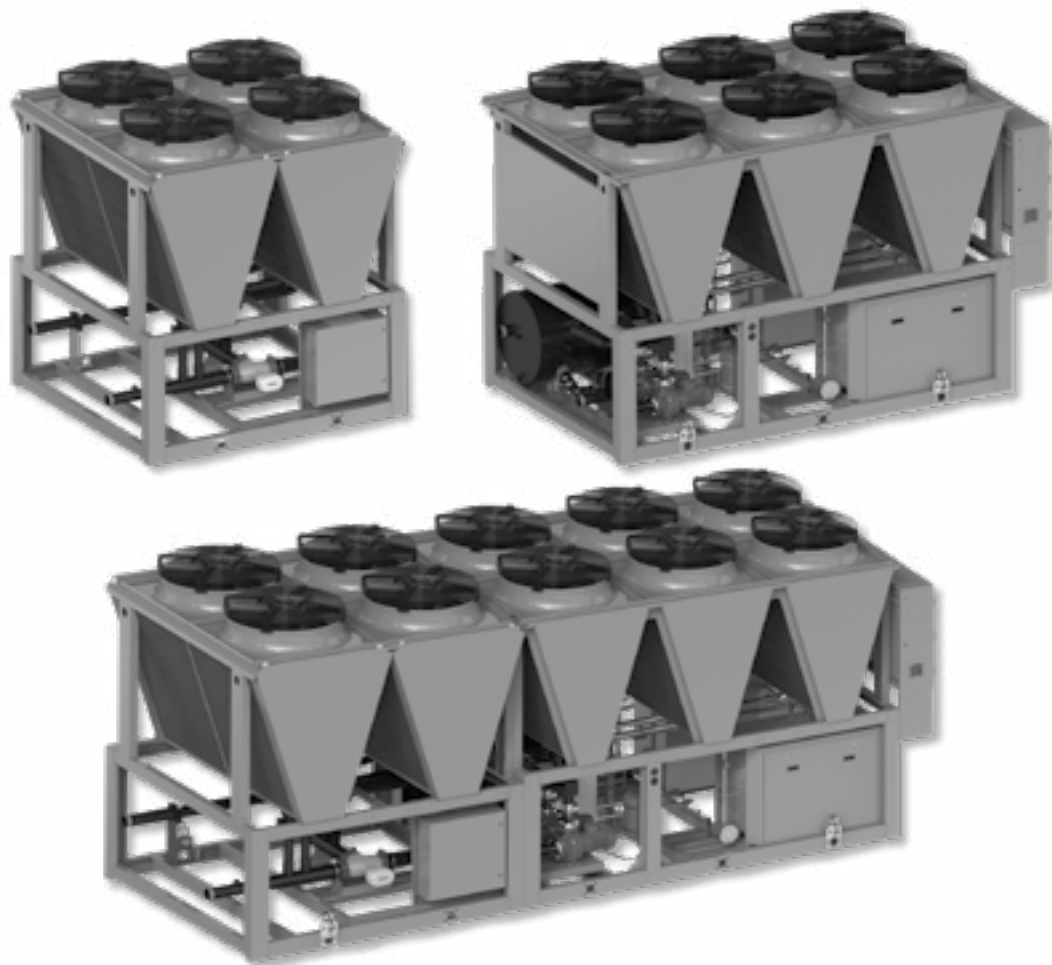


SysFreeCool



English

Français

Deutsch

Italiano

Español



100
↓
550 kW

Free-cooling module
Module Free-cooling
Módulo Free-cooling
Modulo Free-Cooling
Free-cooling modul

Part number / Code / Code / Codice / Código: **366240/E**
Supersedes / Annule et remplace / Annulliert und ersetzt / Annulla e sostituisce /
Anula y sustituye: **366240/D**
Notified Body / Organisme Notifié / Benannte Zertifizierungsstelle /
Organismo Notificato / Organismo Notificado N°. **0425**



ISO 9001:2015 certified management system

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1 - Foreword

1.1 Introduction

Units, manufactured to state-of-the-art design and implementation standards, ensure top performance, reliability and fitness to any type of air-conditioning systems.

These units are designed for cooling water or glycoled water and are unfit for any purposes other than those specified in this manual.

This manual includes all the information required for a proper installation of the units, as well as the relevant operating and maintenance instructions.

It is therefore recommended to read this manual carefully before installation or any operation on the machine. Installation and maintenance must be carried out by skilled personnel only (where possible, by one of Authorised Service Centers).

The manufacturer may not be held liable for any damage to people or property caused by improper installation, start-up and/or improper use of the unit and/or failure to implement the procedures and instructions included in this manual.

1.2 Warranty

These units are delivered complete, tested and ready for being operated. Any form of warranty will become null and void in the event that the appliance is modified without manufacturer's preliminary written authorisation.

This warranty shall apply providing that the installation instructions have been complied with (either issued by manufacturer, or deriving from the current practice), and the Form 1 ("Start-up") has been filled-in and mailed to manufacturer (attn. After-Sales Service).

In order for this warranty to be valid, the following conditions shall be met:

- The machine must be operated only by skilled personnel from Authorised After-Sales Service.
- Maintenance must be performed only by skilled personnel - from one of Authorised After-Sales Centers.
- Use only original spare parts.
- Carry out all the planned maintenance provided for by this manual in a timely and proper way.

Failure to comply with any of these conditions will automatically void the warranty.

1.3 Emergency stop / Normal stop

The emergency stop of the unit can be enabled using the master switch on the control panel (move down the lever).





For a normal stop, press the relevant push-buttons.

To restart the appliance, follow the procedure detailed in this manual.

1.4 An introduction to the manual

For safety reasons, it is imperative to follow the instructions given in this manual. In case of any damage caused by non-compliance with these instructions, the warranty will immediately become null and void.

Conventions used throughout the manual:


	The Danger sign recalls your attention to a certain procedure or practice which, if not followed, may result in serious damage to people and property.
	The Warning sign precedes those procedures that, if not followed, may result in serious damage to the appliance.
	The Notes contain important observations.
	The Useful Tips provide valuable information that optimises the efficiency of the appliance.

This manual and its contents, as well as the documentation which accompanies the unit, are and remain the property of manufacturer, which reserves any and all rights thereon. This manual may not be copied, in whole or in part, without manufacturer's written authorization.

2 - Safety

2.1 Foreword


These units must be installed in conformity with the provisions of Machinery Directive 2006/42/EC, Pressure Equipment Directive 2014/68/EU, Electromagnetic Compatibility Directive 2014/30/EU, as well as with other regulations applicable in the country of installation. If these provisions are not complied with, the unit must not be operated.


	<p>The unit must be grounded, and no installation and/or maintenance operations may be carried out before deenergising the electrical panel of the unit.</p>
---	--


Failure to respect the safety measures mentioned above may result in electrocution hazard and fire in the presence of any short-circuits.


Units are designed and manufactured according to the requirements of European Standard PED 2014/68/EU (pressure vessels).


- The maximum working pressure values are mentioned on the unit's data plate.
- A safety valve is installed in the system to prevent over abnormal pressures.
- The vents of the safety valves are positioned and oriented in such a way as to reduce the risk of contact with the operator, in the event that the valve is operated. Anyway, the installer will convey the discharge of the valves far from the unit.

	<p>The guards of the fans (only for units provided with air heat exchangers) must be always mounted and must never be removed before de-energising the appliance.</p>
---	---

	<p>It is the User's responsibility to ensure that the unit is fit for the conditions of intended use and that both installation and maintenance are carried out by experienced personnel, capable of respecting all the recommendations provided by this manual.</p> <p>It is important that the unit is adequately supported, as detailed in this manual. Non-compliance with these recommendations may create hazardous situations for the personnel.</p>
---	---

	<p>The unit must rest on a base which meets the characteristics specified in this manual; a base with inadequate characteristics is likely to become a source of serious injury to the personnel.</p>
---	---

	<p>The unit has not been design to withstand loads and/or stress that may be transmitted by adjacent units, piping and/or structures.</p> <p>Each external load or stress transmitted to the unit may break or cause breakdowns in the unit's structure, as well as serious dangers to people. In these cases, any form of warranty will automatically become null and void.</p>
---	--

	<p>The packaging material must not be disposed of in the surrounding environment or burnt.</p>
---	--

2 - Safety (continued)

2.2 Definitions

OWNER: means the legal representative of the company, body or individual who owns the plant where unit has been installed; he/she has the responsibility of making sure that all the safety regulations specified in this manual are complied with, along with the national laws in force.

INSTALLER: means the legal representative of the company who has been given by the owner the job of positioning and performing the hydraulic, electric and other connections of unit to the plant: he/she is responsible for handling and properly installing the appliance, as specified in this manual and according to the national regulations in force.

OPERATOR: means a person authorised by the owner to do on unit all the regulation and control operations expressly described in this manual, that must be strictly complied with, without exceeding the scope of the tasks entrusted to him.

ENGINEER: means a person authorised directly by manufacturer or, in all EC countries, excluding Italy, under his full responsibility, by the distributor of product, to perform any routine and extraordinary maintenance operations, as well as any regulation, control, servicing operations and the replacement of pieces, as may be necessary during the life of the unit.

2.3 Access to the unit

The unit must be placed in an area which can be accessed also by OPERATORS and ENGINEERS; otherwise the unit must be surrounded by a fence at not less than 2 meters from the external surface of the machine.

OPERATORS and ENGINEERS must enter the fenced area only after wearing suitable clothing (safety shoes, gloves, helmet etc.). The INSTALLER personnel or any other visitor must always be accompanied by an OPERATOR.

For no reason shall any unauthorised personnel be left alone in contact with the unit.

2.4 General precautions

The OPERATOR must simply use the controls of the unit; he must not open any panel, other than the one providing access to the control module.

The INSTALLER must simply work on the connections between plant and machine; he must not open any panels of the machine and he must not enable any control.

When you approach or work on the unit, follow the precautions listed below:

- do not wear loose clothing or jewellery or any other accessory that may be caught in moving parts
- wear suitable personal protective equipment (gloves, goggles etc.) when you have to work in the presence of free flames (welding operations) or with compressed air
- if the unit is placed in a closed room, wear ear protection devices

- cut off connecting pipes, drain them in order to balance the pressure to the atmospheric value before disconnecting them, disassemble connections, filters, joints or other line items
- do not use your hands to check for any pressure drops
- use tools in a good state of repair; be sure to have understood the instructions before using them
- be sure to have removed all tools, electrical cables and any other objects before closing and starting the unit again

2.5 Precautions against residual risks

Prevention of residual risks caused by the control system

- be sure to have perfectly understood the operating instructions before carrying out any operation on the control panel
- when you have to work on the control panel, keep always the operating instructions within reach
- start the unit only after you have checked its perfect connection to the plant
- promptly inform the ENGINEER about any alarm involving the unit
- do not reset manual restoration alarms unless you have identified and removed their cause

Prevention of residual mechanical risks

- install the unit according to the instructions provided in this manual
- carry out all the periodical maintenance operations prescribed by this manual
- wear a protective helmet before accessing the interior of the unit
- before opening any panelling of the machine, make sure that it is secured to it by hinges
- do not touch heat recovery coils without wearing protective gloves
- do not remove the guards from moving elements while the unit is running
- check the correct position of the moving elements' guards before restarting the unit

Prevention of residual electrical risks

- connect the unit to the mains according to the instructions provided in this manual
- periodically carry out all the maintenance operations specified by this manual
- disconnect the unit from the mains by the external disconnecting switch before opening the electrical board

2 - Safety (continued)

- check the proper grounding of the unit before start-up
- check all the electrical connections, the connecting cables, and in particular the insulation; replace worn or damaged cables
- periodically check the board's internal wiring
- do not use cables having an inadequate section or flying connections, even for limited periods of time or in an emergency

Prevention of other residual risks

- make sure that the connections to the unit conform to the instructions provided in this manual and on the unit's panelling
- if you have to disassemble a piece, make sure that it has been properly mounted again before restarting the unit
- keep a fire extinguisher for electrical appliances near the machine
- Wear proper protections near the safety valves. Each valve conveying through piping may change the real intervention value
- remove and leak of fluid inside and outside the unit
- do not store flammable liquids near the unit
- weld only empty pipes
- do not bend/hit pipes containing fluids under pressure

2.6 Precautions during maintenance operations

Maintenance operations can be carried out by authorised technicians only.

Before performing any maintenance operations:

- disconnect the unit from the mains with the external disconnecting switch
- place a warning sign "do not turn on - maintenance in progress" on the external disconnecting switch
- make sure that on-off remote controls are inhibited
- wear suitable personal protective equipment (helmet, safety gloves, goggles and shoes etc.)

To carry out any measurements or checks which require the activation of the machine:

- work with the electrical board open only for the necessary time
- close the electrical board as soon as the measurement or check has been completed
- for outdoor units, do not carry out any operations in the presence of dangerous climatic conditions (rain, snow, mist etc.)

The following precautions must be always adopted:

- never scatter the fluids of the hydraulic circuit in the surrounding environment
- when replacing an eprom or electronic cards, use always suitable devices (extractor, antistatic bracelet, etc.)
- to replace weighty element, make sure that the lifting equipment is consistent with the weight to be lifted
- do not access the fan compartment unless you have disconnected the machine by the disconnecting switch on the board and you have placed a warning sign "do not turn on - maintenance in progress"
- contact manufacturer for any modifications, hydraulic or wiring diagram of the unit, as well as to its control logics
- contact manufacturer if it is necessary to perform very difficult disassembly and assembly operations
- use only original spare parts purchased directly from manufacturer or the official retailers of the companies on the recommended spare parts list
- contact manufacturer if it is necessary to handle the unit one year after its positioning on site or if you wish to dismantle it.

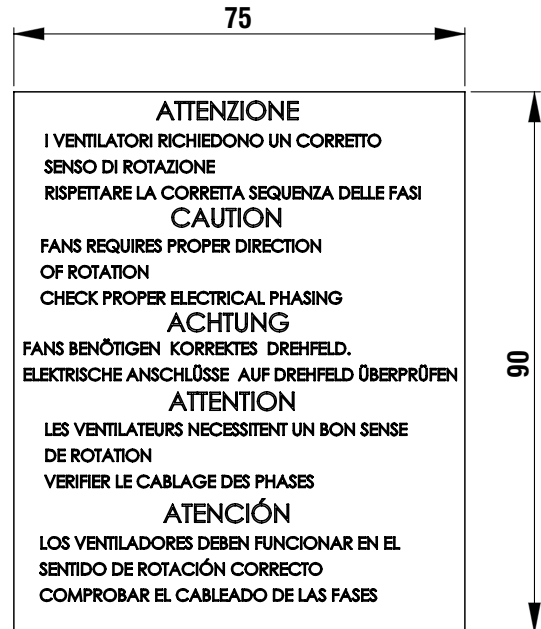
2 - Safety (continued)

2.7 Safety labels

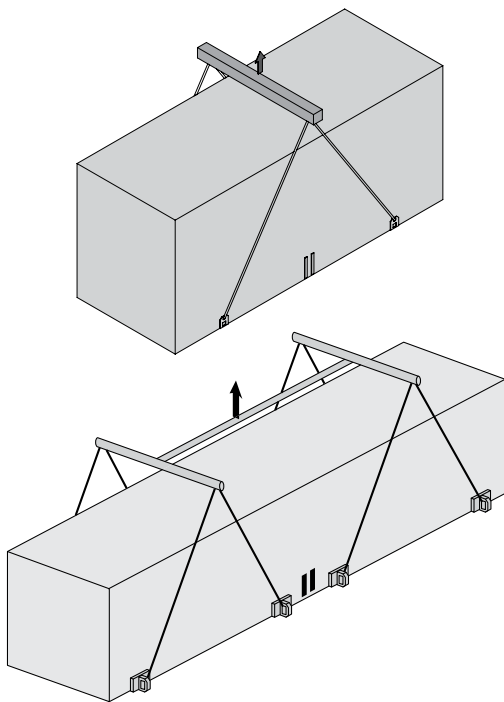
Identification of the unit Outside, on the right-hand front column

CODICE PRODOTTO NEUTRO PRODUCT CODE		<input type="text"/>	
CE			
MODELLO MODEL		<input type="text"/>	
0425			
MO.NO			
MATRICOLA SERIAL NO.			
ANNO DI COSTRUZIONE Manuf. Year		<input type="text"/>	
REFR.	GWP	CIRCUIT CHARGE (kg)	1 2 3 4
PS (LATO ALTA / LATO BASSA) PS (HIGH / LOW SIDE)		bar <input type="text"/>	
TS (ALTA / BASSA) TS (HIGH / LOW)		°C <input type="text"/>	
ALIM. POTENZA MAIN SUPPLY		V / PH / Hz <input type="text"/>	
CORRENTE DI SPUNTO LRA		(max) A <input type="text"/>	
CORRENTE A PIENO CARICO FLA		(max) A <input type="text"/>	
POTENZA ASSORBITA POWER INPUT		(max) Kw <input type="text"/>	
PRESS. MAX ESERCIZIO ACQUA MAX WATER OPERATING PRESSURE		bar <input type="text"/>	
MASSA MASS		Kg <input type="text"/>	
SYSTEMAIR S.r.l. Via XXV Aprile 29 20825 BARLASSINA MB ITALIA MADE IN ITALY COD.NO: P35952			
MODELLO: MODEL			
MATRICOLA: SERIAL NO.		ANNO DI COSTRUZIONE Manuf. year	
CODICE: PRODUCT CODE		ANNO DI COSTRUZIONE Manuf. year	
MODELLO: MODEL		ANNO DI COSTRUZIONE Manuf. year	
MATRICOLA: SERIAL NO.		ANNO DI COSTRUZIONE Manuf. year	
CODICE: PRODUCT CODE		ANNO DI COSTRUZIONE Manuf. year	

Sequence phase control on the electrical board



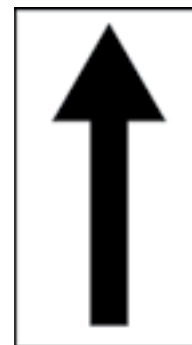
Instruction for the lifting



Gravity centre - Base



Instruction for the lifting

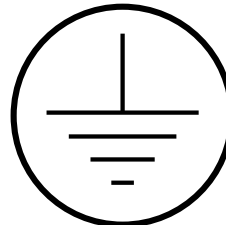


2 - Safety (continued)

Electrical warning Adjacent to the master switch

	ATTENZIONE !	ATTENTION !
	Prima di aprire togliere tensione	Enlever l'alimentation électrique avant d'ouvrir
ACHTUNG !	CAUTION !	ATENCIÓN !
Vor öffnen des gehäuses hauptschalter ausschalten	Disconnect electrical supply before opening	Cortar la corriente antes de abrir el aparato

Grounding connection on the electrical board, adjacent to the connection



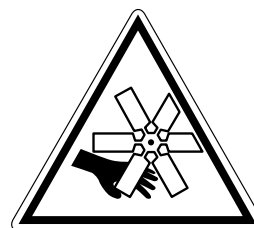
Final Test Certificate - Inside the external door

QUALITY CHECK PROOF		
MODEL/TYPE MODELLO/TIPO	SERIAL NUMBER-PRODUCTION LOT N° DI SERIE-LOTTO DI PRODUZIONE	P. NUMBER CODE CODICE
		MANUFACTURED YEAR ANNO DI COSTRUZIONE
NUMBER CHECK	DESCRIPTION OF INSPECTION	INSPECTOR REFERENCE
NUMERO CONTROLLI	DESCRIZIONE DEI TEST DI CONTROLLO	TIMBRO OPERATORE
01	PRELIMINARY PROOF PRESSURE TEST AND LEAK TEST WITH ELIUM AND NITROGEN AT MINIMUM 10 BAR (REFRIGERANT SIDE) IN COMPLIANCE WITH TEST SPECIFICATION - MARK WITH PENS PROVA PRELIMINARE DI PRESSIONE E TENUTA CIRCUITO CON ELIO E AZOTO AD ALMENO 10 BAR (LATO REFRIGERANTE), IN ACCORDO ALLA SPECIFICA DI COLLAUDO - SEGNARE CON PENNARELLO CARRY OUT AN ADDITIONAL LEAK TEST WITH ELIUM AND NITROGEN AT 2,5 BAR (WATER SIDE) - MARK WITH PENS EFFETTUARE UNA PROVA PRELIMINARE DI TENUTA CON ELIO E AZOTO A 2,5 BAR (LATO ACQUA) - SEGNARE CON PENNARELLO	
02	VACUUM TEST CARRIED OUT VUOTO ESEGUITO	
03	REFRIGERANT CHARGE CARICA REFRIGERANTE	
04	CHECK WIRINGS CABLE CONNECTION VERIFICA CABLAGGIO ELETTRICO	
05	SAFETY TEST: CONTINUITY, INSULATION, DIELECTRICAL STRENGTH PROVE DI SICUREZZA: CONTINUITÀ, ISOLAMENTO, RIGIDITÀ	
06	RUNNING TEST WITH SAFETY DEVICES COLLAUDO FUNZIONALE COMPLETO CON INTERVENTO SICUREZZA E RILIEVI	
07	LEAK TEST ON REFRIGERANT CIRCUIT DURING RUNNING CONDITION - MARK WITH PENS VERIFICA TENUTA CIRCUITO REFRIGERANTE DURANTE IL FUNZIONAMENTO - SEGNARE CON PENNARELLO	
08	FINAL LEAK TEST ON REFRIGERANT CIRCUIT AFTER RUNNING - MARK WITH PENS VERIFICA FINALE TENUTA CIRCUITO REFRIGERANTE DOPO IL COLLAUDO FUNZIONALE - SEGNARE CON PENNARELLO	
09	CHECK ASSEMBLY PARTS VERIFICA ASSEMBLAGGIO PARTI	
10	CHECK MOUNTED ACCESSORIES OR SUPPLY LOOSE CONTROLLO ACCESSORI MONTATI E/O FORNITI A BORDO UNITÀ	
11	CHECK DOCS SUPPLY (CE, IOM, START UP FORM, WIRING DIAGRAM, RULE) VERIFICA DOCUMENTI FORNITI CON L'UNITÀ	
12	CHECK STICKERS, LABELLING VERIFICA TARGHETTE	
13	AESTHETICAL CHECK AND CLEANING CONTROLLO ESTETICO PULIZIA	
14	CHECK TEST SHEET AND CHECK LIST FILLED UP CONTROLLO COMPILAZIONE SCHEDA DI COLLAUDO E CHECK LIST	

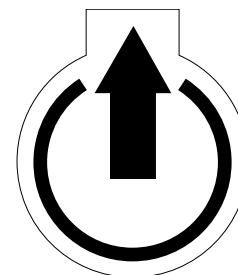
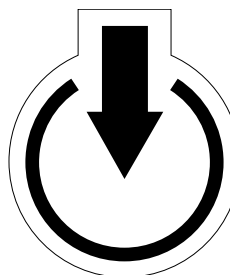
Read the instruction on the electrical board



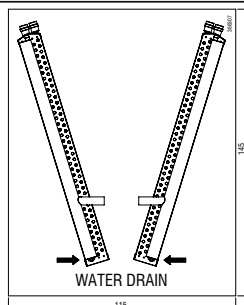
Fan Danger



Fitting identification - Adjacent to fittings



Water drain



3 - Transport, Lifting and Positioning

Units are supplied assembled (apart from standard antivibrating rubber supports, that will be installed on site).

3.1 Inspection

When the unit is delivered, it is recommended to check it carefully and to identify any damage occurred during transportation. The goods are shipped ex-factory, at the buyer's risk. Check that the delivery includes all the components listed in the order.

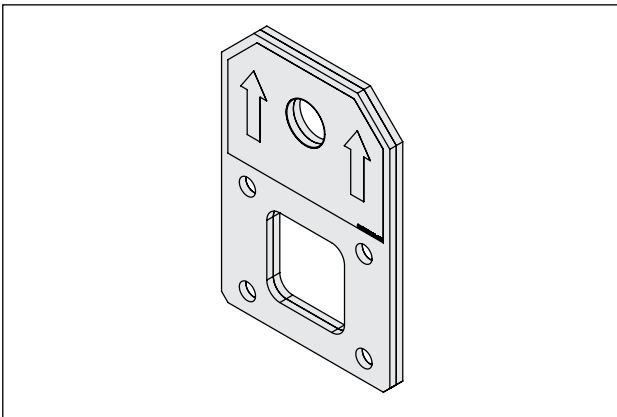
In case of damage, note it down on the carrier's delivery note and issue a claim according to the instructions provided in the delivery note.

In the presence of any serious damage, that does not affect the surface only, it is recommended to inform manufacturer immediately.

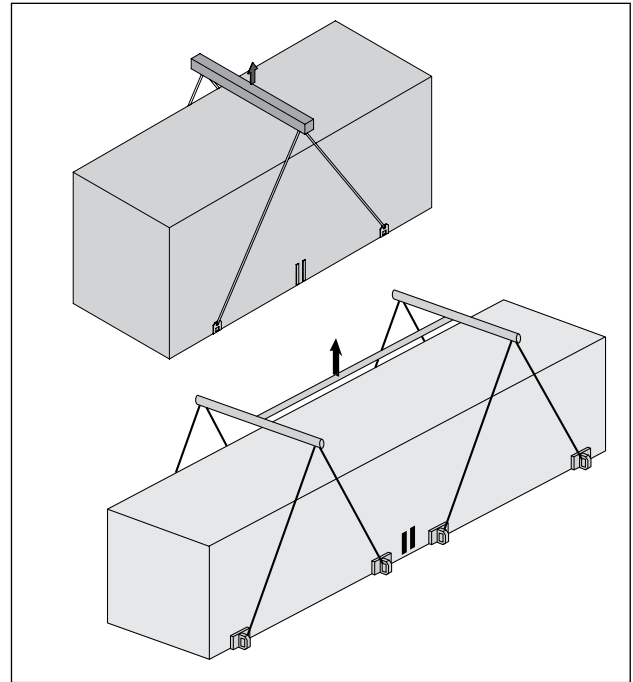
Please note that manufacturer may not be held liable for any damage to the equipment during transportation, even though the carrier has been appointed by the factory.

3.2 Lifting

The unit must be lifted by using the hooks inserted into the relevant eyebolts (see the figure).



It is recommended to use a spacer to prevent cables from damaging the unit (see the figure).



Before positioning the unit, make sure that the place of installation is appropriate and sturdy enough to hold the weight and to withstand the stress caused by the operation of the whole assembly.



Do not displace the unit on rollers, and do not lift it with a lift truck.

Unit must be lifted carefully.

To lift unit slowly and regularly.

To lift and displace the unit:

- Insert and secure eyebolts into the holes marked on the frame.
- Insert spacer between cables.
- Place the spacer in line with the center of gravity of the unit.
- The cables must be long enough to form, if tensioned, an angle of at least 45° with respect to the horizontal plane.



For lifting operations, use only tools and material fit for this purpose, in accordance with accident-prevention regulations.

3 - Transport, Lifting and Positioning (continued)



During the lifting and handling of the unit, be careful not to damage the finned pack of the coils positioned on the sides of the unit.

The sides of the unit must be protected by cardboard or plywood sheets.



It is recommended not to remove the protective plastic envelope, that should prevent scraps from penetrating into the appliance and any damage to the surfaces, until the unit is ready for operation.



The lifting eyebolts protrude from the base of the unit; it is therefore recommended to remove them once the unit has been lifted and positioned, if in your opinion they are likely to become a source of hazard and injury.

The eyebolts must be mounted on the unit whenever it shall be displaced and then lifted again.

3.3 Anchoring

It is not essential to secure the unit to the foundations, unless in areas where there is a serious risk of earthquake, or if the appliance is installed on the top of a steel frame.

3.4 Storage

When the unit is to be stored before installation, adopt a few precautions to prevent any damage or risk of corrosion or wear:

- plug or seal every single opening, such as water fittings
- minimum storage temperature is -25 °C
- it is recommended to store the unit in a roof where traffic is minimized, to prevent the risk of accidental damage
- the unit must not be washed with a steam jet
- take away and leave to the site manager all the keys providing access to the control board

Finally, it is recommended to carry out visual inspections at regular intervals.

4 - Installation

4.1 Positioning of the unit



Before installing the unit, make sure that the structure of the building and/or the supporting surface can withstand the weight of the appliance. The weights of the units are listed in Chapter 8 of this manual.

These units have been designed for outdoor installation on a solid surface. Standard accessories include antivibrating rubber supports, that must be positioned under the base.

When the unit is to be installed on the ground, it is necessary to provide a concrete base, to ensure a uniform distribution of the weights.

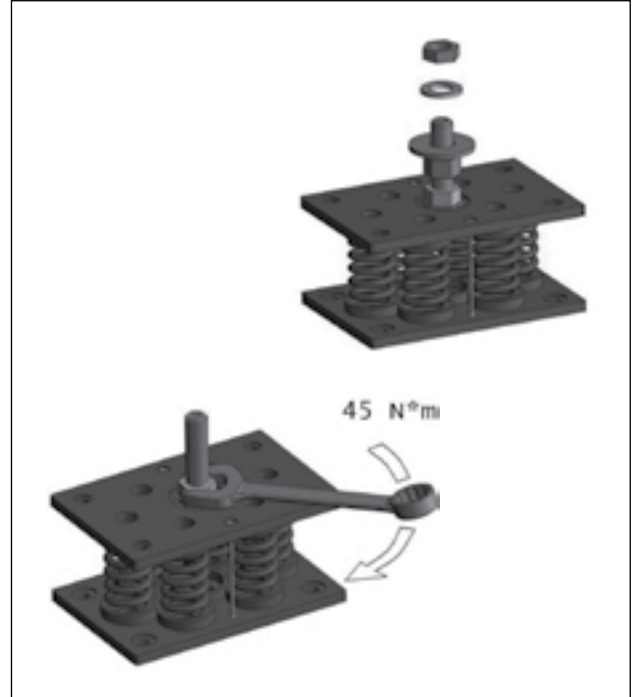
As a general rule, no special sub-bases are required. However, if the unit is to be installed on the top of inhabited rooms, it is advisable to rest it on spring shock absorbers (optional), that will minimise the transmission of any vibration to the structures.

To choose the place of installation of the unit, bear in mind that:

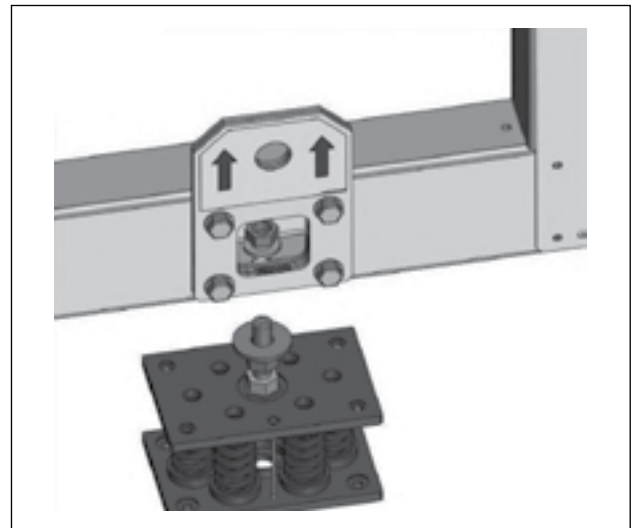
- the longitudinal axis of the unit must be parallel to the direction of prevailing winds, so as to ensure a uniform distribution of the air on finned exchangers
- the unit must not be installed near boilers' vent pipes
- the unit must not be installed leeward with respect to sources of air contaminated by greases, such as, for example, the outlets to kitchen exhaust hoods into the atmosphere. Otherwise, the grease is likely to deposit on the fins of the refrigerant /air exchangers, and would fix every type of atmospheric impurity, resulting in the quick clogging of the exchangers
- the unit must not be installed in areas subject to considerable snow falling
- the unit must not be installed in areas subject to flooding, under gutters etc.
- the unit must not be installed in air shafts, narrow courts or other small places, where the noise may be reflected by the walls or the air ejected by fans may short-circuit itself on heat recovery coils
- the place of installation must be have all the necessary spaces for air circulation and maintenance operations (see Chapter 8).

4.2 Spring Isolator Installation

- Prepare the base, that must be flat and plane.
- Lift the appliance and insert shock absorbers as follows:



- 1) Proceed to assemble the jack components. Fit the jack in the threaded housing on the upper plate of the antivibration mount.




- 2) Fit the jack mounted on the antivibration mount in the hole in the machine base.

4 - Installation (continued)

4.3 External Water Circuit

The flow switch and the filter water, although not included in the supply, must always be fitted such as plant components. Their installation is mandatory for warranty.

	<p>The external water circuit shall guarantee a constant water flow rate through the unit both under steady operating conditions and in case of load variation.</p>
---	---


The circuit shall be composed by the following elements:

- A circulation pump which can ensure the necessary flow rate and head.
- The total content of the primary circuit must avoid too close start-up.
- A membrane expansion tank complete with a safety valve and a drain which shall be visible.

RECOMMENDED WATER COMPOSITION		
PH	7,5 - 9	
Electrical conductivity	10 - 500	μS/cm
Total hardness	4,5 - 8,5	dH
Temperature	< 60	[°C]
Alkalinity (HCO ₃ ⁻)	70-300	ppm
Alkalinity / Sulphates (HCO ₃ ⁻ / SO ₄ ²⁻)	> 1	ppm
Sulphates (SO ₄ ²⁻)	< 70	ppm
Chlorides (Cl ⁻)	< 50	ppm
Free Chlorine	< 0,5	ppm
Phosphates (PO ₄ ³⁻)	< 2	ppm
Ammonia (NH ₃)	< 0,5	ppm
Ammonium Ion (NH ₄ ⁺)	< 2	ppm
Manganese Ion (Mn ²⁺)	< 0,05	ppm
Free Carbon Dioxide (CO ₂)	< 5	ppm
Hydrogen Sulfide (H ₂ S)	< 0,05	ppm
Oxygen Content	< 0,1	ppm
Nitrates (NO ₃ ⁻)	< 100	ppm
Manganese (Mn)	< 0,1	ppm
Iron (Fe)	< 0,2	ppm
Aluminium (Al)	< 0,2	ppm

Caution

If the water circuit is to be drained for a time exceeding one month, the circuit must be fully charged with nitrogen to prevent any risk of corrosion by differential venting

	<p>The expansion tank shall be dimensioned in such a way that it can absorb a 2% expansion of the total volume of the water in the plant (exchanger, pipelines, uses and storage tank, if available).</p> <p>The expansion tank shall never be insulated when the circulating fluid is not flowing through it.</p>
---	--

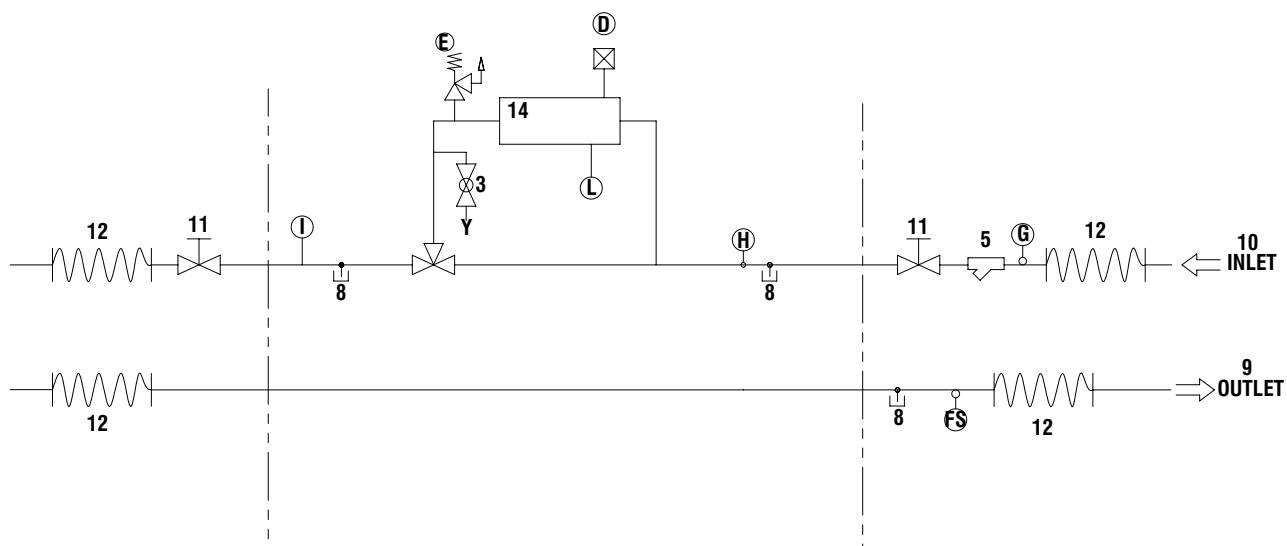
A water flow switch is mounted as a standard. It will stop the unit whenever a flow rate problem occurs.

In addition:

- Arrange a by-pass complete with an on/off valve between the manifolds of the heat exchangers.
- Arrange air vent valves at the high points of the water lines.
- Arrange drain points complete with plugs, clocks, etc. in the proximity of the low points of the water lines.
- Insulate the water lines to prevent the heat from blowing back and avoid condensation.
- Install inlet / outlet shut-off valves in order to insulate brine mixture inside coils for maintenance purpose.

4 - Installation (continued)

Hydraulic Diagram - Stand Alone

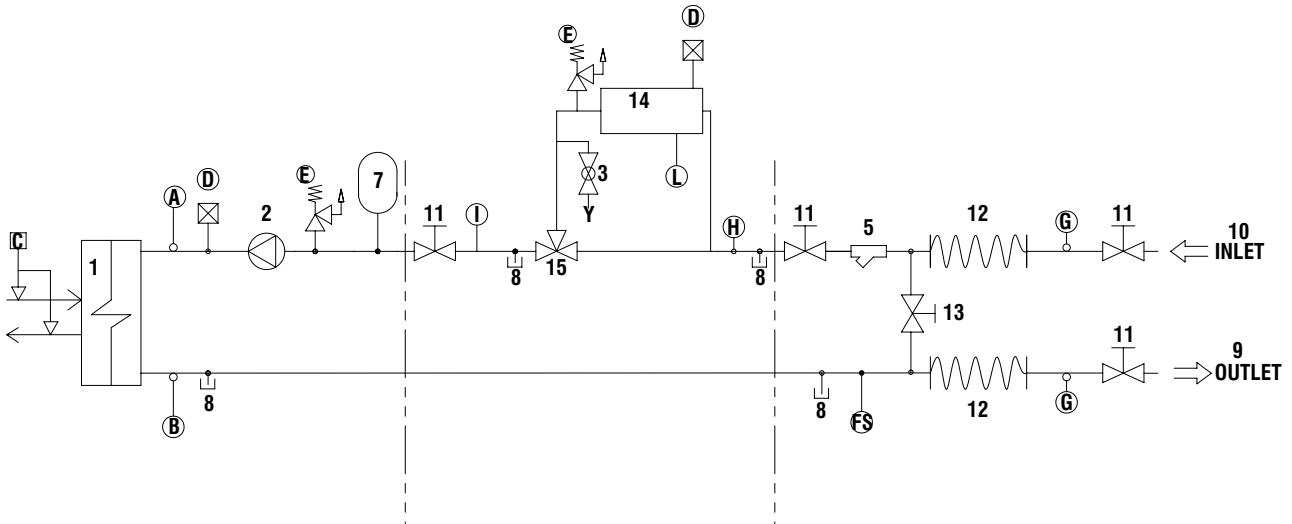


COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free-cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free-cooling
I	Outlet water temperature sensor free-cooling
L	Air temperature sensor free-cooling

4 - Installation (continued)

Hydraulic Diagram - Slave / 1P

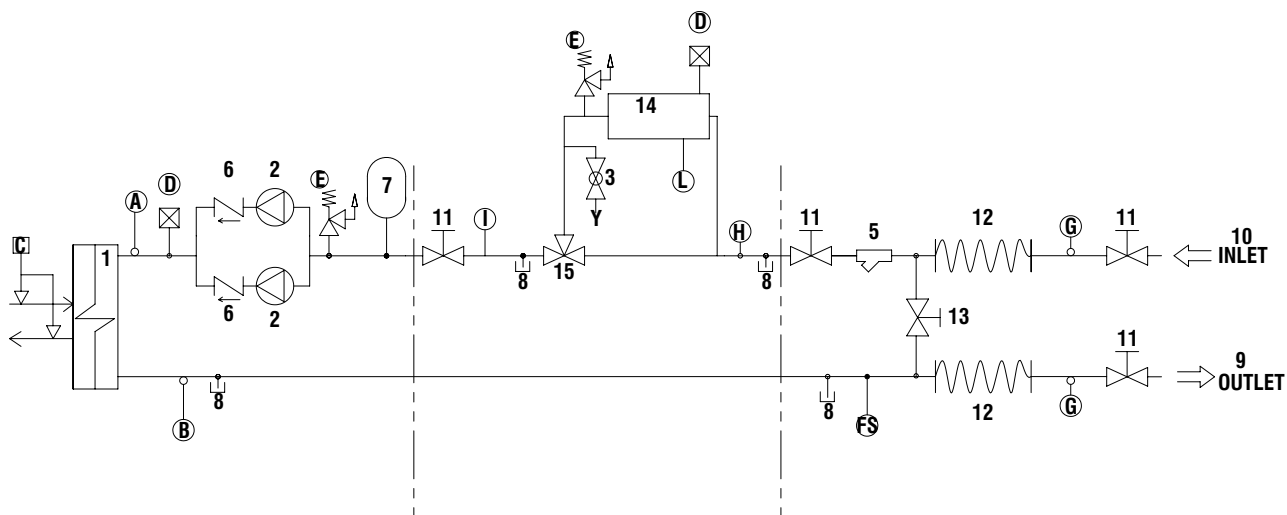


COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free-cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free-cooling
I	Outlet water temperature sensor free-cooling
L	Air temperature sensor free-cooling

4 - Installation (continued)

Hydraulic Diagram - Slave / 2P

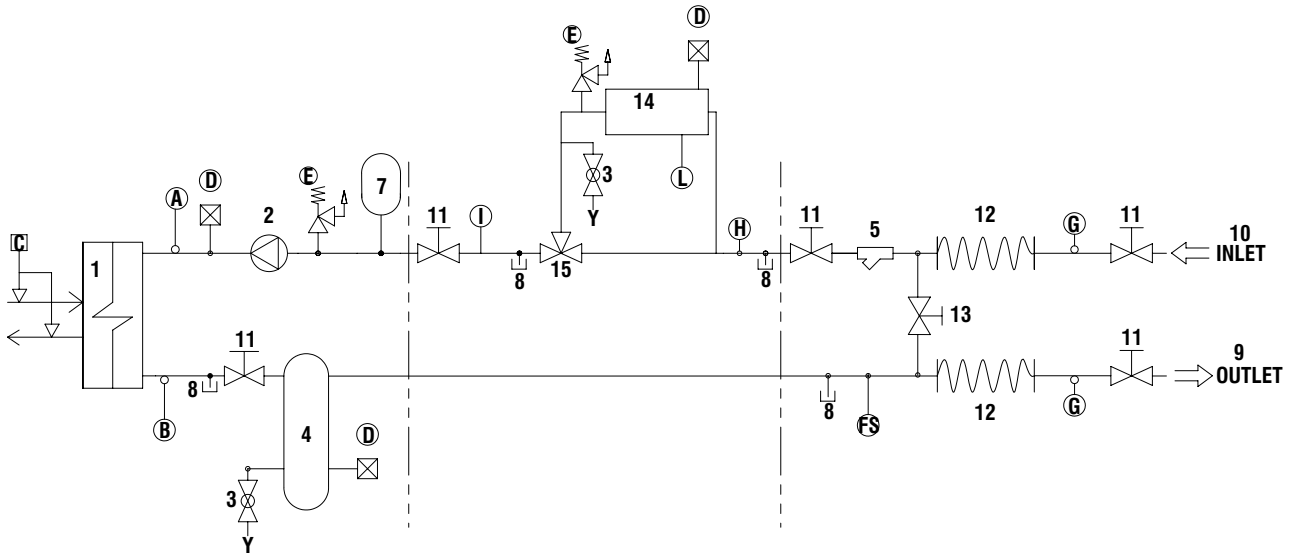


COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free-cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free-cooling
I	Outlet water temperature sensor free-cooling
L	Air temperature sensor free-cooling

4 - Installation (continued)

Hydraulic Diagram - Slave / 1P+T

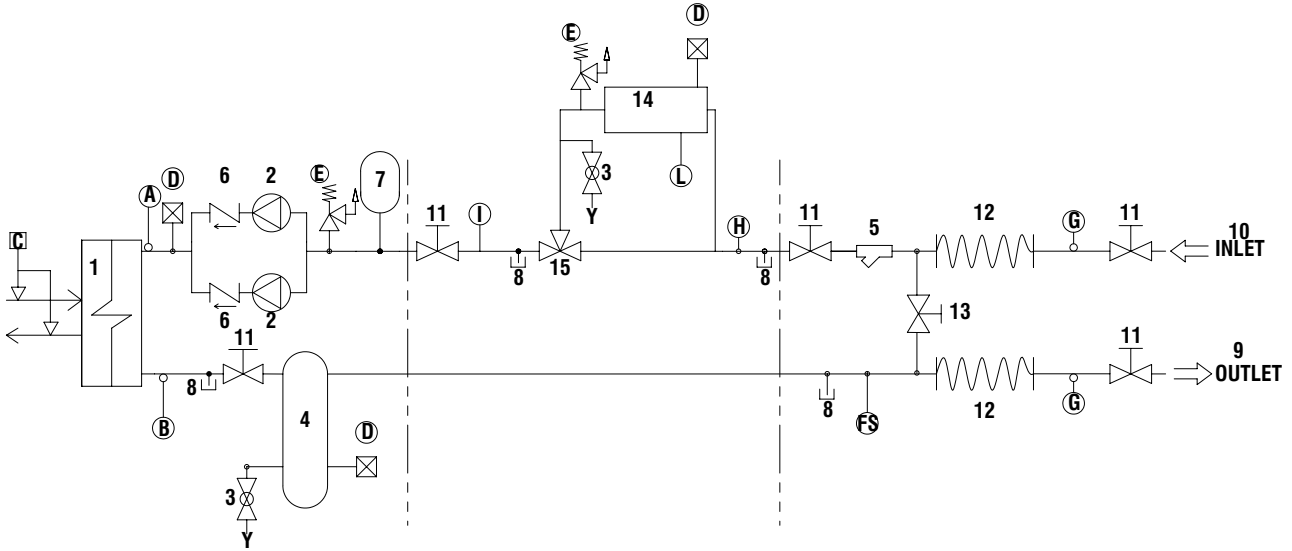


COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free-cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free-cooling
I	Outlet water temperature sensor free-cooling
L	Air temperature sensor free-cooling

4 - Installation (continued)

Hydraulic Diagram - Slave / 2P+T



COMPONENTS	
1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free-cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES	
A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free-cooling
I	Outlet water temperature sensor free-cooling
L	Air temperature sensor free-cooling

4 - Installation (continued)

4.4 Water connections



The attachments at the water inlet and outlet shall be connected in compliance with the instructions which can be found on the labels in the proximity of the attachments.

Connect the water lines of the plants with the attachments of the unit whose diameters and positions are shown by Chapter 8.

4.5 Power supply



Before carrying out any operations on the electrical system, make sure that the unit is deenergised.



It is important that the appliance is grounded.



The company in charge of the installation shall conform to the standards applicable to outdoor electrical connections.

The manufacturer may not be held liable for any damage and/or injury caused by failure to comply with these precautions.

The unit conforms to EN 60204-1.

The following connections shall be provided:

- A 3-phase and grounding connection for the power supply circuit.
- The electrical distribution system shall meet the power absorbed by the appliance.
- The disconnecting and magnetothermal switches must be sized to control the starting current of the unit.
- The power supply lines and the insulation devices must be designed in such a way that every line independent.
- It is recommended to install differential switches, to prevent any damage caused by phase drops.
- The fans are supplied through contactors controlled from the control panel.
- Each motor is provided with an internal safety thermal device and external fuses.
- The power supply cables must be inserted into dedicated openings on the front of the unit, and they will enter the electrical board through holes drilled on the bottom of the board.

4.6 Electrical connections

The unit must be installed on site according to the Machinery Directive 2006/42/EC, Electromagnetic Compatibility Directive 2014/30/EU and the usual procedures and standards applicable in the place of installation.

The unit must not be operated if its installation has not been carried out according to the instructions provided in this manual.

The power supply lines must consist of insulated copper conductors, dimensioned for the maximum absorbed current.

Connection to terminals must be performed according to the diagram of connections (User's Terminal Box) provided in this manual and according to the wiring diagram which accompanies the unit.



Before connecting the power supply lines, check that the available voltage value does not exceed the range specified in the Electric Data (Chapter 8).

For 3-phase systems, check also that the unbalance between the phases does not exceed 2%. To perform this check, measure the differences between the voltage of each phase couple and their mean value during operation.

The maximum % value of these differences (unbalance) must not exceed 2% of the mean voltage.

If the unbalance is unacceptable, contact the Energy Distributor to solve this problem.

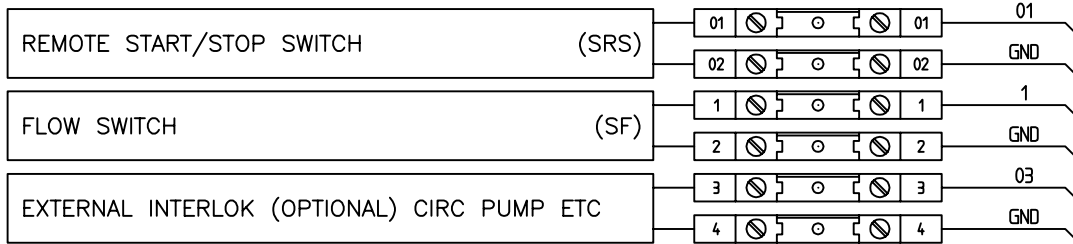


Supplying the unit through a line whose unbalance exceeds the permissible value will automatically void the warranty.

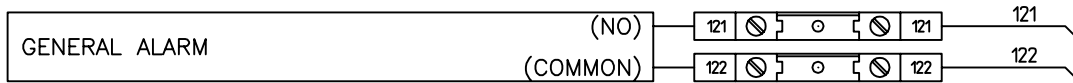
4 - Installation (continued)

Electrical Connections

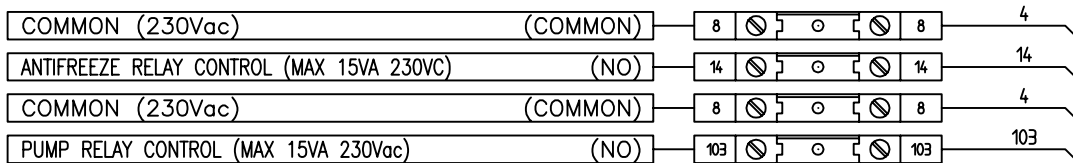
QG - Y1



QG - Y2



QG - Y3



5 - Start-Up



The unit must be started for the first time by personnel suitably trained by one Authorised Service Centre. Failure to meet this requirement will immediately void the warranty.



The operations carried out by authorised personnel are limited to the start-up of the unit, and do not include any other operation on the plant, such as, for example, electrical and hydraulic connections etc.

5.1 Preliminary check

The checks listed below shall be performed before starting the unit and before the arrival of the personnel authorised.

- Check the section of power supply and grounding cables; make sure that terminals are tightened and check the correct operation of contactors, with the main switch open.
- Check that any voltage and phase variation in the power supply does not exceed the prefixed thresholds.
- Connect the contacts of the flow switch and the thermal relay of the pump and of the other devices (if any), to terminals 1-2 and 3-4, respectively.
- Check that the components of the external water circuit (pump, user equipment, filters, power supply tank and reservoir, if any) have been installed properly, and according to the manufacturer's instructions.
- Check the filling of the hydraulic circuits, and make sure that the fluid circulation is correct, without any trace of leaks and air bubbles. If you use ethylene glycol as antifreeze, check that its percentage is correct (do not exceed 40% glycol percentage).
- Check that the direction of rotation of the pumps is correct, and that fluids have been circulating for at least 12 hours for both pumps. Then, clean the filters on the suction side of the pumps.
- Adjust the liquid distribution network in such a way that the flow rate is within the specified range.
- Check that the water quality is up to the specifications.

5.2 Start-up

Start-up sequence:

- Turn on the Main switch.
- Check the operation of all the external equipment, and make sure that the control devices of the plant are properly calibrated.
- Start the pump and check that the water flow is correct.
- Set the desired fluid temperature on the control board.
- Start the appliance (see Chapter 6).
- Check the right sense of rotation of fan motors.

5.3 Checking the operation

Check the following:

- The temperature of the water entering the three ways valve.
- The temperature of the water leaving the three ways valve.
- The level of the water flow rate, if possible.
- The fan's current absorption.

5.4 Delivery to the customer

- Train the user according to the instructions provided in Section 6.

6 - Control

6 General information

Introduction

This document contains the information and the operating instructions for SysFreeCool units.

Main characteristics

- simple user interface with possibility to customize keys functions and to set menus visibility
- parameter setting through keyboard or PC
- thermoregulation > water probe
- alarm log
- 0-10V analogue ventilation control

The following accessories can be also connected:

- multi Function Key (MFK) to upload / download parameters map
- serial communication RS485 card; to connect the control to a BMS network
- remote display terminal
- wire remote control

6.1 Control of SysFreeCool units

SysFreeCool units are provided with a microprocessor card fully programmed by default for the control of a free-cooling unit.

General information

The figure shows the terminal. It is provided with a 4 red digits with 7 segments with decimal point led, 18 LED and 4 buttons, so as to allow the programming of the control parameters (setpoint, differential bands, alarm thresholds) and the main operations to be carried out by the user.



6.2 Keypad functions

KEY	DESCRIPTION	SINGLE PUSH (PUSH /RELEASE)
	UP	- Increase value - Go to next label - Change Set-point
	DOWN	- Decrease value - Go to previous label - Change Set-point (if UI25 =1)
	ESC	- Exit without saving - Go to previous level
	SET	- Confirm value / exit with setting saving - Go to next level - Go to status menu

LINKED FUNCTION	EXTENDED PUSH (MORE THAN 3s)	MENU/NOTES
/	- Stand-by > ON	- Stand-by - Local ON/OFF
/	- Change mode	- Mode menu
/	- Main display	- Display menu

KEYS COMBINATION	LINKED FUNCTION	MENU/NOTES
	- Enable / Disable	- Time slots menu
	- Enter in "Program Menu"	- Program Menu

ICON / COLOR	STEADY ICON	BLINKING ICON
GREY	- Alarm ON	- Alarm QUIT
/ GREY	/	/
/ GREY	- FREECOOLING mode	FREECOOLING mode by remote
/ GREY	- Mode: STAND-BY	- Stand-by mode by remote
/ GREY	/	/
/ GREY	/	/
/ GREY	- Current HR - Time slots activ.	- HR setting - Time slots programming
°C / GREY	/	/
Bar / GREY	/	/
/ GREY	Not used	Not used
/ GREY	Menu surf	/

6 - Control (continued)

6.3 Folder structure

Folder structure is composed of totally four menus

- 1) Main display > used to set what to display without acting on any key
 - Ai > analogue input (temperature, pressure)
 - rtC > room time clock
 - SetP > standard set-point
- 2) Operating mode > used to set operating mode
 - StbY > stand-by
 - HEAT > Free Cooling OFF
 - COOL > Free Cooling ON
- 3) Status > used to show resources values
 - Ai (AIL/AIE/Air) > analogue inputs (main board / expansion board / remote terminal)
 - di (diL/diE) > digital inputs (main board / expansion board)
 - AO (AOL/AOE) > analogue outputs (main board/expansion board)
 - CL (HOUr/dAtE/YEAr) > clock
 - AL (Er00 > Er98) > alarms
 - SP > standard set-point
- 4) Program > define parameters, functions, password and to display alarm log

6.4 Menu structure

“Program” menu is composed of totally four folders

- 1) Parameters > change unit parameters
 - 2) Functions > manual operations (switch ON / switch OFF, alarm quit, historic alarm delete, multi function key use)
 - 3) Password > define visibility levels for parameters/folders
 - 4) Alarm log > display alarm log
- Parameter folder gives access to following sub-folders
- CL/CF > configure device I/O (L > local; F > serial)
 - analogue inputs (type of probe, range, differential, logic function)
 - digital inputs (logic function)
 - digital outputs (logic function)
 - analogue outputs (range)
 - serial configuration (communication parameters)
 - TR > define thermoregulation parameters
 - set-point (max/min/hysteresis)
 - probe selection
 - ST > defining operating mode
 - * cool only (Free Cooling mode ON)
 - FC > configuring three-way valve and ventilation management
 - TE > define time slots management (different operating daily profiles)
 - AL > define alarms management (automatic / manual reset, by-pass time, sampling)

6.5 Alarm list

Alarm code	Alarm description	RESET auto/man	Three-way valve staus	Ventilation status
Er00	General alarm	A	OFF	OFF
Er20	Internal circuit flow switch	M	OFF	OFF
Er43	Free-cooling heat exchanger fan motors thermal alarm	M	OFF	OFF
Er45	Clock failure	A		
Er46	Clock to be set	A		
Er60	Internal circuit LWT probe failure	A	OFF	OFF
Er61	Internal circuit RWT probe failure	A	OFF	OFF
Er68	Outdoor air temperature probe failure	A		
Er80	Configuration error	A		

6 - Control (continued)

6.6 Protection and Safety Equipment

Frost Protection for the Chilled Fluid

These units are provided with frost protection for the chilled fluid. Setting FC04 value inside PAR/FC folder (Free-Cooling pre-freeze alarm deactivation set point), it is possible to set the temperature limit output value with active Free Cooling. FC04 value must be set according the freezing point of the glycol mixture. In order to avoid anomalies antifreeze alarm occurrence in case of forced recovery, in case Free Cooling is acting as a pre-cooler of a chiller unit, it is good to set FC04 to a value slightly higher than the anti-freeze threshold set on the chiller.

Fan protection

The windings of the fan motors are provided with a thermal protection.

For models an accessory kit for thermal protection is available, for any overcurrent of scroll compressors, which shall be shop-mounted.

6.7 HPF version configuration

Units equipped with High pressure fan (HPF) can be set-up on the field to give the unit a specific static pressure.

By varying FC11 and FC12 parameters inside PAR/FC folder, it is

possible to set fan motors available static pressure. it is possible to modify high static pressure. The table below shows the correspondance between SySfreecool, fan RPM, high static pressure.

	Fan Static Pressure (Pa)	Fan RPM	Parameter in Service Level: FC11=FC12
12-44	0	900	80%
	30	950	85%
	60	1.000	90%
	90	1.050	95%
	120	1.100	100%

6.8 Ventilation parameters optimization

In order to provide a more stable operation, FC15 (differential maximum Free Cooling fan speed) and FC16 (proportional band Free Cooling fan speed) parameters must be set according expected fluid system temperature. FC15 and FC16 parameters (inside PAR/FC folder) must be set as follows:

$$FC15 = 2 \times a + 0,5$$

$$FC16 = 2 \times a$$

where

a = fluid system temperature drop / 5

7 - Product Description

7.1 General Information

Units are monobloc type, suitable to cool down water and glycol mixtures for any air conditioning application, cooling and process. These units are completely factory assembled and equipped with all the plumbing and electrical connections that are needed for a quick installation in field. Once completed the assembly, a functional test is performed to check the tightness of the hydraulic system and the proper operation of the unit.

7.2 Body and Frame

The base and frame of these units are made with galvanized steel elements, assembled with stainless steel screws. All panels can be removed to ensure easy access to internal components. All galvanized steel parts are protected by epoxy powder paint.

7.3 Heat recovery coils

Air/water coils are made of copper tubes arranged in staggered rows and mechanically expanded inside an aluminium finned pack. Maximum operating pressure water side is 21 bar. Coils are equipped with an automatic air vent valve on the top to bleed air during loading operation and a plug on the bottom for drainage. In order to access the drain plug, it is necessary to remove coils cover plate - in correspondance to "WATER DRAIN" label (see section 2.7) - by removing the fixing screws.

The operation must be carried out when the unit is OFF.

7.4 Condenser Fans

The condenser fans are of a helical type. They are directly coupled and have an impeller with wing contoured aluminium blades. Each fan is equipped with a galvanised steel accident-prevention protection which is painted after manufacture. The fans motors are completely closed. They have an IP54 protection degree and a protection thermostat embedded in the windings.

7.5 Fans Control

All models are equipped as a standard with a fan speed control, performed by a cut-phase device operating through a 0-10V signal according return water temperature level.

7.6 Control Supply Panel

All components of the control system and those necessary to start the motors are shop connected and tested. The control compartment contains an electronic card and a control board with an external keyboard and display, to show the operational functions, as well as the intervention of the alarms and the working blocks.

7.7 Three-ways valve

Three-ways valves operate with a three-point floating signal and are equipped with grooved connections, coupled to a bi-directional electronic actuator. They are built with cast iron body and seat, bronze shutter and stainless steel stem. A cover in polyurethane foam is provided over valve body to prevent surface condensation.

7.8 Servo-control

Servo-control is built with aluminum body and plastic cover with IP54 protection. They are provided with diagnostic functions, using two LEDs (red and green) located on the control board inside the plastic cover, reporting a problem in case of wrong operation. A cover in polyurethane foam is provided to avoid ice formation on the stem when the fluid is at a negative temperature, and to withstand external temperatures down to -20 °C.

7.9 Hydraulic circuit

Each unit is equipped with a safety valve set to 6 bar, three drainage points on the lower part of each pipe converging at the three-way valve, automatic vent and drain plug on each coil outlet manifold. Slave version is equipped with an additional valve - placed between three-way valve outlet and chiller inlet - to insulate the two units and allowing maintenance operations. Piping are connected using flexible couplings Victaulic type.

If glycol percentage is not enough to prevent ice formation inside the circuit during periods of inactivity, ensure the complete emptying of the fluid through all available drainage points (pipes and coils). In case of ice formation circuit may be subject to breakage.

8 - Technical Data

8.1 Pressure drops

PRESSURE DROP - SysFreeCool_		12	14	22	23	24	32	33	34	43	44
Minimum flow rate	l/s	3.1	3.5	4.8	7.5	8.0	7.5	10.4	11.0	15.1	16.0
Nominal flow rate	l/s	5.3	8.2	10.7	12.8	14.4	16.1	19.2	21.5	25.6	28.7
Maximum flow rate	l/s	8.3	9.4	13.1	20.4	21.6	20.2	28.2	29.8	40.9	43.2
Minimum pressure drop	kPa	15	15	15	15	15	15	15	15	15	15
Nominal pressure drop	kPa	44	83	74	43	49	70	51	57	43	49
Maximum pressure drop	kPa	110	110	110	110	110	110	110	110	110	110

PRESSURE DROP - SysFreeCool_L		12	14	22	23	24	32	33	34	43	44
Minimum flow rate	l/s	3.1	3.5	4.8	7.5	8.0	7.5	10.4	11.0	15.1	16.0
Nominal flow rate	l/s	4.4	6.4	8.9	10.3	11.3	13.3	15.4	16.9	20.6	22.5
Maximum flow rate	l/s	8.3	9.4	13.1	20.4	21.6	20.2	28.2	29.8	40.9	43.2
Minimum pressure drop	kPa	15	15	15	15	15	15	15	15	15	15
Nominal pressure drop	kPa	31	52	50	28	30	48	33	35	28	30
Maximum pressure drop	kPa	110	110	110	110	110	110	110	110	110	110

8 - Technical Data (continued)

8.2 Technical data

SysFreeCool_		12	14	22	23	24	32	33	34	43	44
Power supply	V/ph/Hz	400 (± 10%) / 3 / 50									
COILS											
Number of coils		2	2	4	4	4	6	6	6	8	8
Total coil face area per coil	m ²	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
FANS											
Number of fans		2	2	4	4	4	6	6	6	8	8
Nominal speed	rpm	900	900	900	900	900	900	900	900	900	900
Total airflow	m ³ /h	45400	41000	90000	85200	80400	135000	127800	120600	170400	160800
Total input power	kW	4.2	4.2	8.4	8.4	8.4	12.6	12.6	12.6	16.8	16.8
Total input power(*)	kW	6.2	6.2	12.4	12.4	12.4	18.6	18.6	18.6	24.8	24.8
External static pressure	Pa	0 or 120 Pa (**)									
WATER CONNECTIONS											
Type		Male GAS Threaded						Victaulic			
Inlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	4"	4"	5"	5"
Outlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	4"	4"	5"	5"
WEIGHT											
Shipping	kg	624	664	912	965	1005	1336	1404	1464	1800	1880
Operating	kg	669	733	1002	1075	1139	1466	1574	1670	2070	2198
DIMENSIONS											
Length	mm	2146	2146	2124	2124	2124	3176	3176	3176	4228	4228
Width	mm	1097	1097	2146	2146	2146	2146	2146	2146	2146	2146
Height	mm	2519	2519	2519	2519	2519	2519	2519	2519	2519	2519

(*) HPF version.

SysFreeCool_L		12	14	22	23	24	32	33	34	43	44
Power supply	V/ph/Hz	400 (± 10%) / 3 / 50									
COILS											
Number of coils		2	2	4	4	4	6	6	6	8	8
Total coil face area per coil	m ²	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
FANS											
Number of fans		2	2	4	4	4	6	6	6	8	8
Nominal speed	rpm	700	900	900	900	900	900	900	900	900	900
Total airflow	m ³ /h	34000	30000	66400	62000	58000	99600	93000	87000	124000	116000
Total input power	kW	2.3	2.3	4.6	4.6	4.6	6.9	6.9	6.9	9.2	9.2
External static pressure	Pa	0 or 120 Pa (**)									
WATER CONNECTIONS											
Type		Male GAS Threaded						Victaulic			
Inlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	4"	4"	5"	5"
Outlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	4"	4"	5"	5"
WEIGHT											
Shipping	kg	624	664	912	965	1005	1336	1404	1464	1800	1880
Operating	kg	669	733	1002	1075	1139	1466	1574	1670	2070	2198
DIMENSIONS											
Length	mm	2146	2146	2124	2124	2124	3176	3176	3176	4228	4228
Width	mm	1097	1097	2146	2146	2146	2146	2146	2146	2146	2146
Height	mm	2519	2519	2519	2519	2519	2519	2519	2519	2519	2519

8 - Technical Data (continued)

8.3 Unit electrical data

SysFreeCool_		12	14	22	23	24	32	33	34	43	44
Rated voltage	V/ph/Hz	400 (± 10%) / 3 / 50									
Max. absorbed power	kW	4.2	4.2	8.4	8.4	8.4	12.6	12.6	12.6	16.8	16.8
Rated Current	A	8.2	8.2	16.4	16.4	16.4	24.6	24.6	24.6	32.8	32.8
Max. current FLA	A	8.2	8.2	16.4	16.4	16.4	24.6	24.6	24.6	32.8	32.8
Max. start-up current LRA	A	8.2	8.2	16.4	16.4	16.4	24.6	24.6	24.6	32.8	32.8
External fuses	A	16	16	25	25	25	40	40	40	50	50
Max. cable section (*)	mm ²	6	6	6	6	6	16	16	16	16	16

SysFreeCool_L		12	14	22	23	24	32	33	34	43	44
Rated voltage	V/ph/Hz	400 (± 10%) / 3 / 50									
Max. absorbed power	kW	2.3	2.3	4.6	4.6	4.6	6.9	6.9	6.9	9.2	9.2
Rated Current	A	4.4	4.4	8.8	8.8	8.8	13.2	13.2	13.2	17.6	17.6
Max. current FLA	A	4.4	4.4	8.8	8.8	8.8	13.2	13.2	13.2	17.6	17.6
Max. start-up current LRA	A	4.4	4.4	8.8	8.8	8.8	13.2	13.2	13.2	17.6	17.6
External fuses	A	16	16	25	25	25	40	40	40	50	50
Max. cable section (*)	mm ²	6	6	6	6	6	16	16	16	16	16

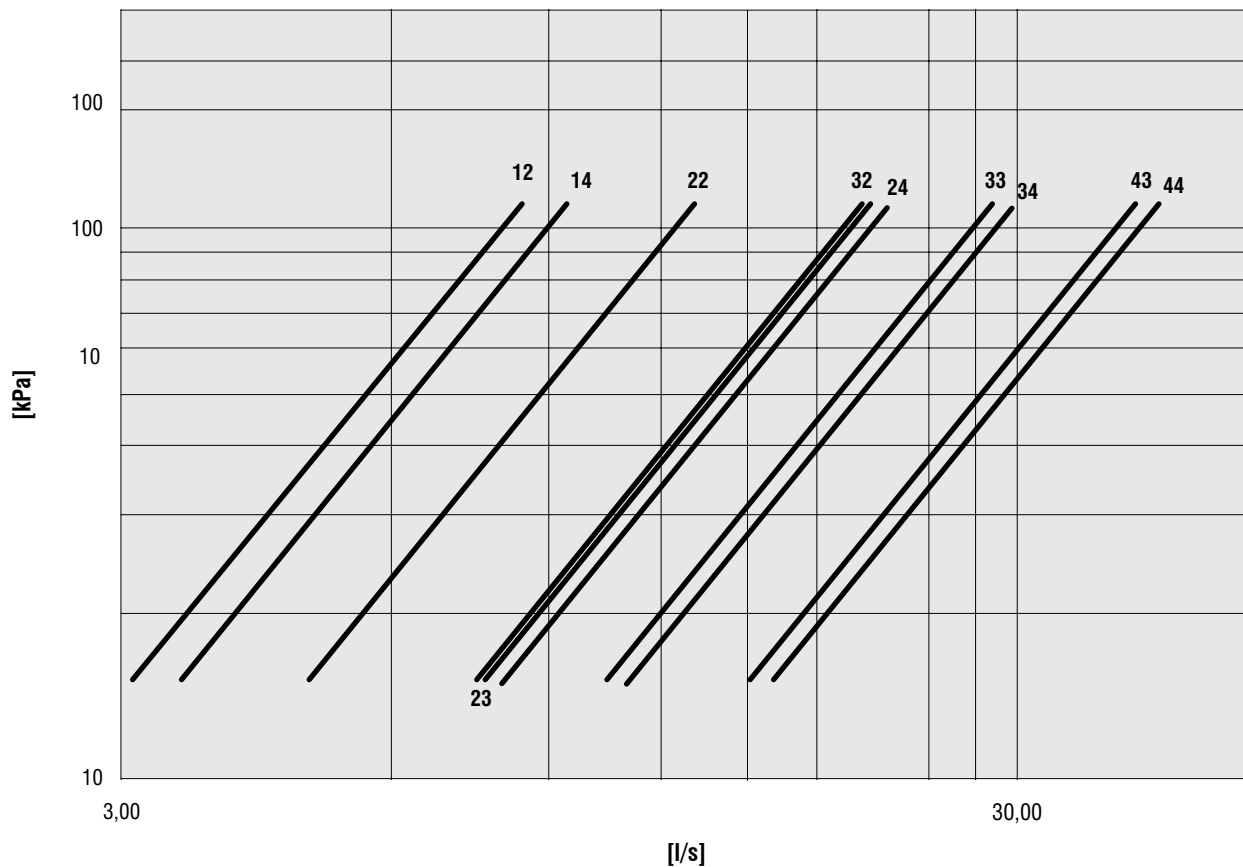
SysFreeCool_HPF/EC		12	14	22	23	24	32	33	34	43	44
Rated voltage	V/ph/Hz	400 (± 10%) / 3 / 50									
Max. absorbed power	kW	6.2	6.2	12.4	12.4	12.4	18.6	18.6	18.6	24.8	24.8
Rated Current	A	9.6	9.6	19.2	19.2	19.2	28.8	28.8	28.8	38.4	38.4
Max. current FLA	A	9.6	9.6	19.2	19.2	19.2	28.8	28.8	28.8	38.4	38.4
Max. start-up current LRA	A	9.6	9.6	19.2	19.2	19.2	28.8	28.8	28.8	38.4	38.4
External fuses	A	16	16	25	25	25	40	40	40	50	50
Max. cable section (*)	mm ²	6	6	6	6	6	16	16	16	16	16

(*) The dimensioning of the unit's power cables is the responsibility of the installer, who shall consider: the rating, the maximum working temperature in the room, the type of insulation and the cable laying, the maximum length of the power supply line.

8 - Technical Data (continued)

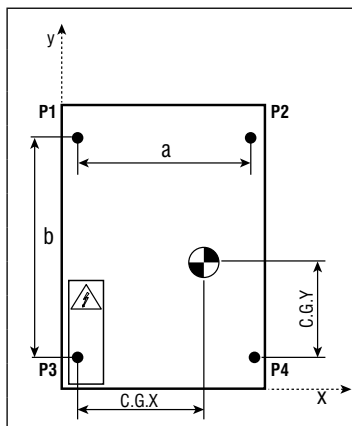
8.4 Hydraulic features

Pressure Drop Curves - SysFreeCool



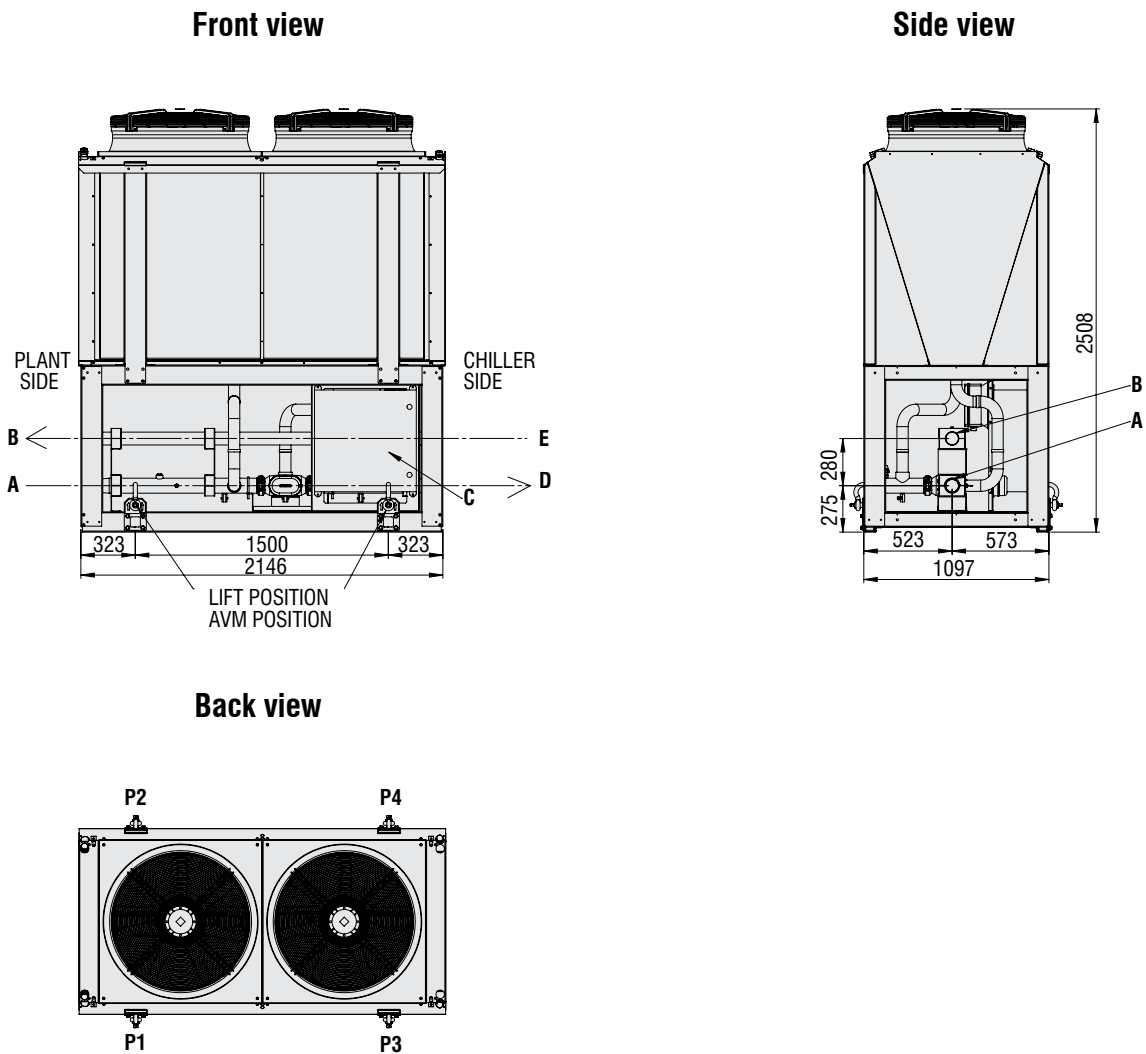
8.5 Position of shock adsorbers and weight distribution on supports

SysFreeCool	Weight distribution (kg)				Operating weight (kg)	Shipping weight (kg)	P1-P4 coordinates		CG coordinates	
	P1	P2	P3	P4			a (mm)	b (mm)	x (mm)	y (mm)
12	165	149	186	169	669	624	1014	1500	482	703
14	181	165	202	185	733	664	1014	1500	484	707
22	246	223	278	255	1002	912	2070	956	988	448
23	264	241	296	273	1075	965	2070	956	991	450
24	280	257	312	289	1139	1005	2070	956	993	451
32	355	333	400	377	1466	1336	2070	2056	1003	965
33	382	359	428	405	1574	1404	2070	2056	1005	968
34	405	383	452	430	1670	1464	2070	2056	1007	970
43	511	479	556	524	2070	1800	2070	3060	1003	1464
44	543	511	588	556	2198	1880	2070	3060	1005	1468



8 - Technical Data (continued)

8.6 Dimensions SysFreeCool 12-14 (stand-alone)

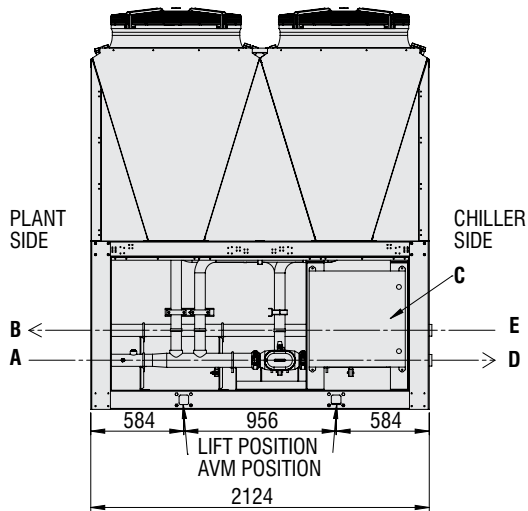


A	Water in 2-1/2" GAS M
B	Water out 2-1/2" GAS M
D	Water out 2-1/2" GAS M
E	Water in 2-1/2" GAS M
C	Electrical power supply

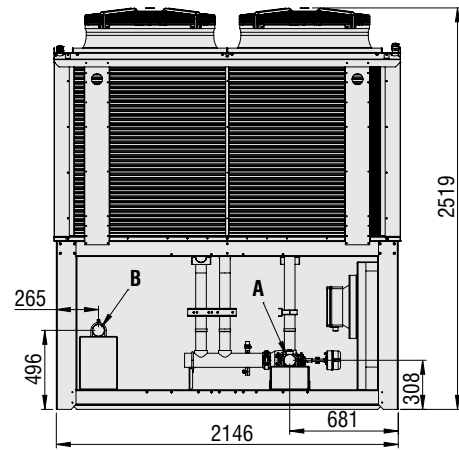
8 - Technical Data (continued)

Dimensions SysFreeCool 22-23-24 (stand-alone)

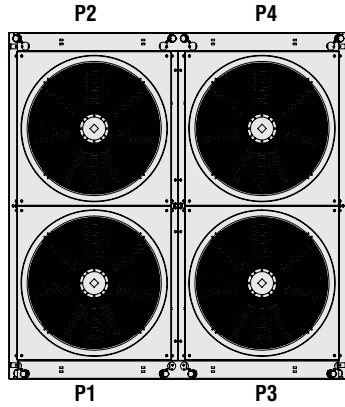
Front view



Side view



Back view



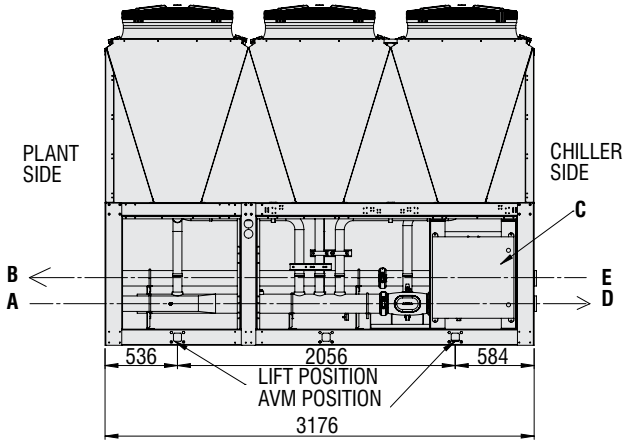
SIZE 22	
A	Water in 2-1/2" GAS M
B	Water out 2-1/2" GAS M
D	Water in 2-1/2" GAS M
E	Water out 2-1/2" GAS M
C	Electrical power supply

SIZES 23-24	
A	Water in 3" GAS M
B	Water out 3" GAS M
D	Water in 3" GAS M
E	Water out 3" GAS M
C	Electrical power supply

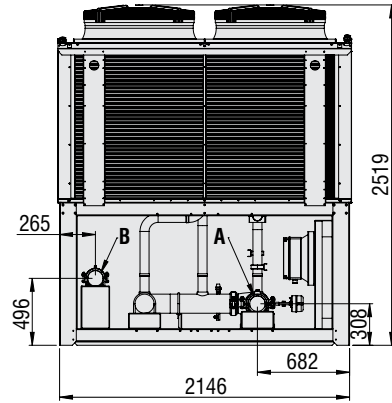
8 - Technical Data (continued)

Dimensions SysFreeCool 32-33-34 (stand-alone)

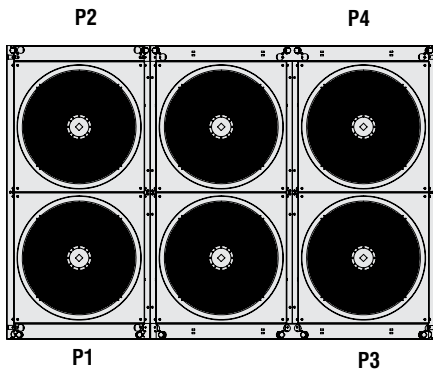
Front view



Side view



Back view



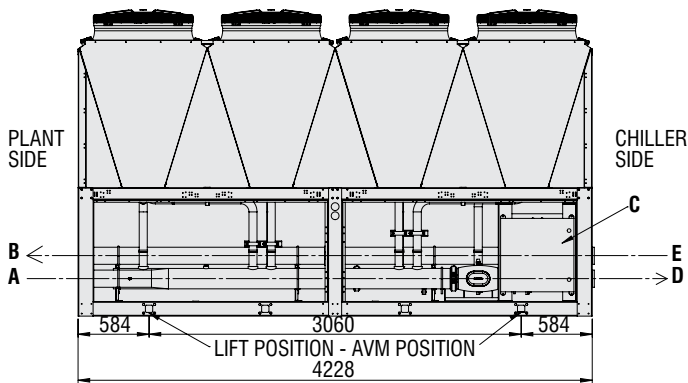
SIZE 32	
A	Water in 3" GAS M
B	Water out 3" GAS M
D	Water out 3" GAS M
E	Water in 3" GAS M
C	Electrical power supply

SIZES 33-34	
A	Water in 4" GAS M
B	Water out 4" GAS M
D	Water out 4" GAS M
E	Water in 4" GAS M
C	Electrical power supply

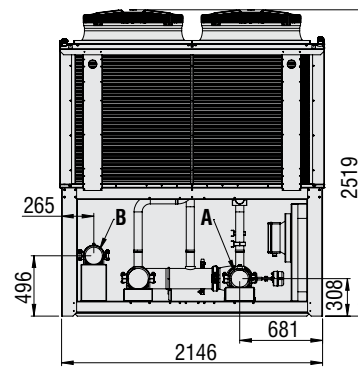
8 - Technical Data (continued)

Dimensions SysFreeCool 43-44 (stand-alone)

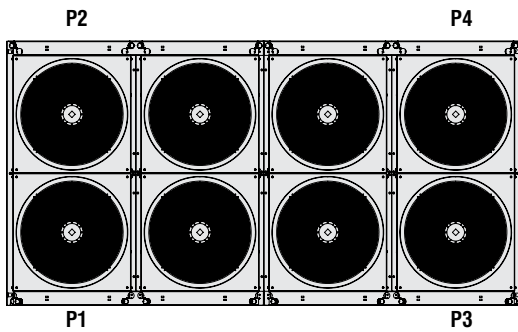
Front view



Side view



Back view

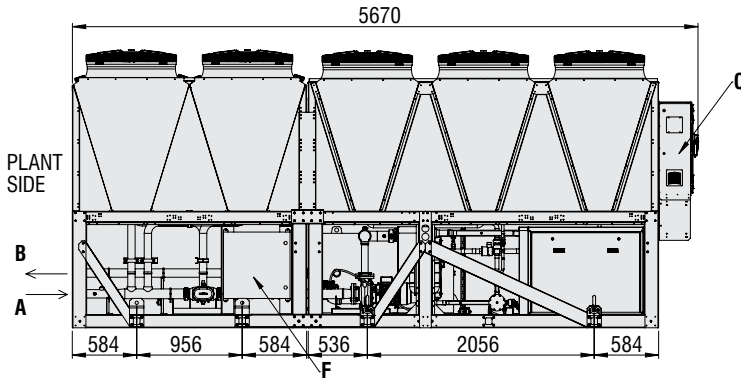


SIZES 43-44	
A	Water in 5" Victaulic
B	Water out 5" Victaulic
D	Water out 5" Victaulic
E	Water in 5" Victaulic
C	Electrical power supply

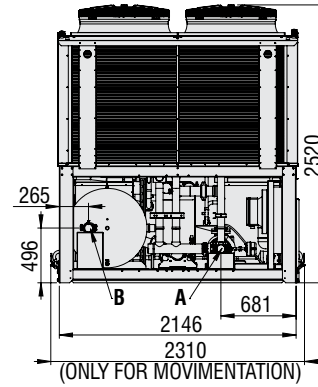
8 - Technical Data (continued)

Dimensions SysFreeCool SyScroll 200 Air EVO FC 22 / SyScroll 230-280 Air EVO FC 23-24 / SyScroll Air 240-320 FC 23-24 (slave)

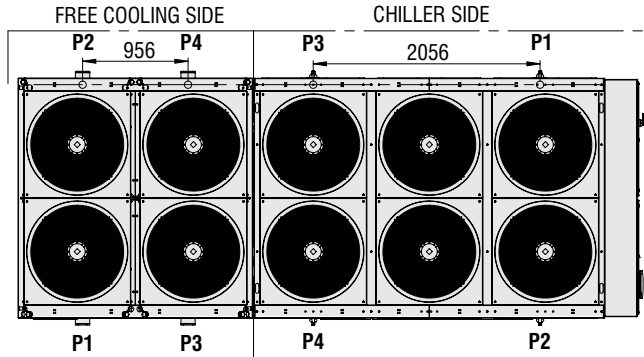
Front view



Side view



Back view



**SYSCROLL 240-320 AIR FC 23-24
SYSCROLL 230-280 AIR EVO FC 23-24**

A	Water in 5" Victaulic
B	Water out 5" Victaulic
C	Electrical power supply
F	Electrical power supply free-cooling

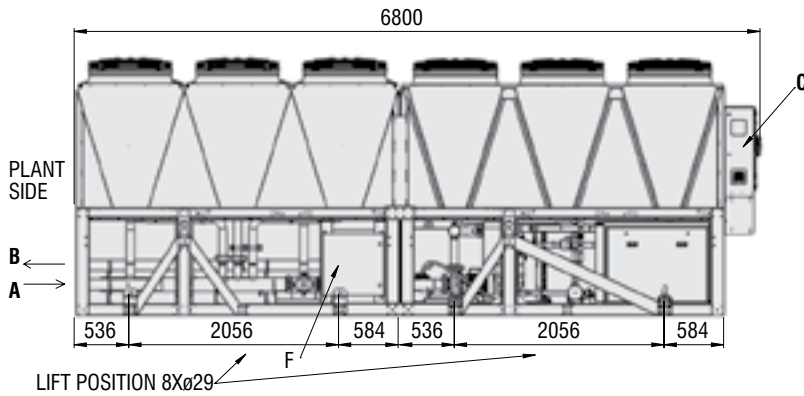
SYSCROLL 200 AIR EVO FC 22

A	Water in 2-1/2" Victaulic
B	Water out 2-1/2" Victaulic
C	Electrical power supply
F	Electrical power supply free-cooling

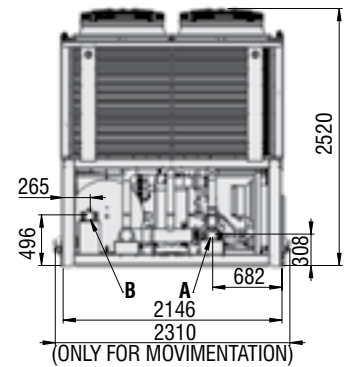
8 - Technical Data (continued)

Dimensions SyScroll 230-280 Air EVO FC 32 / SyScroll Air 240-320 FC 32 (slave)

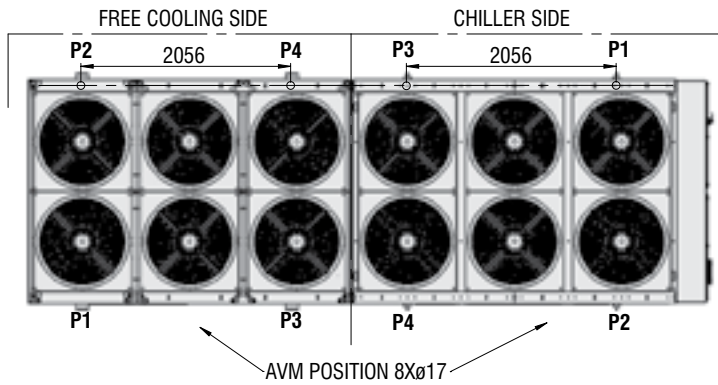
Front view



Side view



Back view

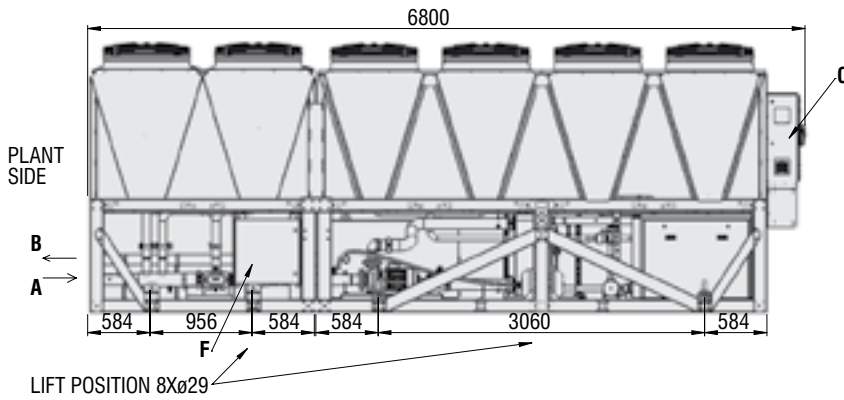


SYSCROLL 240-320 AIR FC 32 SYSCROLL 230-280 AIR EVO FC 32	
A	Water in 3" Victaulic
B	Water out 3" Victaulic
C	Electrical power supply
F	Electrical power supply free-cooling

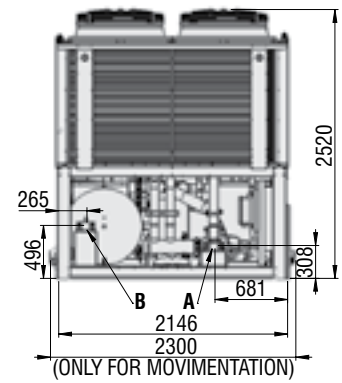
8 - Technical Data (continued)

Dimensions SysScroll 300-360 Air EVO FC 23-24 (slave)

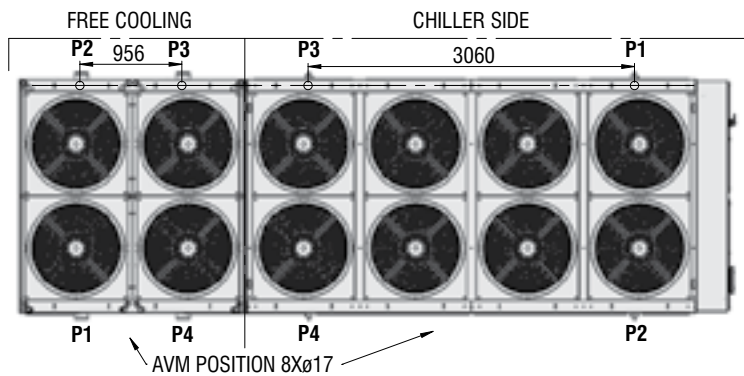
Front view



Side view



Back view



SYSCROLL 300-360 AIR EVO FC 23-24

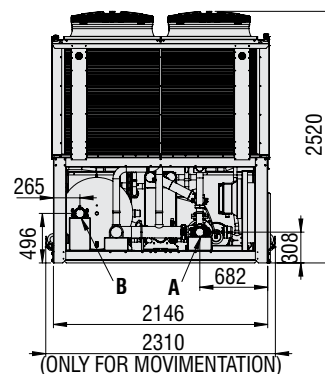
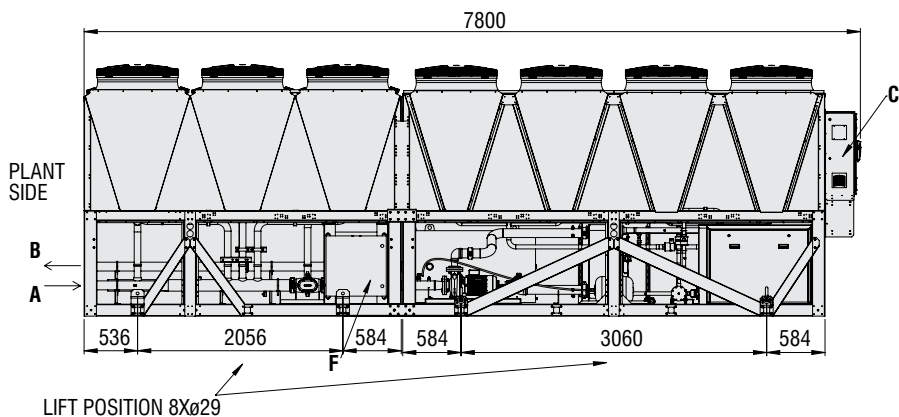
A	Water in 3" GAS M
B	Water out 3" GAS M
C	Electrical power supply
F	Electrical power supply free-cooling

8 - Technical Data (continued)

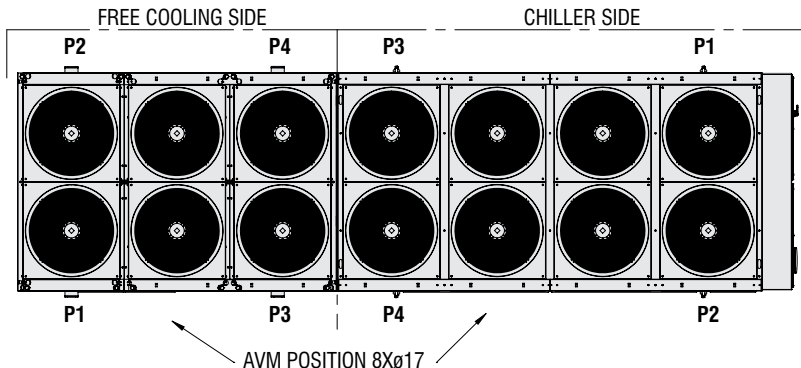
Dimensions SyScroll 300-360 Air EVO FC 32 / SyScroll Air 360-420 FC 33-34 (slave)

Front view

Side view



Back view



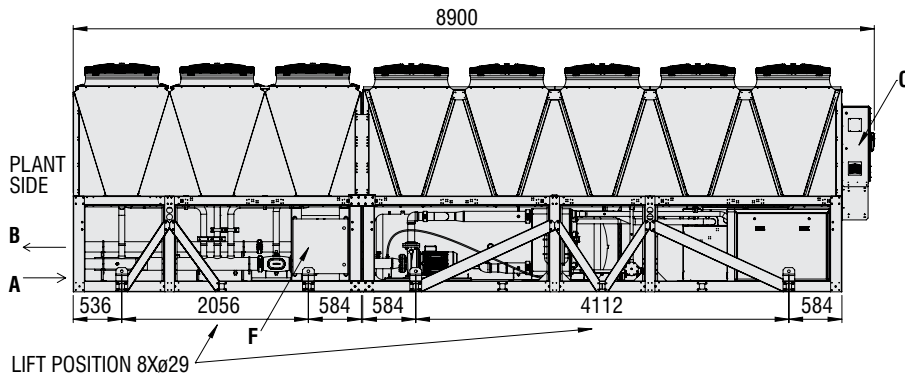
SYSCROLL 360-420 AIR FC 33-34	
A	Water in 4" Victaulic
B	Water out 4" Victaulic
C	Electrical power supply
F	Electrical power supply free-cooling

SYSCROLL 300-360 AIR EVO FC 32	
A	Water in 3" Victaulic
B	Water out 3" Victaulic
C	Electrical power supply
F	Electrical power supply free-cooling

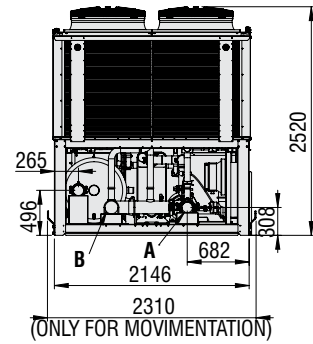
8 - Technical Data (continued)

Dimensions SyScroll Air 470-540 FC 33-34 (slave)

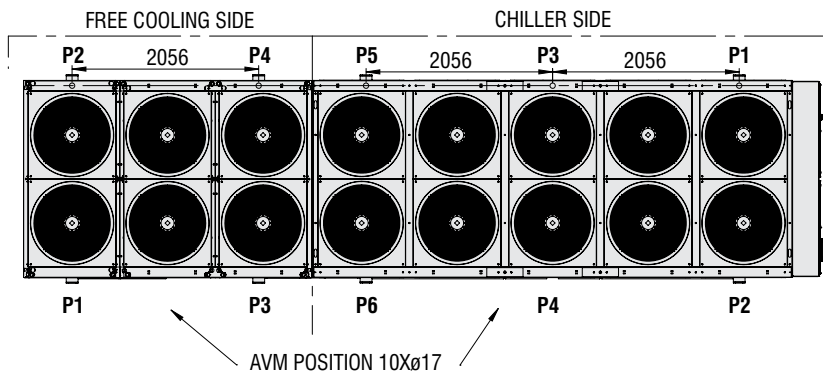
Front view



Side view



Back view



SYSCROLL 470-540 AIR FC 33-34

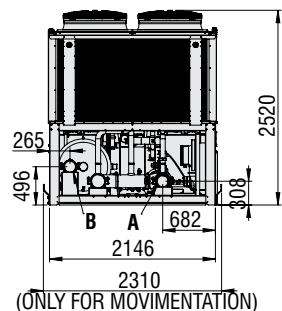
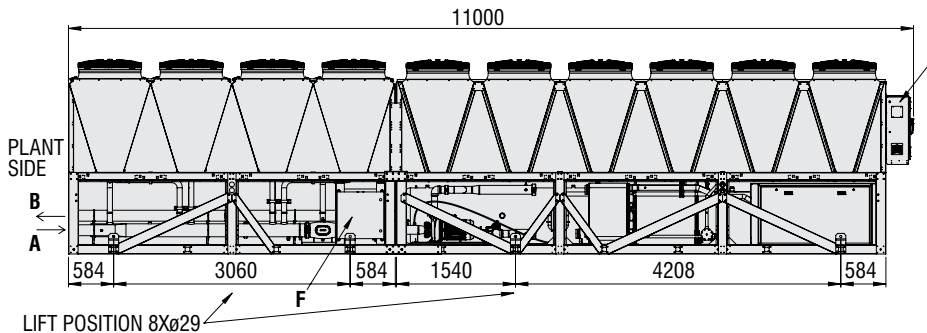
A	Water in 4" Victaulic
B	Water out 4" Victaulic
C	Electrical power supply
F	Electrical power supply free-cooling

8 - Technical Data (continued)

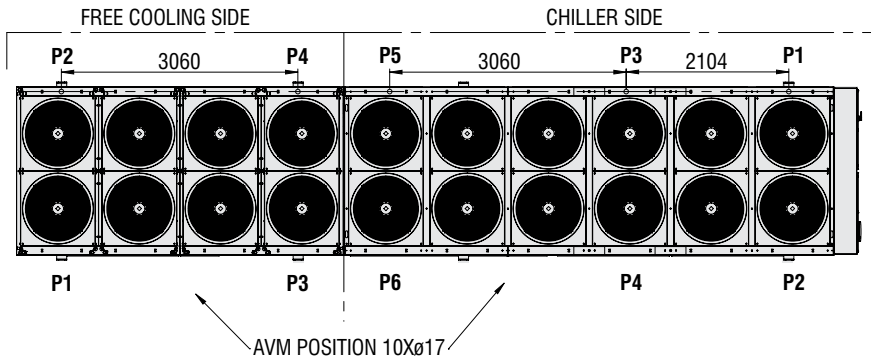
Dimensions SyScroll Air 590-660 FC 43-44 (slave)

Front view

Side view



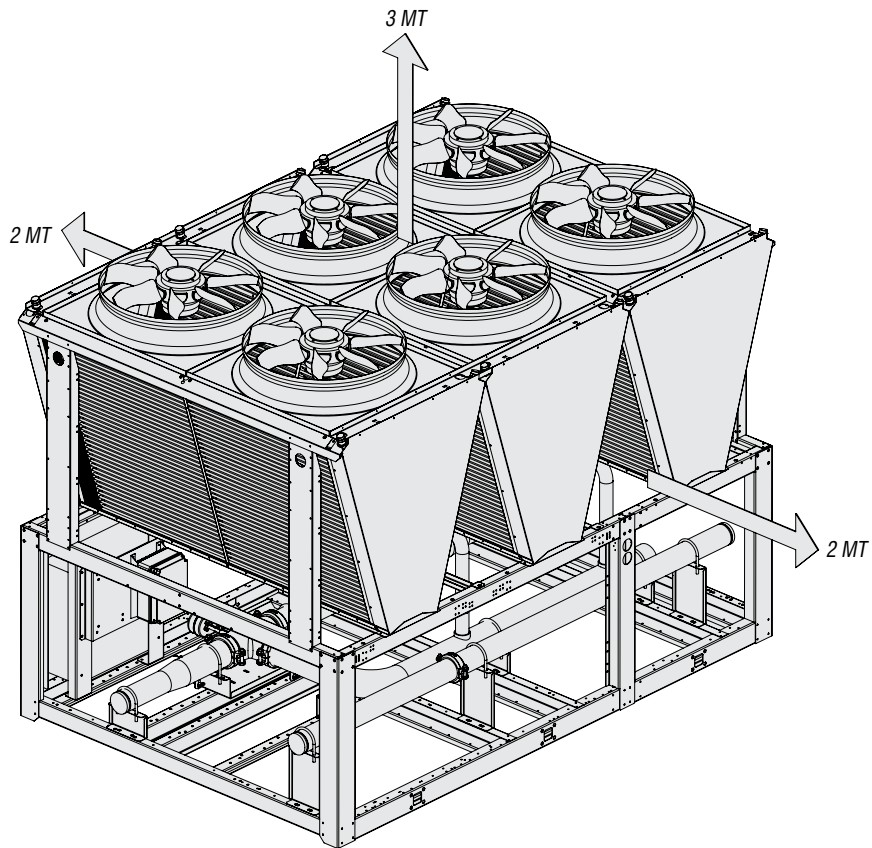
Back view



SYSCROLL 590-660 AIR FC 43-44	
A	Water in 5" Victaulic
B	Water out 5" Victaulic
C	Electrical power supply
F	Electrical power supply free-cooling

8 - Technical Data (continued)

8.7 Space requirements



9 - Maintenance

Carefully read the “Safety” section of this manual before carrying out any maintenance operations.

9.1 General requirements

Units have been designed for continuous operation, providing that they are subjected to regular maintenance, within the limits specified in this manual. Each unit must be serviced according to the programme by the User/Customer, and must be inspected at regular intervals by the personnel of one authorised Service Centers.

It is the responsibility of the User to meet these maintenance requirements and/or to enter into an agreement with one of authorised Service Centers, so as to properly safeguard the operation of the appliance.

During the warranty period, in case of damage or failures caused by improper maintenance, manufacturer will not refund the costs incurred to repair the appliance in its original state.

The provisions of this section apply only to standard units; according to the order requirements, other documentation may be added, concerning any modifications or supplementary accessories.

9.2 Planned maintenance

Maintenance inspections must be carried out according to the program below, by a qualified person.

As a general rule, units cannot be repaired directly by the user, who shall not try to service or repair any failures or anomalies identified during daily inspections. If you are in doubt, please contact authorised Service Centre.

Operations	Daily	Weekly	Monthly	Beginning of season	End of season
Check the temperature of the leaving fluid	●				
Check 3-ways valve pressure drop between IN/OUT line		●			
Check for electric absorption		●			
Check that the fins of the external coil are clean (if any)			●		
Check the remote control switches			●		
Check 3-ways valve and servo-control insulation				●	
Check that terminals are tightened				●	
Check that the terminals' screws are tightened				●	
Clean the exterior of the unit with water and soap				●	
Check the density of the antifreeze				●	●
Check the operation of the flow switches				●	

9.3 Three-ways valve

During free-cooling operation (Free Cooling mode active), check that water temperature probes L1 (input) and L2 (output) give different values (taking also into account sensor tolerance). In order to check the limit switch achievement, remove the protective shell of the servo-control and make sure that the disc connecting the stems of the valve and the actuator has reached the bottom point (through special indicators positioned on the rails of the actuator). If the disc is in an intermediate position, remove any foreign substances interfering with the standard operation of valve opening and closing.

9.4 Heat recovery coils

Heat recovery coils consist of copper pipes and aluminium fins. In case of leakage caused by any damage or shock, the coils shall be repaired or replaced by one of authorised Service Centers. To ensure the effective and correct operation, it is important to keep coil surface perfectly clean, and to check that there is no foreign material, such as leaves, wires, insects, waste etc. If the coil becomes dirty, there is an increase in the absorption of electric energy.

Be careful not to damage the aluminium fins during cleaning.

Cleaning operation must be carried out with a low pressure compressed air jet, parallel to the aluminium fins, in opposite direction to the air circulation.

To clean the coil you can use also a vacuum cleaner, or a jet of water and soap.

9.5 Fans

Axial fan motors are complete with impeller with aerodynamic profile blades and a cylindrical nozzle. Motor bearings are lubricated forever.

10 - Troubleshooting

The table below lists the anomalies of operation of the unit, the relevant causes and the corrective measures. For anomalies of any other type or not listed, contact one of authorised Service Centre for technical assistance.

Anomaly	Cause	Operation
The unit does not activate recovery function	Probe failure / wrong calibration.	Replace.
	Servo-control failure.	Replace.
	Ice formation on the stem in the valve due to applications with negative temperature process fluid.	Check valve and actuator insulation.
	Valve stuck.	Remove any foreign object.
Excessive noise	Lines vibration.	Check clamping brackets.
Fan motors not working	Electric circuit interruption.	Check the electric circuit and detect any ground dispersions and short circuits. Check fuses.
	The fuse of the control circuit is burned.	Check for ground dispersions and short circuits. Replace fuses.
	Loosened terminals.	Check and tighten.
	Halt caused by thermal overload of the electric circuit.	Check the operation of check and safety devices. Identify and remove the cause.
	Wrong wiring.	Check the wiring of control and safety devices.
	Too low line voltage.	Check voltage. If the problem is concerning the system, solve it. If the problem is caused by the distribution network, inform the Energy Distributor.
Brine leakage from the safety valve	System overpressure.	Check internal and external hydraulic system.

11 - Spare Parts

11.1 Spare part list

The table below shows the list of spare parts recommended during the first two years of operation.

Component	Number
Fan	1
Flow switch	1
Display	1
Auxiliary circuit transformer	1
Water sensor	4
Air sensor	1
Electronic main board	1
Fuses	4

11.2 Wiring diagrams

The wiring diagrams are installed inside the doors of the electrical panels of the unit. Any request for wiring diagrams shall be forwarded to manufacturer's Service Centre.

12 - Dismantling, Demolition and Scrapping



If no shutoff valves have been provided, it may be necessary to drain the whole plant.

If a glycoled solution or a similar fluid has been used in the hydraulic circuits, or if chemical additives have been added to the circulating water, the circulating fluid **MUST** be drained in a proper way.

For **NO** reason shall a circuit containing glycoled water or a similar solution be discharged directly into the drains or surface waters.

For the disposal, contact the competent authority for information.

Unless otherwise specified, the maintenance operations listed below may be carried out by any trained maintenance operator.

12.1 Generalities

Open each line that supplies the unit, including the ones of control circuits. Make sure that all disconnecting switches are secured in the off position. The power cables can be disconnected and disassembled. Refer to Chapter 4 for the position of connection points.

Isolate the unit's heat exchangers from the external hydraulic circuits and drain the heat exchange sections of the plant.

After draining operations, the piping of the hydraulic networks can be disconnected and disassembled.

Once they have been disconnected as specified, the packaged units can be disassembled in a single piece. First of all, disassemble the anchoring screws and then lift the unit from the position of installation, and hook it to the lifting points provided, using suitable lifting equipment.

To this end, refer to Chapter 4 for the installation of these appliances, to Chapter 8 for their weights and Chapter 3 for handling.

The units that, once disconnected, cannot be removed in a single piece, must be dismantled on site; in this case, be very careful with the weight and handling of every single component.

It is always advisable to dismantle the units following the installation steps, but in reverse.



Some residues, glycoled water or similar solutions may remain in certain parts of the unit. These residues must be recovered and disposed of according to the procedures specified above.

It is very important to ensure that, while a component of the unit is being removed, all the others are properly supported.



Use only lifting means of adequate capacity.

Once disassembled, the components of the unit can be disposed of in conformity with current regulations.

12.2 RAEE Directive (only UE)

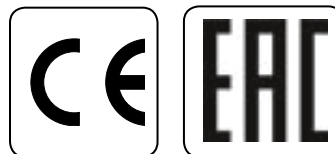


- The RAEE Directive requires that the disposal and recycling of electrical and electronic equipment must be handled through a special collection, in appropriate centers, separate from that used for the disposal of mixed urban waste.
- The user has the obligation not to dispose of the equipment at the end of the useful life as municipal waste, but to send it to a special collection center.
- The units covered by the RAEE Directive are marked with the symbol shown above.
- The potential effects on the environment and human health are detailed in this manual.

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