Installation and maintenance manual
Manuel d'installation et de maintenance
Installations- und Wartungshandbuch
Manuale di installazione e di manutenzione
Manual de instalación y de mantenimiento

SYSCREW 380-1260
Air EVO HSE CO/TR

English | Français | Deutsch | Italiano | Español

366
↓
1.241 kW

r134a

R513A

Air Cooled Water Chillers with Screw Compressors
Refroidisseurs de liquide à condensation par air avec compresseurs à vis
Luftgekühlte Wasserkühler mit Schraubenkompressoren
Refrigeratori d'Acqua Raffreddati ad Aria con compressori a vite
Enfriadores de Agua Condensadas con Aire con compresores a tornillo

Part number / Code / Code / Codice / Código: **J37276**
Supersedes / Annule et remplace / Annulliert und ersezt / Annulla e sostituisce / Anula y sustituye: **-**
Notified Body /Organisme Notifié / Benannte Zertifizierungsstelle / Organismo Notificato / Organismo Notificado **N°. 0425**

CE EAC

ISO 9001:2015 certified management system

English

Table of Contents

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 for water heating in models with heat recovery included) 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. The chiller 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 Compability Directive 2014/30/EU - as per EN 55011, Group 1, Class A, 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.

Compressors with frequency inverter (FI) are installed. Several electrical connections are required and all are established inside the terminal box. FI and the compressor motor are Permanently wired and the compressor motor cannot be operated without FI. As soon as the FI is under voltage, the capacitors in the FI intermediate circuit are charged and from this moment on, all the electrical components in the terminal box present risks.

	**Hazardous voltages in frequency inverter housing! Any contact will cause severe injury or death. Never open FI housing during operation. In case of any operation in the FI housing, switch off the main switch and secure it against being switched on again. Wait for at least 5 minutes until all capacitors have been discharged. Close perfectly the FI housing before switching on again**

The inverter compressor is provided with the safety fuction called "Safe Torque Off" (STO), that is used as device for removal power for prevention of unexpected start-up. As long as this function is activated, no drive energy is transferred to the compressor motor, so the compressor motor is safely free of torque, but it is not de-energized. That means that, even if the compressor has been stopped by the "Safe Torque Off" (STO) or "motoroff" function, the FI remains energized.

	**Even in the cases described above the main switch must be switched off and must be waited for at least 5 minutes before any operation in th FI housing**

	Due to the use of compressor frequency inverter, the unit may produce a strong magnetic field Keep magnetic and magnetizable objetcs away from the unit. Persons with cardiac pacemakers, implanted heart defibrillators or metallic implants must maintain a clearance of at least 30cm from the compressor.

	**The unit must be grounded and no installation and/or maintenance operations may be carried out before deenergising the electrical panel of the unit and protect against restoring power. Wait at least 5 minutes for capacitors to de-energize!**

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

	**Inside the heat exchangers, the compressors and the refrigeration lines, this unit contains liquid and gaseous refrigerant under pressure. The release of this refrigerant may be dangerous and cause injuries.**

	**The units are not designed to be operated with natural refrigerants, such as hydrocarbons. Manufacturer may not be held liable for any problems deriving from the replacement of original refrigerant or the introduction of hydrocarbons.**

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

- The used refrigerants are included in group II (non-hazardous fluids).
- The maximum working pressure values are mentioned on the unit's data plate.
- Suitable safety devices (pressure switches and safety valves) have been provided, to prevent any anomalous overpressure inside the plant.
- 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.
- Dedicated guards (removable panels with tools) and danger signs indicate the presence of hot pipes or components (high surface temperature).

2 - Safety (continued)

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.

The standard unit is provided with fans protection grill always factory mounted. For specific customer requests, mainly due to limiting transport conditions, it is still possible the unit is shipped with fans not fully assembled. In this circumstance, before switching on the unit, it is mandatory that the Customer/Installer completes the fans assembling on field - including fan protection grills -according to the instructions included into the manual.

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.

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.

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.

The unit has not been design to withstand loads and/or stress that may be transmitted by adjacent units, piping and/or structures.

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.

The packaging material must not be disposed of in the surrounding environment or burnt.

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 tat 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 air condensation 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
- 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
- do not touch the delivery pipes from the compressor, the compressor and any other piping or component inside the machine before wearing protective gloves
- keep a fire extinguisher fir for electrical appliances near the machine
- on the units installed indoor, connect the safety valve of the refrigeration circuit to a piping network that can channel any overflowing refrigerant outside
- remove and leak of fluid inside and outside the unit
- collect the waste liquids and dry any oil spillage
- periodically clean the compressor compartment, to remove any fouling
- do not store flammable liquids near the unit
- do not disperse the refrigerant and the lubricating oil into the environment
- weld only empty pipes; do not approach flames or other sources of heat to refrigerant 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:

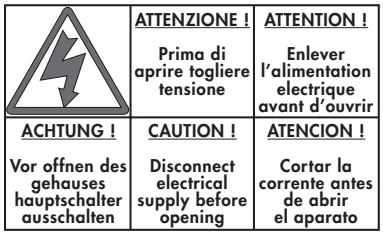
- do not scatter the fluids of the refrigeration circuit in the surrounding environment
- when replacing an eprom or electronic cards, use always suitable devices (extractor, antistatic bracelet, etc.)
- to replace a compressor, the evaporator, the condensing coils or any other weighty element, make sure that the lifting equipment is consistent with the weight to be lifted
- in air units with independent compressor compartment, 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 to the refrigeration, 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

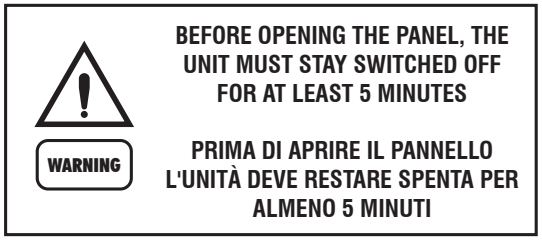
Identification of the refrigerant - External door

Electrical warning - Adjacent to the master switch

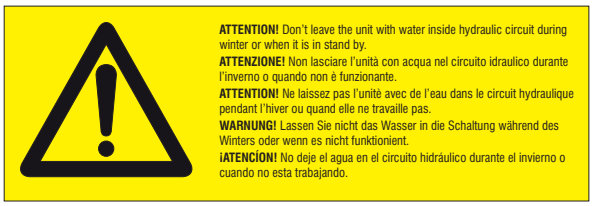


Read the instruction on the electrical board

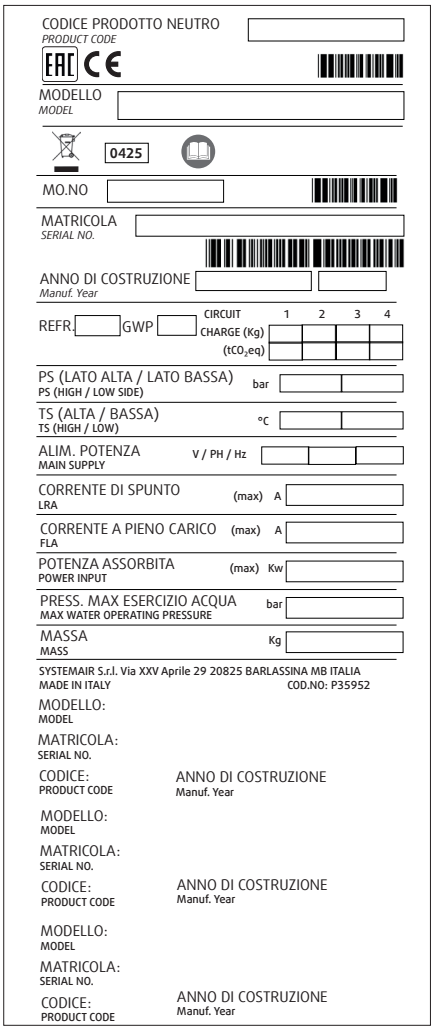
On the compressor box



Circuit drain - Outside, on the right-hand front column

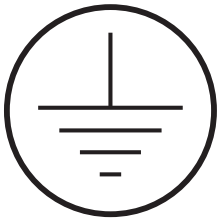


Identification of the unit - Outside, on the right-hand front column



Gravity centre - Base

Grounding connection on the electrical board, adjacent to the connection



2 - Safety (continued)

Start-up warning - Outside the door of the electrical board

ATTENZIONE

INSERIRE LE RESISTENZE DI RISCALDAMENTO OLIO ALMENO 12 ORE PRIMA DI OGNI AVVIAMENTO (SE PREVISTE)
PRIMA DELLA MESSA IN TENSIONE ASSICURARSI CHE LE VITI DEI CIRCUITI ELETTRICI SIANO SERRATE COMPLETAMENTE

WARNING

ENERGIZE THE CRANCKCASE HEATER FOR AT LEAST 12 HOURS BEFORE EACH STARTING (IF FITTED)
BEFORE TIGHTENING-UP, TO TIGHTEN ALL TERMINAL SCREWS ESPECIALLY THOSE IN MAIN CIRCUIT

WARNUNG

OLSUMPFHEIZUNG (FALLS VORHANDEN) 12 STUNDEN VOR DEM START EINSCHALTEN
VOR INBETRIEBNAHME ALLE SCHRAUBENVERBINDUNGEN NACHZIEHEN, BESONDERS DIE ELEKTRISCHEN ANSCHLUSSE

ATTENTION

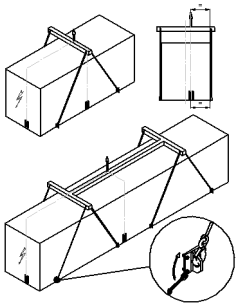
ALIMENTER ELECTRIQUEMENT LA RESISTANCE DE CARTER AU MOINS 12 HEURES AVANT CHAQUE DEMARRAGE (SI MONTE SUR LE PRODUIT)
AVANT DE DEMARRER LA MACHINE, VERIFIER LE SERRAGE DE TOUTES LES BORNES A VIS, SPECIALEMENT DANS LE BOITIER ELECTRIQUE

ATENTION

ATENCIÓN ALIMENTAR ELÉCTRICAMENTE LA RESISTENCIA DE CARTER AL MENOS 12 HORAS ANTES DE CADA PUESTA EN MARCHA (SI ESTA EQUIPADA EN LA UNIDAD)
ANTES DE LA PUESTA EN MARCHA, COMPROBAR QUE LOS BORNES ESTAN BIEN APRETADOS, ESPECIALMENTE EN EL CUADRO ELÉCTRICO

035B00057-000 **MADE IN ITALY**

Instruction for the lifting



Fitting identification - Adjacent to fittings

EIN - INLET
ENTRÉE - ENTRATA
AUS - OUTLET
SORTIE - USCITA

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 NUMERO CONTROLLI	DESCRIPTION OF INSPECTION DESCRIZIONE DEI TEST DI CONTROLLO	INSPECTOR REFERENCE 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	VACUM 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: CONTINUITÁ, ISOLAMENTO, RIGIDITÁ	
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 PEN 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 VAERIFICA ASSEMBLAGGIO PARTI	
10	CHECK MOUNTED ACCESSORIES OR SUPPLY LOOSE CONTROLLO ACCESSORI MONTATI E/O FORNITI A BORDO UNITÁ	
11	CHECK DOCS SUPPLY (CE, IOM, START UP FORM, WIRING DIAGRAM, RULE) VERIFICA DOCUMENTI FORNITI CON L'UNITÁ	
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	

On the coil

ATTENZIONE! BORDI TAGLIENTI
VORSICHT! SCHARFE RÄNDER
CAUTION! SHARP EDGES
ATTENTION! BORDS COUPANTS
ATENCION! PERFIL AFILADO

Warning - Safety valve vents

Warning - High temperature zone adjacent to hot pipes or components

2 - Safety (continued)

2.8 Safety regulations

REFRIGERANT DATA	SAFETY DATA: R134a/R513A
R134a	ASHRAE Number: R134a Composition: R134a ASHRAE Safety classification: A1
R513A	ASHRAE Number: R513A Composition: HFO-1234yf /R134a ASHRAE Safety classification: A1
Toxicity	Low
Contact with skin	If sprayed, the refrigerant is likely to cause frost burns. If absorbed by the skin, the danger is very limited; it may cause a slight irritation, and the liquid is degreasing. Unfreeze the affected skin with water. Remove the contaminated clothes with great care - in the presence of frost burns, the clothes may stick to the skin. Wash with plenty of warm water the affected skin. In the presence of symptoms such as irritation or blisters, obtain medical attention.
Contact with eyes	Vapours do not cause harmful effects. The spraying of refrigerant may cause frost burns. Wash immediately with a proper solution or with tap water for at least 15 minutes, and then obtain medical attention.
Ingestion	Very unlikely - should something happen, it will cause frost burns. Do not induce vomiting. Only if the patient is conscious, wash out mouth with water and give some 250 ml of water to drink. Then, obtain medical attention.
Inhalation	Remarkable concentrations in the air may have an anaesthetic effect, up to fainting. The exposure to considerable amounts may cause irregular heartbeat, up to the sudden death of the patient. Very high concentrations may result in the risk of asphyxia, due to the reduction in the oxygen percentage in the atmosphere. Remove the patient to fresh air and keep warm and at rest. If necessary, give oxygen. In case of breathing difficulties or arrest, proceed with artificial respiration. In case of cardiac arrest, proceed with cardiac massage. Then, obtain medical attention.
Recommendations	Semiotics or support therapy is recommended. Cardiac sensitisation has been observed that, in the presence of circulating catecholamines such as adrenalin, may cause cardiac arrhythmia and accordingly, in case of exposure to high concentrations, cardiac arrest.
Prolonged exposure	A study on the effects of exposure to 50,000 ppm during the whole life of rats has identified the development of benign testicle tumour. This situation should therefore be negligible for personnel exposed to concentrations equal to or lower than professional levels.
Professional levels	Recommended threshold: 1000 ppm v/v - 8 hours TWA.
Stability	Not specified
Conditions to avoid	Do not use in the presence of flames, burning surfaces and excess humidity.

2.8 Safety regulations (continued)

REFRIGERANT DATA	SAFETY DATA: R134a/R513A
Hazardous reactions	May react with sodium, potassium, barium and other alkaline metals. Incompatible substances: magnesium and alloys with magnesium concentrations > 2%.
Hazardous decomposition products	Halogen acids produced by thermal decomposition and hydrolysis.
General precautions	Do not inhale concentrated vapours. Their concentration in the atmosphere should not exceed the minimum preset values and should be maintained below the professional threshold. Being more weighty than the air, the vapour concentrates on the bottom, in narrow areas. Therefore, the exhaust system must work at low level.
Respiratory system protection	If you are in doubt about the concentration in the atmosphere, it is recommended to wear a respirator approved by an accident-prevention Authority, of the independent or oxygen type.
Storage	Cylinders must be stored in a dry and fresh place, free from any fire hazard, far from direct sunlight or other sources of heat, radiators etc. Keep a temperature below 50 °C.
Protective clothing	Wear overalls, protective gloves and goggles or a mask.
Accidental release measures	It is important to wear protective clothing and a respirator. Stop the source of the leak, if you can do this without danger. Negligible leaks can be left evaporating under the sun, providing that the room is well ventilated. Considerable leaks: ventilate the room. Reduce the leak with sand, earth or other absorbing substances. Make sure that the liquid does is not channelled into gutters, sewers or pits where the vapours are likely to create a stuffy atmosphere.
Disposal	The best method is recovery and recycling. If this method is not practicable, dispose according to an approved procedure, that shall ensure the absorption and neutralization of acids and toxic agents.
Fire fighting information	Not flammable in the atmosphere.
Cylinders	The cylinders, if exposed to fire, shall be cooled by water jets; otherwise, if heated, they may explode.
Protective fire fighting equipment	In case of fire, wear an independent respirator and protective clothing.

2 - Safety (continued)

2.8 Safety regulations (continued)

LUBRICANT OIL DATA	SAFETY DATA: ESTER OIL
Classification	Not harmful.
Contact with skin	May cause slight irritation. Does not require first aid measures. It is recommended to follow usual personal hygiene measures, including washing the exposed skin with soap and water several times a day. It is also recommended to wash your overalls at least once a week.
Contact with eyes	Wash thoroughly with a suitable solution or tap water.
Ingestion	Seek medical advice immediately.
Inhalation	Seek medical advice immediately.
Conditions to avoid	Strong oxidising substances, caustic or acid solutions, excess heat. May corrode some types of paint or rubber.
Protection of the respiratory system	Use in well ventilated rooms.
Protective clothing	Always wear protective goggles or a mask. Wearing protective gloves is not mandatory, but is recommended in case of prolonged exposure to refrigerant oil.
Accidental release measures	It is important to wear protective clothing and, especially, goggles. Stop the source of the leak. Reduce the leak with absorbing substances (sand, sawdust or any other absorbing material available on the market).
Disposal	The refrigerant oil and its waste will be disposed of in an approved incinerator, in conformity with the provisions and the local regulations applicable to oil waste.
Fire fighting information	In the presence of hot liquid or flames, use dry powder, carbon dioxide or foam. If the leak is not burning, use a water jet to remove any vapours and to protect the personnel responsible for stopping the leak.
Cylinders	The cylinders exposed to a fire will be cooled with water jets in case of fire.
Fire fighting protective equipment	In case of fire, wear an independent respirator.

3 - Transport, Lifting and Positioning

Refrigerators are supplied assembled (apart from standard antivibrating rubber supports, that will be installed on site). The equipment are full of refrigerant and oil, in the quantity required for a proper operation.

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.

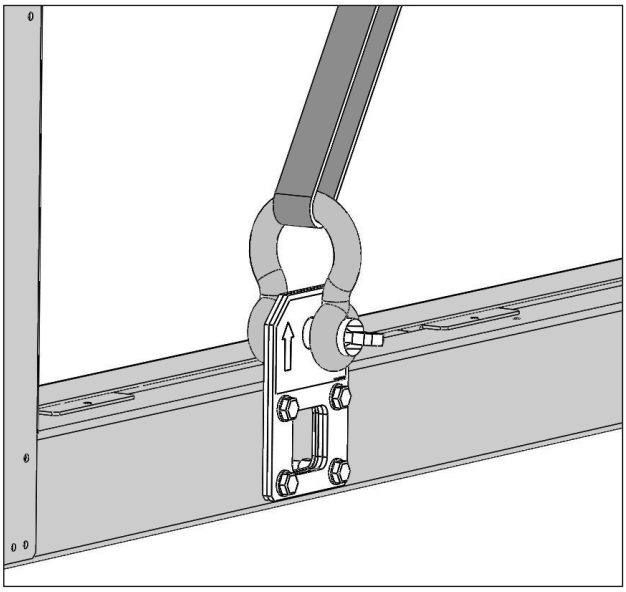
In case of damage, note it down on the carrier's delivery note and issue a claim according to the instructions provided in the delivery note.

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

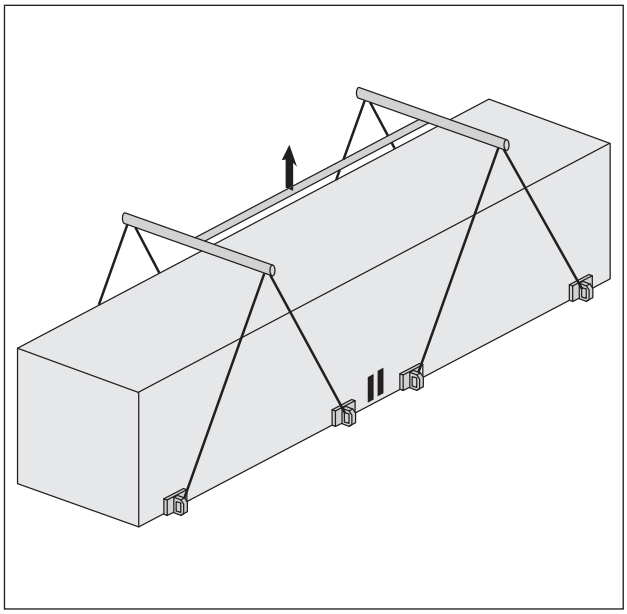
Please note that manufacturer may not be held liable for any damage to the equipment during transportation, even though the carrier has been appointed by the factory.

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.

WARNING	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.
- Hook near the barycentre 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.

WARNING	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
- do not store the appliance in a room where the temperature exceeds 50 °C and, if possible, do not expose to direct sunlight
- minimum storage temperature is -20 °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.

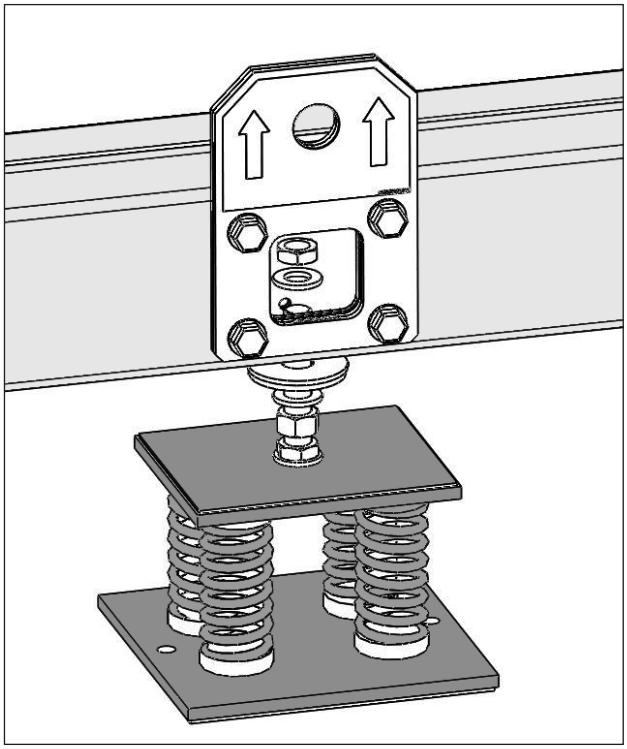
As a general rule, no special sub-bases are required. However, if the unit is to be installed on the top of inhabited rooms, it is advisable to rest it on spring shock absorbers (optional), that will minimise the transmission of any vibration to the structures.

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 refrigerant/air heat exchangers or condenser
- 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:



4.3 Place of installation

In the place of installation **the air temperature average during 24 hours must be lower than 40°C.**

The place of installation's altitude must be **lower than 2000 m.**

4 - Installation (continued)

4.4 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.

The external hydraulic circuit must ensure the water flow to the evaporator under any working or adjustment conditions.

The circuit shall be composed by the following elements:

- A circulation pump which can ensure the necessary capacity and discharge head.
- The capacity of the primary hydraulic circuit should not be less than the minimum water volumes shown in the table below, in order to prevent the repeated start-up of the compressor and any damage to it. If the water capacity in the primary piping of the circuit and in the evaporator is lower than this value, an insulated storage tank shall be installed.

MINIMUM WATER VOLUMES			
SYSCREW AIR EVO HSE		380-450-510-590-660	730-810
Recommended system chilled water volume [4]	l	2334	2953

SYSCREW AIR EVO HSE		900-980	1060-1160-1260
Recommended system chilled water volume [4]	l	3608	5017

[4] Minimum water contents at normal air conditioning applications
The following formula must be respected
Vmin = Cap * MinCapStep * 28,8 , where
Cap = Nominal Unit Capacity [kW] at conditions of installation
MinCapStep = Minimum unit capacity step [%] shown in Technical Data Table

If the application is a process cooling type, the minimum system chilled water volume is generally higher than above recommended.
In this case, please contact your nearest Systemair Sales Office

- A membrane expansion vessel provided with safety valve with vent, that must be visible.

The capacity of the expansion vessel must allow for an expansion of at least 2% of the volume of the fluid in the circuit (evaporator, piping, user circuit and standby tank, if any). The expansion vessel needs not be isolated, because no water can circulate inside it.

A flow switch will stop the unit when the water is not circulating or a flow rate problem occurs.

To install the flow switch, follow the manufacturer's instructions.

As a general rule, the flow switch shall be mounted on a horizontal pipe, at a distance from the curves equal to 10 times the diameter of the pipe and far from valves or other components that are likely to hinder the water flow upstream of or downstream from the flow switch.

- The bleed valves must be mounted on the highest point of the piping.
- The stop valves must be mounted on the piping of the water entering/leaving the evaporator.
- The drain points (provided with plugs, cocks etc.) must be arranged in the lowest point of the piping.

The flow switch must be connected (terminals 1-2) as shown in the wiring diagram of the "User's Terminal Box".

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 Sufide (H_2S)	< 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

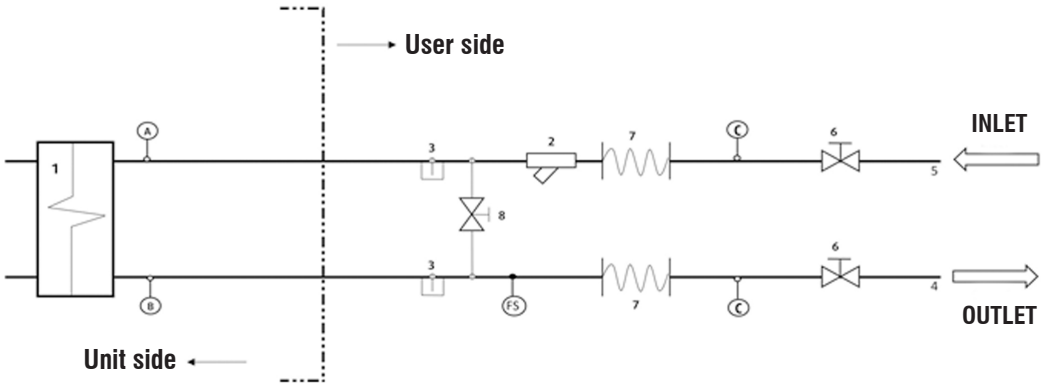
Caution
If the water circuit is to be drained for a time exceeding one month, the circuit must be fully charged with nitrogen to prevent any risk of corrosion by differential venting

4 - Installation (continued)

Then:

- Provide the evaporator with a by-pass circuit equipped with a valve to wash the plant.
- Insulate the piping, to prevent the risk of heat loss.
- Position a filter on the suction side of the evaporator of the heat recovery condenser.

Standard hydraulic circuit



COMPONENTS	
1	Shell & Tube Heat Exchanger
2	Water Filter
3	Pressure point/drain
4	Water outlet
5	Water inlet
6	Globe valve
7	Flexible pipe
8	By-pass valve

SAFETY/CONTROL DEVICES	
A	Inlet water temp. sensor
B	Outlet water temp. sensor
C	Thermometer
FS	Flow switch

O	Probes

WARNING	Before filling the circuit, it is important to check that it is free from any foreign matter, sand, gravels, rust, welding deposits, waste and other materials that may damage the evaporator.

When cleaning the lines, it is recommended to create a circuit by-pass. It is important to mount a filtering medium (30 mesh) upstream of the chiller.

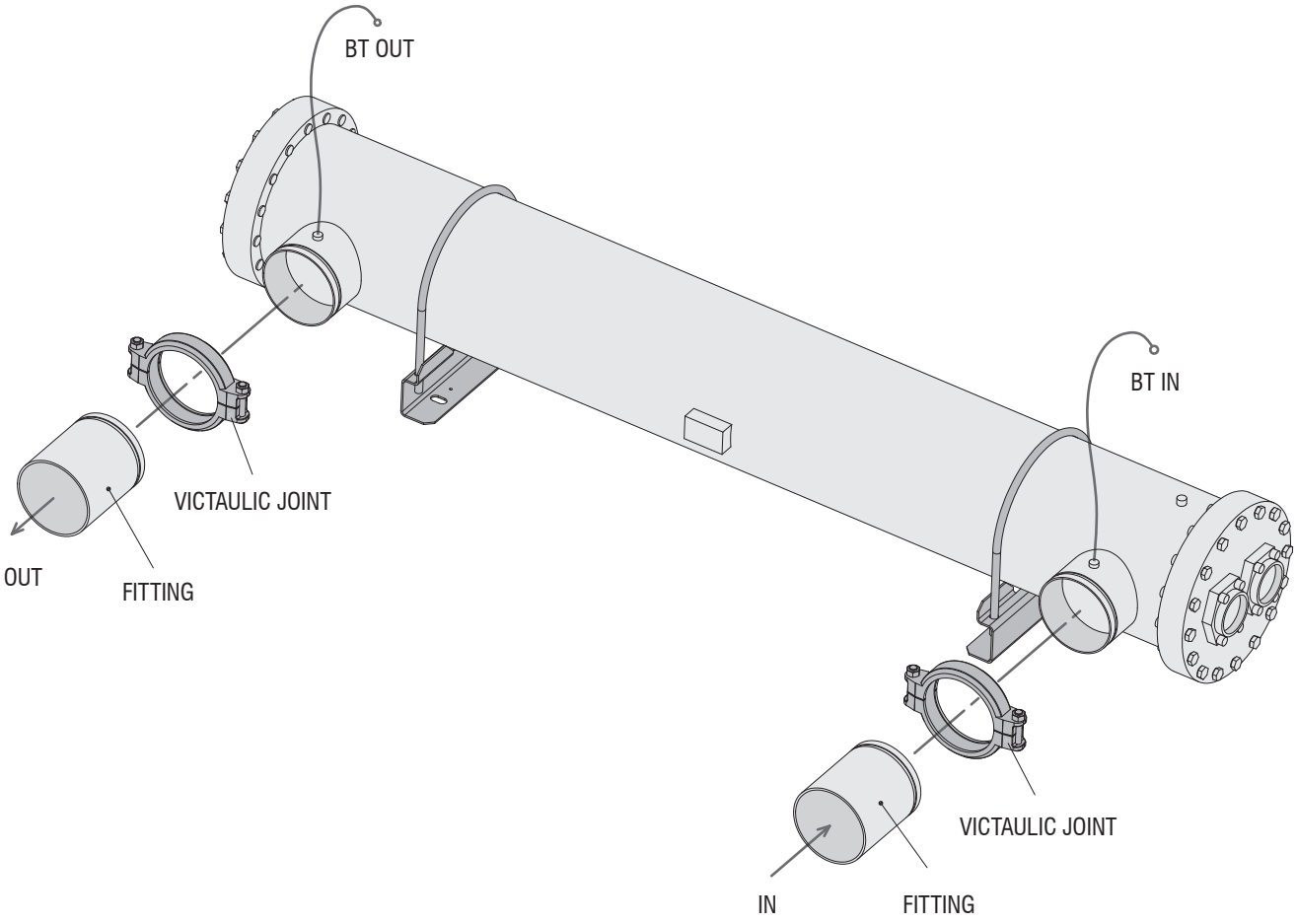
NOTE	If necessary, the water required to fill the circuit must be treated to obtain the requested pH.

4 - Installation (continued)

4.5 Water connections for base unit configuration (without hydraulic options)

The units are provided with fittings for hydraulic connections between heat exchangers and plant.

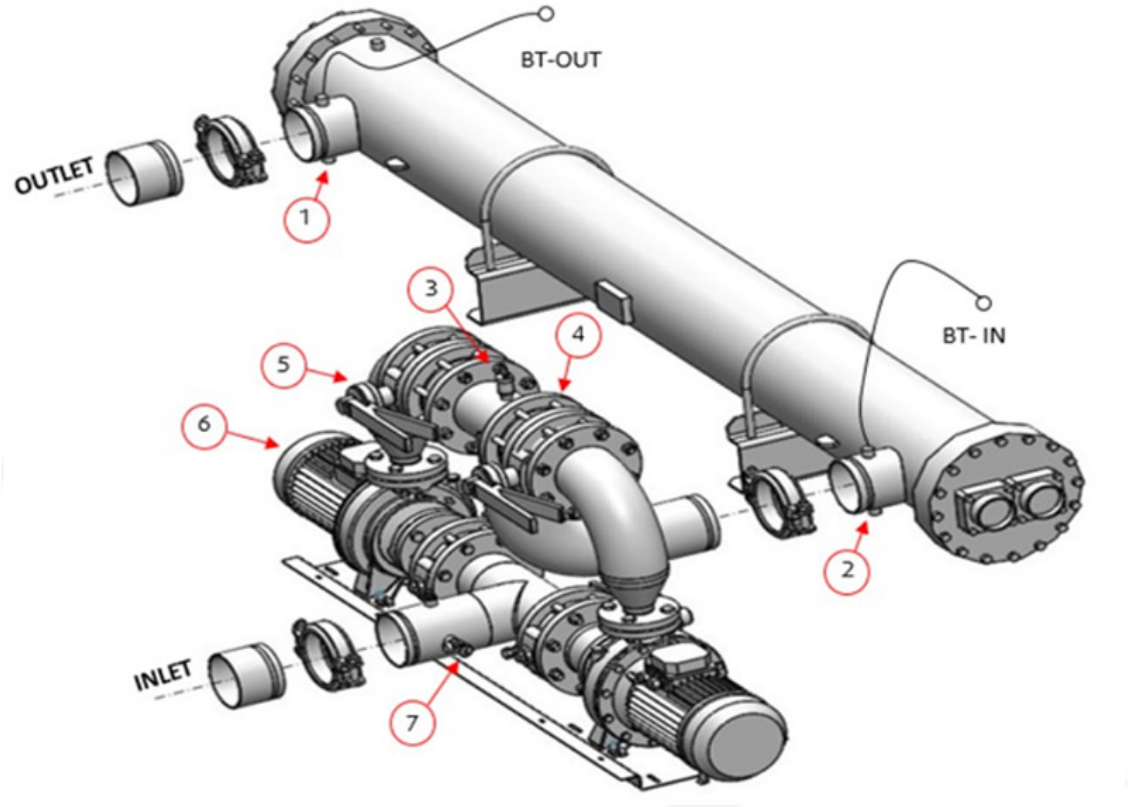
Each fitting is complete with sensor well to fasten temperature sensor (BT-IN and BT-OUT). Fittings are supplied separate and must be mounted during the installation of the unit.



4.6 Water connections for unit provided with hydraulic option

In case of hydraulic option installed (single/double pump), the water inlet/outlet fittings shall conform to the instructions provided by the plates affixed near the connection points.

General hydraulic layout with pump/s installed is shown in the image below.



DESCRIPTION	
1	Pressure transducer (Outlet of HE)*
2	Pressure transducer (Inlet of HE)*
3	Air vent
4	Non-return valve
5	Butterfly valve
6	Pump
7	Safety valve

* Only for Variable flow hydraulic module

4 - Installation (continued)

4.7 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 and compressors 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 the will enter the electrical board through holes drilled on the bottom of the board.

4.8 Electrical connections

The unit must be installed on site according to the Machinery Directive 2006/42/EC, Electromagnetic Compatibility Directive 2014/30/EU - as per EN 55011, Group 1, Class A, Pressure Equipment Directive 2014/68/EU and the usual procedures and standards applicable in the place of installation.

This equipment is intended only for industrial applications and must be installed on side according to the standards mentioned above and according also to the usual procedures and standards applicable in the place of installation.

The installar is responsible for ensuring the correct electrical installation and the use of correct materials.

Incorrect electrical installation and/or using incorrect materials may cause additional radio frequency emissions which may require mitigation measures

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.

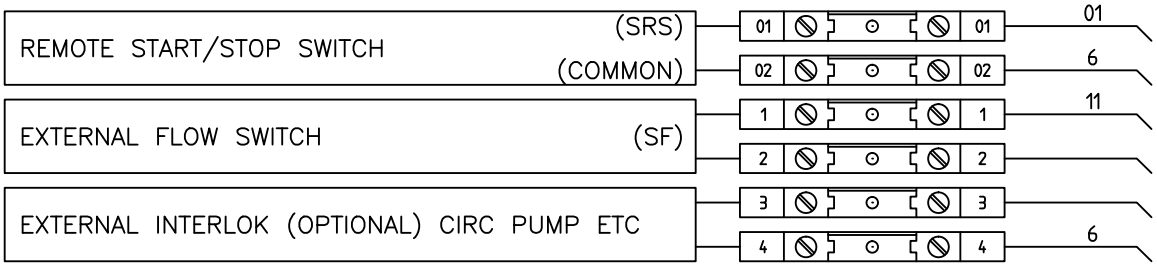
If the unbalance is unacceptable, contact the Energy Distributor to solve this problem.

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

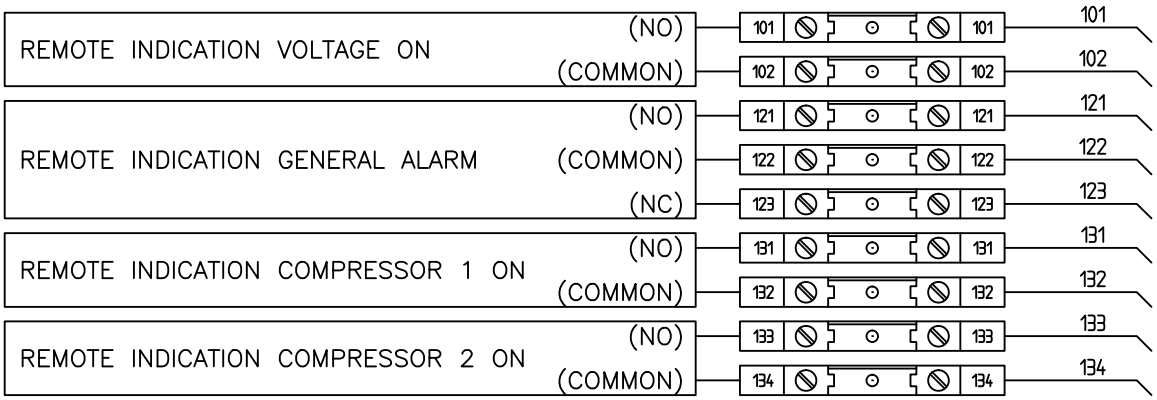
4 - Installation (continued)

Electrical connections

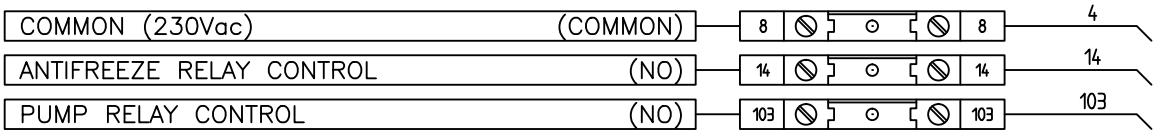
QG - Y1 (EXTERNAL EQUIPMENT TERMINALS)



QG - Y2 (FREE VOLTAGE CONTACT) Maximum switching 250Vac, 1A



QG - Y3 (230Vac VOLTAGE CONTACT) Maximum switching 50VA)



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.

All the other operations before start-up, including oil pre-heating for at least 12 hours, must be performed by the Installer.

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.
- 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.
- Check that oil heaters, if any, have been turned on at least 12 hours before.

5.2 Start-up

Start-up sequence:

- Turn on the Main switch (at least 12 hours before).
- Check that the oil in the compressor has reached the requested temperature (the minimum temperature outside the pan must be approx. 40°C) and that the auxiliary control circuit is energised.
- 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 correct direction of rotation of compressors. Scroll compressors cannot compress the refrigerant when they rotate in the opposite direction. To make sure that they are rotating in the correct direction, simply check that, just after the start-up of the compressor, the pressure drops on the LP side and rises on the HP side. Furthermore, if a scroll compressor rotate in the opposite direction, there is a considerable rise in the sound level of the unit, as well as in a dramatic reduction of current absorption compared to normal values. In case of wrong rotation, the scroll compressor can be definitely damaged. Phase monitor is assembled in the unit as a standard to prevent wrong compressors rotation.
- After about 15 minutes of operation check that there are no bubbles, through the sight glass on the liquid line.

The presence of bubbles may indicate that a part of the refrigerant charge has been released in one or more points. It is important to remove these leaks before proceeding.

- Repeat the start-up procedure after removing the leaks.
- Check the oil level in the compressor's sight glass.

5.3 Checking the operation

Check the following:

- The temperature of the water entering the evaporator.
- The temperature of the water leaving the evaporator.
- The level of the water flow rate in the evaporator, if possible.
- The current absorption upon the start of the compressor and in case of stabilised operation.
- The fan's current absorption.

Check that the condensing and evaporation temperatures, during operation at high and low pressure detected by the pressure gauges of the refrigerant, are within the following range:

(On the units not provided with HP/LP pressure gauges for the refrigerant, connect a pressure gauge to the Shrader valves on the refrigeration circuit).

HP side	Approx. 15 to 21 °C above the temperature of the air entering the condenser.
LP side	Approx. 2 to 7 °C below the temperature of the leaving chilled water.

5.4 Delivery to the customer

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

6 - Control

6.1 General information

Introduction

This document contains the information and the operating instructions for 2 screw compressors (step type and inverter driven type).

This information is for the after-sales service and the production operators, for the end-of-line testing.

Main characteristics

– Microprocessor control

– User-friendly keyboard

– Proportional and integral control of the return water temperature or leaving water temperature (LWT or RWT)

– Access code to enter the Service Level

– Access code to enter User Level

– Basic functions without access code

– Alarm and LED

– Backlighted LCD

– Rotation of the compressor operation

– Oil return function - Standard for the inverter compressor, optional (oil switch device) for step compressor

– Night mode (or Low Noise) control

– Counting of the pump/compressors' hours of operation

– Display of discharge and suction pressure values

– Display of temperature sensor

– History of stored alarms (option)

– Built-in serial communication RS485 port with Modbus protocol to connect the main board to a BMS network.
This built-in port is available as standard only in the case no extra network control systems (netTune) are selected with the units.

– Built-in serial communication Ethernet port with two possible protocols (Modbus or Bacnet, in case also at the same time). In case of Bacnet communication protocol it is needed to activate a license.

– Custom protocols are available on request

The following accessories can be also connected:

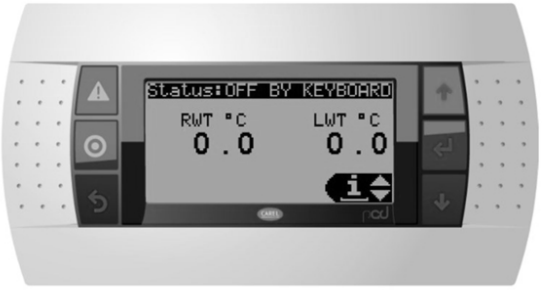
– Remote Display Terminal.

The control system consists of:

a) Main Board. The units are provided with a microprocessor card which is fully programmed by default for the control of a chiller of cold only type with 2 circuits, 1 compressor for circuit, a HP transducer and a LP transducer for Circuit.

b) EEV controllers (two separate drivers) for the management of the electronic expansion valves.

C) Keyboard & Display Terminal.



The terminal makes it possible to carry out the following operations:

– the change of the main operating parameters

– the display of the detected alarms

– the display of all the measured quantities

The terminal and the card are connected by a 6-way phone cable.

The connection of the terminal to the basic card is not essential for the normal operation of the controller.

6 - Control (continued)

Keypad Functions

BUTTON		DESCRIPTION
	ESC	Move back from one mask to higher level menu
	ALARM	Press it to enter in a) Alarm Status a.1) Press again to reset each single alarm, if present (one by one) a.2) Scroll down up to the end of the alarm list (if an alarm list is present) and keep pressed it for 3 second to reset all alarms in one time b) Alarm Data logger
	PRG	Used to enter in the main menu tree
	UP	Scroll a list upwards or increase a value highlighted by the cursor
	DOWN	Scroll a list downwards or decrease a value highlighted by the cursor
	ENTER	Enter in the selected menu or confirm a value highlighted by the cursor

6.2 Display/Keyboard

The display is an LCD 8 lines x 22 columns. The quantities and the information about the operation of the unit are alternated in the form of subsequent screens, named “masks”.

It is possible to move inside the masks with the terminal keys as described below.

6.3 Main Control Functions

In the main mask the cursor flashes at the bottom right corner of the display, in correspondence of the Quick Menu.

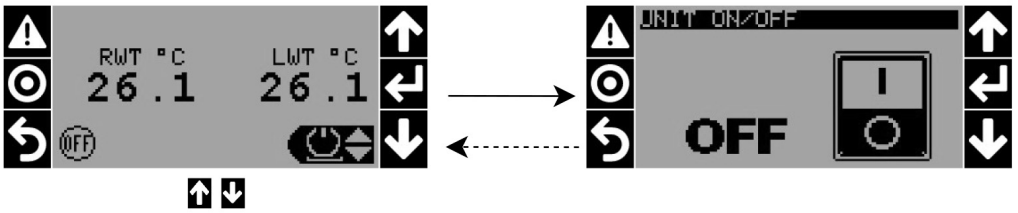
By pressing UP/DOWN keys, it is possible to select the following items of the Quick Menu.

Setting


On/Off

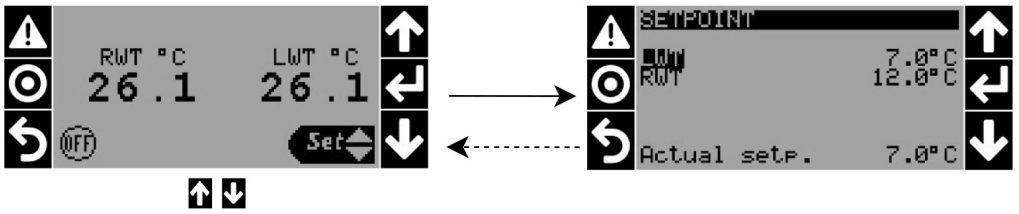

Information

MAIN MASK TREE



POWER

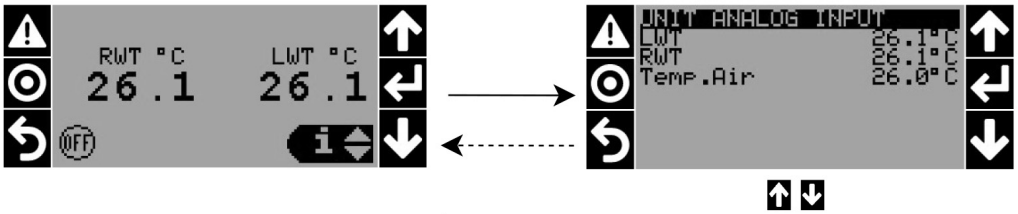
UP and DOWN key to switch unit ON and OFF



SETPOINT

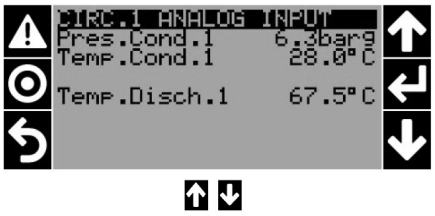
LWT/RWT setpoints can be modified in a range decided by manufacturer.

The Actual Setp. is the setpoint of regulation for actual working mode.



READINGS

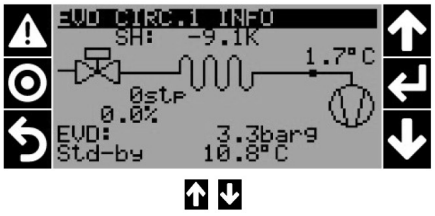
Water Outlet Temperature
Water Inlet Temperature
Outdoor Air Temperature



READINGS CIRC.1

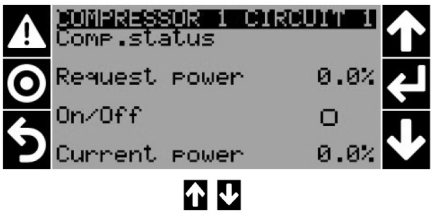
Condensating Pressure
Saturated Condensating Pressure

Discharge Temperature



READINGS CIRC.1

Main readings about evaporating pressure/ temperature, superheat and opening of the electronic valve both in steps and percentage.



READINGS CIRC.1

Compressor Status info:

Power Request by regulator

On/off

Current Power given by compressor

Legenda:

Proceed forward →

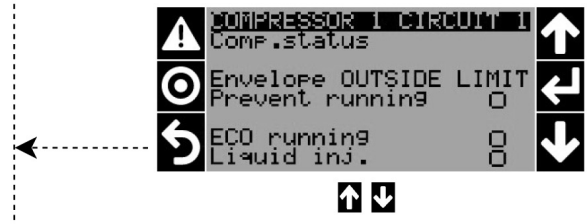
Go back ←

6 - Control (continued)

READINGS CIRC.1

Compressor Status info:

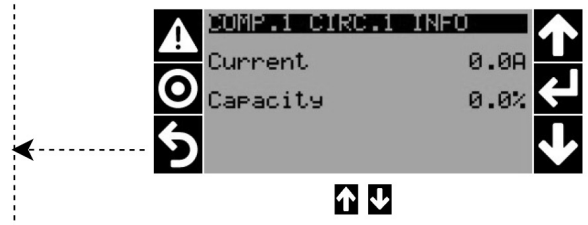
Actual functioning status of compressor



READINGS CIRC.1

Compressor Status info:

Options status inactive / (active)



READINGS CIRC.1

Absorbed current read by TA

Theorical capacity of compressor depending on aboserbed current

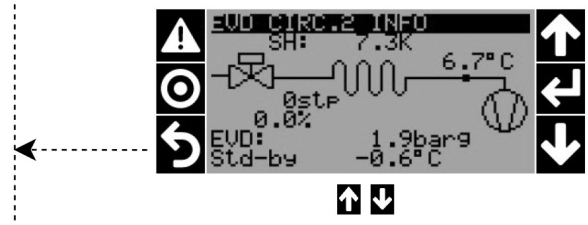
READINGS CIRC.1

Actual fans speed in percentage divided into same groups shown on electrical scheme.

READINGS CIRC.1

Condensating Pressure
Saturated Condensating Pressure

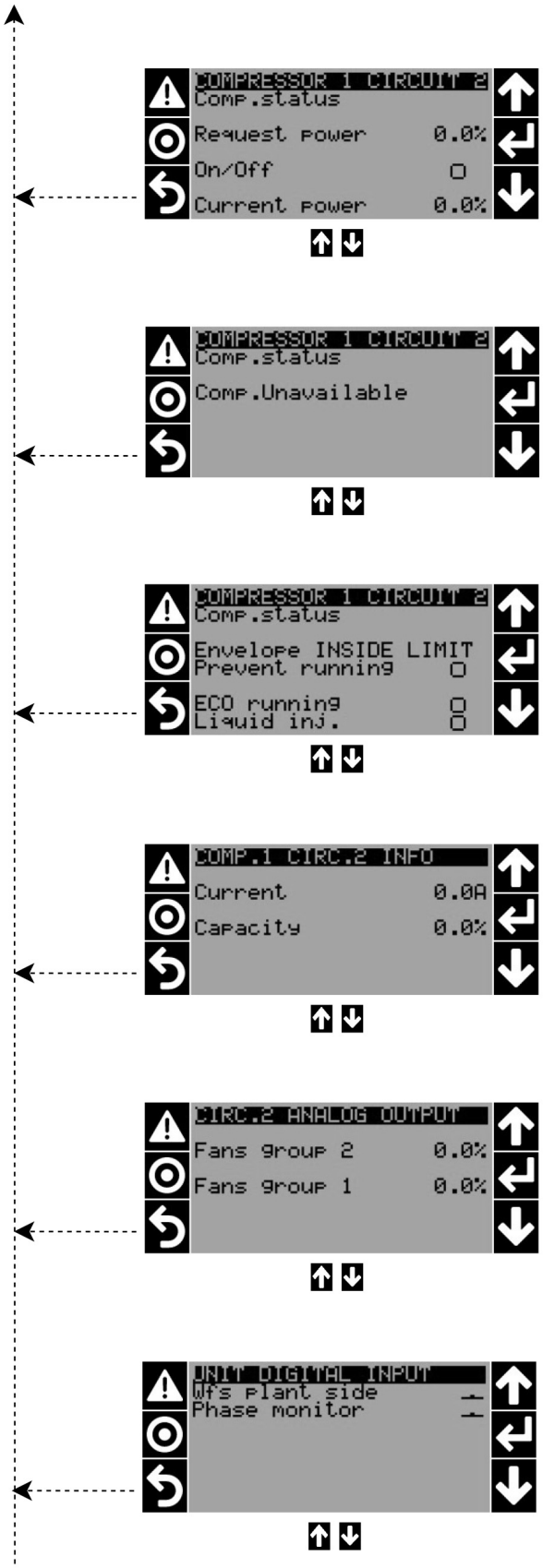
Discharge Temperature



READINGS CIRC.2

Main readings about evaporating pressure/ temperature, superheat and opening of the electronic valve both in steps and percentage.

6 - Control (continued)



READINGS CIRC.2

Compressor Status info:

Power Request by regulator

On/off

Current Power given by compressor

READINGS CIRC.2

Compressor Status info:

Actual functioning status of compressor

READINGS CIRC.2

Compressor Status info:

Options status inactive / (active)

READINGS CIRC.2

Absorbed current read by TA

Theorical capacity of compressor depending on aboserbed current

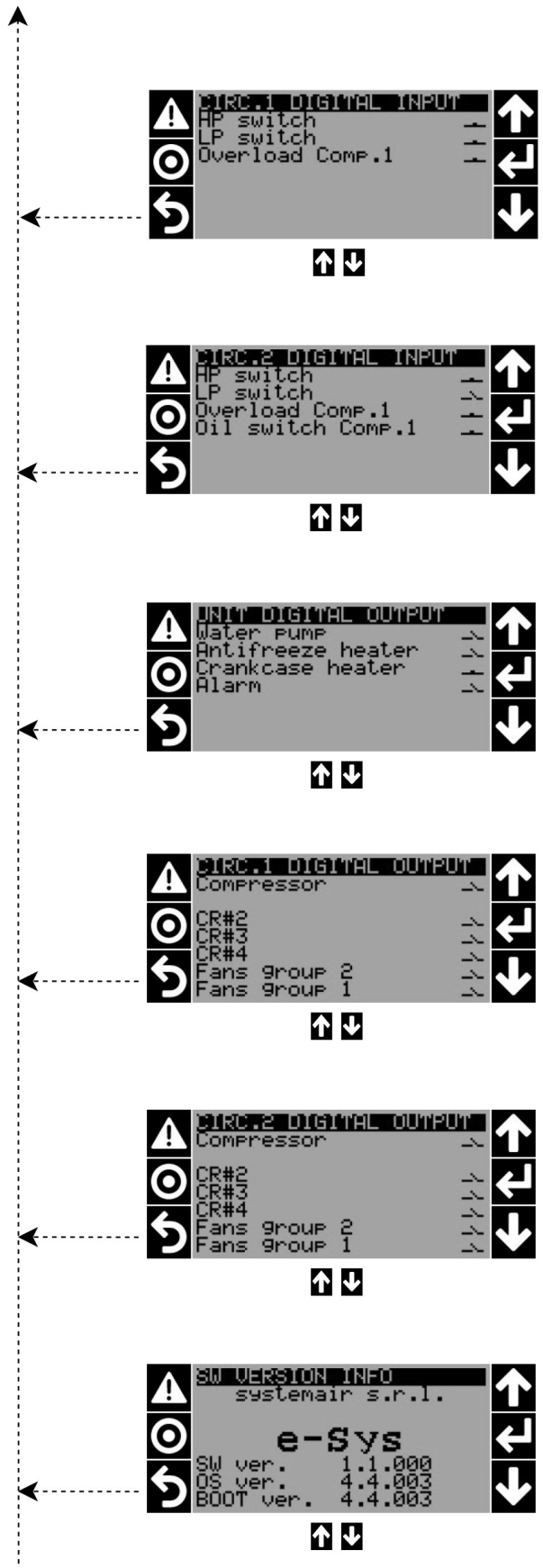
READINGS CIRC.2

Actual fans speed in percentage divided into same groups shown on electrical scheme.

UNIT DIGITAL INPUTS

Status open/close of digital inputs.

6 - Control (continued)



DIGITAL INPUTS CIRC.1

Status open/close of digital inputs related to circuit 1.

DIGITAL INPUTS CIRC.2

Status open/close of digital inputs related to circuit 2.

UNIT DIGITAL OUTPUTS

Status open/close of digital outputs.

DIGITAL OUTPUTS CIRC.1

Status open/close of digital outputs related to circuit 1.

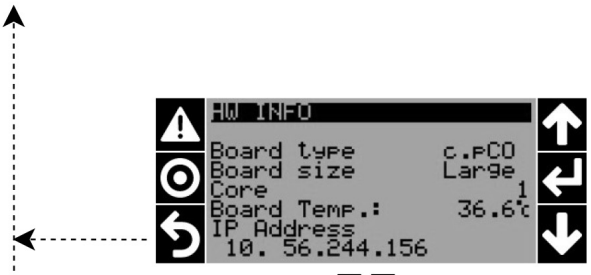
DIGITAL OUTPUTS CIRC.2

Status open/close of digital outputs related to circuit 2.

SOFTWARE INFORMATION

Name and version of the software installed in the unit and also versions of main firmwares.

6 - Control (continued)

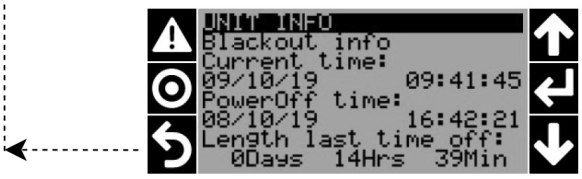


HARDWARE INFO

Basic informations and actual IP address of the main board.

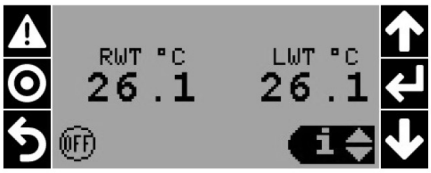
HOURS COUNTERS

Working hours counters of the main components of the unit and of the unit itself.



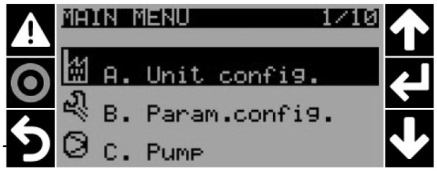
UNIT INFORMATIONS

Informations about actual date/time, when it occured the last power off of the unit, how much time it assed since the unit was turned off last time.



Every digit of the password can be modified by up/down key to the desired value

USER PASSWORD



MAIN MENU
Several sub-menu at disposal:

A. Unit configuration
B. Parameters configuration
C. Pump
D. Compressor
E. EEV
F. Fan
G. Setting
H. Safety
I. Alarm log
L. Logout

Use UP/DOWN keys to select the desired menu and press ENTER to access it.

For User only some sub-menu are accessible.

6 - Control (continued)

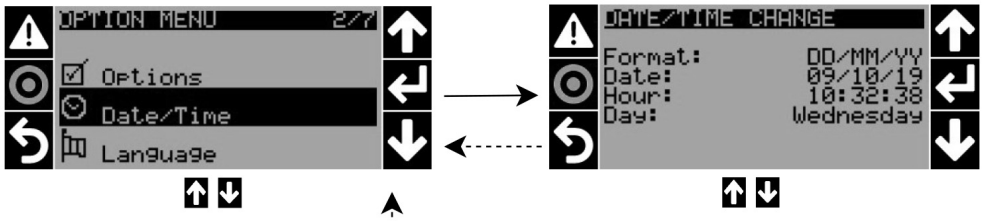
SETTING MENU

Several sub-menu at disposal:

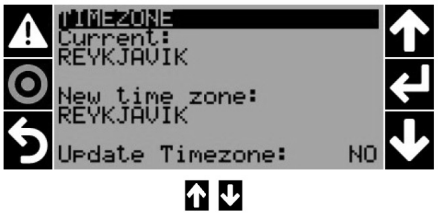
1. Options
2. Date/Time
3. Language
4. Serial Ports
5. Pwd Change
6. Initialization
7. UoM

Use UP/DOWN keys to select the desired menu and press ENTER to access it.
For User only some sub-menu are accessible.

DATE/TIME SUB-MENU



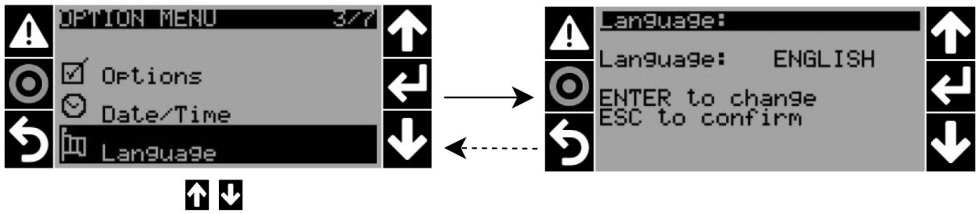
Settable format and actual date/time.



TIME ZONE

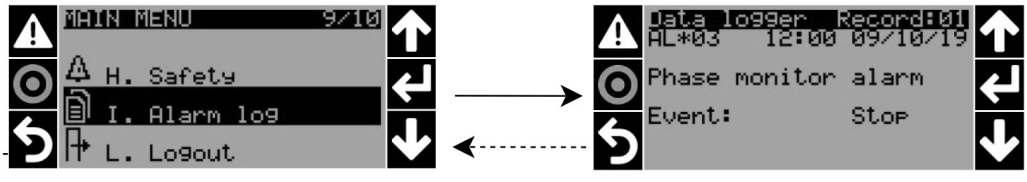
Settable time zone to have automatic update of timing respect to installation site.

LANGUAGE SUB-MENU



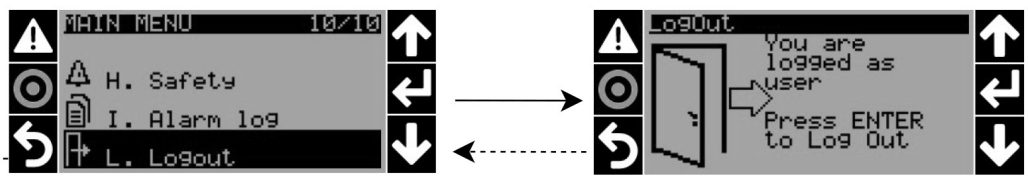
Settable language for software masks.

ALARM LOG MENU



In case of alarms occured since the last memory cleared, then it shows a full list of alarms occured with date/time and identification number of the alarm.

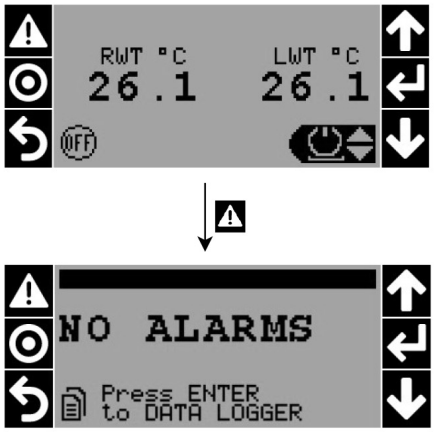
LOGOUT MENU



Press ENTER to log out from user menu.

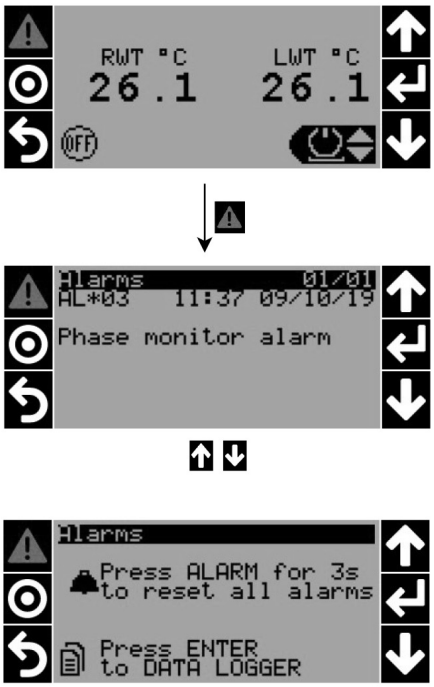
ALARM TREE

NO ALARMS ACTIVE



Press ALARM key for 3 second to reset alarm if the cause which generated the alarm is solved.

ALARMS ACTIVE



In presence of more than one active alarm: press ALARM key for 3 second to reset all alarms (if causes which generated the alarm are solved).

Press ENTER key to access to Alarm Log Menu

6 - Control (continued)

List of parameters - IN/OUT MENU

Notes:
n° circuits : 2
compressor circuit 1: fixed speed step screw
compressor circuit 2: variable speed (inverter driven) screw

ANALOG INPUTS - control board		
Variable Name	**Type**	**Description**
U1	Ntc	Leaving / Outlet water temperature
U2	4-20mA	Pressure from high pressure transducer 1
U3	4-20mA	Pressure from high pressure transducer 2
U4	Ntc	Entering / Inlet water temperature
U5	Ntc	Outdoor air temperature
U6	-	Not used
U7	-	Not used
U8	-	Not used
U9	Ntc-HT	Discharge probe temperature circuit 1
U10	Ntc-HT	Discharge probe temperature circuit 2

DIGITAL INPUTS - control board		
Variable Name	**Type**	**Description**
ID1	24Vdc	Remote On/Off Status
ID2	24Vdc	Low pressure switch circuit 1 Status
ID3	24Vdc	Low pressure switch circuit 2 Status
ID4	24Vdc	Not used
ID5	24Vdc	Serious Alarm (phase monitor) Status
ID6	24Vdc	Thermal protection compressor 1 Status
ID7	24Vdc	Oil level switch compressor 1 Status
ID8	24Vdc	Not used
ID9	24Vdc	Not used
ID10	24Vdc	Not used
ID11	24Vdc	Not used
ID12	24Vdc	Water flow switch / Interlock Status
ID13H	230Vdc	High pressure switch comrpessor 1
ID14H	230Vdc	Not used
ID15	24Vdc	Thermal protection fan circuit 1 step 2 Status
ID16	24Vdc	Thermal protection fan circuit 1 step 1 Status
ID17	24Vdc	Thermal protection fan circuit 2 step 2 Status
ID18	24Vdc	Thermal protection fan circuit 2 step 1 Status

INPUTS / OUTPUTS - expansion card		
Variable Name	**Type**	**Description**
U1	-	Remote double set point
U2	-	Part load / switch off Circuit 1
U3	-	Part load / switch off Circuit 2
U4	-	Thermal shared fan deck
U5	-	Not used
U6	-	Not used
U7	-	Shared fan deck (control signal)
U8	-	Analog remote set point
U9	-	Not used
U10	-	Not used

List of parameters - IN/OUT MENU (continued)

ANALOG OUTPUTS - control board		
Variable Name	**Type**	**Description**
Y1	0/10Vdc	Inverter fans Circuit 1 Step 2
Y2	0/10Vdc	Inverter fans Circuit 1 Step 1
Y3	0/10Vdc	Inverter fans Circuit 2 Step 2
Y4	0/10Vdc	Inverter fans Circuit 2 Step 1
Y5	0/10Vdc	Inverter pump evaporator
Y6	0/10Vdc	Not used

DIGITAL OUTPUTS - control board		
Variable Name	**Type**	**Description**
NO1	SPST	Evaporator heater status
NO2	SPST	Compressor 1 Circuit 1 Solenoid CR1 status
NO3	SPST	Compressor 1 Circuit 1 Solenoid CR2 status
NO4	SPST	Compressor 1 Circuit 1 Solenoid CR3 status
NO5	SPST	Compressore 1 circuito 1 PartWindingA status
NO6	SPST	Compressore 1 circuito 1 PartWindingB status
NO7	SPST	Pump status
NO8	SPDT	Alarm status
NO9	SPST	Not used
NO10	SPST	Not used
NO11	SPST	Compressor cranckase heater status
NO12	SPDT	Not used
NO13	SPDT	Not used
NO14	SPDT	Not used
NO15	SPDT	Circuit 1 fans step 2 (group with fans >) Status
NO16	SPST	Circuit 1 fans step 1 (group with fans <) Status
NO17	SPST	Circuit 2 fans step 2 (group with fans >) Status
NO18	SPST	Circuit 1 fans step 1 (group with fans <) Status

DIGITAL OUTPUTS * - expansion card		
Variable Name	**Type**	**Description**
NO1	-	ECO valve system 1 status
NO2	-	ECO valve system 2 status
NO3	-	Liquid injection valve system 1 status
NO4	-	Not used
NO5	-	Share fan deck fans (on-off) status
NO6	-	Not used

6 - Control (continued)

Alarms

Alarm code	Description	Type	Notes
0	Error in the number of retain memory writings	User reset	
1	Error in retain memory writings	User reset	
2	Water Flow Switch / Interlock	Auto reset until counter	
3	Phase monitor alarm	Auto reset	
4	Antifreeze	User reset	
5	High difference RWT/LWT	Auto reset	
6	Wrong trend RWT/LWT	Auto reset	
7	Returning water temperature probe	Auto reset	
8	Leaving water temperature probe	Auto reset	
9	Discharge pressure transducer circuit 1	Auto reset	
10	Discharge pressure transducer circuit 2	Auto reset	
11	External air temperature probe	Auto reset	
12	Discharge temperature probe circuit 1	Auto reset	
13	Discharge temperature probe circuit 2	Auto reset	
14	High discharge temperature Comp 1 Circuit 1	User reset	
15	Low discharge pressure Comp 1 Circuit 1	User reset	
16	High suction pressure Comp 1 Circuit 1	User reset	
17	Low suction pressure Comp 1 Circuit 1	User reset	
18	High current Comp 1 Circuit 1	User reset	
19	High ratio pressure Comp 1 Circuit 1	User reset	
20	Low ratio pressure Comp 1 Circuit 1	User reset	
21	Low delta pressure Comp 1 Circuit 1	User reset	
22	High discharge pressure Comp 1 Circuit 1	User reset	
23	LOP - EEV Valve A Circuit 1	Auto reset	
24	LOP - EEV Valve B Circuit 1	Auto reset	
25	MOP - EEV Valve A Circuit 1	Auto reset	
26	MOP - EEV Valve B Circuit 1	Auto reset	
27	EEV A Motor Error Circuit 1	Auto reset	
28	EEV B Motor Error Circuit 1	Auto reset	
29	Low suction temperature EEV valve A Circuit 1	Auto reset	
30	Low suction temperature EEV valve B Circuit 1	Auto reset	
31	High condensing temperature Circuit 1	Auto reset	
32	Suction pressure transducer circuit 1	Auto reset	
33	Suction temperature probe circuit 1	Auto reset	
34	S3 probe circuit 1	Auto reset	
35	S4 probe circuit 1	Auto reset	
36	Battery low charge EVD circuit 1	Auto reset	
37	EEPROM Alarm EVD circuit 1	Auto reset	
38	Incomplete closing EVD circuit 1	Auto reset	
39	Emergency closing EVD circuit 1	Auto reset	
40	Firmware not compatible EVD circuit 1	Auto reset	
41	Configuration Error EVD circuit 1	Auto reset	
42	Offline EVD circuit 1	Auto reset	
43	High discharge temperature Comp 1 Circuit 2	Auto reset	
44	Low discharge pressure Comp 1 Circuit 2	Auto reset	
45	High suction pressure Comp 1 Circuit 2	Auto reset	
46	Low suction pressure Comp 1 Circuit 2	Auto reset	
47	High current Comp 1 Circuit 2	Auto reset	
48	High ratio pressure Comp 1 Circuit 2	Auto reset	
49	Low ratio pressure Comp 1 Circuit 2	Auto reset	
50	Low delta pressure Comp 1 Circuit 2	Auto reset	
51	High discharge pressure Comp 1 Circuit 2	Auto reset	
52	LOP - EEV Valve A circuit 2	Auto reset	
53	LOP - EEV Valve B circuit 2	Auto reset	
54	MOP - EEV Valve A circuit 2	Auto reset	
55	MOP - EEV Valve A circuit 2	Auto reset	
56	EEV A Motor Error circuit 2	Auto reset	
57	EEV B Motor Error circuit 2	Auto reset	
58	Low suction temperature EEV valve A Circuit 2	Auto reset	
59	Low suction temperature EEV valve B Circuit 2	Auto reset	
60	High condensing temperature Circuit 2	Auto reset	
61	Suction pressure transducer circuit 2	Auto reset	

Alarm code	Description	Type	Notes
62	Suction temperature probe circuit 2	Auto reset	
63	S3 probe circuit 2	Auto reset	
64	S4 probe circuit 2	Auto reset	
65	Battery low charge EVD circuit 2	Auto reset	
66	EEPROM Alarm EVD 2	Auto reset	
67	Incomplete closing EVD circuit 2	Auto reset	
68	Emergency closing EVD circuit 2	Auto reset	
69	Firmware not compatible EVD circuit 2	Auto reset	
70	Configuration Error EVD circuit 2	Auto reset	
71	EVD offline EVD circuit 2	Auto reset	
72	Pcoe 1 offline	Auto reset	
73	Wrong configuration on Pcoe 1	Auto reset	
74	Low pressure switch circuit 1	Auto reset until counter	
75	Low pressure switch circuit 2	Auto reset until counter	
76	Overload compressor 1 circuit 1	User reset	
77	High pressure switch circuit 1	User reset	
78	Oil level switch circuit 1	User reset	
79	Overload fan deck 1 circuit 1	User reset	
80	Overload fan deck 2 circuit 1	User reset	
81	Overload fan deck 1 circuit 2	User reset	
82	Overload fan deck 2 circuit 2	User reset	
83	High pressure switch circuit 2	User reset	
84	Oil level switch circuit 2	User reset	
85	Overload compressor 1 circuit 2	User reset	
86	Low superheat alarm EEV valve A circuit 1	Auto reset	
87	Low superheat alarm EEV valve B circuit 1	Auto reset	
88	Low superheat alarm EEV valve A circuit 2	Auto reset	
89	Low superheat alarm EEV valve B circuit 2	Auto reset	
90	Overload fan deck shared	User reset	
91	Current transformer circuit 1	Auto reset	
92	Current transformer circuit 2	Auto reset	
93	Maintenance hours compressor 1 circuit 1	User reset	
94	Maintenance hours compressor 1 circuit 2	User reset	
95	Compressor 1 circuit 1 offline (Inverter)	Auto reset	
96	Compressor 1 circuit 2 offline (Inverter)	Auto reset	
97	Returning water temperature probe	Auto reset	
98	Leaving water temperature probe	Auto reset	
99	Compressor 1 circuit 1 Critical (Inverter)	Manual reset	(*)
100	Compressor 1 circuit 1 Fault (Inverter)	Manual reset	(*)
101	Compressor 1 circuit 2 Critical (Inverter)	Manual reset	(*)
102	Compressor 1 circuit 2 Fault (Inverter)	Manual reset	(*)
103	Pump Inverter Alarm	Auto reset (2 times only)	(**)
104	Pump Inverter Fault	Auto reset (2 times only)	(**)

(*) The Inverter Compressor alarms (critical and fault) must be resetted with support of Systemair Service personnel. Call your Service Center by providing the Alarm/Fault code shown on the controller display in order to make possible a further analysis of the problem occurred.

(**) Alarm/Fault code shown in the pump inverter display. After auto reset (2 times) the manual reset is possible from pump inverter display

INVERTER PUMP ALARM LIST

S.NO.	WARNING NO.	DESCRIPTION
1	W/A2	Live zero error
2	W/A7	DC over voltage
3	W/A8	DC under voltage
4	W/A9	Inverter overloaded
5	W/A10	Motor ETR over temperature
6	W/A11	Motor thermistor over temperature
7	W/A12	Torque limit
8	W/A27	Brake chopper short-circuited
9	W/A35	Out of frequency range
10	W/A37	Phase Imbalance
11	A4	Mains phase loss
12	A13	Over Current
13	A14	Ground fault
14	A29	Drive over temperature
15	A30	Motor phase U missing

S.NO.	WARNING NO.	DESCRIPTION
16	A31	Motor phase V missing
17	A32	Motor phase W missing
18	A47	24 V supply low
19	A65	Control Board Over-temperature
20	A244	Heatsink temp
21	A16	Short Circuit
22	A33	Inrush fault
23	A38	Internal fault
24	A39	Heatsink sensor
25	A45	Earth fault 2
26	A46	Pwr. card supply
27	A48	1.8 V supply low
28	A69	Pwr. Card Temp
29	A79	Illegal PS config
30	A91	Analog input 54 wrong settings

6 - Control (continued)

6.4 Setpoint

Pressing the Set key allows you to enter the Set point level accessible to the user. The parameters that can be set are listed below, along with the limit values and the default values (standard shop settings):

User parameters	Control mode	Min value	Max value	Default
Cooling Setpoint	RWT Return Control	8	18	12
	LWT Leaving Control	5	15	7
Cooling Setpoint - glycol water 10%	RWT Return Control	3	18	12
	LWT Leaving Control	0	15	7
Cooling Setpoint - glycol water 40%	RWT Return Control	-5	18	12
	LWT Leaving Control	-8	15	7

6.5 Protection and Safety Equipment

Refrigeration system

The units are filled with R134a/R513A refrigerant fluid of non hazardous type (group II). Safety device (pressure switch and safety valves) with the sets below indicated are provided on the discharge and suction line of each circuit.

Discharge Line
Pressure relief valve 22 bar.
Pressure switch 19,7 bar.

Suction line
Pressure relief valve 14.5 bar.
Pressure switch 0.5 bar.

Frost Protection for the Chilled Fluid

These units are provided with frost protection for the chilled fluid. This protection consists of an electrical resistor positioned in contact with the coolant/circulating fluid exchanger, which is activated (although the unit is off) when the temperature of the fluid drops below 5 °C - the standard value for a non-glycol unit.

If the leaving water temperature drops below 4 °C (standard value for a non-glycol unit) the machine's antifreeze alarm is activated. If the circulating fluid is water, before the beginning of the cold season it is advisable to drain the circuit to prevent water frosting.

If the circuit cannot be drained, it is essential to avoid de-energizing the unit, so as to permit the activation, when necessary, of the frost protection.

Compressor protection

Compressors are equipped with a heating element to prevent oil dilution, which may result in remarkable risks of failure of compressors.

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

An accessory kit for thermal protection (ACB) is available, for any overcurrent of compressors, which shall be shop-mounted.

Electrical flow switch

A electrical flow switch must be installed, to prevent the unit working in case of insufficient circulation of the chilled fluid.

The electrical flow switch must be carefully installed, according to the instructions given by the Manufacturer.

The electrical flow switch must be installed on the pressing side of the circulation pump for the fluid, just upstream of the heat exchanger's inlet. The electrical flow switch must be installed in a horizontal straight length of piping, in a position reasonably far (both upstream and downstream) from localized pressure drops (curves, valves etc.).

Continuous Regulation of the EC brushless fans

EC brushless fans are mounted as standard and allow the unit to work at an ambient temperature down to -10 °C.

6.6 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 entering parameter in service level - Max Speed (Vdc) - it is possible to modify high static pressure. The table below shows the correspondance between chiller model, fan RPM, high static pressure (approximate values).

Model	Fan Static Pressure (Pa)	Fan RPM	Parameter in Service Level: Max Speed (Vdc)
380-1260	0	900	6,9
	30	950	7,3
	70	1.000	7,9
	100	1.050	8,3
	120	1.100	10,0

7 - Product Description

7.1 Introduction

The units are air cooled water chillers provided with screw compressors with two refrigeration circuits.

These units are fit for cooling intermediate fluids (glycoled water), for air-conditioning applications in industrial processes.

These units can be installed outdoor on the roof of a building or at ground level.

This series includes the following versions:

VERSION (1)	DESCRIPTION
Standard version	Air cooled water chillers, using R134a or R513A refrigerant.
Super Low Noise version (S)	
High pressure fan (HPF) (1)	
High Temperature version (HT) (1)	

(1) A high pressure fan (HPF) version and High Temperature (HT) version are equipped with extra powered brushless fans, able to work up to 1100 Rpm.

Brine Version: Unit with dedicated devices on refrigeration system allows the units to operate with brine (ethylenic or propylenic glycol) down to -8 °C.

Available options:

OPTIONS	DESCRIPTION
Desuperheater (D)	The heat recovery is carried out by a desuperheater mounted on the compressor's discharge line.
Totaly heat recovery	Not available. For information, please contact commercial office.

7.2 General specifications

The units are supplied complete and provided with all connecting pipes for the refrigerant and internal wiring.

The refrigeration circuit of each unit undergoes a pressure test, is drained, vacuumised, dehydrated and filled with refrigerant, and includes the necessary oil. Once assembled, each unit is subjected to a complete final testing and the correct operation of all refrigeration circuits is checked.

The base and the frame of each unit are made of very thick galvanised sheet, and are secured by screw and stainless bolts. All panels are secured by screw and tropicalised steel bolts, they can be disassembled for easy access to internal components.

All galvanised steel parts are painted with white polyester resin, to ensure the resistance of the unit to corrosion and weather agents over time.

7.3 Compressors

The units are provided with high power, high efficiency and low vibration level semi-hermetic screw compressors. For special application (on request) compressors with liquid injection or external oil cooling with plate-type exchangers can be provided to reduce the discharge temperature.

As standard, the capacity control is of hybrid type: step type for the fixed speed compressor and stepless type for the inverter driven compressor. It is handled by capacity control solenoid valves, handled by the microprocessor of the appliance.

The motor's terminals are weatherproof, according to standard IP54.

7.4 Refrigeration circuits

The units are provided with two independent circuits with screw compressors for each circuit and shell and tube heat exchanger.

Each refrigerant circuit includes: a service valve for refrigerant filling, shutoff valves for suction lines (on request), as well as for the delivery and liquid lines, an electronic expansion valve, that completely closed (as a solenoid valve) makes it possible to start/stop the compressor, a dehydrating cartridge filter, a sight glass with humidity indicator.

Furthermore, each circuit is equipped with safety devices in accordance with PED 2014/68/EU: high and low pressure switches, safety valves providing protection in case of fire or malfunction of compressors.

7.5 Water heat exchanger

Evaporator

The units are provided with a direct-expansion refrigerant/water shell and tube heat exchanger with several refrigeration circuits.

The evaporators are insulated with UV ray-proof 19 mm-thick anti-condensate closed-cell polyethylene material.

The external surface is provided with wire electric heaters (400-800 W), which prevent frosting at low temperatures (down to -18 °C) when the unit is off.

Desuperheater

All units are available with desuperheaters (DSH). DSH is refrigerant/ water heat exchanger with brazed plates.

DSH is fitted on the compressor discharge pipe and it's dimensioned to recover about the 10-15% of total rejected heat. Each unit is equipped with 2 exchangers, one for each circuit.

Total heat recovery condenser

Some units are available with total heat recovery condenser (THRC). THRC is refrigerant / water heat exchanger with brazed plates or shell and tube, according to chiller size. THRC is fitted on the compressor discharge pipe in parallel with the standard cooling circuit. The heat recovery function is by means of a four-way valve. Each unit is equipped with 2 exchangers, one for each circuit. Exchangers are insulated with UV ray-proof 19 mm-thick anticondensate closed-cell polyethylene material.

7.6 Air heat exchanger

Coils are microchannel type, made of 100% aluminum (fins, tubes and headers). Tube and fins coils (copper/aluminium) are available as option

7.7 Fans

The condenser's fans are of large diameter (800 mm) axial type. They are EC brushless type up to around 900Rpm for standard and S versions, up to around 1100 Rpm for HT and HPF versions. They are provided with external diffusers (nozzles), that reduce the aeraulic motor to a large extent. Each fan is provided with galvanised steel accident-prevention guard, painted after assembly.

Finally, the fans' motors are completely closed, protection class IP55, protection thermostat immersed in windings.

7.8 Electric power supply and control system

All units are provided with a microprocessor and a "Chiller Control" system.

The electrical connection of the controls and the startup units for the motor are carried out and tested in the factory. The power supply and control components are separate and accessible from different doors.

A door stop disconnecting switch is always available, and is mounted on the door of the appliance, supply side. The cabinet includes also another door, that can be opened from the top, waterproofed according to IP54 standard.

The power supply compartment includes:

- Master switch
- Network isolator, contactors, compressor fuses

Control panel includes:

- A transformer for auxiliaries, fuses, relay and electronic card, a thermostat for the compressor's delivery temperature
- The keyboard and the display of the "Chiller-Control" microcomputer, mounted on the door of the control section.

7.9 Accessories

List of available accessories, provided separately, to be mounted on site by the installer:

Water flow switch

Prevents the operation of the unit when the chilled fluid is insufficient. It is advisablem to install a flow switch, to ensure the correct operation of the unit.

Water filter

Filter to be mounted on the suction side of the water heat exchanger. It is mandatory to install a water filter to remove impurities from the water suplly.

Antivibrating supports (AVM)

Isolating spring supports, equipped with bolts for fastening to the base. They are supplied separated from the unit and must be mounted on site by the customer, at his own expense.

Remote wall terminal

Makes it possible to check the unit through a remote terminal, up to a maximum distance of 400 meters.

RS485 serial card (for MODBUS or BACNET)

A communication interface makes it possible to control and manage the unit from a local station, with RS485 connection, up to a distance of 1000 m.

It is possible to obtain the remote control and the management, by inserting the control into the management plant of the building.

Internal hydro kits

Consist of pump(s) and relevant accessories (tank is not available inside the unit).

Hydraulic module

"Consist of one or two centrifugal pumps standardized to EN 733, ISO 5199 and directive 2009/125/EC. Three-phase electrical motor, protected to IP55, insulation class F. In the case of two pumps (One Operational and one standby), the standby pump starts once the operational pump breaks down. "

Variable flow hydraulic module

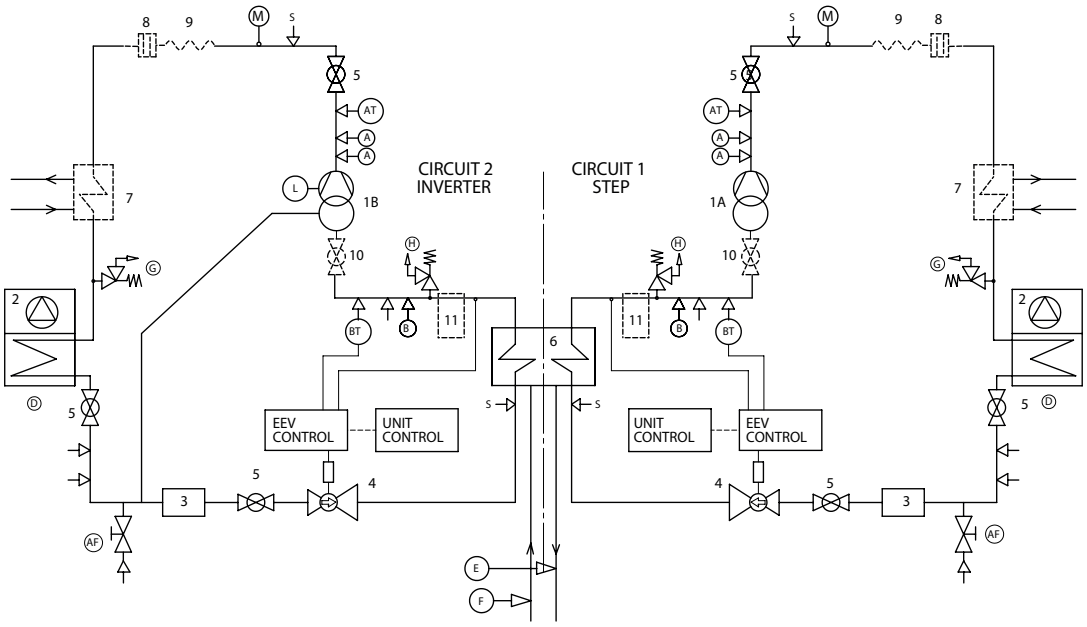
"Consist of one or two centrifugal pumps standardized to EN 733, ISO 5199 and directive 2009/125/EC. Three-phase electrical motor, protected to IP55, insulation class F, coupled with an inverter (protected to IP55), which modulates the current's frequency between 25 and 50 Hz. The two pumps are managed to balance their running time. The inverter is used to manage the pumps is placed in a dedicated panel and is driven directly by the unit's controller. "

External hydro kits

Consist of buffer tank, pump(s), relevant accessories and with or without tank antifreeze heater.

7 - Product Description (continued)

Refrigerant flow diagram - Unit 380-510 CO

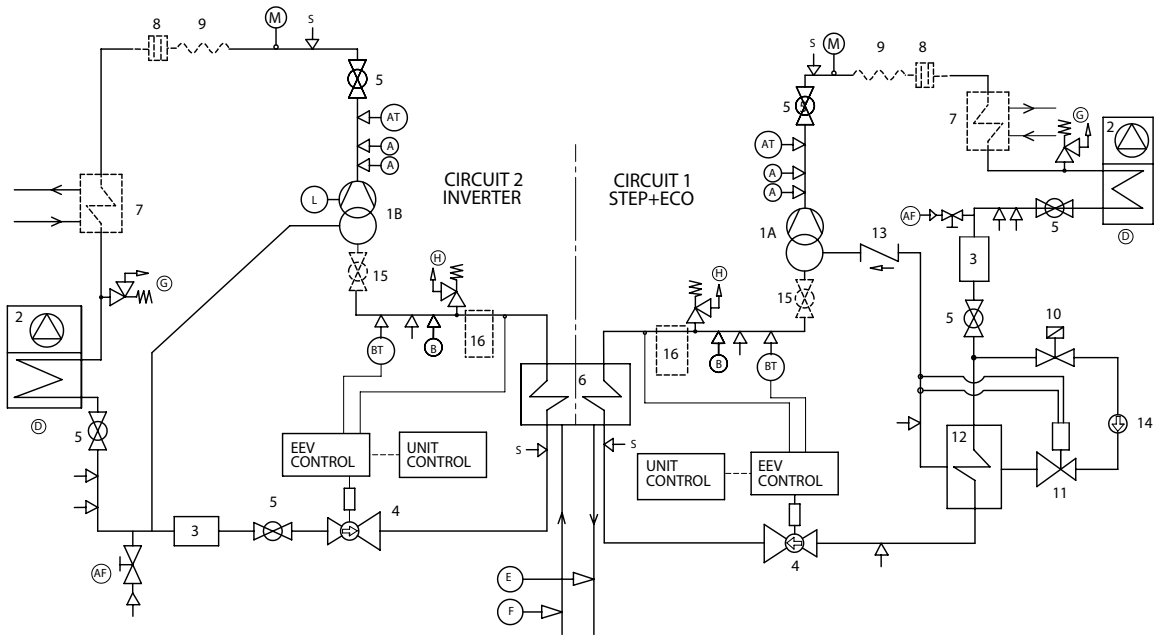


COMPONENTS	
1A	Compressor (Screw Step type)
1B	Compressor (Screw Inverter type)
2	Air cooled condenser
3	Filter drier
4	Electronic expansion valve
5	Globe valve
6	Heat exchanger (Shell & Tube Type)
7	Desuperheater (Optional)
8	Muffler (Optional)
9	Anti-vibration pipe (Optional)
10	Suction compressor valve (Optional)
11	Suction accumulator (only BC version)

SAFETY / CONTROL DEVICES	
A	High pressure switch
AT	High pressure transducer
B	Low pressure switch
BT	Low pressure transducer
S	5/16” Shrader connection
D	Air temperature sensor
E	Outlet water temperature sensor
F	Inlet water temperature sensor
G	PED pressure relief valve HP side
H	PED pressure relief valve LP side
M	Discharge temperature sensor
AF	Access fitting SAE FLARE 3/8”
L	Oil level switch
	Pressure Pipe connection with Shrader valve

7 - Product Description (continued)

Refrigerant flow diagram - Unit 440-590-660-730-810-900-980-1060-1160 CO

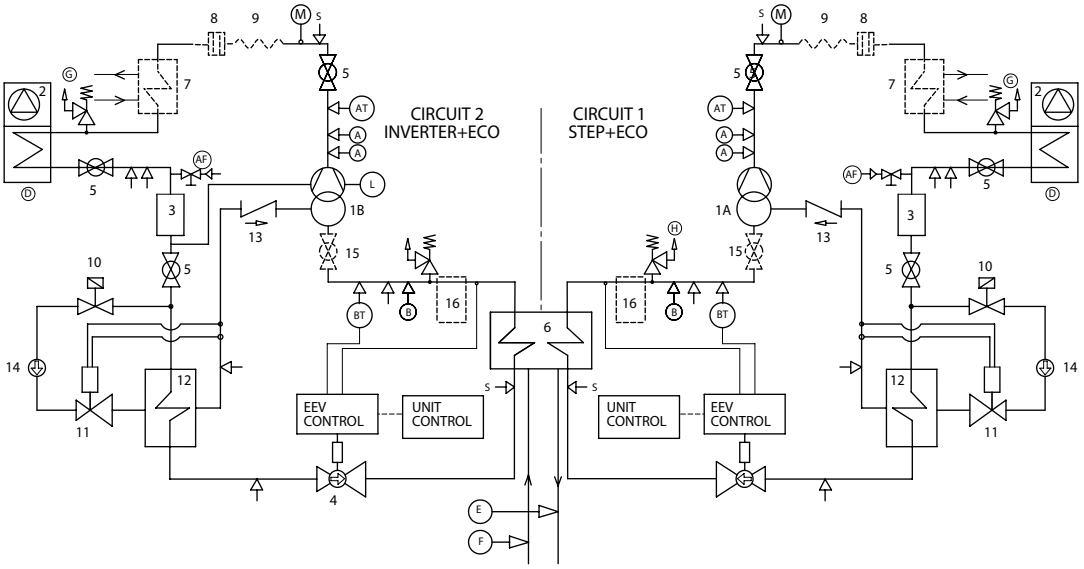


COMPONENTS	
1A	Compressor (Screw Step type)
1B	Compressor (Screw Inverter type)
2	Air cooled condenser
3	Filter drier
4	Electronic expansion valve
5	Globe valve
6	Heat exchanger (Shell & Tube Type)
7	Desuperheater (Optional)
8	Muffler (Optional)
9	Anti-vibration pipe (Optional)
10	Solenoid valve (ECO)
11	Thermostatic expansion valve (ECO)
12	Heat exchanger (Phetype) (ECO)
13	Non return valve (ECO)
14	Sight glass (ECO)
15	Suction compressor valve (Optional)
16	Suction accumulator (only BC version)

SAFETY / CONTROL DEVICES	
A	High pressure switch
AT	High pressure transducer
B	Low pressure switch
BT	Low pressure transducer
S	5/16” Shrader connection
D	Air temperature sensor
E	Outlet water temperature sensor
F	Inlet water temperature sensor
G	PED pressure relief valve HP side
H	PED pressure relief valve LP side
M	Discharge temperature sensor
AF	Access fitting SAE FLARE 3/8”
L	Oil level switch
	Pressure Pipe connection with Shrader valve

7 - Product Description (continued)

Refrigerant flow diagram - Unit 1260 CO

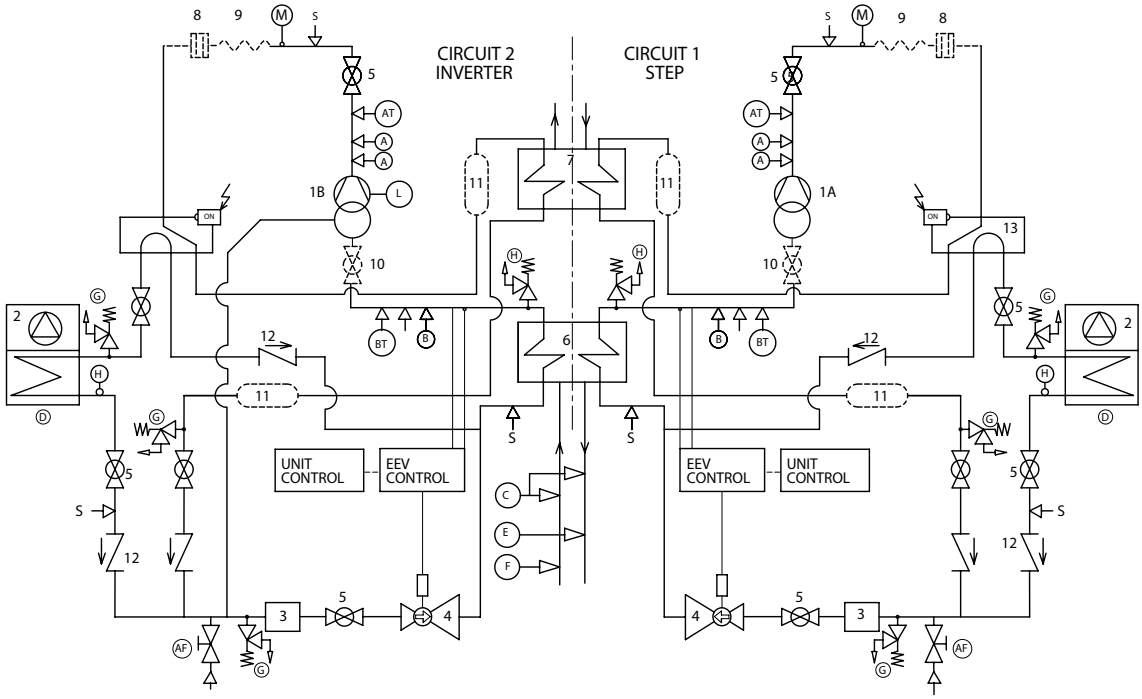


COMPONENTS	
1A	Compressor (Screw Step type)
1B	Compressor (Screw Inverter type)
2	Air cooled condenser
3	Filter drier
4	Electronic expansion valve
5	Globe valve
6	Heat exchanger (Shell & Tube Type)
7	Desuperheater (Optional)
8	Muffler (Optional)
9	Anti-vibration pipe (Optional)
10	Solenoid valve (ECO)
11	Thermostatic expansion valve (ECO)
12	Heat exchanger (Phetype) (ECO)
13	Non return valve (ECO)
14	Sight glass (ECO)
15	Suction compressor valve (Optional)
16	Suction accumulator (only BC version)

SAFETY / CONTROL DEVICES	
A	High pressure switch
AT	High pressure transducer
B	Low pressure switch
BT	Low pressure transducer
S	5/16” Shrader connection
D	Air temperature sensor
E	Outlet water temperature sensor
F	Inlet water temperature sensor
G	PED pressure relief valve HP side
H	PED pressure relief valve LP side
M	Discharge temperature sensor
AF	Access fitting SAE FLARE 3/8”
L	Oil level switch
	Pressure Pipe connection with Shrader valve

7 - Product Description (continued)

Refrigerant flow diagram - Unit 380-510 TR

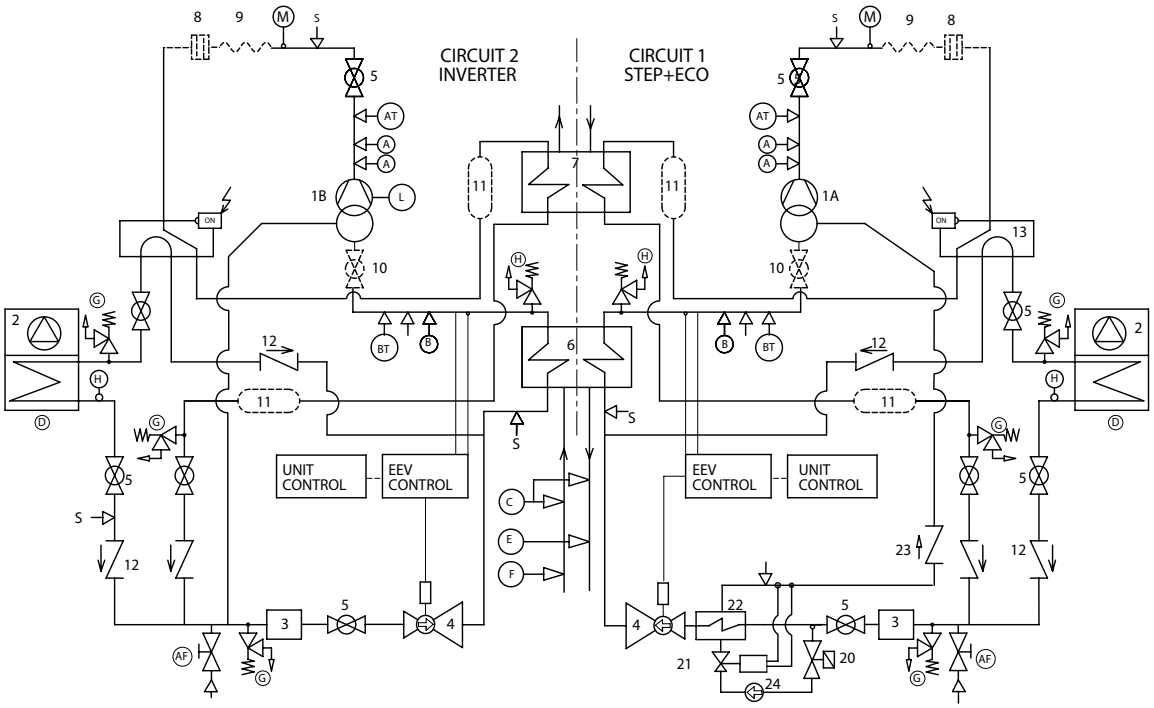


COMPONENTS	
1A	Compressor (Screw Step type)
1B	Compressor (Screw Inverter type)
2	Air cooled condenser
3	Filter drier
4	Electronic expansion valve
5	Globe valve
6	Heat exchanger (Shell & Tube Type)
7	Heat recover (Shell & Tube Type)
8	Muffler (Optional)
9	Anti-vibration pipe (Optional)
10	Suction compressor valve (Optional)
11	Liquid receiver
12	Check valve
13	4-way valve

SAFETY / CONTROL DEVICES	
A	High pressure switch
AT	High pressure transducer
B	Low pressure switch
BT	Low pressure transducer
S	5/16” Shrader connection
D	Air temperature sensor
E	Outlet water temperature sensor
F	Inlet water temperature sensor
G	PED pressure relief valve HP side
H	PED pressure relief valve LP side
M	Discharge temperature sensor
AF	Access fitting SAE FLARE 3/8”
L	Oil level switch
	Pressure Pipe connection with Shrader valve

7 - Product Description (continued)

Refrigerant flow diagram - Unit 440-590-660 TR



COMPONENTS	
1A	Compressor (Screw Step type)
1B	Compressor (Screw Inverter type)
2	Air cooled condenser
3	Filter drier
4	Electronic expansion valve
5	Globe valve
6	Heat exchanger (Shell & Tube Type)
7	Heat recover (Shell & Tube Type)
8	Muffler (Optional)
9	Anti-vibration pipe (Optional)
10	Suction compressor valve (Optional)
11	Liquid receiver
12	Check valve
13	4-way valve
20	Solenoid valve (ECO)
21	Thermostatic expansion valve (ECO)
22	Heat exchanger (Phetype) (ECO)
23	Non return valve (ECO)
24	Sight glass (ECO)

SAFETY / CONTROL DEVICES	
A	High pressure switch
AT	High pressure transducer
B	Low pressure switch
BT	Low pressure transducer
S	5/16” Shrader connection
D	Air temperature sensor
E	Outlet water temperature sensor
F	Inlet water temperature sensor
G	PED pressure relief valve HP side
H	PED pressure relief valve LP side
M	Discharge temperature sensor
AF	Access fitting SAE FLARE 3/8”
L	Oil level switch
	Pressure Pipe connection with Shrader valve

8 - Technical Data

8.1 Pressure drops

Evaporator Pressure drop

Model	Nom. Capacity	Qnom.	Qmax.	Qmin.	K	Dp nom	DP max	DP min
	kW	l/h	l/h	l/h	kPa/(l/h) ^ 2	kPa	kPa	kPa
380	366	63010	105016	39381	4,314E-09	17,1	47,6	6,7
450	444	76366	127277	47729	4,129E-09	24,1	66,9	9,4
500	501	86180	143633	53862	2,486E-09	18,5	51,3	7,2
590	567	97512	162519	60945	2,486E-09	23,6	65,7	9,2
660	645	110953	184922	69346	2,485E-09	30,6	85,0	11,9
730	706	121426	202376	75891	1,999E-09	29,5	81,9	11,5
810	780	134199	223666	83875	1,999E-09	36,0	100,0	14,1
900	898	154539	257565	96587	8,812E-10	21,0	58,5	8,2
980	985	169490	282483	105931	8,297E-10	23,8	66,2	9,3
1060	1050	180531	300885	112832	8,459E-10	27,6	76,6	10,8
1160	1157	198964	331607	124353	8,459E-10	33,5	93,0	13,1
1260	1243	213864	356440	133665	7,106E-10	32,5	90,3	12,7

Desuperheater pressure drop

Model	Nom. Capacity	Qnom.	Qmax.	Qmin.	K	Dp nom	DP max	DP min
	kW (*)	l/h	l/h	l/h	kPa/(l/h) ^ 2	kPa	kPa	kPa
380	28	4752	7919	2970	1,1838E-07	2,7	7,4	1,0
450	33	5680	9467	3550	7,8281E-08	2,5	7,0	1,0
500	38	6474	10791	4046	5,0243E-08	2,1	5,9	0,8
590	42	7252	12087	4532	5,0243E-08	2,6	7,3	1,0
660	48	8245	13742	5153	4,0625E-08	2,8	7,7	1,1
730	53	9072	15120	5670	4,0625E-08	3,3	9,3	1,3
810	58	10023	16706	6265	2,7081E-08	2,7	7,6	1,1
900	67	11543	19238	7214	2,7081E-08	3,6	10,0	1,4
980	74	12693	21156	7933	2,0919E-08	3,4	9,4	1,3
1060	78	13396	22327	8373	2,0919E-08	3,8	10,4	1,5
1160	86	14808	24681	9255	2,0004E-08	4,4	12,2	1,7
1260	93	16044	26740	10028	2,0004E-08	5,1	14,3	2,0

(*) Capacity referred to only one circuit.
Data referred to standard unit and refrigerant R513A. Minor differences with configurations S/HT and refrigerant R134a (< 5%)

8 - Technical Data (continued)

8.2 Technical data

SYSCREW AIR EVO HSE STD / HT / HPF		380	440	510	590	660	730
Power supply*	V/Ph/Hz	400 (± 10%) / 3 / 50					
Number of refrigerant circuits		2					
Start-up Type		PW+FI	PW+FI	PW+FI	PW+FI	SD+FI	SD+FI
Min÷Max capacity steps	%	22% ÷ 100%	18% ÷ 100%	16% ÷ 100%	14% ÷ 100%	13% ÷ 100%	15% ÷ 100%
COMPRESSOR							
Number		2					
Type		1 STEP SCREW + 1 INVERTER SCREW					
INTERNAL HEAT EXCHANGER (EVAPORATOR)							
Number		1					
Type		Shell & tube					
Water connections	inch	6	6	8	8	8	8
EXTERNAL HEAT EXCHANGER (COILS)							
Number		8	10	10	10	12	12
Type		MCHX - Al/Alloy					
FAN							
Number		8	10	10	12	14	14
Air flow	m^3/h	183.960	230.040	230.040	276.120	321.840	321.840
Total input power	kW	12,0	15,0	15,0	18,0	21,0	21,0
Total input power **	kW	20,5	25,6	25,6	30,7	35,8	35,8
Total input power ***	kW	24,0	30,0	30,0	36,0	42,0	42,0
REFRIGERANT							
Type / GWP		R134a / 1430					
Charge 1 / 2 (1)	kg	33 / 33	41 / 41	46 / 46	51 / 51	65 / 65	68 / 68
	tCO_2eq	47,2 / 47,2	58,6 / 58,6	65,8 / 65,8	72,9 / 72,9	93,0 / 93,0	97,2 / 97,2
Type / GWP		R513A / 631					
Charge 1 / 2 (1)	kg	33 / 33	41 / 41	46 / 46	51 / 51	65 / 65	68 / 68
	tCO_2eq	20,8 / 20,8	25,9 / 25,9	29,0 / 29,0	32,2 / 32,2	41,0 / 41,0	42,9 / 42,9
DESUPERHEATER							
Number		2					
Type		PHE					
WEIGHT							
Shipping	kg	3747	4117	4651	4995	5392	5931
Operating	kg	3896	4259	4897	5241	5620	6207
DIMENSIONS							
Length	mm	4660	5712	5712	6764	7816	7816
Width	mm	2192	2192	2192	2192	2192	2192
Height	mm	2510	2510	2510	2510	2510	2510

(1) The refrigerant value are indicative values for standard units. The actual data are indicated on the unit label.

* Voltage supply tolerances: +/- 10% of the nominal Voltage (400V) for short term application; +/-5% of the nominal Voltage (400V) for continuous application

** High Temperature Units (HT), data with fans at max speed (1100 Rpm)

*** HPF Units, data with fans at max speed (1100 Rpm)

8 - Technical Data (continued)

SYSCREW AIR EVO HSE STD / HT / HPF		810	900	980	1060	1160	1260
Power supply*	V/Ph/Hz	400 (± 10%) / 3 / 50					
Number of refrigerant circuits		2					
Start-up Type		SD+FI	SD+FI	SD+FI	SD+FI	SD+FI	SD+FI
Min÷Max capacity steps	%	13% ÷ 100%	14% ÷ 100%	13% ÷ 100%	17% ÷ 100%	15% ÷ 100%	14% ÷ 100%
COMPRESSOR							
Number		2					
Type		1 STEP SCREW + 1 INVERTER SCREW					
INTERNAL HEAT EXCHANGER (EVAPORATOR)							
Number		1					
Type		Shell & tube					
Water connections	inch	8	8	10	10	10	10
EXTERNAL HEAT EXCHANGER (COILS)							
Number		14	14	16	18	20	22
Type		MCHX - Al/Alloy					
FAN							
Number		16	18	20	22	24	24
Air flow	m^3/h	367.920	414.000	460.080	506.160	552.240	552.240
Total input power	kW	24,0	27,0	30,0	33,0	36,0	36,0
Total input power **	kW	41,0	46,1	51,2	56,3	61,4	61,4
Total input power ***	kW	48,0	54,0	60,0	66,0	72,0	72,0
REFRIGERANT							
Type / GWP		R134a / 1430					
Charge 1 / 2 (1)	kg	76 / 76	88 / 88	93 / 93	102 / 102	114 / 114	114 / 114
	tCO_2eq	108,7 / 108,7	125,8 / 125,8	133,0 / 133,0	145,9 / 145,9	163,0 / 163,0	163,0 / 163,0
Type / GWP		R513A / 631					
Charge 1 / 2 (1)	kg	76 / 76	88 / 88	93 / 93	102 / 102	114 / 114	114 / 114
	tCO_2eq	48,0 / 48,0	55,5 / 55,5	58,7 / 58,7	64,4 / 64,4	71,9 / 71,9	71,9 / 71,9
DESUPERHEATER							
Number		2					
Type		PHE					
WEIGHT							
Shipping	kg	6255	6947	7397	8124	8508	8643
Operating	kg	6531	7326	7764	8491	8875	9074
DIMENSIONS							
Length	mm	8868	9920	10972	12024	13076	13076
Width	mm	2192	2192	2192	2192	2192	2192
Height	mm	2510	2510	2510	2510	2510	2510

(1) The refrigerant value are indicative values for standard units. The actual data are indicated on the unit label.

* Voltage supply tolerances: +/- 10% of the nominal Voltage (400V) for short term application; +/-5% of the nominal Voltage (400V) for continuous application

** High Temperature Units (HT), data with fans at max speed (1100 Rpm)

*** HPF Units, data with fans at max speed (1100 Rpm)

8 - Technical Data (continued)

SYSCREW AIR EVO HSE S		380	440	510	590	660	730
Power supply*	V/Ph/Hz	400 (± 10%) / 3 / 50					
Number of refrigerant circuits		2					
Start-up Type		PW+FI	PW+FI	PW+FI	PW+FI	SD+FI	SD+FI
Min÷Max capacity steps	%	22% ÷ 100%	18% ÷ 100%	16% ÷ 100%	14% ÷ 100%	13% ÷ 100%	15% ÷ 100%
COMPRESSOR							
Number		2					
Type		1 STEP SCREW + 1 INVERTER SCREW					
INTERNAL HEAT EXCHANGER (EVAPORATOR)							
Number		1					
Type		Shell & tube (Pure counterflow)					
Water connections	inch	6	6	8	8	8	8
EXTERNAL HEAT EXCHANGER (COILS)							
Number		8	10	10	10	12	12
Type		MCHX - Al/Alloy					
FAN							
Number		8	10	10	10	12	12
Air flow	m^3/h	152.640	191.160	191.160	191.160	229.320	229.320
Total input power	kW	9.2	11.5	11.5	11.5	13.8	13.8
REFRIGERANT							
Type / GWP		R134a / 1430					
Charge 1 / 2 (1)	kg	33 / 33	41 / 41	46 / 46	51 / 51	65 / 65	68 / 68
	tCO_2eq	47,2 / 47,2	58,6 / 58,6	65,8 / 65,8	72,9 / 72,9	93,0 / 93,0	97,2 / 97,2
Type / GWP		R513A / 631					
Charge 1 / 2 (1)	kg	33 / 33	41 / 41	46 / 46	51 / 51	65 / 65	68 / 68
	tCO_2eq	20,8 / 20,8	25,9 / 25,9	29,0 / 29,0	32,2 / 32,2	41,0 / 41,0	42,9 / 42,9
DESUPERHEATER							
Number		2					
Type		PHE					
WEIGHT							
Shipping	kg	3832	4210	4744	5077	5474	6017
Operating	kg	3981	4352	4990	5323	5702	6293
DIMENSIONS							
Length	mm	4660	5712	5712	6764	7816	7816
Width	mm	2192	2192	2192	2192	2192	2192
Height	mm	2590	2590	2590	2590	2590	2590

(1) The refrigerant value are indicative values for standard units. The actual data are indicated on the unit label.

* Voltage supply tolerances: +/- 10% of the nominal Voltage (400V) for short term application; +/-5% of the nominal Voltage (400V) for continuous application

** High Temperature Units (HT), data with fans at max speed (1100 Rpm)

*** HPF Units, data with fans at max speed (1100 Rpm)

8 - Technical Data (continued)

SYSCREW AIR EVO HSE S		810	900	980	1060	1160	1260
Power supply*	V/Ph/Hz	400 (± 10%) / 3 / 50					
Number of refrigerant circuits		2					
Start-up Type		SD+FI	SD+FI	SD+FI	SD+FI	SD+FI	SD+FI
Min÷Max capacity steps	%	13% ÷ 100%	14% ÷ 100%	13% ÷ 100%	17% ÷ 100%	15% ÷ 100%	14% ÷ 100%
COMPRESSOR							
Number		2					
Type		1 STEP SCREW + 1 INVERTER SCREW					
INTERNAL HEAT EXCHANGER (EVAPORATOR)							
Number		1					
Type		Shell & tube (Pure counterflow)					
Water connections	inch	8	8	10	10	10	10
EXTERNAL HEAT EXCHANGER (COILS)							
Number		14	14	16	18	20	22
Type		MCHX - Al/Alloy					
FAN							
Number		14	14	16	18	20	22
Air flow	m^3/h	267.480	267.480	305.640	343.800	381.960	420.120
Total input power	kW	16.1	16.1	18.4	20.7	23.0	25.3
REFRIGERANT							
Type / GWP		R134a / 1430					
Charge 1 / 2 (1)	kg	76 / 76	88 / 88	93 / 93	102 / 102	114 / 114	114 / 114
	tCO_2eq	108,7 / 108,7	125,8 / 125,8	133,0 / 133,0	145,9 / 145,9	163,0 / 163,0	163,0 / 163,0
Type / GWP		R513A / 631					
Charge 1 / 2 (1)	kg	76 / 76	88 / 88	93 / 93	102 / 102	114 / 114	114 / 114
	tCO_2eq	48,0 / 48,0	55,5 / 55,5	58,7 / 58,7	64,4 / 64,4	71,9 / 71,9	71,9 / 71,9
DESUPERHEATER							
Number		2					
Type		PHE					
WEIGHT							
ShippinG	kg	6341	7033	7485	8212	8596	8731
Operating	kg	6617	7412	7852	8579	8963	9162
DIMENSIONS							
Length	mm	8868	9920	10972	12024	13076	13076
Width	mm	2192	2192	2192	2192	2192	2192
Height	mm	2590	2590	2590	2590	2590	2590

(1) The refrigerant value are indicative values for standard units. The actual data are indicated on the unit label.

* Voltage supply tolerances: +/- 10% of the nominal Voltage (400V) for short term application; +/-5% of the nominal Voltage (400V) for continuous application

** High Temperature Units (HT), data with fans at max speed (1100 Rpm)

*** HPF Units, data with fans at max speed (1100 Rpm)

8 - Technical Data (continued)

8.3 Unit electrical data

Standard Version				380	440	510	590	660	730	810	900	980	1060	1160	1260
Current input	Nom	R134a	A	206	241	272	301	342	369	406	456	512	547	606	627
		R513A	A	200	233	263	290	330	356	392	443	497	525	581	615
	Max		A	395	421	441	449	489	529	602	720	738	826	874	874
Power input	Nom	R134a	kW	121	145	162	181	206	224	249	283	314	334	372	394
		R513A	kW	117	140	156	174	198	215	240	275	305	319	355	377
	Max		kW	238	249	266	271	297	334	363	419	453	510	533	533
Max Start-up current			A	601	682	779	787	616	656	758	875	1004	1092	1164	1164
UNIT (aM) FUSES			A	500	500	500	500	630	630	800	800	800	1000	1000	1000
Phase WIRE SECTION*			mm^2	2x185	2x185	2x185	2x185	2x185	2x185	2x240	2x240	2x240	2x300	2x300	2x300

S Version				380	440	510	590	660	730	810	900	980	1060	1160	1260
Current input	Nom	R134a	A	200	233	265	292	331	359	394	442	497	531	589	610
		R513A	A	194	225	256	281	319	346	380	429	482	509	564	598
	Max		A	395	421	441	449	489	529	602	720	738	826	874	874
Power input	Nom	R134a	kW	117	140	157	175	199	217	241	274	304	323	359	382
		R513A	kW	113	135	151	168	191	208	232	266	295	308	343	365
	Max		kW	238	249	266	271	297	334	363	419	453	510	533	533
Max Start-up current			A	601	682	779	787	616	656	758	875	1004	1092	1164	1164
UNIT (aM) FUSES			A	500	500	500	500	630	630	800	800	800	1000	1000	1000
Phase WIRE SECTION*			mm^2	2x185	2x185	2x185	2x185	2x185	2x185	2x240	2x240	2x240	2x300	2x300	2x300

HT Version				380	440	510	590	660	730	810	900	980	1060	1160	1260
Current input	Nom	R134a	A	218	256	287	319	363	390	430	483	542	581	643	664
		R513A	A	212	248	278	308	351	377	416	470	527	559	618	652
	Max		A	400	427	447	456	497	537	612	731	750	839	888	888
Power input	Nom	R134a	kW	130	156	173	194	221	238	266	302	335	357	397	419
		R513A	kW	126	150	167	187	212	230	257	294	326	343	381	403
	Max		kW	242	253	270	276	303	340	370	427	462	520	544	544
Max Start-up current			A	606	688	785	794	624	664	768	886	1016	1105	1178	1178
UNIT (aM) FUSES			A	500	500	500	500	630	630	800	800	800	1000	1000	1000
Phase WIRE SECTION*			mm^2	2x185	2x185	2x185	2x185	2x185	2x185	2x240	2x240	2x240	2x300	2x300	2x300

HPF Version				380	440	510	590	660	730	810	900	980	1060	1160	1260
Current input	Nom	R134a	A	223	261	293	326	371	398	439	493	553	593	656	677
		R513A	A	217	254	284	315	359	385	425	480	538	571	631	665
	Max		A	400	427	447	456	497	537	612	731	750	839	888	888
Power input	Nom	R134a	kW	133	160	177	199	226	244	272	309	343	366	407	429
		R513A	kW	129	155	171	192	218	236	263	302	334	352	391	413
	Max		kW	242	253	270	276	303	340	370	427	462	520	544	544
Max Start-up current			A	606	688	785	794	624	664	768	886	1016	1105	1178	1178
UNIT (aM) FUSES			A	500	500	500	500	630	630	800	800	800	1000	1000	1000
Phase WIRE SECTION*			mm^2	2x185	2x185	2x185	2x185	2x185	2x185	2x240	2x240	2x240	2x300	2x300	2x300

8 - Technical Data (continued)

Compressors 400 V / 3 Ph / 50 Hz

Model	System	Frame	Compressor start mode	Power input nominal Cond. compressor (kW)		Nom. Cond. current compressor (A)		Power input max. Cond. compressor (kW)	Max. running current compressor FLA (A)	Starting current compressor LRA (A)	Carter oil 230Vac (W)	"Nominal power factor"
				R134a	R513A	R134a	R513A					
380	1	4V	PW	49	51	83	87	88	144	350	200	0,85
	2		FI	56	58	97	100	130	220	20	200	
440	1	5V	PW	61	64	100	105	93	162	423	200	0,89
	2		FI	64	66	109	112	130	220	20	200	
510	1	5V	PW	68	71	116	120	110	182	520	300	0,85
	2		FI	73	76	123	128	130	220	20	200	
590	1	6V	PW	75	79	126	132	110	182	520	300	0,86
	2		FI	81	84	135	140	130	220	20	200	
660	1	7V	SD	96	101	161	168	131	214	341	300	0,86
	2		FI	81	84	135	140	130	220	20	200	
730	1	7V	SD	96	101	161	168	131	214	341	300	0,86
	2		FI	98	102	161	167	167	260	20	200	
810	1	8V	SD	113	118	185	193	155	280	436	300	0,88
	2		FI	103	107	168	174	167	260	20	200	
900	1	9V	SD	124	129	200	208	175	310	465	300	0,90
	2		FI	124	127	199	204	198	340	20	200	
980	1	10V	SD	145	151	239	249	204	320	586	300	0,87
	2		FI	130	133	209	214	198	340	20	200	
1060	1	11V	SD	145	151	239	249	204	320	586	300	0,87
	2		FI	142	150	233	245	250	420	20	200	
1160	1	12V	SD	161	168	265	276	222	360	650	300	0,88
	2		FI	158	167	258	272	250	420	20	200	
1260	1	12V	SD	161	168	265	276	222	360	650	300	0,88
	2		FI	180	190	292	293	250	420	20	200	

8 - Technical Data (continued)

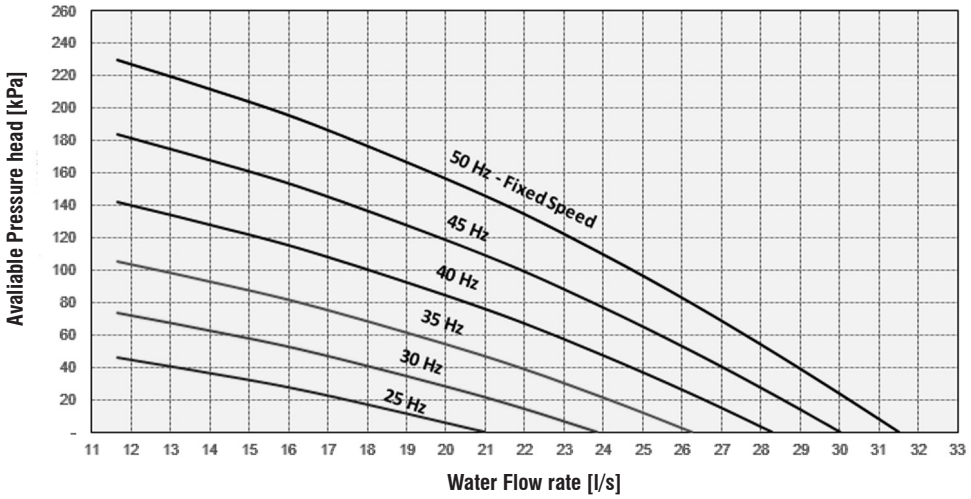
Fans - 400 V / 3 Ph / 50 Hz

Model	EC fans				
	Number	Nominal Power (kW)	Nominal Current(A)	Max. Running Power (kW)	Max. Running Current (A)
Standard Version					
380	8	1,5	2,4	2,6	3,9
440	10	1,5	2,4	2,6	3,9
510	10	1,5	2,4	2,6	3,9
590	12	1,5	2,4	2,6	3,9
660	14	1,5	2,4	2,6	3,9
730	14	1,5	2,4	2,6	3,9
810	16	1,5	2,4	2,6	3,9
900	18	1,5	2,4	2,6	3,9
980	20	1,5	2,4	2,6	3,9
1060	22	1,5	2,4	2,6	3,9
1160	24	1,5	2,4	2,6	3,9
1260	24	1,5	2,4	2,6	3,9
S Version					
380	8	1,0	1,7	2,6	3,9
440	10	1,0	1,7	2,6	3,9
510	10	1,0	1,7	2,6	3,9
590	12	1,0	1,7	2,6	3,9
660	14	1,0	1,7	2,6	3,9
730	14	1,0	1,7	2,6	3,9
810	16	1,0	1,7	2,6	3,9
900	18	1,0	1,7	2,6	3,9
980	20	1,0	1,7	2,6	3,9
1060	22	1,0	1,7	2,6	3,9
1160	24	1,0	1,7	2,6	3,9
1260	24	1,0	1,7	2,6	3,9
HPF Version					
380	8	3,0	4,5	3,0	4,5
440	10	3,0	4,5	3,0	4,5
510	10	3,0	4,5	3,0	4,5
590	12	3,0	4,5	3,0	4,5
660	14	3,0	4,5	3,0	4,5
730	14	3,0	4,5	3,0	4,5
810	16	3,0	4,5	3,0	4,5
900	18	3,0	4,5	3,0	4,5
980	20	3,0	4,5	3,0	4,5
1060	22	3,0	4,5	3,0	4,5
1160	24	3,0	4,5	3,0	4,5
1260	24	3,0	4,5	3,0	4,5
HT Version					
380	8	2,6	3,9	3,0	4,5
440	10	2,6	3,9	3,0	4,5
510	10	2,6	3,9	3,0	4,5
590	12	2,6	3,9	3,0	4,5
660	14	2,6	3,9	3,0	4,5
730	14	2,6	3,9	3,0	4,5
810	16	2,6	3,9	3,0	4,5
900	18	2,6	3,9	3,0	4,5
980	20	2,6	3,9	3,0	4,5
1060	22	2,6	3,9	3,0	4,5
1160	24	2,6	3,9	3,0	4,5
1260	24	2,6	3,9	3,0	4,5

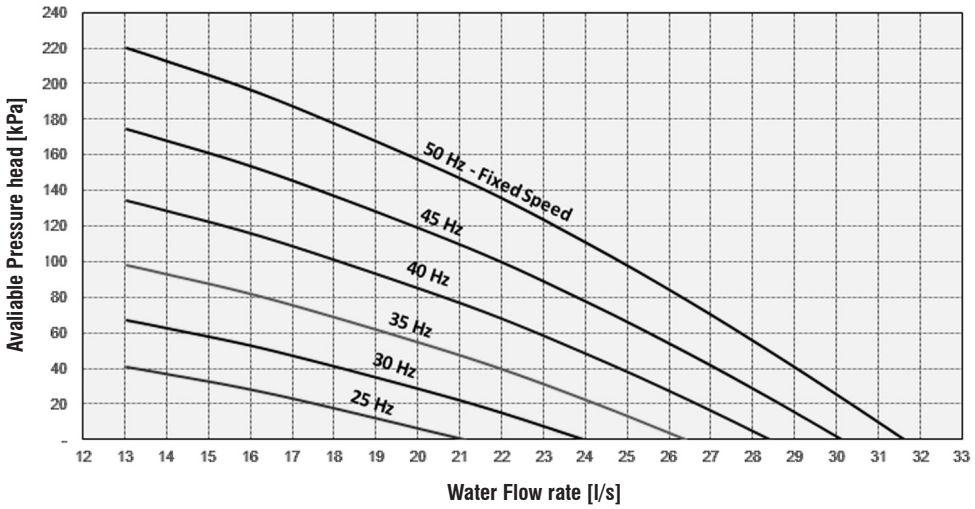
8.4 Hydraulic features

Available pressure head - SYSCREW AIR EVO HSE
Standard pressure pump (1/2PSP)

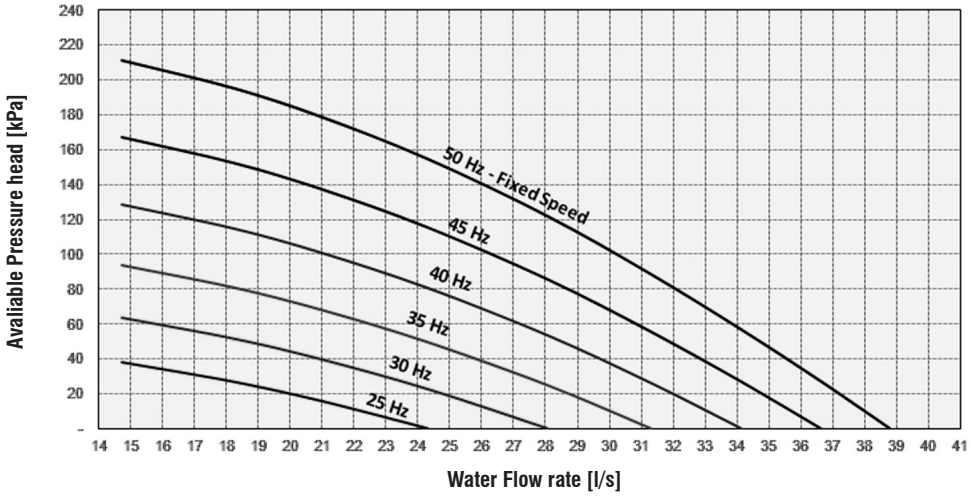
SYSCREW 380 AIR EVO HSE



SYSCREW 440 AIR EVO HSE



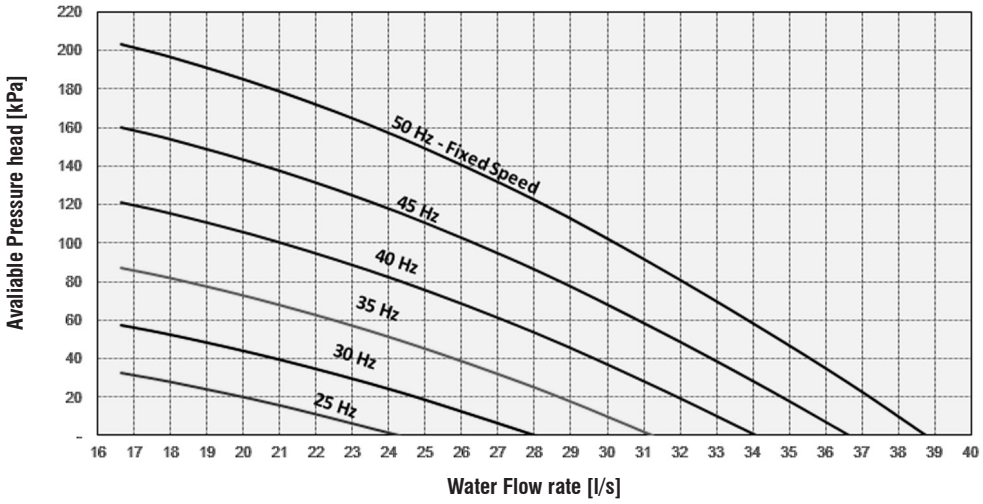
SYSCREW 510 AIR EVO HSE



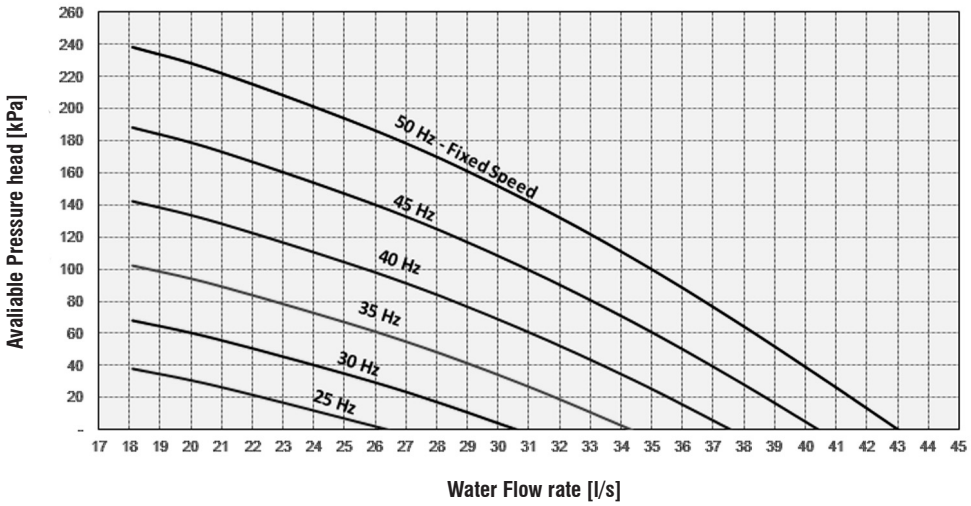
8 - Technical Data (continued)

Available pressure head - SYSCREW AIR EVO HSE
Standard pressure pump (1/2PSP) (continued)

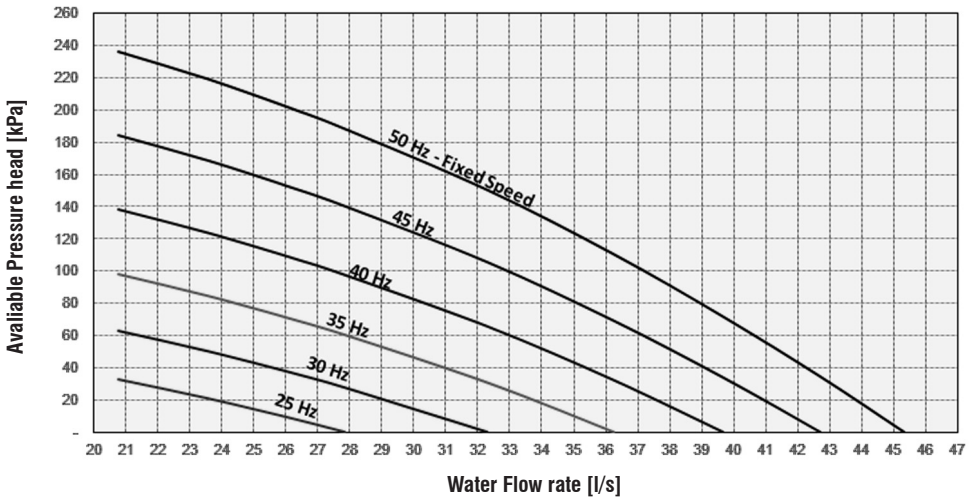
SYSCREW 590 AIR EVO HSE



SYSCREW 660 AIR EVO HSE



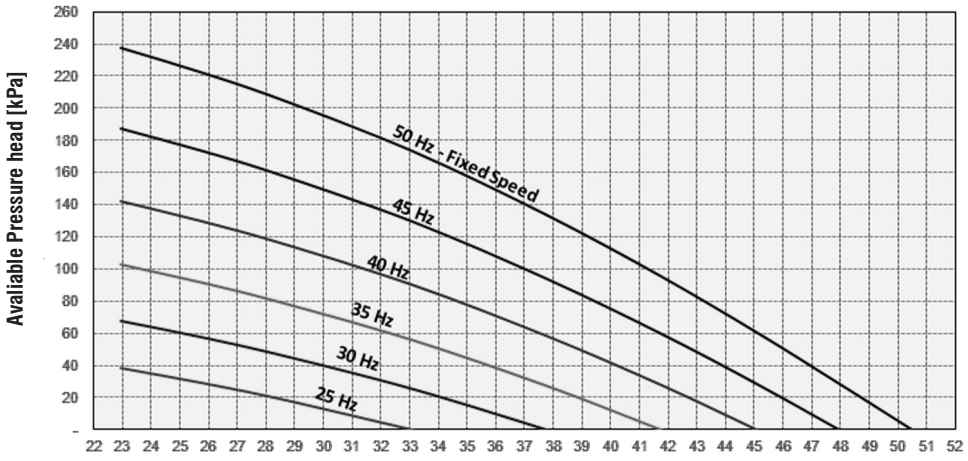
SYSCREW 730 AIR EVO HSE



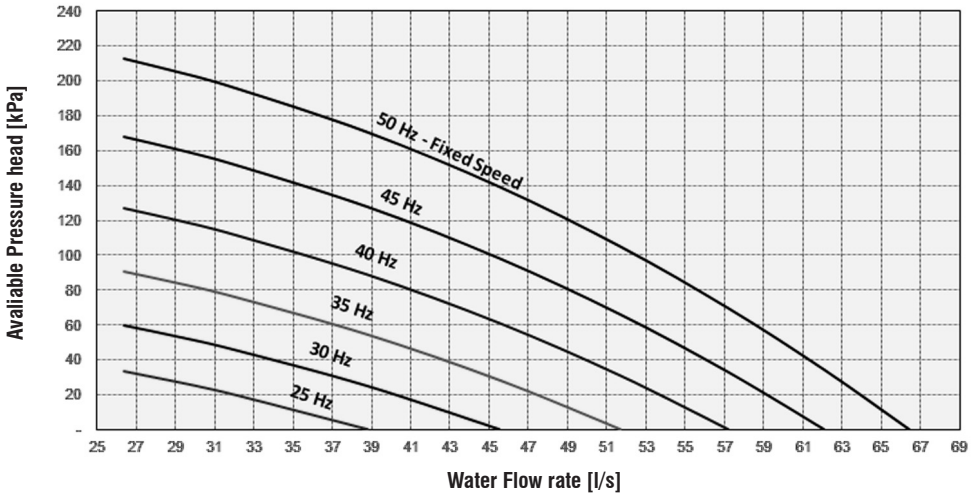
8 - Technical Data (continued)

Available pressure head - SYSCREW AIR EVO HSE
Standard pressure pump (1/2PSP) (continued)

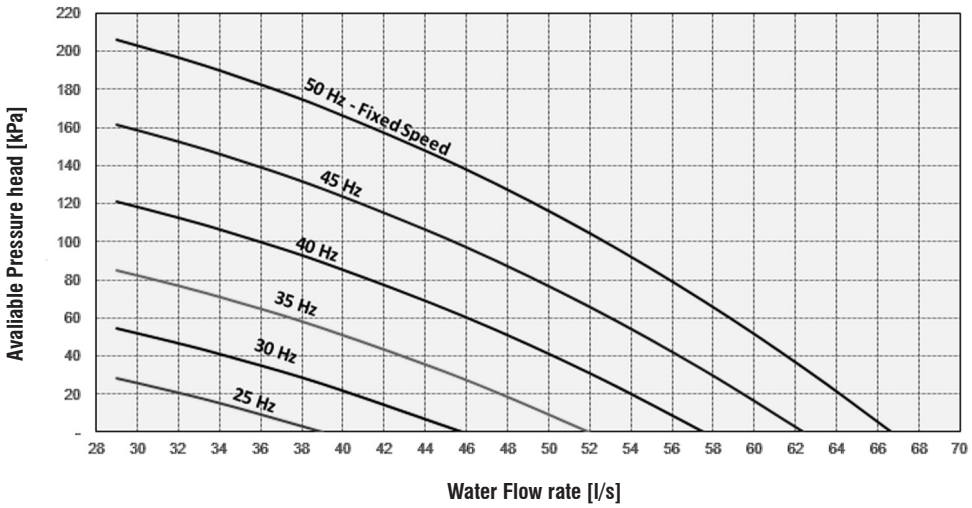
SYSCREW 810 AIR EVO HSE



SYSCREW 900 AIR EVO HSE



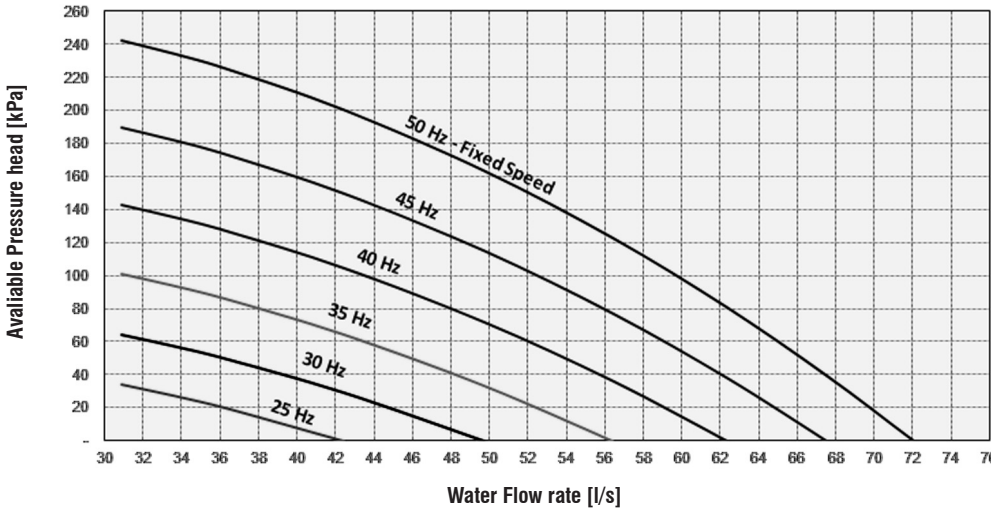
SYSCREW 980 AIR EVO HSE



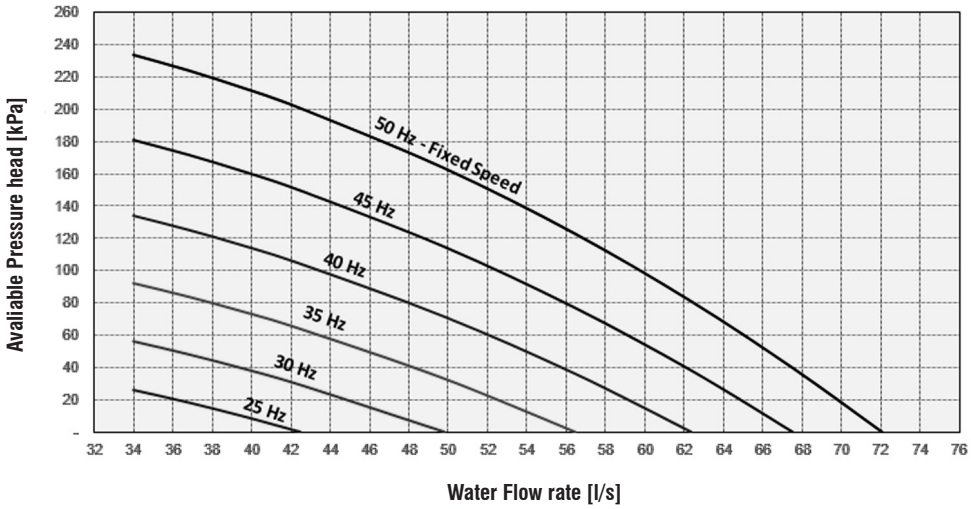
8 - Technical Data (continued)

Available pressure head - SYSCREW AIR EVO HSE
Standard pressure pump (1/2PSP) (continued)

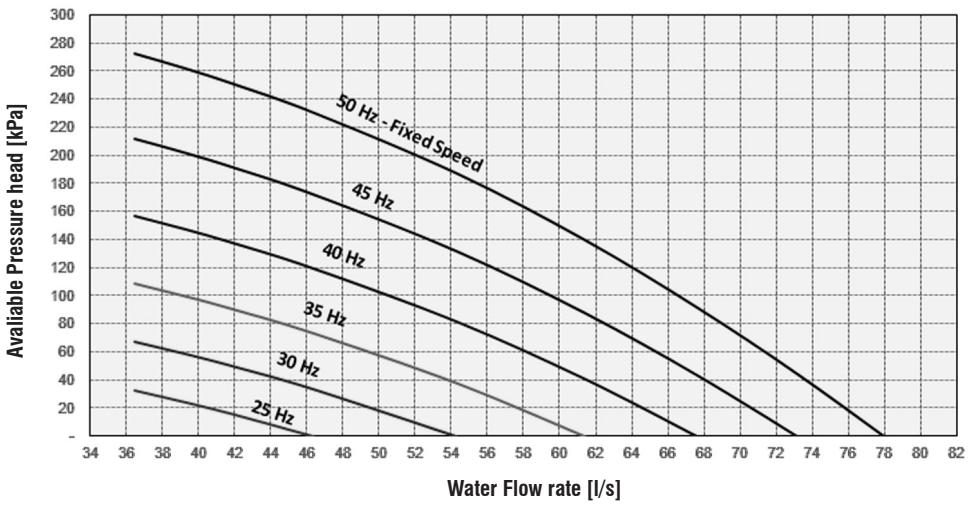
SYSCREW 1060 AIR EVO HSE



SYSCREW 1160 AIR EVO HSE



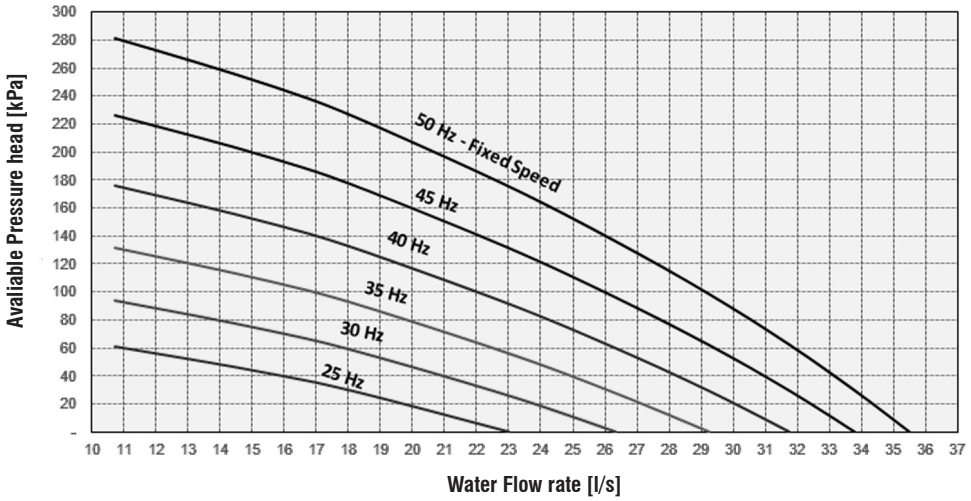
SYSCREW 1260 AIR EVO HSE



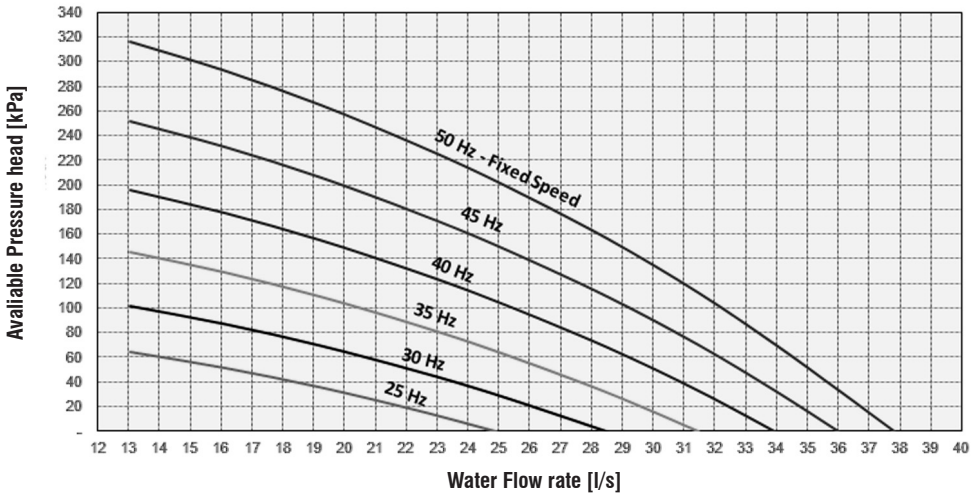
8 - Technical Data (continued)

Available pressure head - SYSCREW AIR EVO HSE
High pressure pump (1/2PHP)

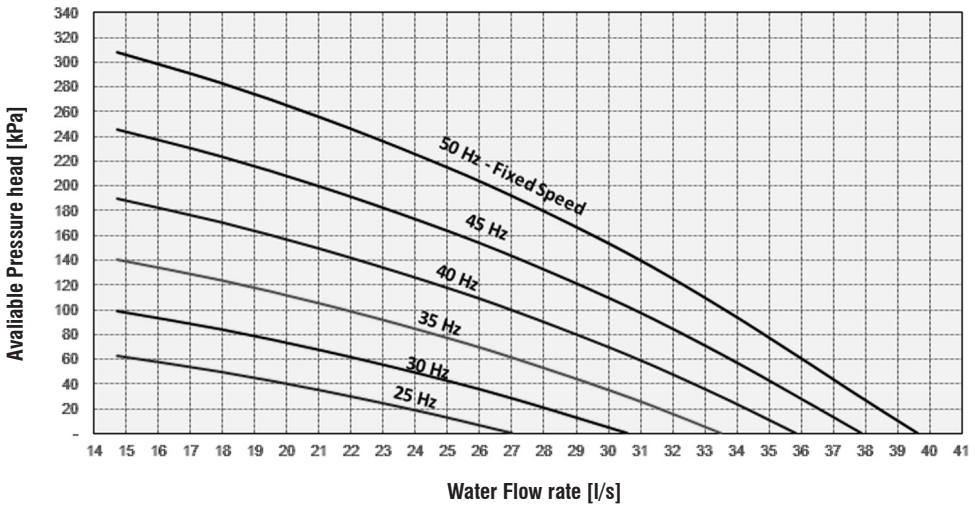
SYSCREW 380 AIR EVO HSE



SYSCREW 440 AIR EVO HSE



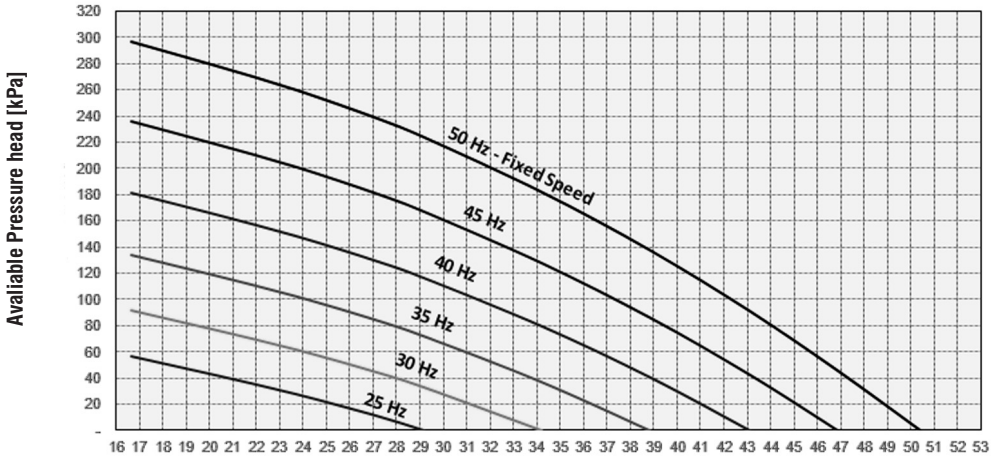
SYSCREW 510 AIR EVO HSE



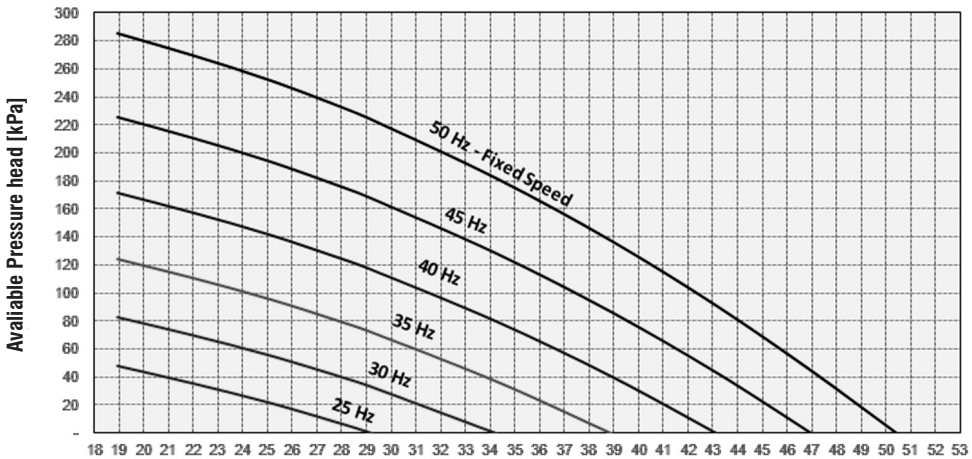
8 - Technical Data (continued)

Available pressure head - SYSCREW AIR EVO HSE
High pressure pump (1/2PHP) (continued)

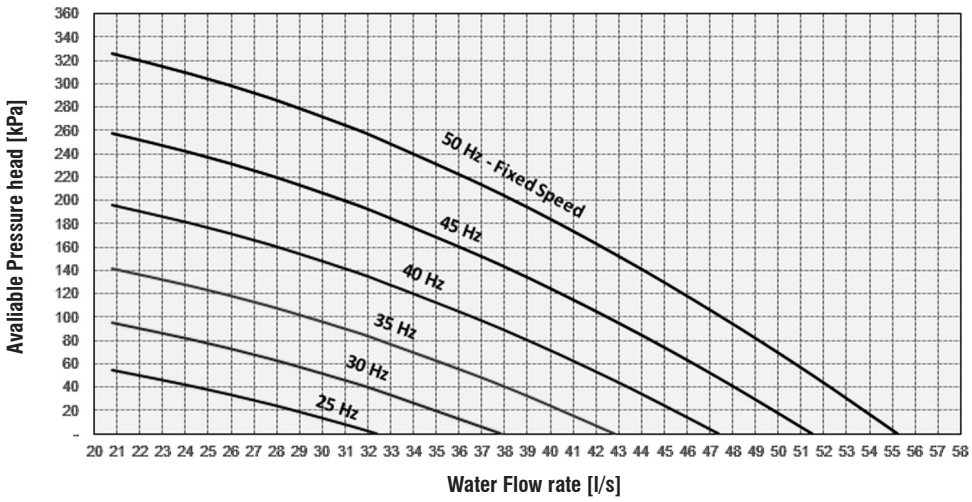
SYSCREW 590 AIR EVO HSE



SYSCREW 660 AIR EVO HSE



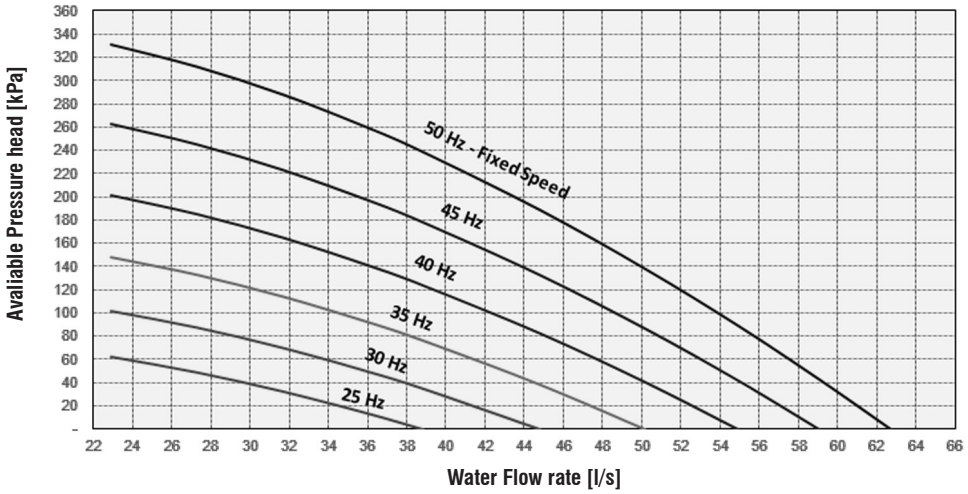
SYSCREW 730 AIR EVO HSE



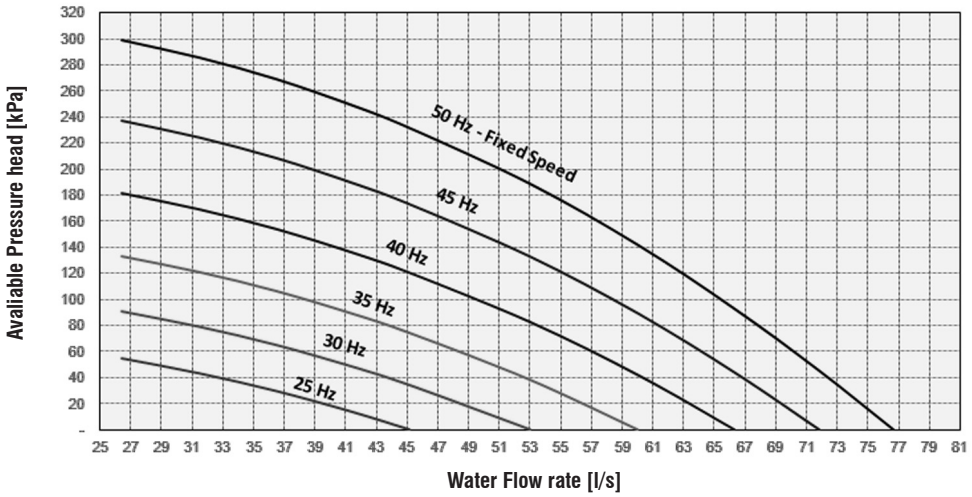
8 - Technical Data (continued)

Available pressure head - SYSCREW AIR EVO HSE
High pressure pump (1/2PHP) (continued)

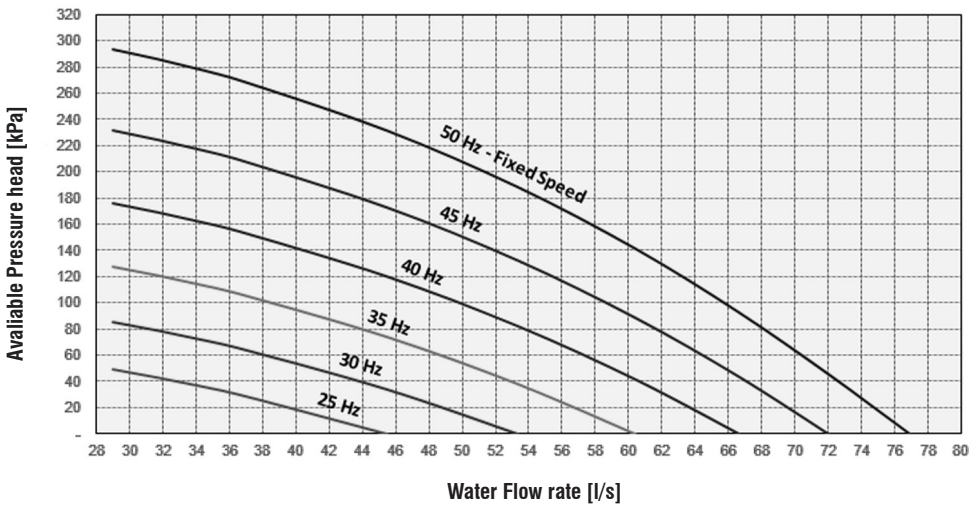
SYSCREW 810 AIR EVO HSE



SYSCREW 900 AIR EVO HSE



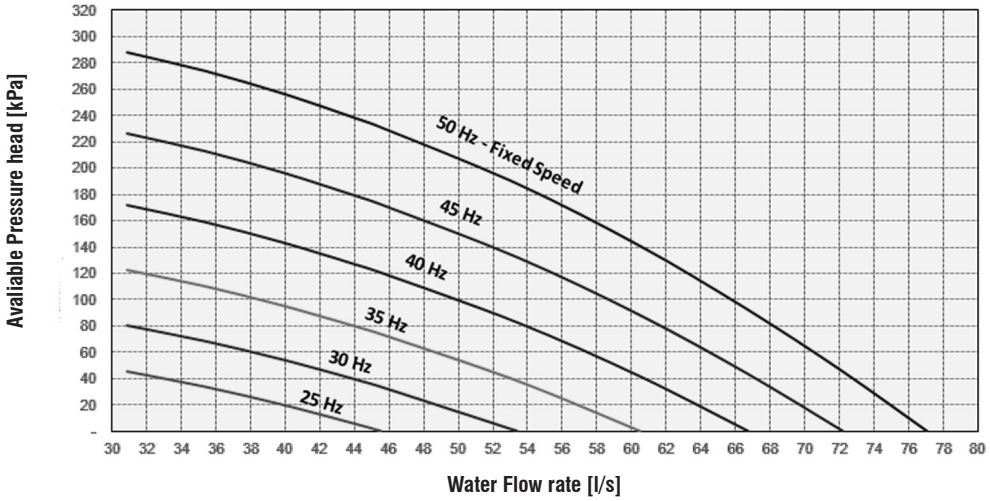
SYSCREW 980 AIR EVO HSE



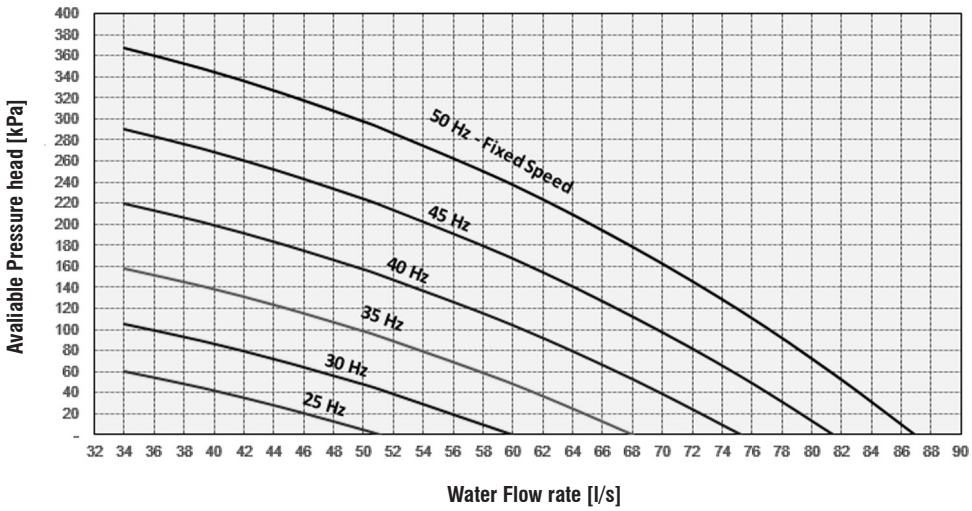
8 - Technical Data (continued)

Available pressure head - SYSCREW AIR EVO HSE
High pressure pump (1/2PHP) (continued)

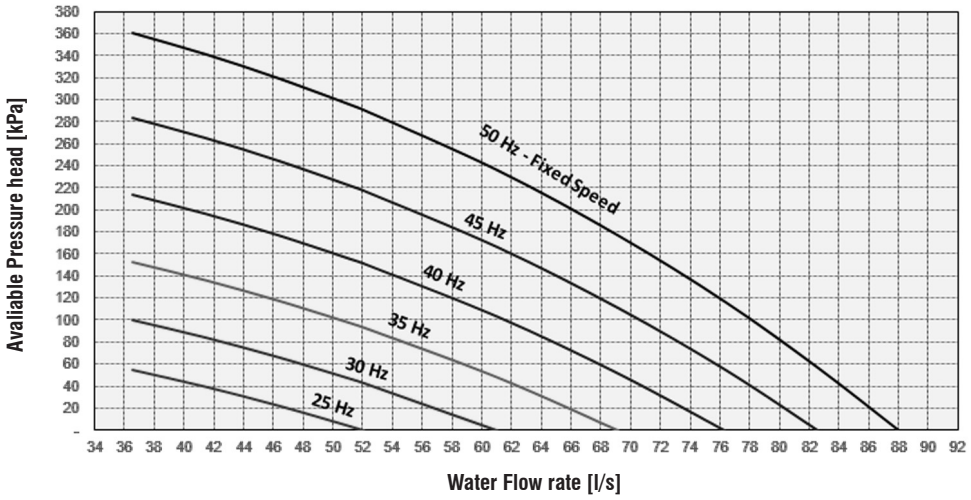
SYSCREW 1060 AIR EVO HSE



SYSCREW 1160 AIR EVO HSE



SYSCREW 1260 AIR EVO HSE



8 - Technical Data (continued)

Hydro option

Low head pump [Weights]

Size	Shipping Weight [1P]	Gross Weight [1P]	Shipping Weight [2P]	Gross Weight [2P]	Inverter Extra weight *
	kg	kg	kg	kg	kg
380	183	216	361	402	24
440	183	216	361	402	24
510	201	234	396	437	38
590	240	285	445	494	38
660	247	292	458	507	38
730	251	296	466	515	38
810	414	597	665	855	38
900	521	705	879	1069	38
980	521	705	879	1069	38
1060	615	839	1011	1234	48
1160	615	839	1011	1234	48
1260	690	914	1150	1374	48

* Only in case of Variable flow hydraulic module

High head pump [Weights]

Size	Shipping Weight [1P]	Gross Weight [1P]	Shipping Weight [2P]	Gross Weight [2P]	Inverter Extra weight *
	kg	kg	kg	kg	kg
380	185	218	365	406	24
440	204	237	403	444	38
510	204	237	403	444	38
590	255	300	474	523	38
660	322	367	607	656	38
730	332	377	628	677	48
810	495	679	827	1017	48
900	584	768	1006	1196	48
980	584	768	1006	1196	48
1060	675	898	1129	1353	48
1160	750	974	1281	1505	71
1260	766	989	1302	1525	71

* Only in case of Variable flow hydraulic module

8 - Technical Data (continued)

8.5 Position of shock adsorbers and weight distribution on supports

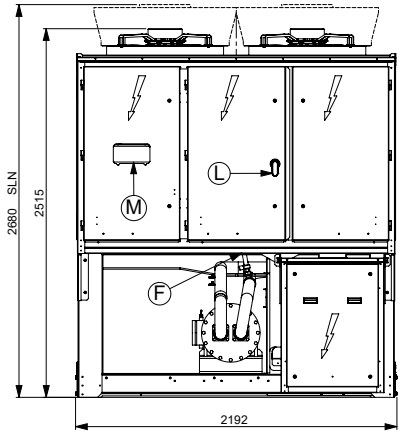
MODEL	MODULES	Weight distribution								Operating weight	Shipping weight	P coordinates				CG	
		F1	F2	F3	F4	F5	F6	F7	F8			a	b	c	d	x	y
		kg	kg	kg	kg	kg	kg	kg	kg	kg	kg	mm	mm	mm	mm	mm	mm
380 STD / HT MCHX	**4**	426	693	527	794	594	861	0	0	3896	3747	2082	2104	1392	-	2020	1255
440 STD / HT MCHX	**5**	529	789	585	845	626	886	0	0	4259	4117	2082	2630	1918	-	2497	1232
510 STD / HT MCHX	**5**	687	1016	648	977	620	949	0	0	4897	4651	2082	2630	1918	-	2330	1251
590 STD / HT MCHX	**6**	479	506	630	657	672	699	786	813	5241	4995	2082	2537	712	1918	3049	1063
660 STD / HT MCHX	**7**	320	337	616	633	772	789	1068	1085	5620	5392	2082	2630	1392	2630	4251	1054
730 STD / HT MCHX	**7**	371	337	705	670	881	847	1215	1180	6207	5931	2082	2630	1392	2630	4269	1018
810 STD / HT MCHX	**8**	420	382	712	674	954	916	1256	1218	6531	6255	2082	2537	2104	2630	4621	1017
900 STD / HT MCHX	**9**	467	429	748	710	1121	1083	1402	1364	7326	6947	2082	2630	3496	2630	5673	1019
980 STD / HT MCHX	**10**	529	482	841	794	1176	1130	1429	1382	7764	7397	2082	3249	3496	2630	6083	1016
1060 STD / HT MCHX	**11**	362	380	873	892	1231	1250	1743	1761	8491	8124	2082	4022	2816	4022	7315	1050
1160 STD / HT MCHX	**12**	442	457	962	977	1277	1292	1727	1742	8875	8508	2082	4641	2816	4022	7659	1048
1260 STD / HT MCHX	**12**	455	475	982	1002	1302	1322	1758	1778	9074	8643	2082	4641	2816	4022	7644	1050
380 S MCHX	**4**	423	727	522	827	588	893	0	0	3981	3832	2082	2104	1392	-	2014	1280
440 S MCHX	**5**	547	807	600	860	639	899	0	0	4352	4210	2082	2630	1918	-	2489	1228
510 S MCHX	**5**	705	1034	664	992	633	962	0	0	4990	4744	2082	2630	1918	-	2326	1247
590 S MCHX	**6**	478	505	639	666	684	711	806	833	5323	5077	2082	2537	712	1918	3064	1062
660 S MCHX	**7**	318	335	623	640	785	802	1090	1107	5702	5474	2082	2630	1392	2630	4266	1053
730 S MCHX	**7**	370	336	713	679	895	860	1237	1203	6293	6017	2082	2630	1392	2630	4283	1018
810 S MCHX	**8**	419	381	719	681	968	930	1279	1241	6617	6341	2082	2537	2104	2630	4637	1017
900 S MCHX	**9**	467	429	754	716	1137	1099	1424	1386	7412	7033	2082	2630	3496	2630	5690	1020
980 S MCHX	**10**	528	482	848	801	1192	1145	1451	1404	7852	7485	2082	3249	3496	2630	6099	1016
1060 S MCHX	**11**	360	378	881	899	1245	1264	1767	1785	8579	8212	2082	4022	2816	4022	7331	1050
1160 S MCHX	**12**	440	455	970	985	1291	1306	1750	1765	8963	8596	2082	4641	2816	4022	7675	1048
1260 S MCHX	**12**	453	473	990	1010	1316	1336	1782	1801	9162	8731	2082	4641	2816	4022	7661	1050

(*) Weights are referred to STD units (with MCHX coils and without hydrokit or desuperheater).

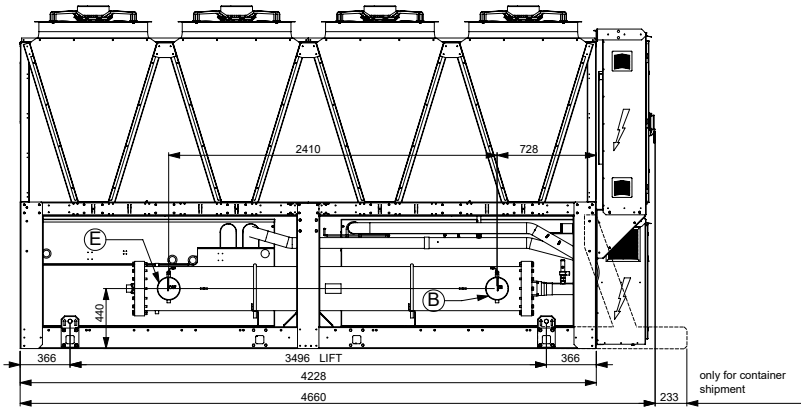
8 - Technical Data (continued)

8.6 Dimensional drawings - SYSCREW 380 AIR EVO HSE

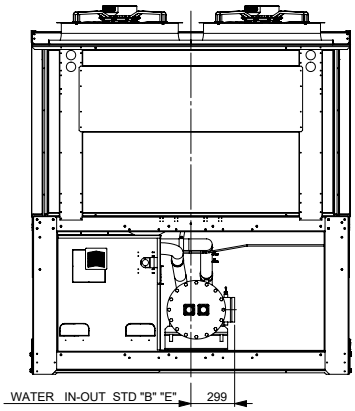
Front view



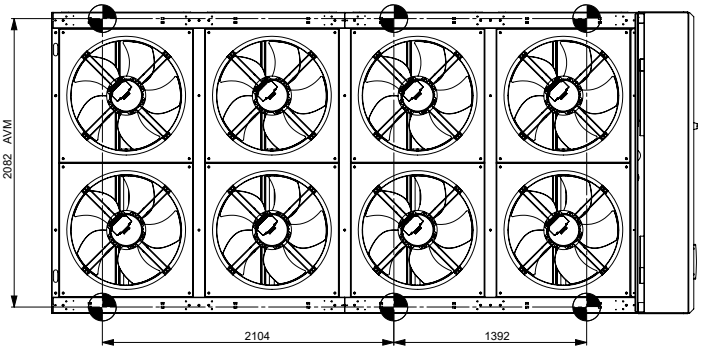
Side view



Back view



Top view



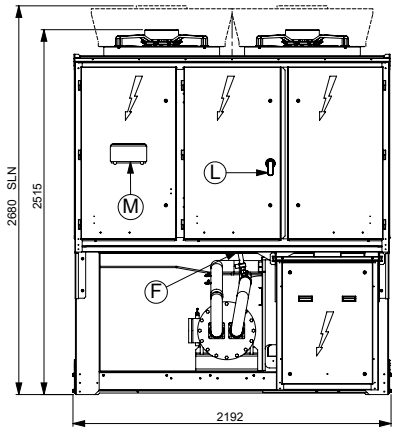
B	Water inlet 6” Victaulic
E	Water outlet 6” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

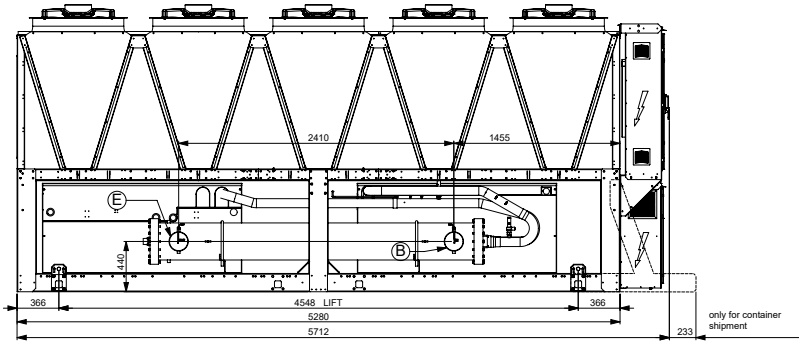
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 440 AIR EVO HSE

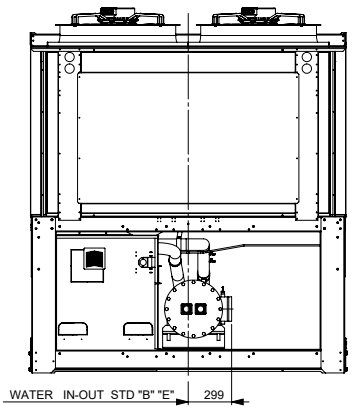
Front view



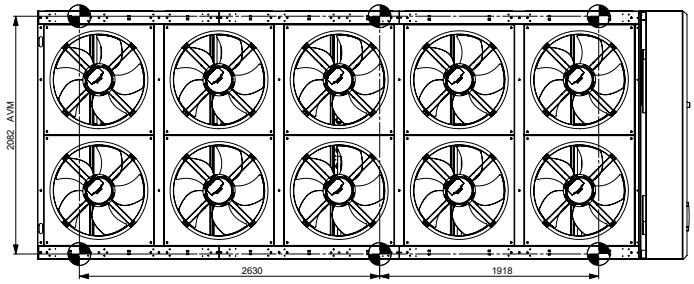
Side view



Back view



Top view



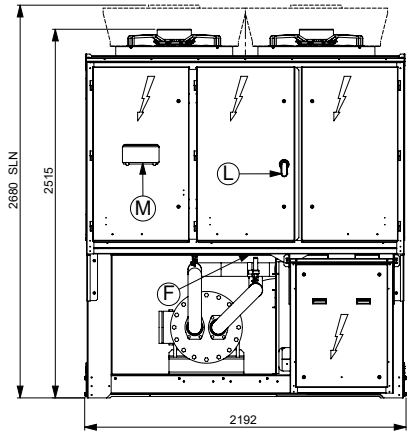
B	Water inlet 6” Victaulic
E	Water outlet 6” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

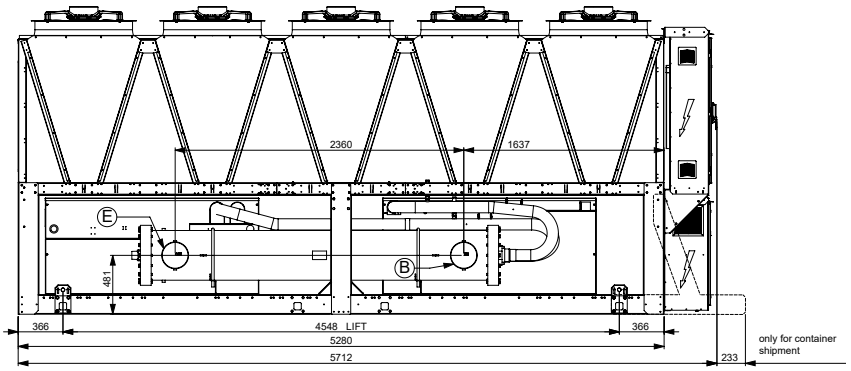
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 510 AIR EVO HSE

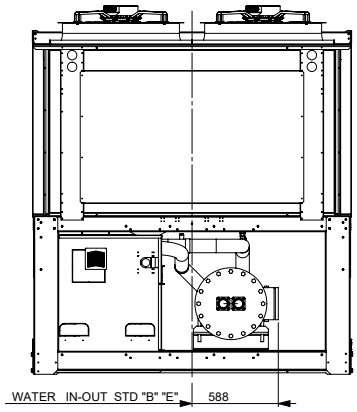
Front view



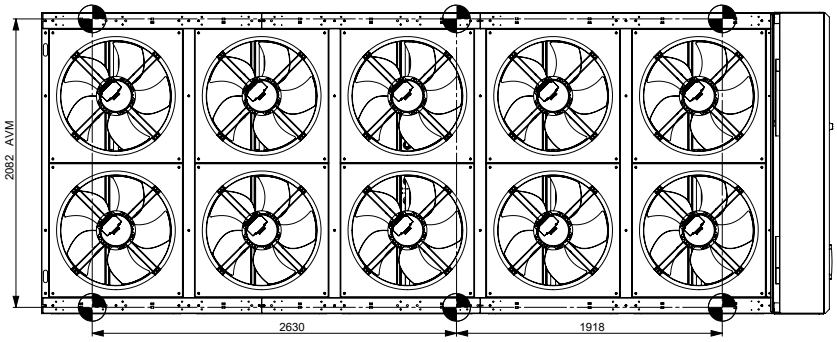
Side view



Back view



Top view



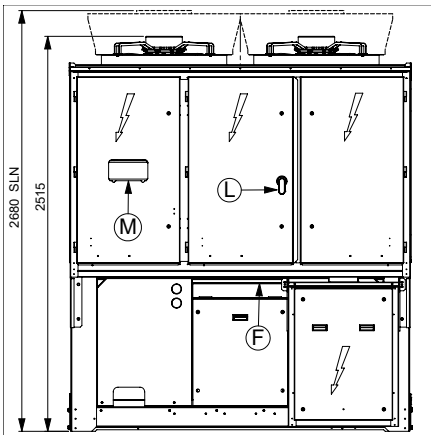
B	Water inlet 8” Victaulic
E	Water outlet 8” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

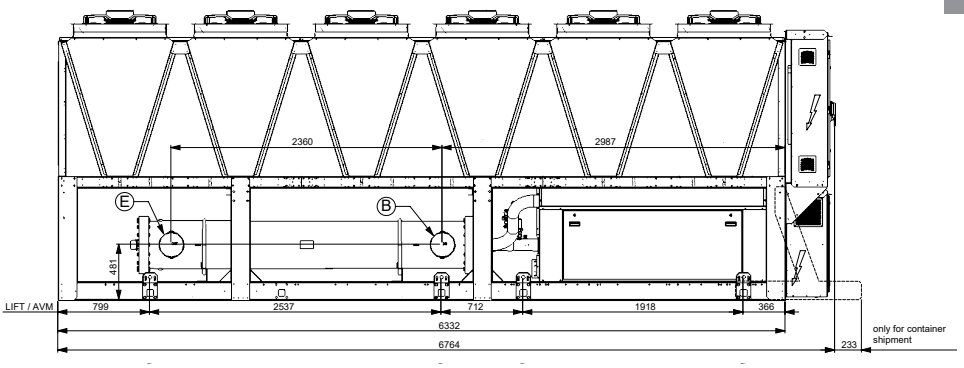
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 590 AIR EVO HSE

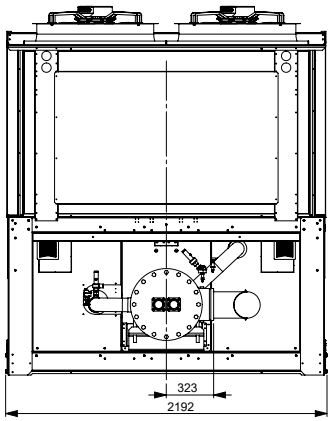
Front view



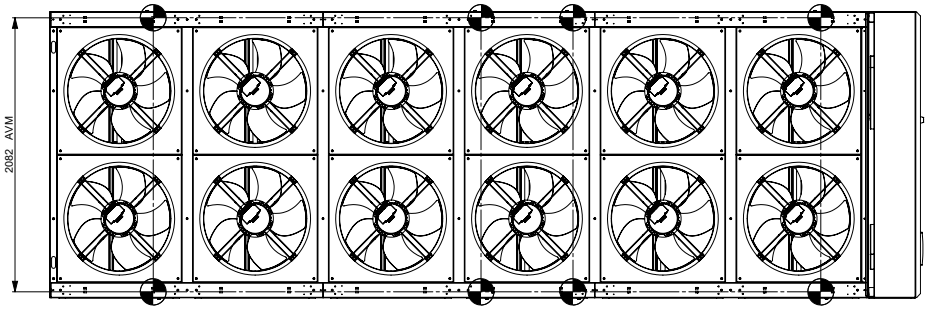
Side view



Back view



Top view



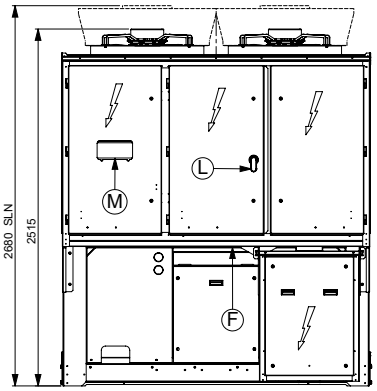
B	Water inlet 8” Victaulic
E	Water outlet 8” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

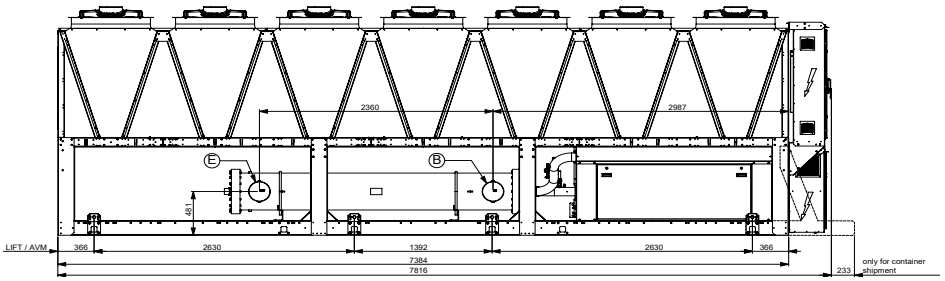
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 660 AIR EVO HSE

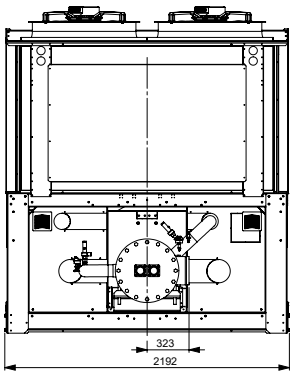
Front view



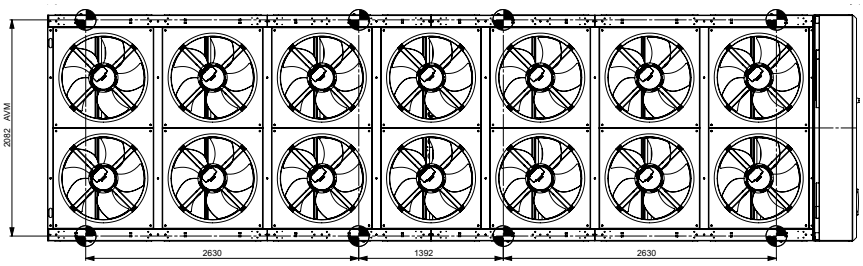
Side view



Back view



Top view



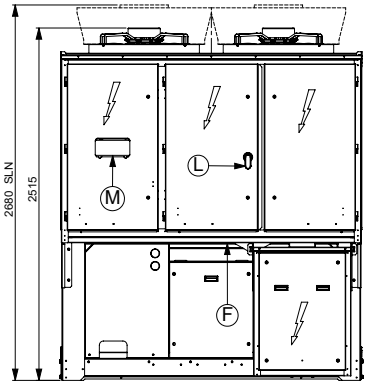
B	Water inlet 8” Victaulic
E	Water outlet 8” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

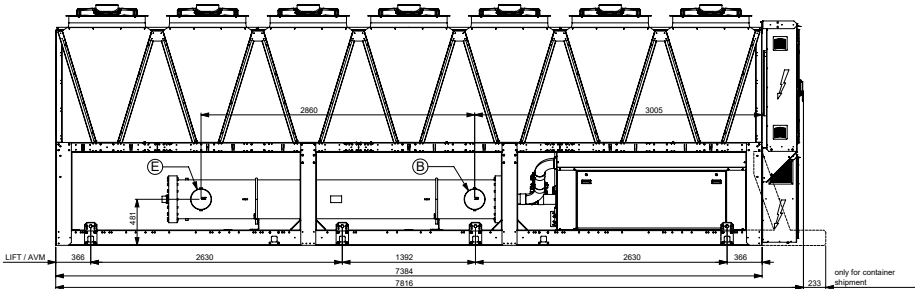
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 730 AIR EVO HSE

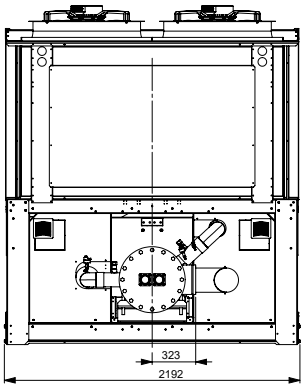
Front view



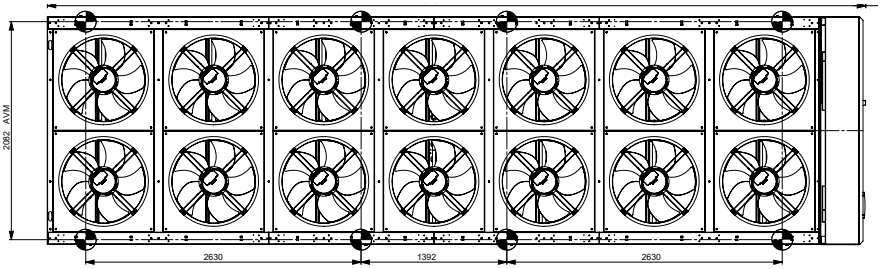
Side view



Back view



Top view



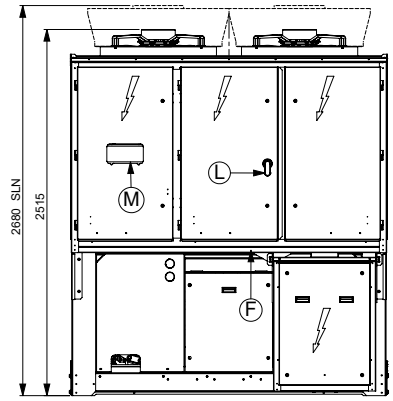
B	Water inlet 8” Victaulic
E	Water outlet 8” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

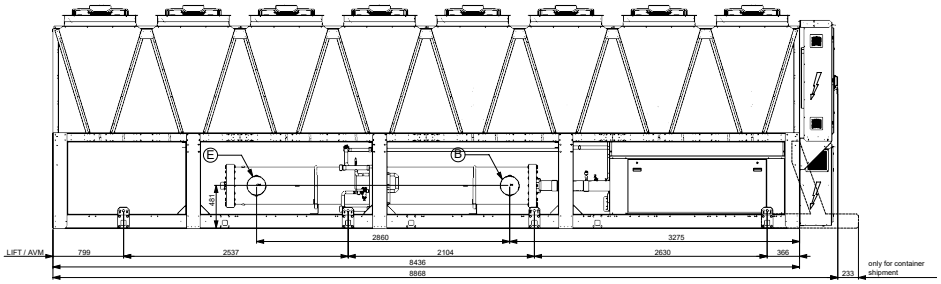
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 810 AIR EVO HSE

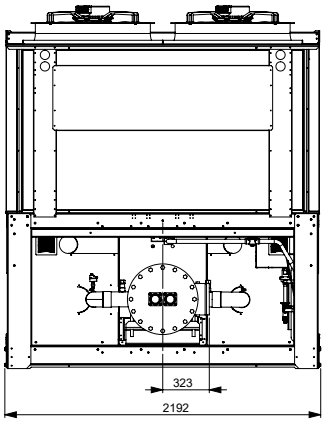
Front view



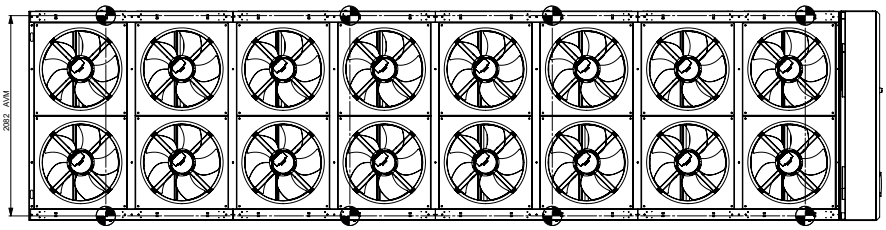
Side view



Back view



Top view



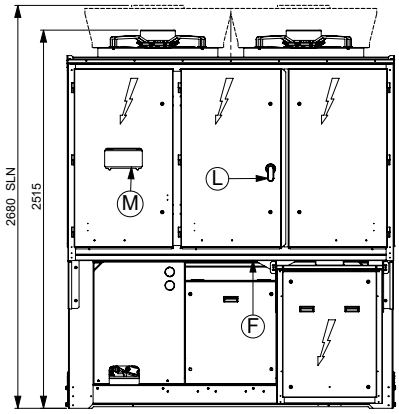
B	Water inlet 8” Victaulic
E	Water outlet 8” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

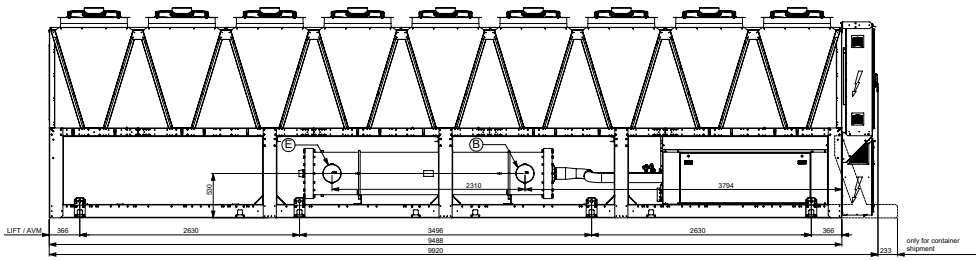
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 900 AIR EVO HSE

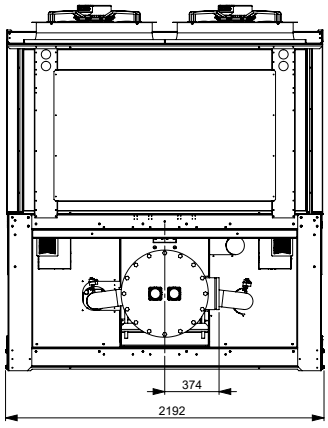
Front view



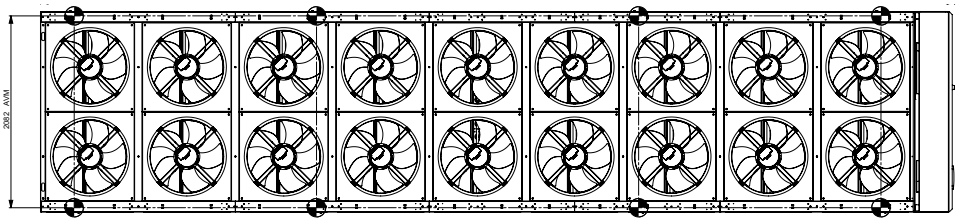
Side view



Back view



Top view



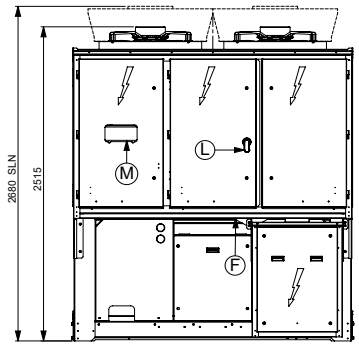
B	Water inlet 8” Victaulic
E	Water outlet 8” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

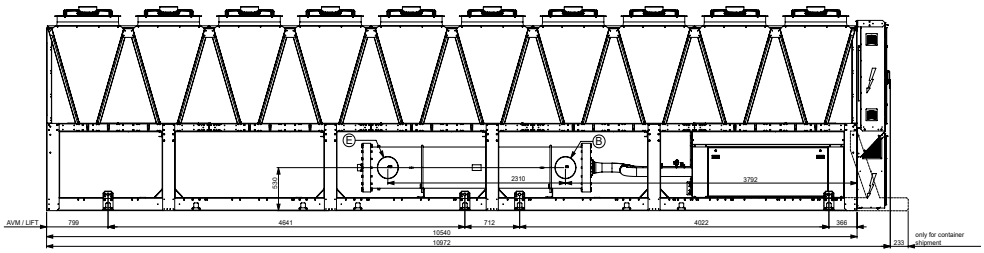
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 980 AIR EVO HSE

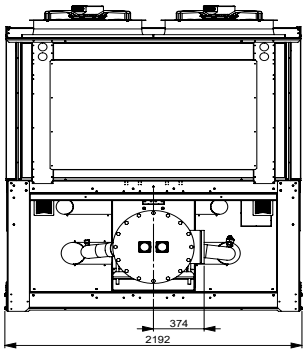
Front view



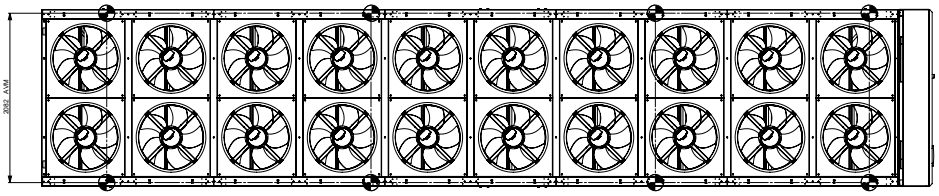
Side view



Back view



Top view



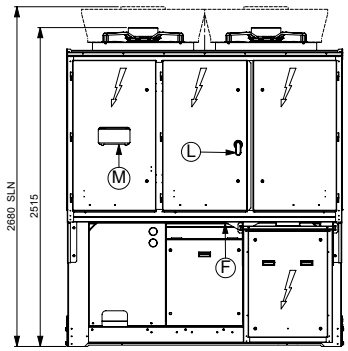
B	Water inlet 10” Victaulic
E	Water outlet 10” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

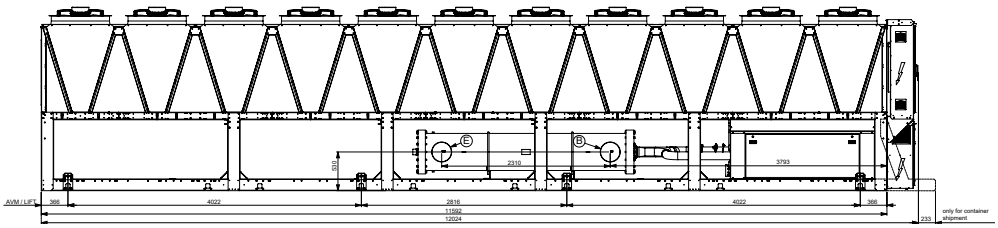
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 1060 AIR EVO HSE

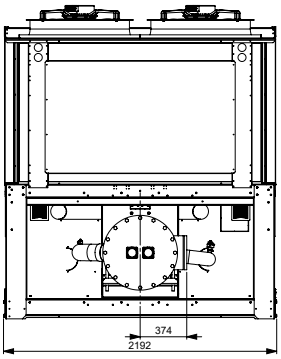
Front view



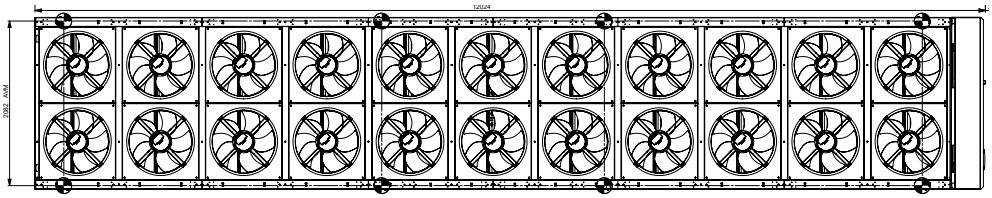
Side view



Back view



Top view



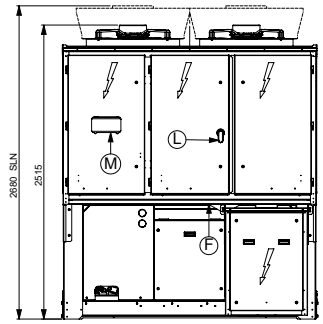
B	Water inlet 10” Victaulic
E	Water outlet 10” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

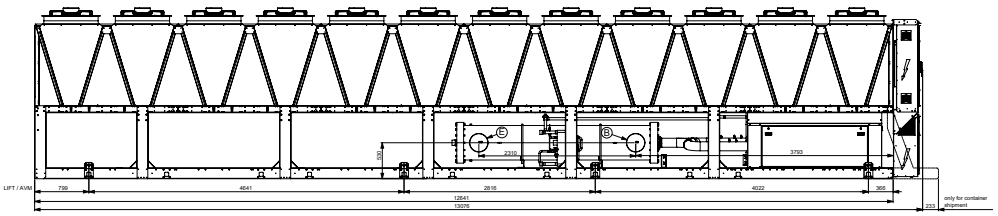
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 1160 AIR EVO HSE

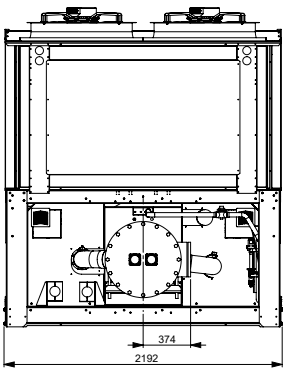
Front view



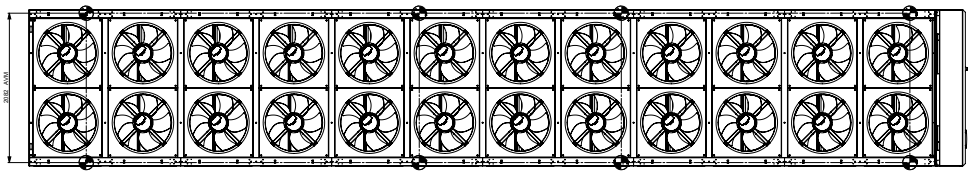
Side view



Back view



Top view



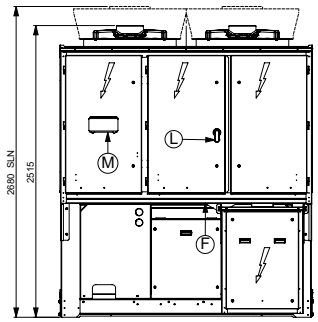
B	Water inlet 10” Victaulic
E	Water outlet 10” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

Hydraulic option	Water in	Water out
STD	B	E

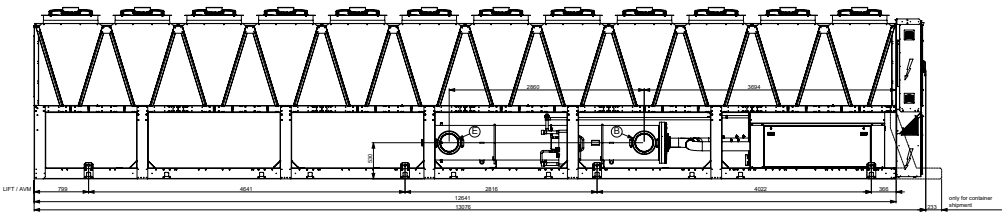
8 - Technical Data (continued)

Dimensional drawings - SYSCREW 1260 AIR EVO HSE

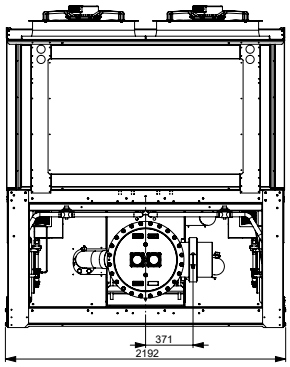
Front view



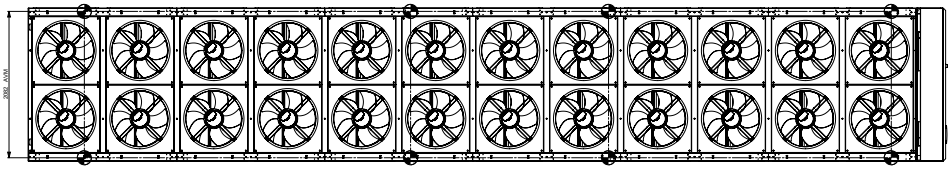
Side view



Back view



Top view

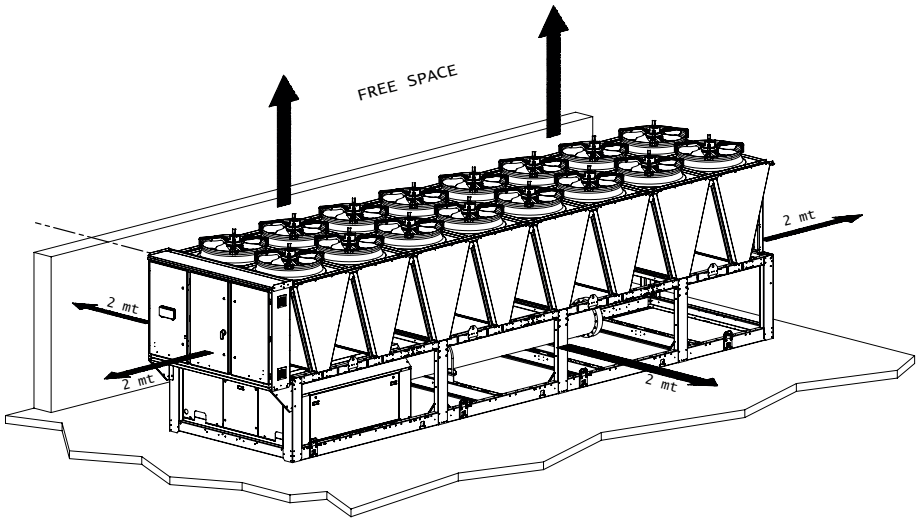


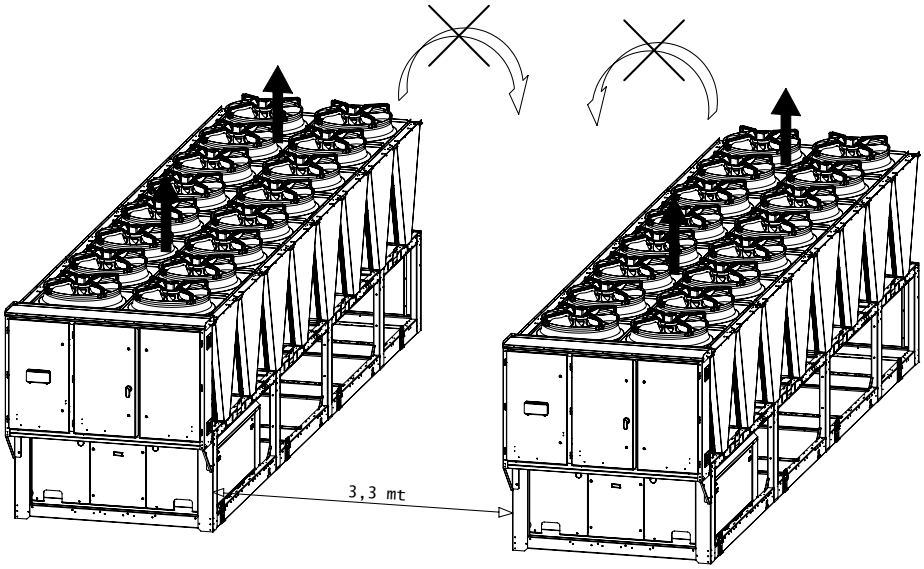
B	Water inlet 10” Victaulic
E	Water outlet 10” Victaulic
F	Electrical power supply
L	Main switch
M	Control keypad / Display

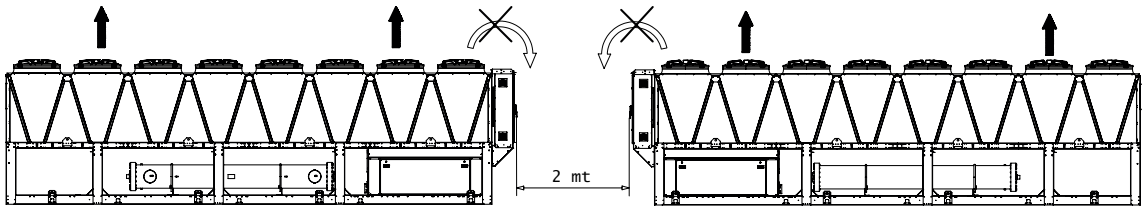
Hydraulic option	Water in	Water out
STD	B	E

8 - Technical Data (continued)

8.7 Space requirements







The units are air-cooled and are designed for outdoor application.
Adequate space around chillers is mandatory, as shown in the pictures below
- to guarantee the proper air flow through the condenser coils, since warm air recirculation and coil starvation may cause the degradation of performances or, in the worst cases, the unit shutdown for high pressure.
- to guarantee access for periodic service and maintenance.

These recommendations and are generally enough even in case of extraordinary maintenance, as the replacement of major components of the unit (evaporator, compressors, etc).
In any case, to have confirm of the adequate space for this purpose, please contact your nearest Systemair Sales Office.

9 - Maintenance

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

Do not discharge the refrigerant into the atmosphere while the refrigeration circuits are being drained. Use appropriate recovery equipment.

When the recovered refrigerant cannot be re-used, return it to the manufacturer.

Do not throw away the waste oil of the compressor, because it contains refrigerant in solution.

The waste oil must be returned to the manufacturer.

Unless otherwise specified, the operations described below may be carried out only by a trained maintenance operator.

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 the pressure drops in the heat exchanger		●			
Check for electric absorption		●			
Check suction pressure and temperature		●			
Check delivery pressure and temperature		●			
Check the oil level in the compressor		●			
Check that there are no gas bubbles in the liquid line		●			
Check that the fins of the external coil are clean (if any)			●		
Check the operation of the oil heaters			●		
Check the remote control switches			●		
Check the operation of the LP pressure switch				●	
Check the operation of the HP pressure switch				●	
Check the insulation of the heat exchanger				●	
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 (if any)				●	●
Check the operation of the flow switches				●	
Check the operation of the solenoid valve				●	●

9 - Maintenance (continued)

9.3 Refrigerant charge

Do not inject refrigerant liquid into the LP side of the circuit. Be very careful, and charge the circuit properly.

If the charge is insufficient, the efficiency of the unit will be lower than expected. In the worst of cases the LP pressure switch may be activated, resulting in the halting of the unit.

In the presence of an excess charge, the condensing pressure will rise (in the worst of cases, the HP pressure switch may be activated, resulting in the stop of the equipment), and the consumption will increase as well.

It is strictly forbidden to use the compressor as a vacuum pump to drain the plant.

Fill the refrigeration circuit after it has been drained for maintenance purposes (leaks, replacement of the compressor etc.). The amount of the charge is indicated on the plate affixed to the unit.

Before refilling, it is important to drain and de-hydrate the circuit, thus obtaining a minimum abs. pressure value of 0.06 mbar.

Inject the refrigerant fluid before removing the vacuum, then fill the circuit up to 90% of the total gas requirement (in liquid form). The appliance must be filled through the filling valve on the liquid line, on the outlet side of the condenser.

It is recommended to connect the refrigerant cylinder to the filling valve on the liquid line, and to arrange it in such a way as to inject only liquid refrigerant.

Then start the compressor and let the gas flow from the cylinder, up until the liquid flow, which can be observed through the sight glass, is limpid.

9.4 Compressor

Compressors are delivered with the necessary charge of lubricating oil. During normal operation, this charge is sufficient for the whole life of the unit, providing that the efficiency of the refrigeration circuit is satisfactory and if it has not been overhauled.

If the compressor needs to be replaced (following a mechanical failure or if burnt), contact one of manufacturer.

Hazardous voltages in frequency inverter housing!
Any contact will cause severe injury or death.
Never open FI housing during operation.
In case of any operation in the FI housing, switch off the main switch and secure it against being switched on again.
Wait for at least 5 minutes until all capacitors have been discharged. Close perfectly the FI housing before switching on again.

Compressors use polyester oil. During maintenance operations on the compressor, or if you have to open the refrigerant circuit in any point, remember that this type of oil is highly hygroscopic, and accordingly it is important that it is not left exposed to the weather for prolonged periods, as this would require the replacement of the oil.

Before opening the panel, the unit must stay switched off for at least 5 minutes

9.5 Condenser

Condenser coils are of microchannel type made of 100% aluminium (fins and tubes). In the presence of leaks caused by any damage or shock, the coils shall be repaired or replaced by one authorised Service Center. To ensure the effective and correct operation of the condenser coils, it is important to keep the condenser's surface perfectly clean, and to check that there is no foreign matter, such as leafs, wires, insects, waste etc. If the coil becomes dirty, there is an increase in the absorption of electric energy. Furthermore, the maximum pressure alarm may be activated and may halt the unit.

The condenser must be cleaned with a LP compressed air jet, parallel to the aluminium fins, in the direction opposite to the air circulation.

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

Be careful not to damage the aluminium fins during cleaning.

Standard microchannel condenser coils are made of aluminium without coating, that is relatively corrosion resistant and suitable for installations in areas without corrosive agents.

In case of installation in environments with high level of pollutants, salts or other atmospheric agents that could shorten the life of heat exchangers, it is recommended to select a proper anticorrosion treatment protecting the overall coil.

Before the unit is installed, make sure that the coil configuration is compliant to Systemair Coil Policy. For additional information, please contact Systemair Service.

9 - Maintenance (continued)

9.6 Fans

The fans of the condenser, of axial type, are complete with impeller with aerodynamic profile blades and a cylindrical nozzle. The motor's bearings are lubricated forever.

Before starting the appliance, after any maintenance operations involving the disconnection of 3-phase connections, check that the direction of rotation of the fans is the one indicated by the arrow (upward air current). If the direction of rotation is wrong, invert two of the three supply phases to the motor.

9.7 Dehydrating filter

The refrigeration circuits are provided with dehydrating filters.

The filter clogging is marked by the presence of air bubbles in the sight glass, or by the difference between the temperatures measured downstream from and upstream of the drying filter. If, once the cartridge has been replaced, there are still some air bubbles, the appliance has lost a part of the refrigerant charge in one or more points, that must be identified and serviced. In any case it is suggested the good practice to replace the filter cartridges at each maintenance interventions in order to keep the refrigerant circuit in full efficiency.

9.8 Sight glass

The sight glass is used for inspecting the refrigerant flow and the humidity % of the refrigerant. The presence of bubbles indicates that the dehydrating filter is clogged or the charge insufficient.

A colour indicator is positioned inside the sight glass. If you compare the colour of the indicator to the scale on the ring of the sight glass, you can calculate the percentage of humidity of the refrigerant. If it is excessive, replace the filter's cartridge, operate the appliance for 1 day and then check the humidity % again. When the humidity % is within the pre-determined range, no other operations are required. If the humidity % is still too high, replace the dehydrating filter again, start the unit and operate it for another day.

9.9 Electronic expansion valve

The circuit of the unit is equipped with electronic expansion valve.

The valve is calibrated for an overheating of 6 °C.

Procedure to check for overheating:

– Measure the suction pressure with the pressure gauges on the board of the unit o using a pressure gauge connected to the service valve on the suction side.

– From the pressure gauge's temperature scale, measure the saturated suction temperature (Tsa) which corresponds to the pressure value.

– Using a contact pressure gauge affixed to the outlet fitting of the gas of the evaporator, measure the actual temperature (Tse).

Overheating calculation (S):

S = Tse - Tsa

Overheating is regulated through the expansion valve.

If the electronic expansion valve cannot be regulated, it is probably broken, and shall be replaced. The replacement must be carried out by a Service Centre.

9.10 Evaporator

Check at regular intervals that the water side of the heat exchanger is perfectly clean. To do this, measure the pressure drop, water side (see Section 8) or measure the temperature of the liquid leaving and entering the heat exchanger, and compare it to the evaporation temperature.

To obtain an effective heat exchange, the difference between the temperature of the leaving water and the saturated evaporating temperature must be in the 2 - 4 °C range. A greater difference would indicate a low efficiency of the heat exchanger (i.e. the heat exchanger is dirty).

In this case, the heat exchanger must be subjected to chemical cleaning, an operation that shall be carried out by authorised engineers.

For other maintenance operations (extraordinary overhauling, replacement of the heat exchanger etc.), contact an authorised Service Centre.

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 continues to work, but without cooling	Insufficient charge of refrigerant.	Refill.
	The dehydrating filter is clogged.	Replace.
Ice on the suction line	Wrong calibration of overheating.	Increase overheating.
		Check the charge.
Excessive noise	Vibration of lines.	Check the clamping brackets, if any.
	Whistler emitted by the thermostatic expansion valve.	Refill.
		Check the dehydrating filter.
	Noisy compressor.	Seized bearings; replace the compressor.
		Check that the compressor's locknuts are tightened.
Low oil level in the compressor	One or more gas or oil leaks in the circuit.	Identify and remove leaks.
	Mechanical failure of the compressor.	Request the intervention of a Service Centre.
	Anomaly of the oil heater of the compressor's base.	Check the electric circuit and the resistor of the heater of the motor base, and replace defective components.
One or both compressors are not working	Breaking of the electric circuit.	Check the electric circuit and detect any ground dispersions and short circuits. Check fuses.
	Intervention of the HP pressure switch.	Reset the pressure switch and the control panel and restart the appliance. Identify and remove the cause that enabled the pressure switch.
	The fuse of the control circuit is broken.	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 wiring of check and safety devices.
	The line voltage is too low.	Check voltage. If problems regard the system, solve them. If they are caused by the distribution network, inform the Energy Distributor.
	Short-circuit of the compressor's motor.	Check the continuity of the winding.
	Seized compressor.	Replace the compressor.
Activation of the LP alarm, stop of the unit	Gas leak.	Identify and remove the leak.
	Insufficient charge.	Refill.
	Failure of the pressure switch.	Replace the pressure switch.
Activation of the HP alarm, stop of the unit	Failure of the pressure switch.	Check the operation of the pressure switch, replace it if defective.
	The delivery valve is partially closed.	Open the valve and replace it, if faulty.
	Substances with condensable gases in the circuit.	Drain the circuit.
	The fan of the condenser is stopped.	Check cables and motor. If defective, repair or replace.
The liquid line is too hot	Insufficient charge.	Identify and remove the cause of the loss of charge and refill.
Frosting of the liquid line	The valve of the liquid line is partially closed.	Check that valves are open.
	The liquid filter is clogged.	Replace the cartridge or the filter.
Compressor with Frequency Inverter (FI) not available	Communication between Fequency Inverter (FI) and unit control board interrupted	Check that the data cable from unit control board to FI is not defective and the connection is well tightened
		Check that the FI power supply cables are not defective and the connection is well tightened
		Check that the main supply voltage is inside the permitted range of application
		Check that the control transformer for auxiliary supply is not defective and the connection is well tightened
	The unit control board is defective	Change of control board
	The Frequency inverter is defective	Change of Frequency Inverter

10 - Troubleshooting (continued)

The table below lists anomalies of operation, causes and corrective measures, specifically related to pump inverter (optional).

S.NO.	WARNING / ALARM NO.	DESCRIPTION	TROUBLESHOOTING
1	W/A2	Live zero error	→ Check connections on all analog mains terminals. → Control card terminals 53 and 54 for signals, terminal 55 common → VLT® General Purpose I/O MCB 101 terminals 11 and 12 for signals, terminal 10 common → VLT® Analog I/O Option MCB 109 terminals 1, 3, and 5 for signals, terminals 2, 4, and 6 common. → Check that the frequency converter programming and switch settings to match the analog signal type. → Perform an input terminal signal test.
2	W/A7	DC over voltage	→ Connect a brake resistor. → Extend the ramp time. → Change the ramp type. → Activate the functions in parameter 2-10 Brake Function. → Increase parameter 14-26 Trip Delay at Inverter Fault. → If the alarm/warning occurs during a power sag, use kinetic back-up (parameter 14-10 MainsFailure).
3	W/A8	DC under voltage	→ Check that the supply voltage matches the frequency converter voltage. → Perform an input voltage test. → Perform a soft charge circuit test.
4	W/A9	Inverter overloaded	→ Compare the output current shown on the LCP with the frequency converter rated current. → Compare the output current shown on the LCPwith the measured motor current. → Show the thermal frequency converter load onthe LCP and monitor the value. When running above the frequency converter continuous current rating, the counter increases. When running below the frequency converter continuous current rating, the counter decreases.
5	W/A10	Motor ETR over temperature	Check for motor overheating: → Check if the motor is mechanically overloaded. → Check that the motor current set in parameter 1-24 Motor Current is correct. → Ensure that the motor data in parameters 1–20 to 1–25 are set correctly. → If an external fan is in use, check that it is selected in parameter 1-91 Motor External Fan. → Running AMA in parameter 1-29 Automatic Motor Adaptation (AMA) tunes the frequency converter to the motor more accurately and reduces thermal loading
6	W/A11	Motor thermistor over temperature	Check for motor overheating: → Check if the motor is mechanically overloaded. → When using terminal 53 or 54, check that the thermistor is connected correctly between either terminal 53 or 54 (analog voltage input) and terminal 50 (+10 V supply). Also check that the terminal switch for 53 or 54 is set for voltage. Check that parameter 1–93 Thermistor Source selects terminal 53 or 54. → When using terminal 18, 19, 31, 32, or 33 (digital inputs), check that the thermistor is connected correctly between the digital input terminal used (digital input PNP only) and terminal 50. Select the terminal to use in parameter 1–93 Thermistor Source.
7	W/A12	Torque limit	→ If the motor torque limit is exceeded during ramp-up, extend the ramp-up time. → If the generator torque limit is exceeded during ramp-down, extend the ramp-down time. → If torque limit occurs while running, increase the torque limit. Make sure that the system can operate safely at a higher torque. → Check the application for excessive current draw on the motor.
8	W/A27	Brake chopper short-circuited	→ Remove power to the frequency converter and remove the brake resistor.
9	A4	Mains phase loss	→ Check the supply voltage and supply currents to the frequency converter.
10	A13	Over Current	→ Remove the power and check if the motor shaft can be turned. → Check that the motor size matches the frequency converter. → Check that the motor data is correct in parameters 1-20 to 1-25.

10 - Troubleshooting (continued)

S.NO.	WARNING / ALARM NO.	DESCRIPTION	TROUBLESHOOTING
11	A14	Ground fault	Remove power to the frequency converter and repair the ground fault. → Check for ground faults in the motor by measuring the resistance to ground of the motor cables and the motor with a megohmmeter. → Reset any potential individual offset in the 3 current transducers in . Perform the manual initialisation or perform a complete AMA. This method is most relevant after changing the power card.
12	A29	Drive over temperature	Check for the following conditions. → The ambient temperature is too high. → The motor cables are too long. → Incorrect airflow clearance above and below the frequency converter. → Blocked airflow around the frequency converter. → Damaged heat sink fan. → Dirty heat sink.
13	A30	Motor phase U missing	→ Remove the power from the frequency converter and check motor phase U.
14	A31	Motor phase V missing	→ Remove the power from the frequency converter and check motor phase V.
15	A32	Motor phase W missing	→ Remove the power from the frequency converter and check motor phase W.
16	A47	24 V supply low	→ Check for a defective power card.
17	A65	Control Board Over-temperature	→ Check that the ambient operating temperature is within the limits. → Check for clogged filters. → Check the fan operation. → Check the control card.
18	A244	Heatsink temp	
19	A16	Short Circuit	Remove the power to the frequency converter and repair the short circuit.
20	A33	Inrush fault	→ Let the unit cool to operating temperature
21	A38	Internal fault	→ Cycle power. → Check that the option is properly installed → Check for loose or missing wiring
22	A45	Earth fault 2	→ Check for proper grounding and loose connections. → Check for proper wire size. → Check the motor cables for short circuits or leakage currents.
23	A46	Pwr. card supply	→ Check for a defective power card. → Check for a defective control card. → Check for a defective option card. → If a 24 V DC supply is used, verify proper supply power."
24	A48	1.8 V supply low	→ Check for a defective control card. → If an option card is present, check for overvoltage.
25	A69	Pwr. Card Temp	→ Check that the ambient operating temperature is within limits. → Check for clogged filters. → Check fan operation. → Check the power card.

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
HP pressure switch	1
LP pressure switch	1
Gas filter	2
Electronic expansion valve	2
Auxiliary relays	2
Fan's fuses	6
Compressor's fuses	6
Auxiliary fuses	6
Set of compressor contactors	1
Fan's contactor	1
Water sensor	1
Air sensor	1
Electronic card	1
Keyboard	1
Compressor oil resistor	1

11.2 Oil for compressors

The compressors are lubricated with Ester oil BSE 170 (Viscosity of 170 St / 40 °C).

11.3 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

During the draining of the refrigeration circuits, do not let the refrigerant overflow in the surrounding atmosphere.

The circuit must be drained using suitable recovery equipment.

Do not disperse the waste oil of the compressors in the environment, since it contains some dissolved refrigerant.

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.

Remove all the refrigerant from the refrigeration circuits of the unit and store it in suitable containers, using a recovery unit. If its characteristics have remained the same, the refrigerant can be used again. Contact the competent authority to obtain information about disposal. In **NO** event shall the refrigerant be discharged into the atmosphere. The oil in each refrigeration circuit must be drained and collected into a suitable container; then it shall be disposes of in conformity with local regulations that apply to the disposal of waste lubricants. Any oil spillage must be recovered and disposed of in like manner.

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

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.

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 of oil, 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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