Power supply	V/Ph/Hz	400V / 3Ph / 50Hz						
Total power input <sup>(1)</sup>	kW	59	68	77	85	95	108	
OA <sup>(1)</sup> (without PFC)	A	110	120	135	145	162	184	
cosφ <sup>(1)</sup> (without PFC)	-	0.78	0.82	0.82	0.85	0.85		
OA <sup>(1)</sup> (with PFC)	A	94	108	123	136	154	173	
cosφ <sup>(1)</sup> (with PFC)	-	0.91	0.90					
Max. power input	kW	83	95	109	121	136	154	
FLA	A	149	161	184	196	218	250	
FLA (with PFC)	A	134	150	172	188	211	240	
LRA	A	289	346	407	419	441	495	
LRA (with compressor soft- start)	A	211	245	284	296	319	356	
Compressors - Power input <sup>(1)</sup>	kW	51	59	66	74	81	95	
Compressors - Nominal current <sup>(1)</sup>	A	96	106	118	126	140	162	
Single compressor 1/3 - Max. current	A	34	40	49			65	
Single compressor 2/4 - Max. current	A	34		40		49		
Fans number	Nr.	3		4		5		
EC fans 900 - Power input	kW					2.8		
EC fans 900 - Nominal current	A					4.3		
EC fans 900 - Max. current	A					4.4		
EC fans 800 - Power input (option)	kW					0.8		
EC fans 800 - Nominal current (option)	A					1.3		
EC fans 800 - Max. current (option)	A					1.4		
Std. head pressure pump model (option)	-	65- 260/2			65- 340/2		65- 410/2	
Std. head pressure pump - Nominal power	kW	4.0			5.5		7.5	
Std. head pressure pump - Motor power	kW	4.7			6.5		8.4	
Std. head pressure pump - Max. current	A	8.0			11.2		15.2	
High head pressure pump model (option)	-	65- 340/2			65- 410/2		65- 460/2	
High head pressure pump - Nominal power	kW	5.5			7.5		11.0	
High head pressure pump - Motor power	kW	6.5			8.4		13.3	
High head pressure pump - Max. current	A	11.2			15.2		21.4	

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

# 10

## Application Consideration

Fig. 10a - Support positions and loads

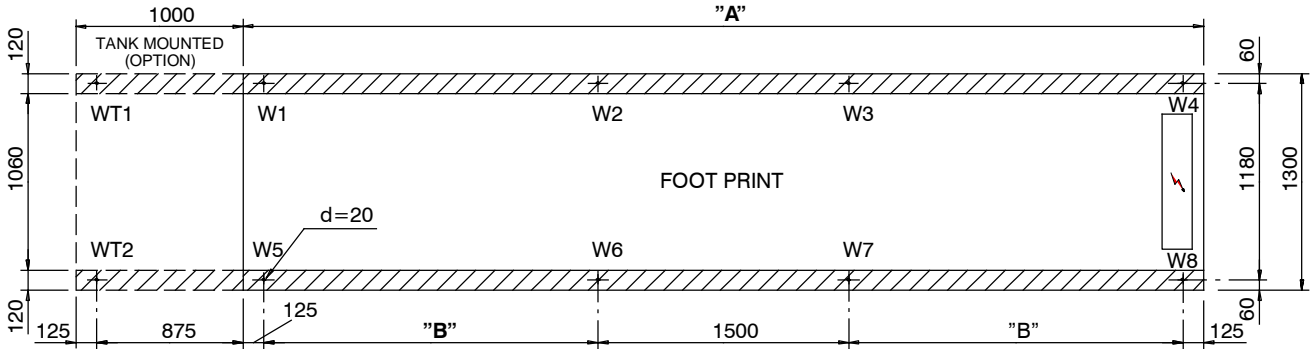
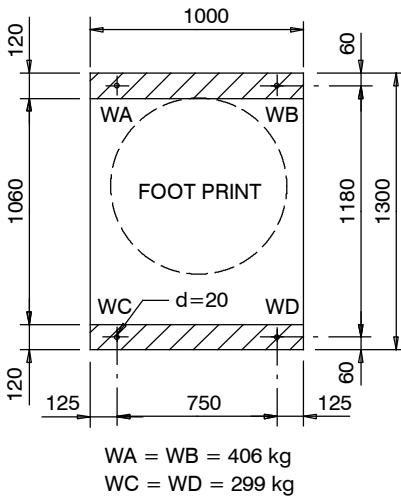


Fig. 10b - Tank (supply not mounted on unit)



Tab. 10a - Dimensions

Models	Size	Dimensions (mm)	
		"A"	"B"
CB0 / FB0	017 - 020 - 023	3750	1000
CG0 / FG0	017 - 020		
CB0 / FB0	025 - 028	4750	1500
CG0 / FG0	023 - 025		
CB0 / FB0	030 - 032	5750	2000
CG0 / FG0	028 - 030		

Tab. 10b - Operating weight distribution - Unit without tank

Models	Size	Weight distribution (kg)								Total (kg)
		W1	W2	W3	W4	W5	W6	W7	W8	
CB0	017	167	167	208	208	193	193	241	241	1618
	020	165	165	224	224	210	210	285	285	1768
	023	169	169	228	228	219	219	296	296	1824
	025	199	199	301	301	250	250	377	377	2254
	028	204	204	304	304	262	262	390	390	2320
	030	227	227	363	363	280	280	447	447	2634
CG0	032	232	232	367	367	291	291	459	459	2698
	017	164	164	207	207	193	193	245	245	1618
	020	162	162	224	224	210	210	289	289	1770
	023	189	189	282	282	235	235	349	349	2110
	025	196	196	302	302	249	249	384	384	2262
	028	224	224	360	360	276	276	444	444	2608
FB0	030	224	224	365	365	278	278	455	455	2644
	017	241	241	266	266	228	228	251	251	1972
	020	238	238	284	284	246	246	294	294	2124
	023	241	241	288	288	255	255	305	305	2178
	025	285	285	380	380	290	290	386	386	2682
	028	290	290	384	384	301	301	399	399	2748
FG0	030	328	328	460	460	325	325	456	456	3138
	032	332	332	465	465	335	335	468	468	3200
	017	238	238	266	266	228	228	255	255	1974
	020	234	234	284	284	246	246	298	298	2124
	023	276	276	360	360	275	275	359	359	2540
	025	281	281	381	381	290	290	392	392	2688
FG0	028	324	324	456	456	322	322	453	453	3110
	030	324	324	463	463	324	324	464	464	3150



# Application Consideration

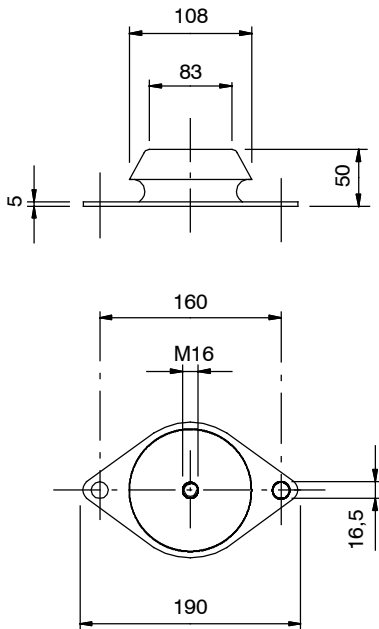
**Tab. 10c - Operating weight distribution - Unit with tank**

Models	Size	Weight distribution (kg)										Total (kg)
		WT1	W1	W2	W3	W4	WT2	W5	W6	W7	W8	
CB0	017	450	450	221	221	221	429	429	211	211	211	3054
	020	434	434	242	242	242	440	440	245	245	245	3209
	023	433	433	247	247	247	446	446	255	255	255	3264
	025	437	437	314	314	314	452	452	325	325	325	3695
	028	437	437	319	319	319	460	460	336	336	336	3759
	030	443	443	370	370	370	461	461	386	386	386	4076
	032	443	443	375	375	375	468	468	396	396	396	4135
CG0	017	446	446	222	222	222	430	430	214	214	214	3060
	020	431	431	242	242	242	441	441	247	247	247	3211
	023	437	437	294	294	294	446	446	300	300	300	3548
	025	433	433	315	315	315	452	452	329	329	329	3702
	028	441	441	366	366	366	460	460	382	382	382	4046
	030	438	438	372	372	372	460	460	391	391	391	4085
FB0	017	501	501	276	276	276	433	433	239	239	239	3413
	020	485	485	297	297	297	444	444	272	272	272	3565
	023	483	483	303	303	303	450	450	282	282	282	3621
	025	495	495	385	385	385	456	456	355	355	355	4122
	028	495	495	391	391	391	463	463	366	366	366	4187
	030	510	510	457	457	457	466	466	418	418	418	4577
	032	510	510	463	463	463	472	472	429	429	429	4640
FG0	017	497	497	276	276	276	434	434	241	241	241	3413
	020	481	481	297	297	297	445	445	274	274	274	3565
	023	496	496	365	365	365	450	450	331	331	331	3980
	025	491	491	386	386	386	456	456	359	359	359	4129
	028	508	508	453	453	453	465	465	414	414	414	4547
	030	505	505	459	459	459	466	466	423	423	423	4588

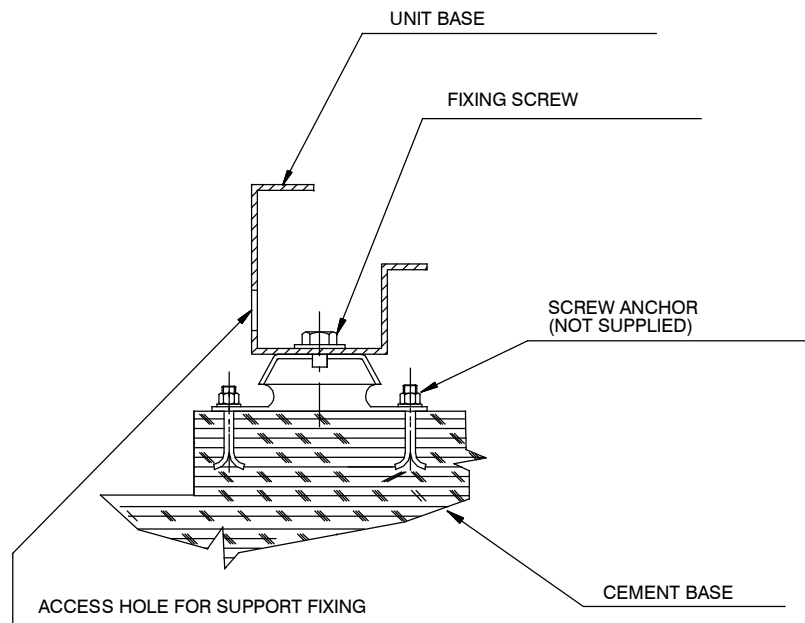
# Application Consideration

Fig. 10c - Rubber anti- vibration support

**Rubber support dimensions**  
(Single rubber support code: 270326)



**Rubber support installation**



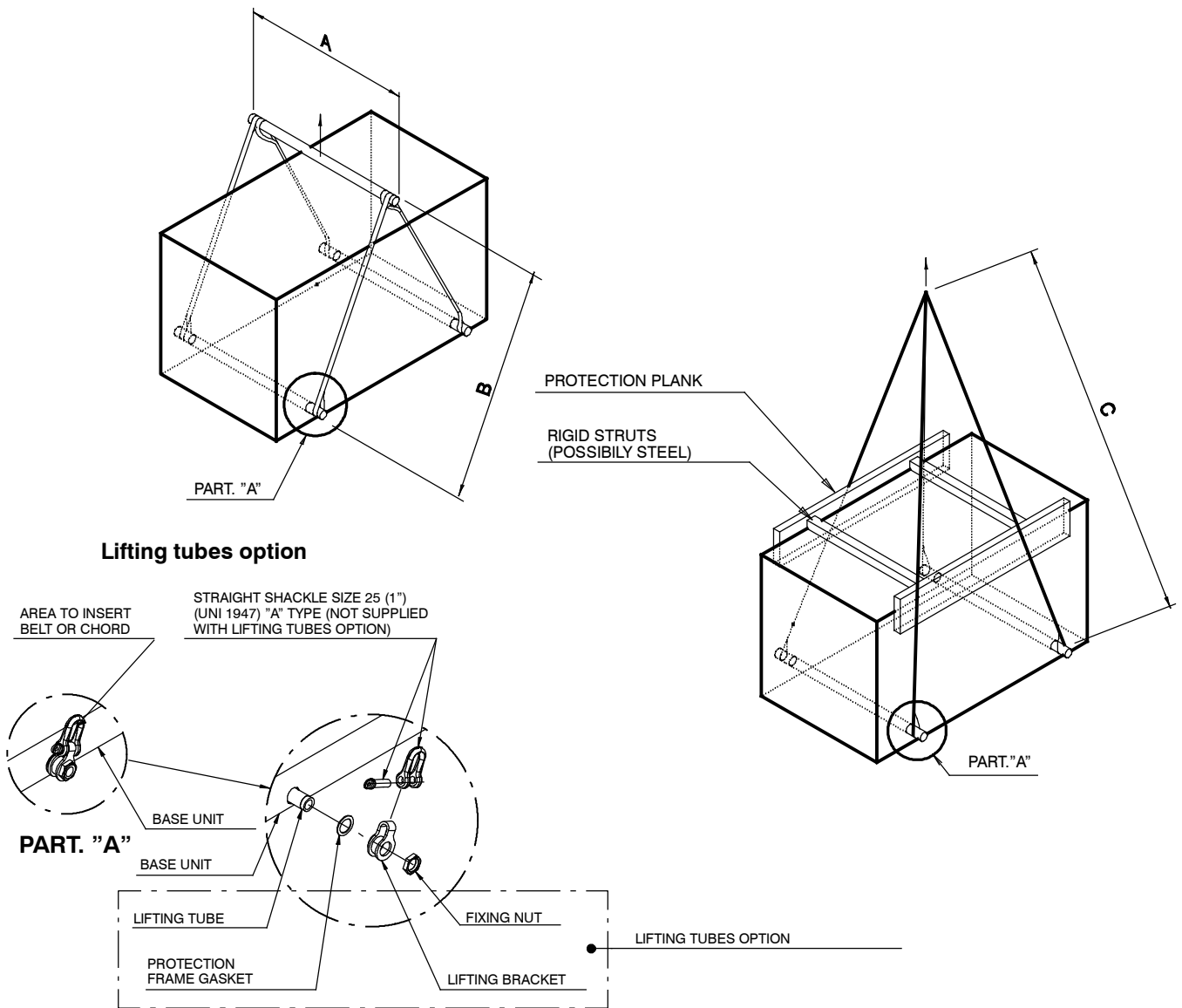
Tab. 10d - Rubber supports + 1000 liters tank

Unit	Configuration	Support kit code	Single support code	Kit support pieces
CB0 / FB0 017- 020- 023- 025- 028- 030- 032	Without tank	485625	270326	8
CG0 / FG0 017- 020- 023- 025- 028- 030				
CB0 / FB0 017- 020- 023- 025- 028- 030- 032	With tank	485626	270326	10
CG0 / FG0 017- 020- 023- 025- 028- 030				
<b>1000 liters tank</b>	Loose supplied	485649	270326	4

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

# Application Consideration

Fig. 10d - Lifting instructions with tubes



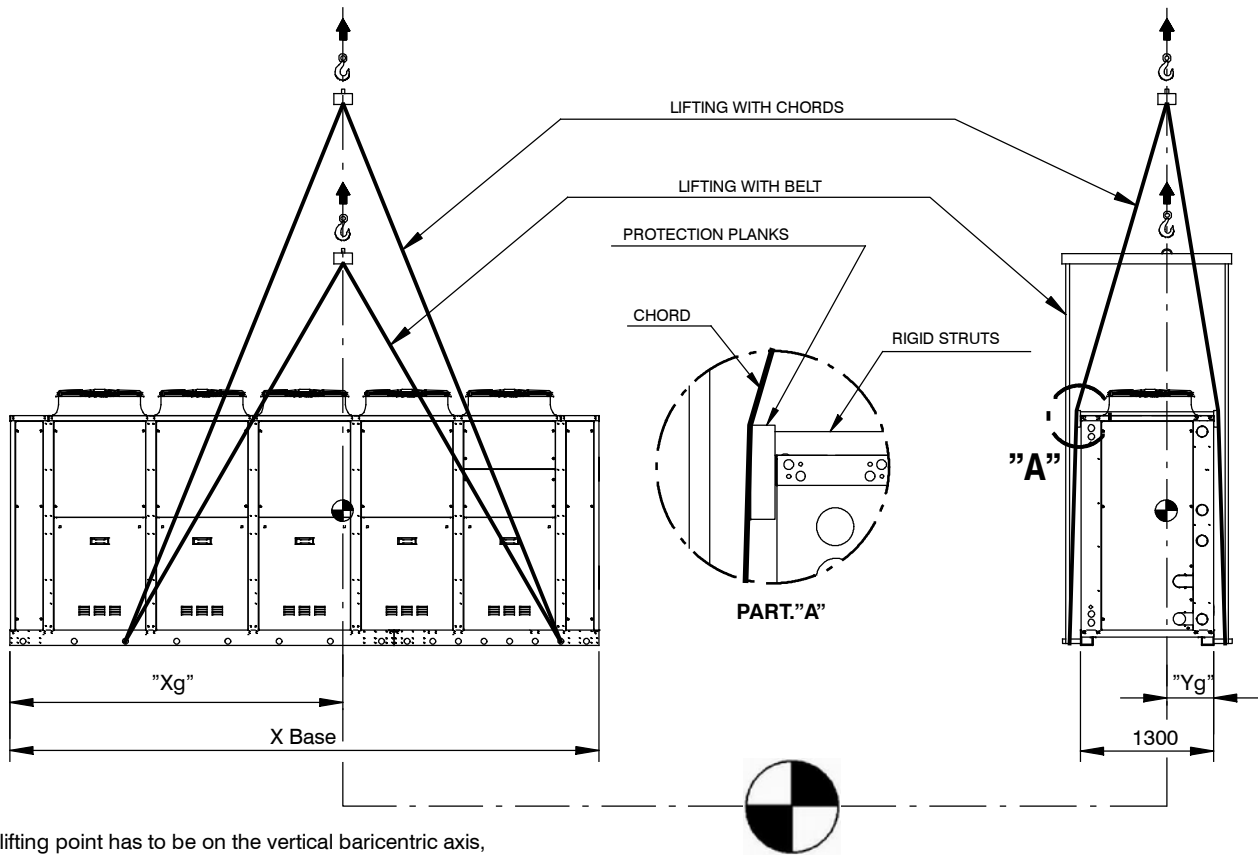
**N.B:** Place the lifting tubes in the holes in the base indicated by the word 'LIFT HERE'. Lock the ends of the tubes in position with the ring nut as shown above, using 60 mm span.  
 The capacity of the lifting gear must be adequate to lift the load in question. Check the weight of the units, the capacity of the lifting gear and ropes and the condition and suitability of the aforementioned equipment.  
 Lift the unit with a speed suitable for the load to be moved, so as not to damage the **Liebert HPC- S 017- 032** 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.

Tab. 10e - Lifting

Models	A (mm)	B (mm)	C (mm)
CB0 / FB0 017- 020- 023- 025- 028- 030- 032	1.800	≈ 5.000	≈ 9.000
CG0 / FG0 017- 020- 023- 025- 028- 030			

# Application Consideration

Fig. 10e - Lifting baricentric axis



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

Tab. 10f - Shipping weight and unit baricentre position - Unit without tank

Models	Size	X Base (mm)	Unit without pumps		Shipping weight (kg)
			"Xg" (mm)	"Yg" (mm)	
CB0	017	3750	2025	610	1608
	020	3750	2075	580	1758
	023	3750	2075	570	1813
	025	4750	2695	580	2242
	028	4750	2685	580	2305
	030	5750	3295	590	2620
	032	5750	3295	590	2678
CG0	017	3750	2035	600	1610
	020	3750	2085	580	1760
	023	4750	2685	590	2098
	025	4750	2705	580	2248
	028	5750	3295	590	2592
	030	5750	3315	590	2630
FB0	017	3750	1935	660	1867
	020	3750	1995	630	2017
	023	3750	1995	620	2072
	025	4750	2595	640	2558
	028	4750	2595	630	2621
	030	5750	3185	640	2993
	032	5750	3185	640	3051
FG0	017	3750	1945	650	1869
	020	3750	2005	630	2019
	023	4750	2585	640	2414
	025	4750	2615	630	2564
	028	5750	3185	640	2965
	030	5750	3195	640	3003

# Application Consideration

Tab. 10g - Shipping weight and unit baricentre position - Unit with tank

Models	Size	X Base (mm)	Unit without pumps		Shipping weight (kg)
			"Xg" (mm)	"Yg" (mm)	
CB0	017	4750	2475	620	2048
	020	4750	2555	600	2198
	023	4750	2565	590	2253
	025	5750	3165	600	2682
	028	5750	3175	590	2745
	030	6750	3745	600	3060
	032	6750	3755	600	3118
CG0	017	4750	2485	610	2050
	020	4750	2565	590	2200
	023	5750	3125	600	2538
	025	5750	3185	590	2688
	028	6750	3745	600	3032
	030	6750	3765	600	3070
	032	6750	3715	640	3491
FB0	017	4750	2475	660	2307
	020	4750	2545	640	2457
	023	4750	2555	630	2512
	025	5750	3145	640	2998
	028	5750	3145	630	3061
	030	6750	3715	650	3433
	032	6750	3715	640	3491
FG0	017	4750	2485	650	2309
	020	4750	2555	630	2459
	023	5750	3105	640	2854
	025	5750	3155	640	3004
	028	6750	3705	650	3405
	030	6750	3725	640	3443

# Application Consideration

**Tab. 10h - Additional net weights for options (kg)**

Options	Model	Size						
	CB0	017	020	023	025	028	030	032
	Base unit	1608	1758	1813	2242	2305	2620	2678
Acoustic option	digit 7 = 1	35	35	35	35	35	35	35
Soft starter	digit 8 = 1	20	20	20	20	20	20	20
Buffer tank	digit 10 ≠ 0	440	440	440	440	440	440	440
Fan speed control	digit 11 = 2	- 39	- 39	- 39	- 52	- 52	- 65	- 65
	digit 11 = 3	- 23	- 23	- 23	- 19	- 19	- 15	- 15
	digit 11 = 4	- 65	- 65	- 65	- 75	- 75	- 85	- 85
Pumps group / Hydraulic kit	digit 12 = 1	10	10	10	10	10	10	10
	digit 12 = 2	160	160	170	170	175	175	175
	digit 12 = 3	175	175	175	175	190	190	190
	digit 12 = 4	220	220	240	240	250	250	250
	digit 12 = 5	250	250	250	250	280	280	280
Coil metal filter	digit 17 = 1	30	30	30	40	40	50	50

Options	Model	Size						
	FB0	017	020	023	025	028	030	032
	Base unit	1867	2017	2072	2558	2621	2993	3051
Acoustic option	digit 7 = 1	35	35	35	35	35	35	35
Soft starter	digit 8 = 1	20	20	20	20	20	20	20
Buffer tank	digit 10 ≠ 0	440	440	440	440	440	440	440
Fan speed control	digit 11 = 2	- 39	- 39	- 39	- 52	- 52	- 65	- 65
	digit 11 = 3	- 23	- 23	- 23	- 19	- 19	- 15	- 15
	digit 11 = 4	- 65	- 65	- 65	- 75	- 75	- 85	- 85
Pumps group / Hydraulic kit	digit 12 = 1	10	10	10	10	10	10	10
	digit 12 = 2	95	95	110	110	110	112	112
	digit 12 = 3	110	110	112	112	112	170	170
	digit 12 = 4	170	170	200	200	200	204	204
	digit 12 = 5	200	200	204	204	204	327	327
Coil metal filter	digit 17 = 1	30	30	30	40	40	50	50

Options	Model	Size					
	CG0	017	020	023	025	028	030
	Base unit	1610	1760	2098	2248	2592	2630
Acoustic option	digit 7 = 2	80	80	100	100	115	115
Soft starter	digit 8 = 1	30	30	30	30	30	30
Buffer tank	digit 10 ≠ 0	440	440	440	440	440	440
Fan speed control	digit 11 = 4	- 42	- 42	- 56	- 56	- 70	- 70
Pumps group / Hydraulic kit	digit 12 = 1	10	10	10	10	10	10
	digit 12 = 2	160	160	170	170	175	175
	digit 12 = 3	175	175	175	175	190	190
	digit 12 = 4	220	220	240	240	250	250
	digit 12 = 5	250	250	250	250	280	280
Coil metal filter	digit 17 = 1	30	30	40	40	50	50

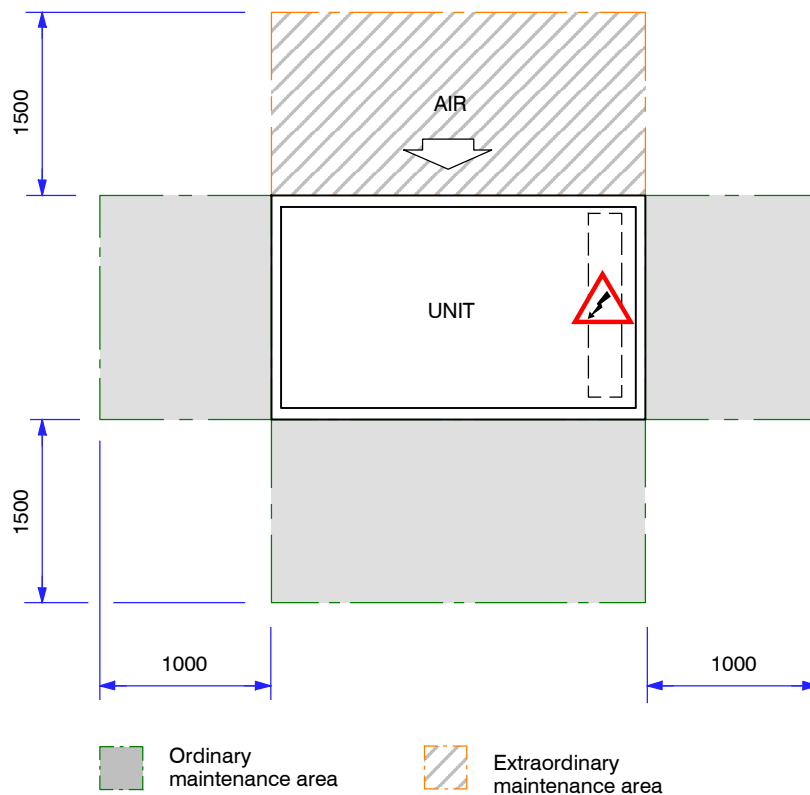
# Application Consideration

Options	Model	Size					
	FG0	017	020	023	025	028	030
	Base unit	1869	2019	2414	2564	2965	3003
Acoustic option	digit 7 = 2	80	80	100	100	115	115
Soft starter	digit 8 = 1	30	30	30	30	30	30
Buffer tank	digit 10 ≠ 0	440	440	440	440	440	440
Fan speed control	digit 11 = 4	- 42	- 42	- 56	- 56	- 70	- 70
Pumps group / Hydraulic kit	digit 12 = 1	10	10	10	10	10	10
	digit 12 = 2	95	95	110	110	110	112
	digit 12 = 3	110	110	112	112	112	170
	digit 12 = 4	170	170	200	200	200	204
	digit 12 = 5	200	200	204	204	204	327
Coil metal filter	digit 12 = 6	114	114	125	125	125	203
	digit 17 = 1	30	30	40	40	50	50

N.B.: Special versions are not included in these tables.

N.B.: With copper - copper coil shipping, weight have big increase. It's mandatory to check all lifting devices.

Fig. 10f - Service areas (top view)



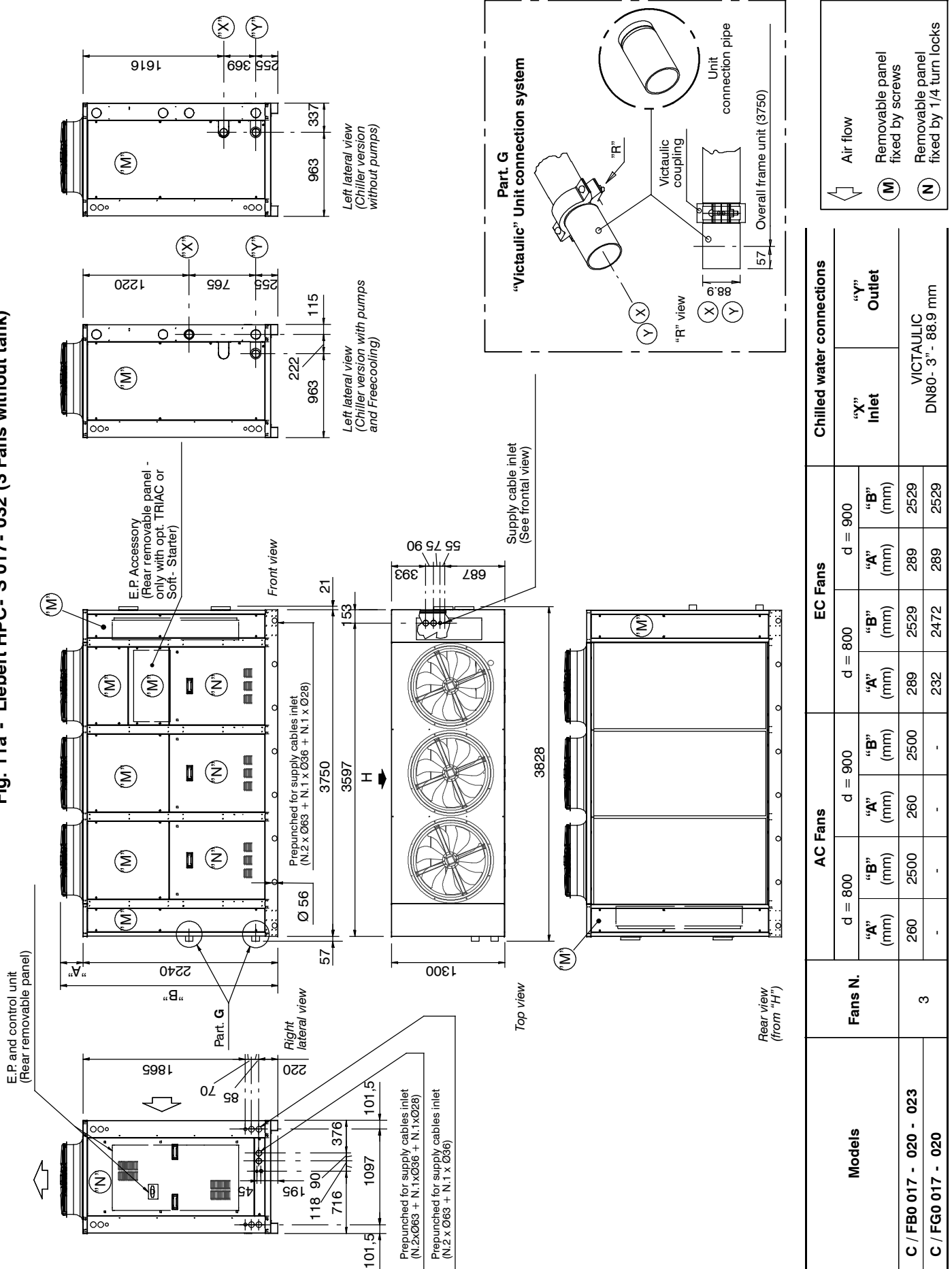
**Notes:**

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

# 11

## Dimensional Data

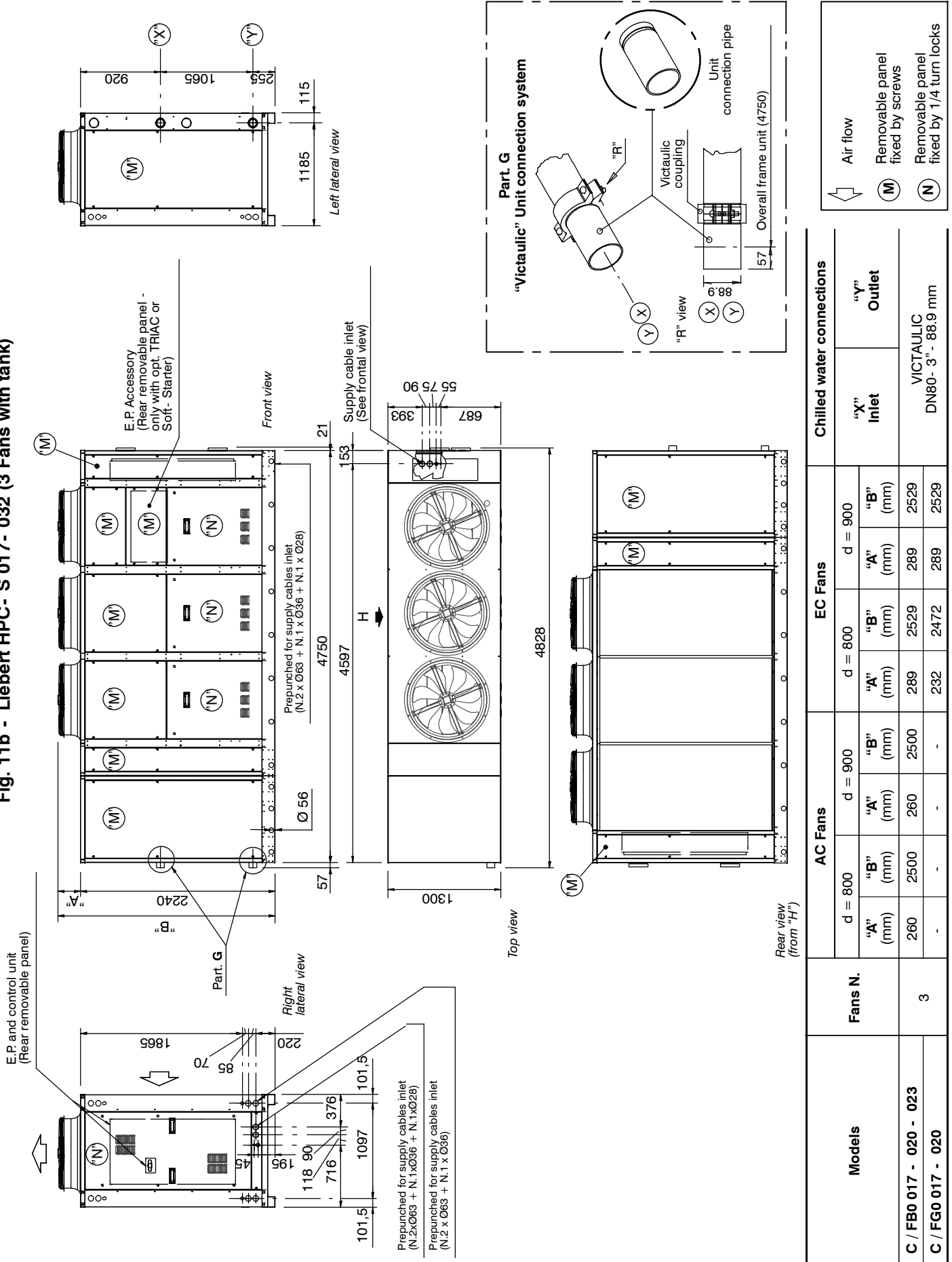
Fig. 11a - Liebert HPC- S 017- 032 (3 Fans without tank)





# Dimensional Data

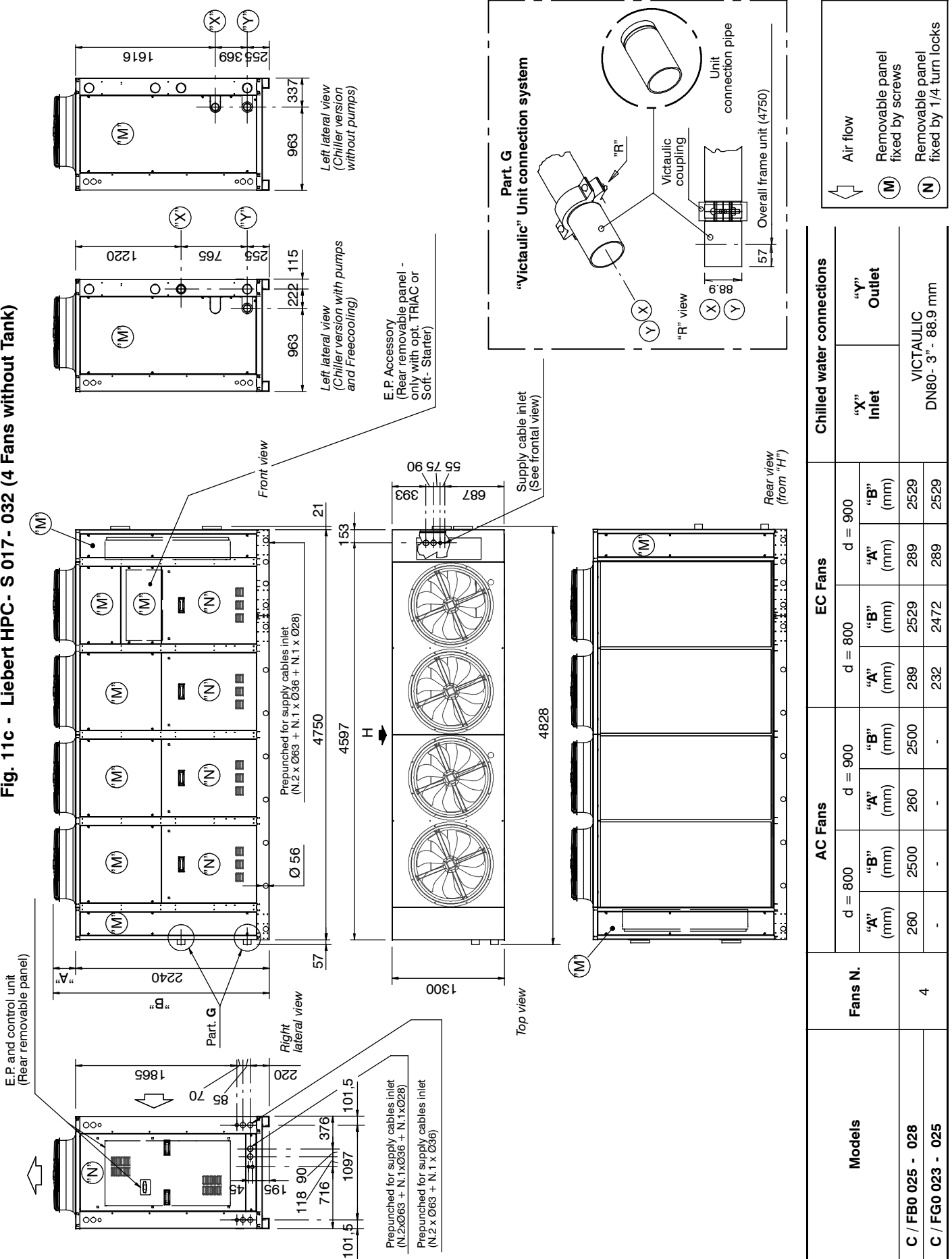
Fig. 11b - Liebert HPC- S 017- 032 (3 Fans with tank)



Models	Fans N.	AC Fans				EC Fans				Chilled water connections	
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"X" Inlet	"Y" Outlet
C / FB0 017 - 020 - 023	3	260	2500	260	2500	289	2529	289	2529	VICTAULIC DN80- 3" - 88.9 mm	
C / FGO 017 - 020		-	-	232	2472	289	2529	289	2529		

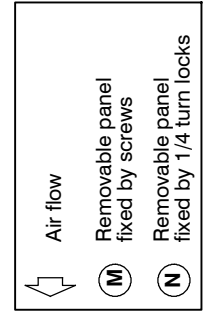
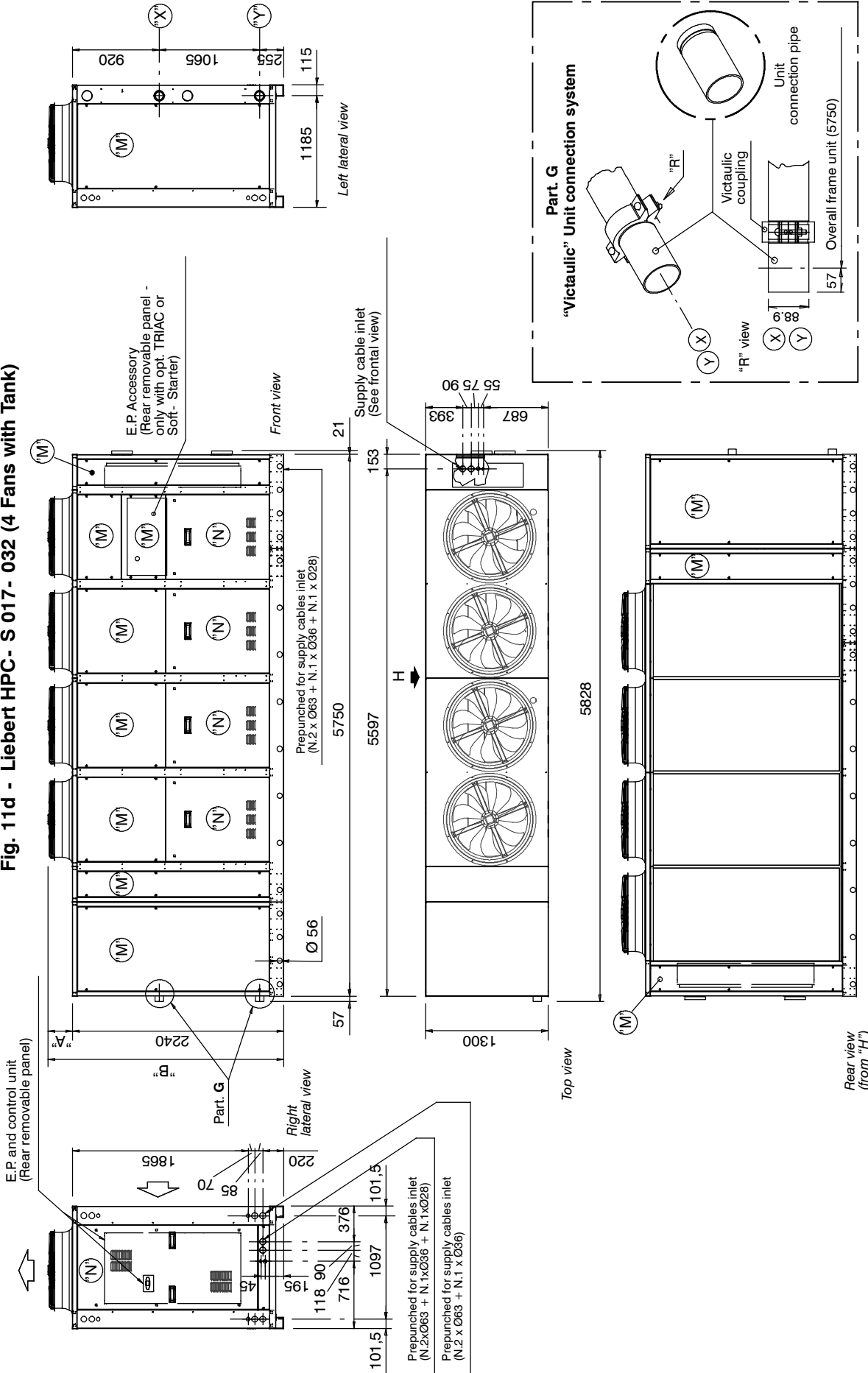
# Dimensional Data

Fig. 11c - Liebert HPC- S 017- 032 (4 Fans without Tank)



# Dimensional Data

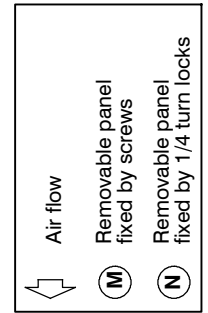
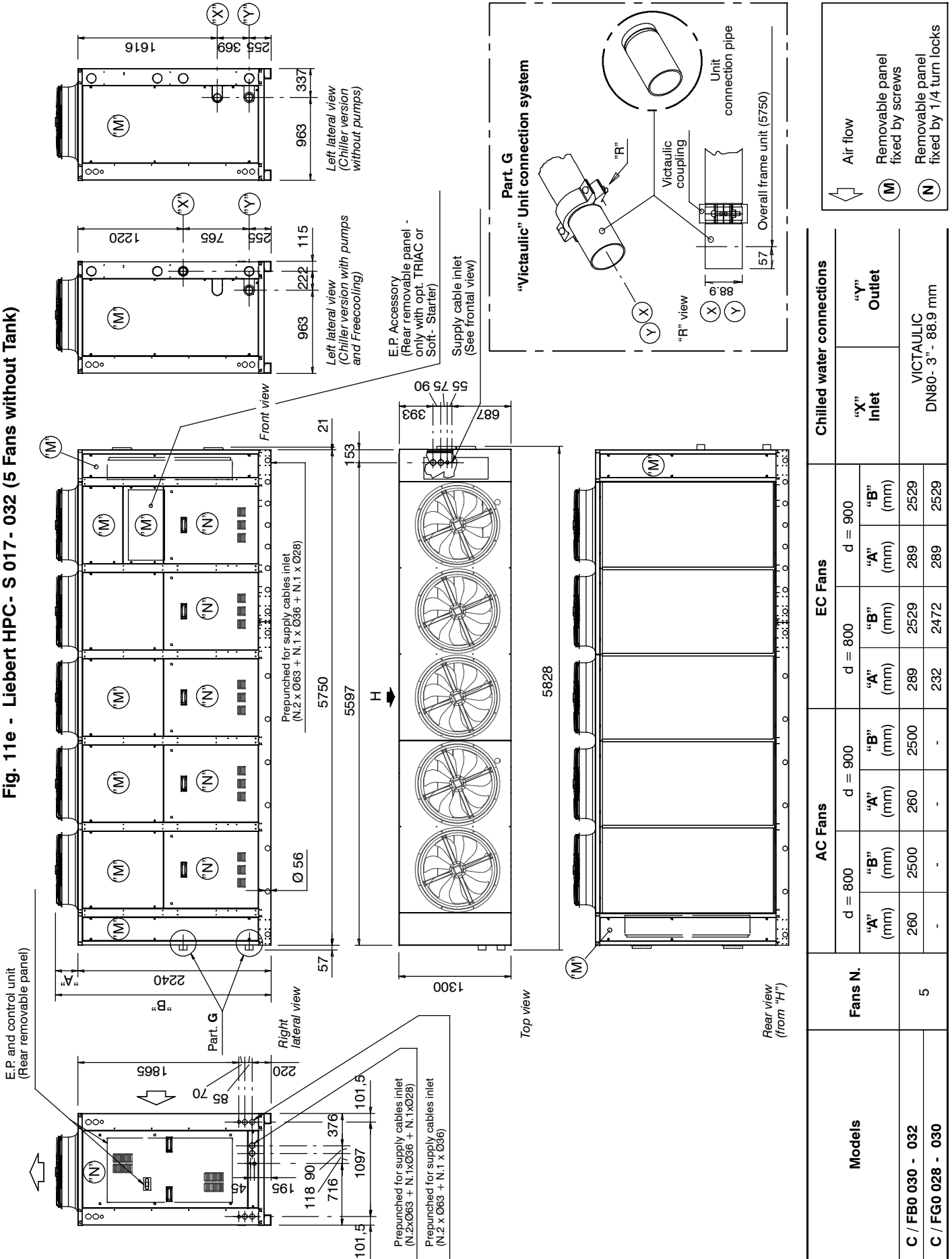
**Fig. 11d - Liebert HPC- S 017- 032 (4 Fans with Tank)**



Models	Fans N.	AC Fans				EC Fans				Chilled water connections	
		d = 800 "A" (mm)	"B" (mm)	d = 900 "A" (mm)	"B" (mm)	d = 800 "A" (mm)	"B" (mm)	d = 900 "A" (mm)	"B" (mm)	"X" Inlet	"Y" Outlet
C / FB0 025 - 028	4	260	2500	260	2500	289	2529	289	2529	VICTAULIC DN80- 3" - 88.9 mm	
C / FGO 023 - 025		-	-	-	-	232	2472	289	2529		

# Dimensional Data

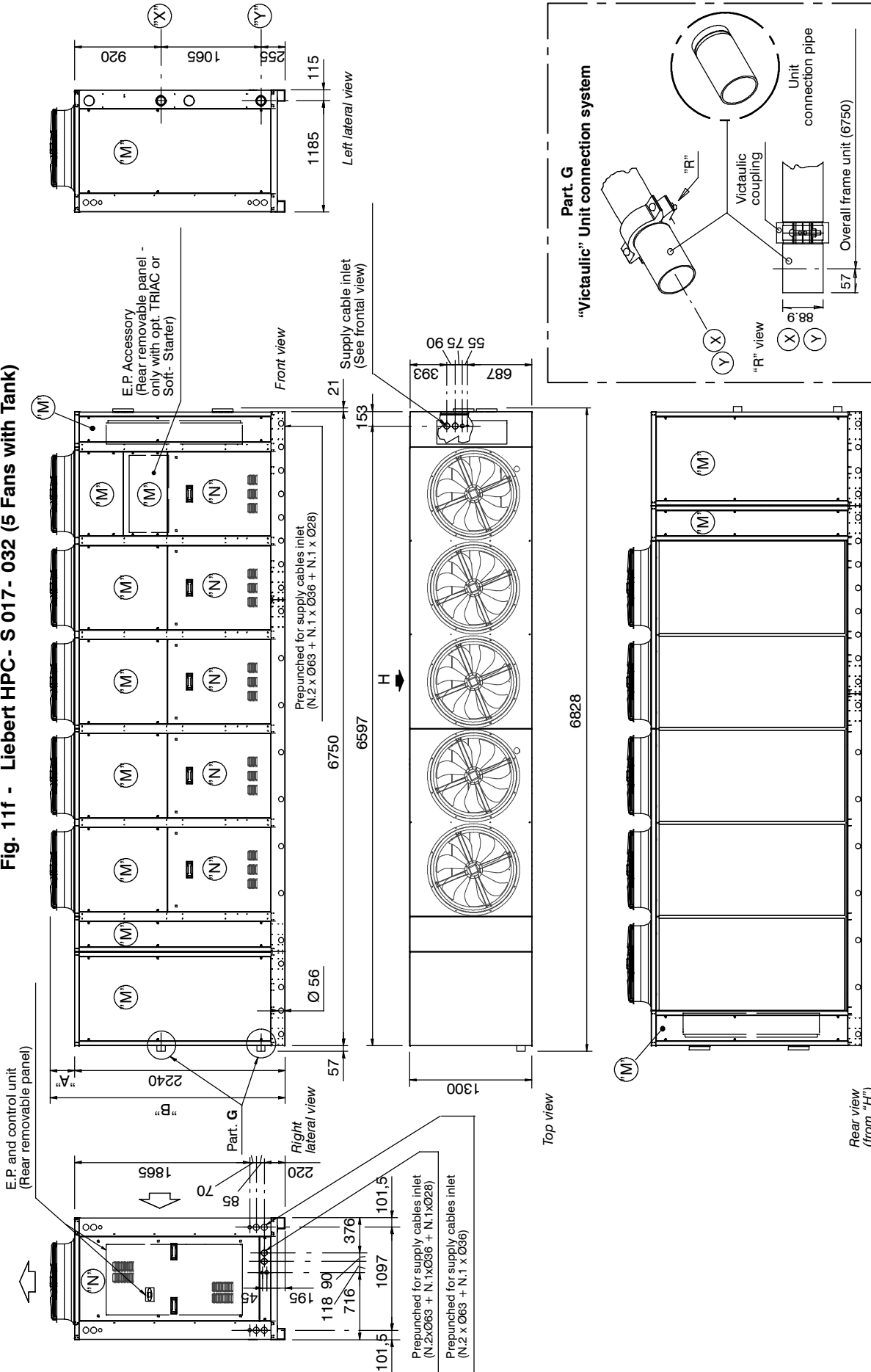
Fig. 11e - Liebert HPC- S 017- 032 (5 Fans without Tank)



Models	Fans N.	AC Fans				EC Fans				Chilled water connections		
		d = 800		d = 900		d = 800		d = 900		"X" Inlet	"Y" Outlet	
C / FB0 030 - 032 C / FGO 028 - 030	5	"A" (mm)	260	2500	260	2500	"A" (mm)	289	2529	289	2529	VICTAULIC DN80 - 3" - 88.9 mm
		"B" (mm)	-	-	232	2472	"B" (mm)	289	2529	289	2529	

# Dimensional Data

Fig. 11f - Liebert HPC- S 017- 032 (5 Fans with Tank)

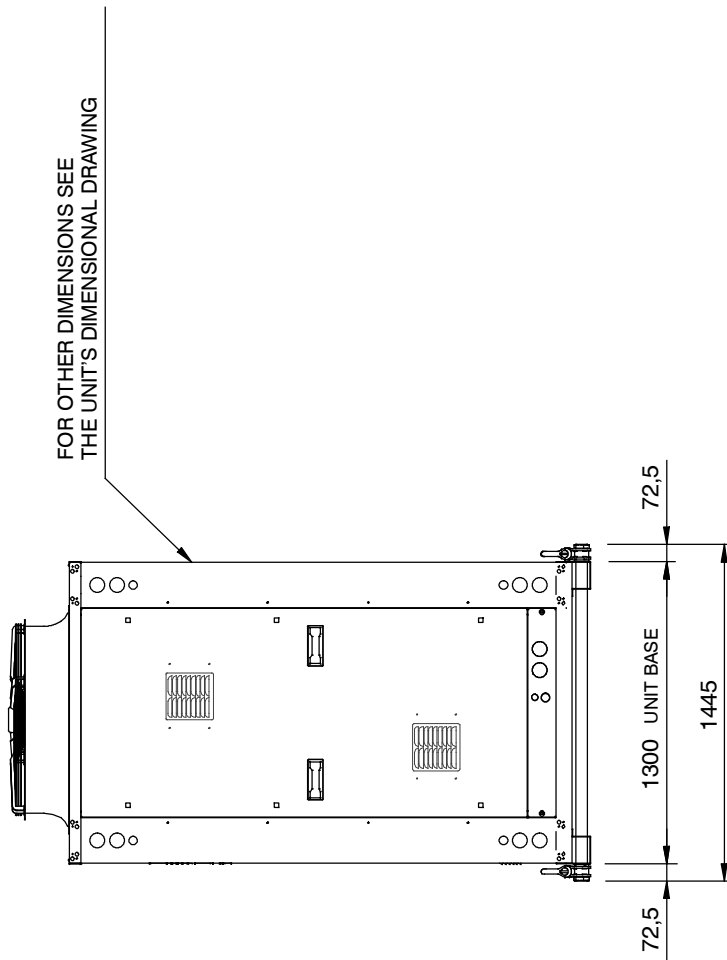


Models	Fans N.	AC Fans				EC Fans				Chilled water connections	
		d = 800		d = 900		d = 800		d = 900		"X" Inlet	"Y" Outlet
		"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)	"A" (mm)	"B" (mm)		
C / FB0 030 - 032	5	260	2500	260	2500	289	2529	289	2529	VICTAULIC	
C / FGO 028 - 030		-	-	-	232	2472	289	2529	289	2529	DN80 - 3" - 88.9 mm

# Dimensional Data

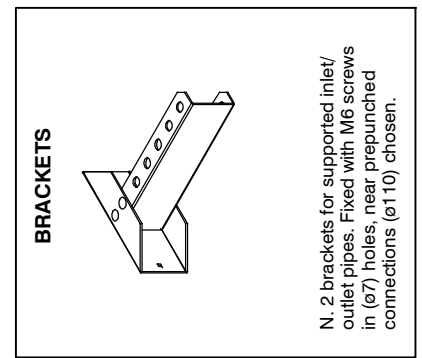
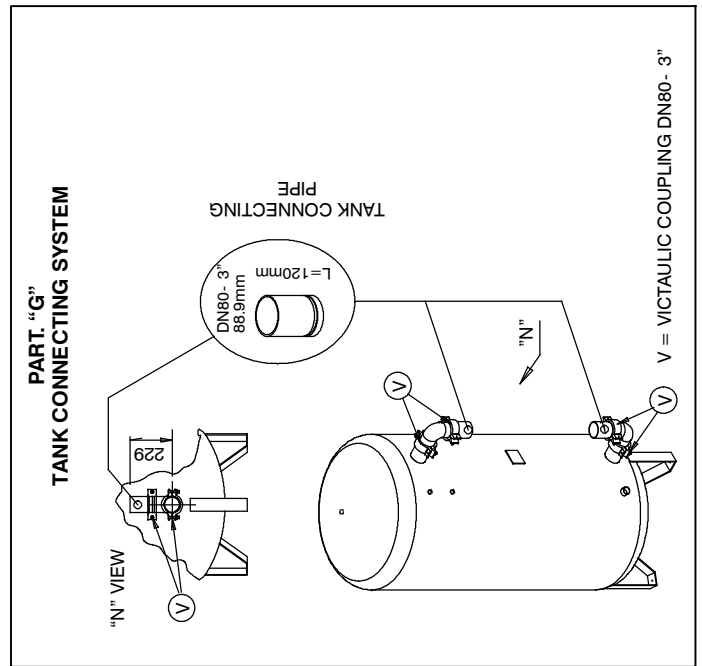
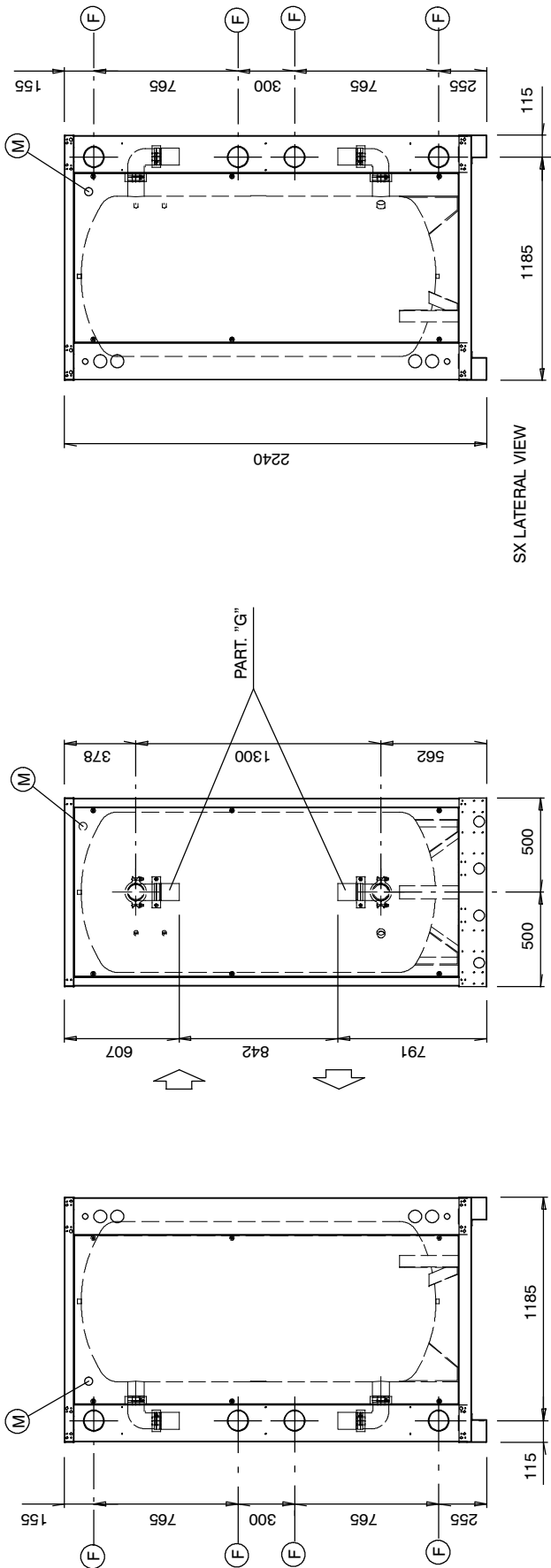
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Fig. 11g - Overall unit dimensions with lifting tubes option



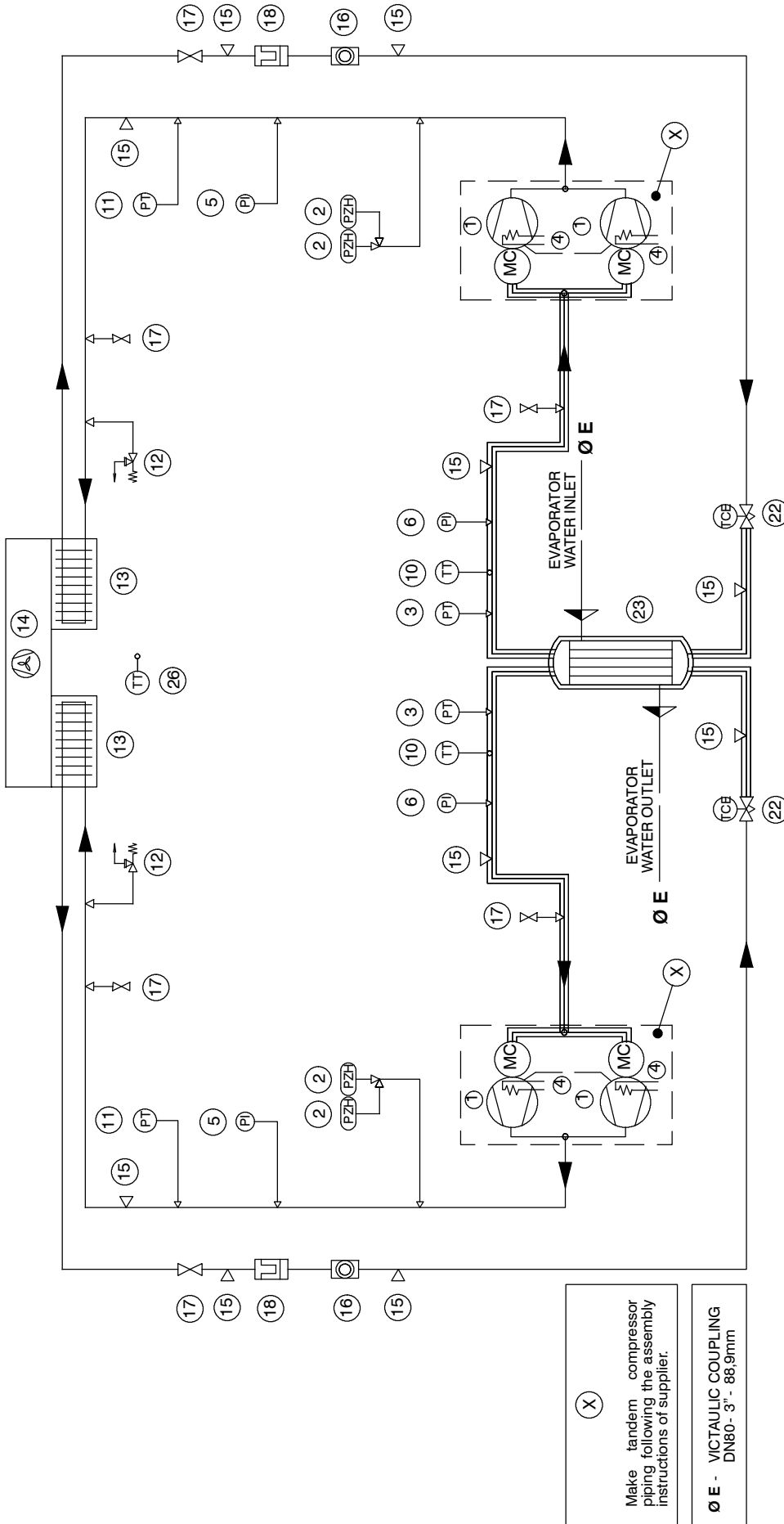
# Dimensional Data

Fig. 11h - Tank overall dimensions (supply not mounted on unit)



- (M) REMOVABLE PANEL
- (F) PREPUNCHED  $\varnothing 110$  (for inlet/outlet pipes connections)

# 12 Refrigerant Circuit



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



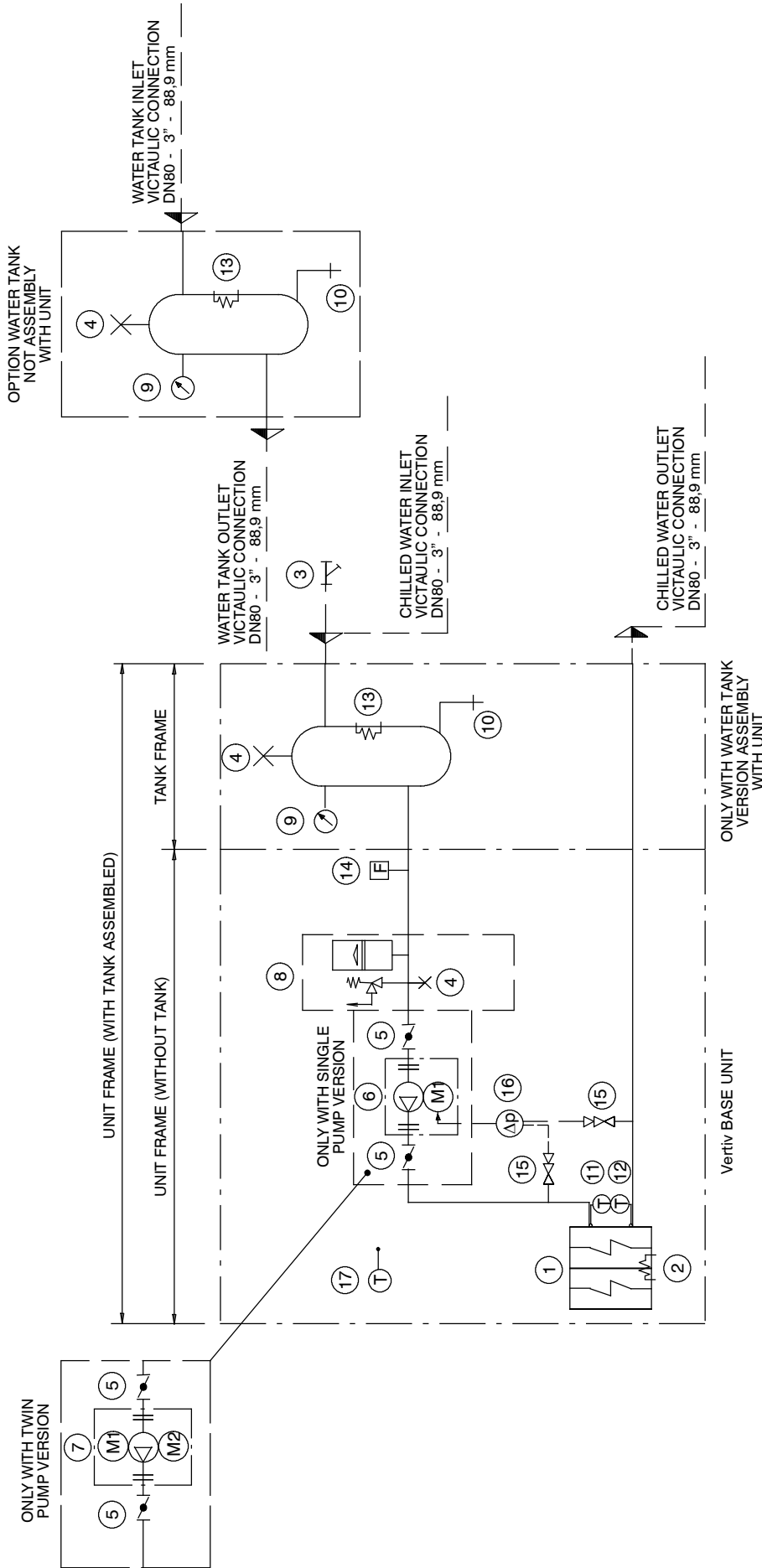


Fig. 13a - Chiller hydraulic diagram

Tab. 13a - Chiller hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Water outlet evaporator probe
2	Evaporator antifreeze heater (optional)	13	Tank antifreeze heater (optional)
3	Water filter (optional)	14	Flow switch
4	Manual air valve	15	Service valve with cap
5	Butterfly valve	16	Differential transducer (only with electronic pumps)
6	Single pump	17	Air temperature sensor
7	Twin pump	18	-
8	Expansion tank + Safety valve (optional)	19	-
9	Manometer	20	-
10	Discharge valve	21	-
11	Water inlet evaporator probe	22	-

# Hydraulic Circuit

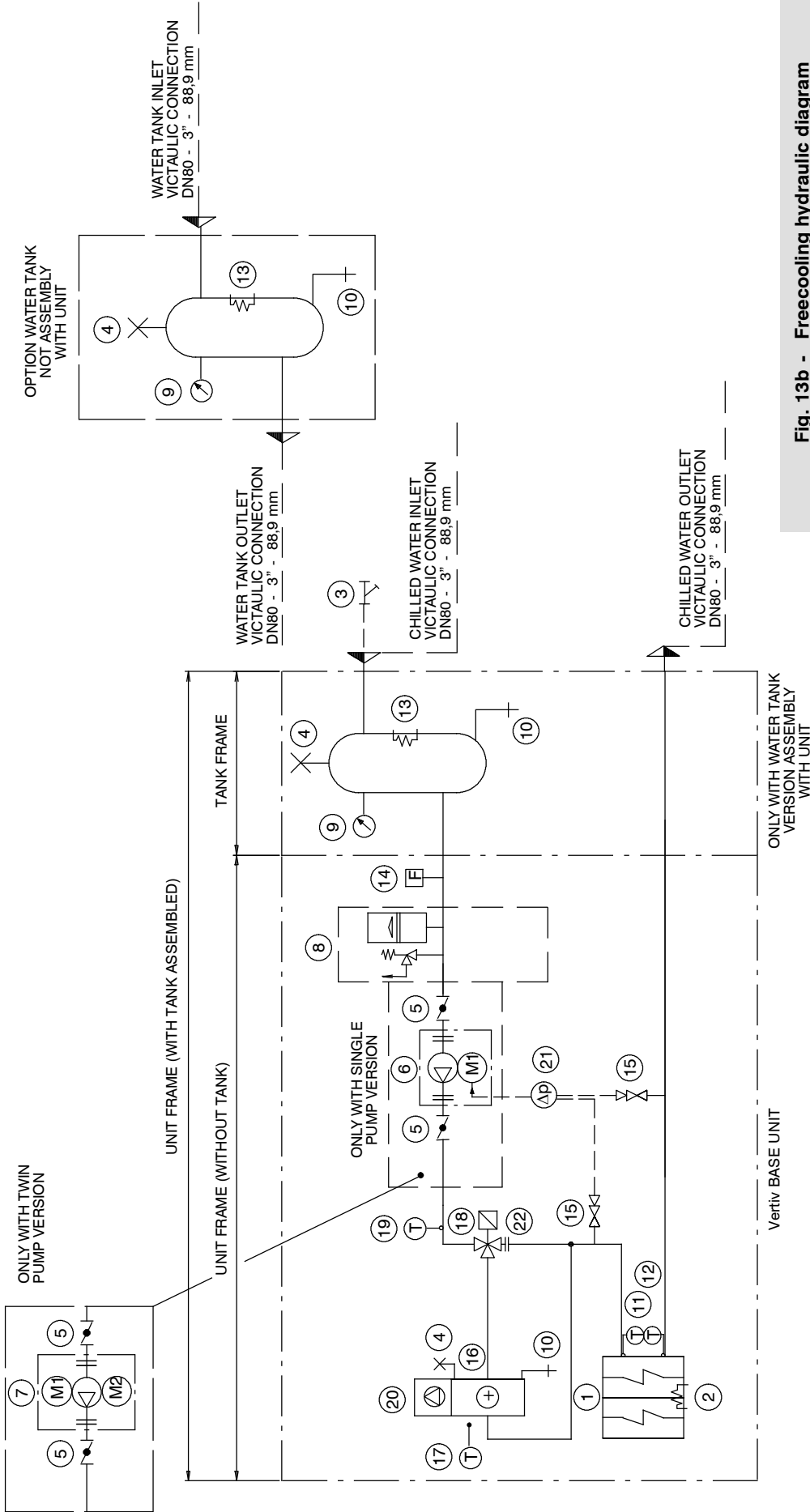


Fig. 13b - Freecooling hydraulic diagram

Tab. 13b - Freecooling hydraulic components

Pos.	Description	Pos.	Description
1	Evaporator	12	Water outlet evaporator probe
2	Evaporator antifreeze heater (optional)	13	Tank antifreeze heater (optional)
3	Water filter (option)	14	Flow switch
4	Manual air valve	15	Service valve with cap
5	Butterfly valve	16	Freecooling coil
6	Single pump	17	Air temperature sensor
7	Twin pump	18	3 way valve
8	Expansion tank + Safety valve (optional)	19	Control freecooling thermostat sensor
9	Manometer	20	Fans
10	Discharge valve	21	Differential transducer (only with electronic pumps)
11	Water inlet evaporator probe	22	Casilibrated baffle



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

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