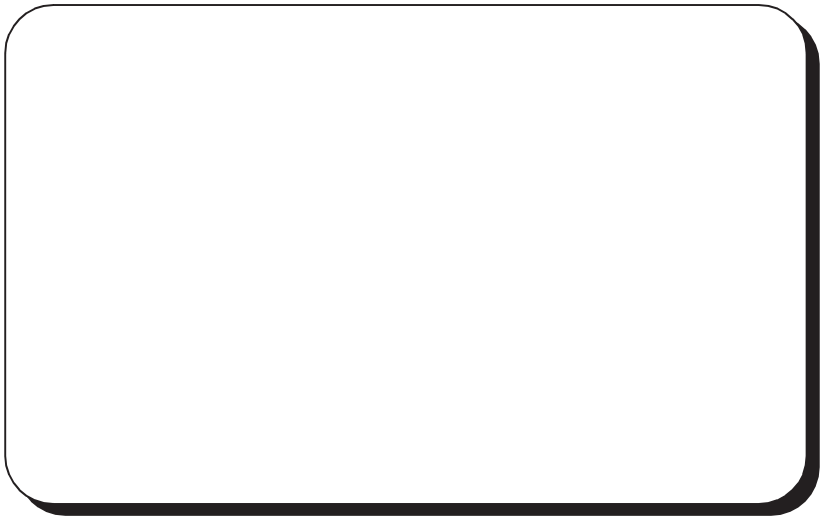
Cooling, conditioning, purifying.

WATER REFRIGERATORS

GL T 120÷360

MAINTENANCE AND OPERATING MANUAL



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CHAPTER 1

GENERAL INFORMATION

1.1 Terminology

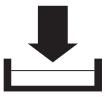
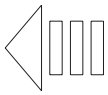
The machines described in this manual are called “WATER REFRIGERATORS” or simply “REFRIGERATORS”.
This manual is written for those responsible for the installation, use and maintenance of the refrigerator.
These refrigerators have been designed to cool a liquid flow.
In most applications, the liquid to be cooled is water and the term “WATER” will be used even if the liquid to be cooled is different from water (a mixture of water and ethilenic-glycol).
The liquid to be cooled must be compatible with the materials used. This analysis must be made before purchasing or installing the refrigerator.
Here below the term “PRESSURE” will be used to indicate the gauge pressure.

ATTENTION

This manual provides the user, installer and maintenance technician with all the technical information required for installation, operation and carrying out routine maintenance operations to ensure long life.
If spare parts are required, this must be original. Requests for SPARE PARTS and for any INFORMATION concerning the unit must be sent to the distributor or to the nearest service centre, providing the MODEL and MACHINE NUMBER shown on the machine data plate and on the first page of this manual.

1.2 Symbols

The following symbols are shown on the stickers on the unit as well as on the overall dimension drawing and refrigeration circuits in this manual. Their meaning is the following:

	Machine water-inlet
	Machine water outlet
	Indications for lifting the unit
	Water drainage point from the machine
	Electrocution risk
	Cooling air flow
	Direction of the refrigerant gas flow and water circuit
	Rotation direction of the fans
	Risk of injury from sharp edges

	Risk of burns from contact with high-temperature surfaces
	Presence of pulleys and belt in motion inside casing

On the main page of the manual there is a metallic plate label with the following indications:

- unit model;
- alphanumeric string-code, to determine the unit characteristics;
- manual code;
- unit serial number;
- unit construction year.

english

1.3 How to interpret the model

MODEL	DESCRIPTION
GL T ◊ ◊◊ / X X X	Unit version (N, SN or SSN) Rated capacity in HP Galaxy Tech model abbreviation

* Water inlet conditions 12°C, water outlet conditions 7°C, ambient temperature 35°C.

1.4 How to interpret the code

/N	Low noise operation value: standard. Fan rotation speed approx. 900 rpm. Compressors compartment only partially acoustically insulated.
/SN	Low noise operation value: medium. Fan rotation speed approx. 700 rpm. Acoustically insulated compressors compartment.
/SSN	Low noise operation value: high. Fan rotation speed approx. 580 rpm (GL T 360 model = 690 rpm). Compressors compartment with high efficiency acoustic insulation.

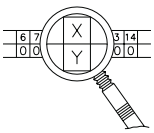
1.5 Technical data

The main technical data are given on the machine data plate.

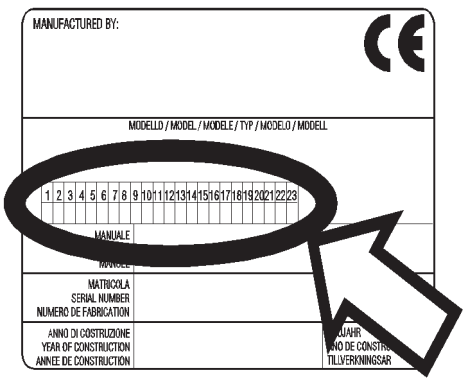
MODEL and CODE	Identifies the size of the machine (see chap " General Information") and the type of construction which distinguishes it.
MANUAL	Code number of this manual.
SERIAL NUMBER	This is the construction number of the unit.
YEAR OF CONSTRUCTION	This is the year of the final test of the machine.
VOLTAGES/PHASES/FREQUENCY	Power supply specifications.
MAX. CONSUMPTION I_{MAX}	This is electrical current consumed by the unit during the limit working conditions.
INSTALLED POWER P_{MAX}	It is the power absorbed by the unit during the limit working conditions.
PROTECTION RATING	As defined by the EN 60529 European standard.
REFRIGERANT	This is the refrigerant fluid in the unit.
COOLANT CHARGE	Quantity of coolant fluid in the entire system.
MAX. COOLING PRESSURE HP SIDE	This is the design pressure of the HP side refrigeration circuit.
MAX. COOLING PRESSURE LP SIDE	This is the design pressure of the LP side refrigeration circuit.
COOLED FLUID USED	Fluid cooled by the machine (normally water).
MAX. WORKING PRESSURE	Maximum design pressure of the user circuit
MAX. TEMPERATURE	Maximum design temperature of the user circuit, absolutely not to be confused with the maximum working temperature which is defined in the offer.
SOUND PRESSURE LEVEL	This is the free field sound pressure level at 1 metre from the condenser side of the unit and at a height of 1.6 metres.
AMBIENT TEMPERATURE	Minimum and maximum value of the cooling air temperature.
WEIGHT	This is the approximate weight of the unit before packing.

1.6 How to interpret the alphanumeric string-code

The alphanumeric string-code is reproduced on the metallic plate of the main page of the manual.



Illustrated on the side is marked symbol found on some parts of the refrigerant and wiring diagrams. Inside it is shown an enlarged part of the same alphanumeric string-code present on the manual.
The upper square indicates the position of the alphanumeric string-code, the lower square indicates the value assigned to that position.



At the left side is marked an example of an empty alphanumeric string-code. Each position will be defined by an alphanumeric value (0, 1, 2, A, B, etc.). Specific unit features are established by the position and the alphanumeric values.
Please find below each alphanumeric values position explained, which can be used:

	POS.	VALUE	DESCRIPTION
VERSION	1-2-3	N	N
		SN	SN
		SSN	SSN
COMPRESSORS SOUNDPROOFING	4	0	NONE
		1	CAP
REFRIGERANT	5	1	R410A
PAINTED CONDENSING COIL	6	0	NO
		1	YES
CONDENSER COIL PROTECTION	7	0	NONE
		1	FILTERS
FAN REGULATION	8	1	ELECTRONIC CONTROL
		2	STEPS
COMPRESSORS COCKS	9	0	NO
		1	YES
ELECTRONIC THERMOSTATIC	10	0	NO
		1	YES
HYDRAULIC GROUP	11	0	NONE
		1	P2 PUMP
		2	P2+P2 DOUBLE PUMP
		3	P2 TANK+PUMP
		4	P2+P2 TANK+DOUBLE PUMP
EVAPORATOR ANTIFREEZE PROTECTION	12	0	NO
		1	YES
COMPRESSOR CASING RESISTANCE	13	0	NO
		1	YES
AMBIENT TEMPERAURE	14	0	STANDARD
		1	-20°

1.7 Performances

The refrigerator performance mainly depends on the flow and temperature of the cooled water and on the ambient temperature. These data are defined during the offer stage and it is to these that reference should be made.

1.8 Sound Level Measurements

GALAXY (GL T) Model	120			135			150			165			180		
Version	N	SN	SSN	N	SN	SSN	N	SN	SSN	N	SN	SSN	N	SN	SSN
Lp dB(A) *	81,6	74,2	67,9	81,5	74,1	67,0	81,3	73,9	68,1	81,4	74,0	68,9	81,6	74,1	69,1
Lw dB(A) **	94,6	87,2	80,9	94,5	87,1	81,0	94,3	86,9	81,1	94,4	87,0	81,9	94,6	87,1	82,1

GALAXY (GL T) Model	195			210			225			240			255		
Version	N	SN	SSN	N	SN	SSN	N	SN	SSN	N	SN	SSN	N	SN	SSN
Lp dB(A) *	82,6	75,0	69,7	82,5	75,0	69,6	82,4	75,1	69,8	82,5	75,0	70,4	82,7	75,1	70,9
Lw dB(A) **	95,6	88,0	82,7	95,5	88,0	82,6	95,4	88,1	82,8	95,5	88,0	83,4	95,7	88,1	83,9

GALAXY (GL T) Model	270			285			300			315			330		
Version	N	SN	SSN	N	SN	SSN	N	SN	SSN	N	SN	SSN	N	SN	SSN
Lp dB(A) *	82,9	75,3	71,4	83,7	76,2	71,0	83,6	76,1	71,0	83,7	76,2	71,5	83,8	76,3	71,9
Lw dB(A) **	95,9	88,3	84,4	96,7	89,2	84,0	96,6	89,1	84,0	96,7	89,2	84,5	96,8	89,3	84,9

GALAXY (GL T) Model	345			360		
Version	N	SN	SSN	N	SN	SSN
Lp dB(A) *	83,9	76,3	72,2	84,0	76,4	72,5
Lw dB(A) **	96,9	89,3	85,2	97,0	89,4	85,5

* at distance of 1 metre (3,2 FT)

** global

Test conditions

Noise levels refer to operation of the unit at full load in nominal conditions.

Sound pressure level in hemispherical irradiation conditions at a distance of 1 m (3,2 FT) from the condenser side of the unit and height of 1.6 m (5,2 FT) from the ground. Values tolerance ± 2 dB.

Sound power level: in compliance with ISO 3744.

CHAPTER 2

SAFETY-INSPECTION

This machinery was designed to be safe in the use for which it was planned provided that it is installed, started up and maintained in accordance with the instructions contained in this manual.
The manual must therefore be studied by all those who want to install, use or maintain the machinery.
The machine contains electrical components which operate at the line voltage, and also moving parts (e.g. fans).
It must therefore be isolated from the electricity supply network before being opened.
All maintenance operations which require access to the machinery must be carried out by expert or appropriately trained persons who have a perfect knowledge of the necessary precautions.
Avoid the presence of children in the unit installation place.

2.1 General warnings

When handling or maintaining the unit and all auxiliary equipment, the personnel must operate with care observing all instructions concerning health and safety at installation site.
Most accidents which occur during the operation and maintenance of the machinery are a result of failure to observe basic safety rules or precautions. An accident can often be avoided by recognising a situation that is potentially hazardous.
The user should make sure that all personnel concerned with operation and maintenance of the unit and all auxiliary equipment have **read and understood** all warnings, cautions, prohibitions and notes written in this manual as well as on the unit. Improper operation or maintenance of the unit and auxiliary equipment could be dangerous and result in an accident causing injury or death.
We cannot anticipate every possible circumstance which might represent a potential hazard.
The warnings in this manual are therefore not all-inclusive.
If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended, he must ensure that the unit and auxiliary equipment will not be damaged or made unsafe and that there is no risk to persons or property.
Any improper use of the machine will relieve the manufacturer from any liability for possible personal injury or property damage.
Arbitrary modifications made to the unit will automatically invalidate all forms of guarantee provided by the manufacturer.

2.2 General precautions

2.2.1 Lifting and carriage precautions

Check all chains, hooks, shackles and slings are in good condition and are of the correct capacity.
They must be tested and approved according to local safety regulations.
Cables, chains or ropes must never be applied directly to lifting eyes.

NOTE
The lifting material is not furnished with the unit.

Always use an appropriate shackle or hook properly positioned. Arrange lifting cables so that there are no sharp bends.
Use a spreader bar to avoid side loads on hooks, eyes and shackles.
When a load is on a hoist stay clear of the danger area beneath and around it.
Keep lifting acceleration and speed within safe limits and never leave a load hanging on a hoist for longer than is necessary.
All unit models have different weights according to the model:
Please see Technical Catalogue or the data plate applied on the casing for weight data.

Handling of the unit up to L=7m.

The handling is carried out by means of:

1. Either nr.1 “H”type balancing lifting;
2. Or nr.1 linear type balancing lifting.

In the first case the following materials are necessary:

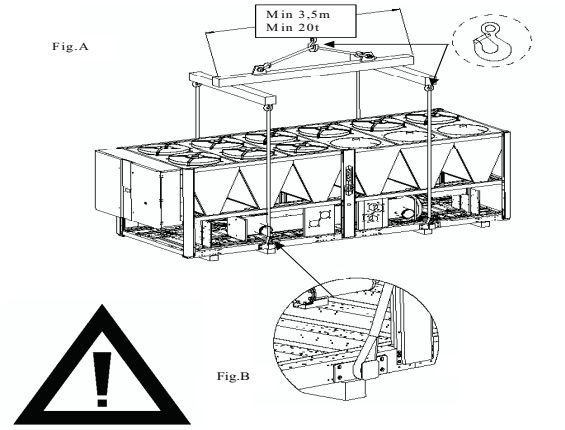
- nr. 4 slings, each sling has a minimum capacity of 5t;
- nr. 1 “H”type balancing lifting with minimum length of 3,5m between the 2 arms, with minimum capacity of 20t;
- nr. 1 crane with capacity adequate to the handling type.

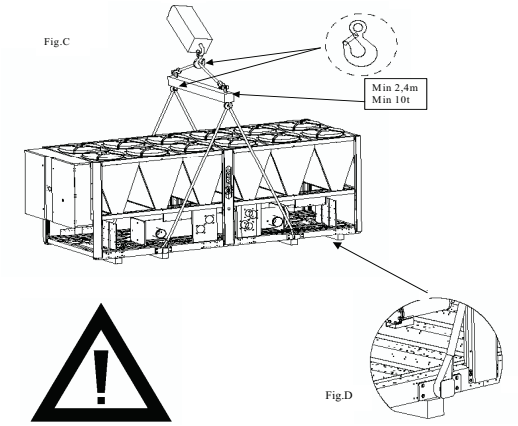
The slings must be connected to the base (see fig. A) and to the balancing lifting (if the balancing lifting has hooks be sure they have anti-unhitching system, see fig. B).

In the second case the following materials are necessary:

- nr. 4 slings, each sling has a minimum capacity of 5t;
- nr. 1 linear type balancing lifting with minimum length of 2,4m and minimum capacity of 10t;
- nr. 1 crane with capacity adequate to the handling type.

The slings must be connected to the base (see fig. C) and to the balancing lifting (if the balancing lifting has hooks be sure they have anti-unhitching system, see fig. D).





Handling of the unit over L=7m

The handling is carried out by means of:

1. Either nr.1 “H”type balancing lifting;
2. Or nr.2 linear type balancing liftings.

In the first case the following materials are necessary:

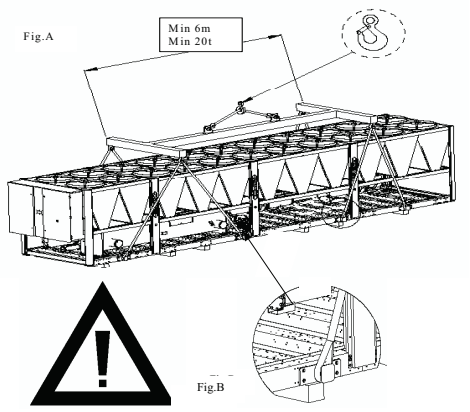
- nr. 8 slings, each sling has a minimum capacity of 5t;
- nr. 1 “H”type balancing lifting with minimum length of 6m between the 2 arms, with minimum capacity of 20t;
- nr. 1 crane with capacity adequate to the handling type.

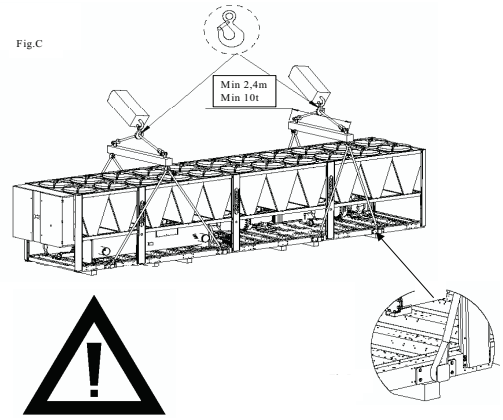
The slings must be connected to the base (see fig. A) and to the balancing lifting (if the balancing lifting has hooks be sure they have anti-unhitching system, see fig. B).

In the second case the following materials are necessary:

- nr. 8 slings, each sling has a minimum capacity of 5t;
- nr. 2 linear type balancing liftings with minimum length of 2,4m and minimum capacity of 10t;
- nr. 2 cranes with capacity adequate to the handling type.

The slings must be connected to the base (see fig. C) and to the balancing lifting (if the balancing lifting has hooks be sure they have anti-unhitching system, see fig. D).





ATTENTION

The images are purely representative, therefore the correct position of lifting lugs is the one indicated on the unit. NEVER MOVE THE LIFTING LUGS.

2.2.2 Precautions during operation

Operation must be carried out by competent personnel under a qualified supervisor.
All the connections to the cooling circuit, the wirings of the electrical plant and of the electrical board must be painted or clearly marked in accordance with local safety regulations in the place of installation.
Never remove or tamper with the safety devices, guards or insulation materials fitted to the unit or auxiliary equipment.
All electrical connections must comply with local codes.
The unit and auxiliary equipment must be earthen and protected by fuses against short-circuits and overloading.
When mains power is switched on, lethal voltages are present in the electrical circuits and extreme caution must be exercised whenever it is necessary to carry out any work on the electrical system.

2.2.3 Maintenance and repair precautions

ATTENTION

When disposing of parts and waste material of any kind make sure that there is no pollution of any drain or natural water-course and that no burning of waste takes place which could cause pollution of the air. Protect the environment by using only approved methods of disposal.

Keep a written record of all maintenance and repair work carried out on the unit and auxiliary equipment. The frequency and the nature of the work required over a period can reveal adverse operating conditions which should be corrected.

ATTENTION

Use only refrigerant gas specified on the specification plate of the unit.

Make sure that all instructions concerning operation and maintenance are strictly followed and that the complete unit, with all accessories and safety devices, is kept in good working order. The accuracy of pressure and temperature gauges must be regularly checked. They must be renewed when acceptable tolerances are exceeded.

ATTENTION

Do not weld or carry out any operation which produces heat near a system which contains oil or flammable liquids. The systems which may contain oil or flammable liquids must be completely drained and cleaned (with steam, for example), before carrying out these operations.

To prevent an increase in working temperature, inspect and clean heat exchanging surfaces (i.e. condenser fins) regularly. For every unit establish a suitable time schedule for cleaning operations.
Avoid to damage the safety valves and other pressure relief devices.

Avoid plugging by paint, oil or dirt accumulation.

ATTENTION

If replacement parts are needed use only original spares.

Before dismantling any part of the unit ensure that all heavy movable parts are secured.
When a repair has been completed, make sure no tools, loose parts or rags are left in, or on the machine.

ATTENTION

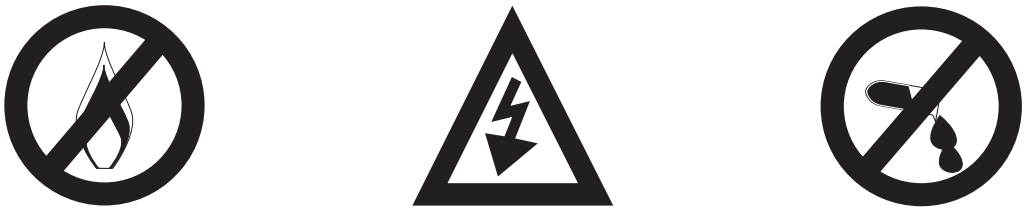
Check the direction of rotation of electric motors when starting up the unit initially and after any work on the electrical connections or switch gear.

All guards must be reinstated after carrying out repair or maintenance work.
Do not use flammable liquid to clean any component during operation.
If chlorinated hydrocarbon non-flammable fluids are used for cleaning, safety precautions must be taken against any toxic vapours which may be released.

ATTENTION

Before removing any panels or dismantling any part of the unit, carry out the following operations:
- Isolate the unit from the main electrical power supply by disconnecting the cable from the electrical power source.
- Lock the isolator in the "OFF" position with a lock.
- Attach a warning label to the main isolator switch conveying: "WORK IN PROGRESS - DON NOT APPLY VOLTAGE".
- Do not switch on electrical power or attempt to start the unit if a warning label is attached.

Coloured tracers can be used in service-maintenance operations.
Inspect all refrigerant circuit joints including connectors, flanges, and more generally all critical points (open joints) in order to prevent possible leakage of refrigerant gas.



2.3 Refrigerant gases

R410Aa is used as refrigerant in these units.
Never attempt to mix refrigerant gases.
To clean out a very heavily contaminated refrigerant system, e.g. after a refrigerant compressor burnout, a qualified refrigeration engineer must be consulted to carry out the task. The manufacturer's instructions and local safety regulations should always be observed when handling and storing high pressure gas cylinders.

2.3.1 Refrigerant safety schedule

Denomination:	R410A (50% Difluoromethane (R32); 50% Pentafluoroethane (R125).
INDICATION OF THE DANGERS	
Major dangers:	Asphyxia.
Specific dangers:	Rapid evaporation can cause freezing.
FIRST AID MEASURES	
General information:	Do not give anything to unconscious persons.
Inhalation:	Take the person outdoors. Use oxygen or artificial respiration if necessary. Do not administer adrenaline or similar substances.
Contact with the eyes:	Thoroughly wash with plenty of water for at least 15 minutes and call a doctor.
Contact with the skin:	Wash immediately with plenty of water. Remove contaminated clothing immediately.
FIRE-FIGHTING MEASURES	
Means of extinction:	Any means.
Specific dangers:	Pressure increase.
Specific methods:	Cool the containers with water sprays.
MEASURES IN THE EVENT OF ACCIDENTAL LEAKAGE	
Individual precautions:	Evacuate personnel to safe areas. Provide adequate ventilation. Use means of personal protection.
Environmental precautions:	Evaporates.
Cleaning methods:	Evaporates.
HANDLING AND STORAGE	
Handling technical measures/ precautions:	Ensure sufficient air change and/or extraction in the work areas.
recommendations for safe use:	Do not inhale vapours or aerosols.
Storage	Close properly and store in a cool, dry well-ventilated place. Store in its original containers. Incompatible products: explosives, flammable materials, organic peroxide.
CONTROL OF EXPOSURE/INDIVIDUAL PROTECTION	
Control parameters:	AEL (8-h e 12-h TWA) = 1000 ml/m3 for each of the two components.
Respiratory protection:	For rescue and maintenance work in tanks, use autonomous breathing apparatus. The vapours are heavier than air and can cause suffocation, reducing the oxygen available for breathing.
Protection of the eyes:	Safety goggles.
Protection of the hands:	Rubber gloves.
Hygiene measures:	Do not smoke.
PHYSICAL AND CHEMICAL PROPERTIES	
Colour:	Colourless.
Odour:	Faint.
Boiling point:	-52.8°C at atm. press.
Flammability point:	Non flammable.
Relative density:	1.08 kg/l at 25°C.
Solubility in water:	Negligible.

STABILITY AND REACTIVITY	
Stability:	No reactivity if used with the relative instructions.
Materials to avoid:	Highly oxidizing materials. Incompatible with: magnesium, zinc, sodium, potassium and aluminium. Incompatibility increases if metal is in powder or surfaces have not been recently protected.
Hazardous decomposition products:	These products are: halogen compounds, hydrofluoric acid, carbon oxide (CO, CO2), carbonyl halides.
TOXICOLOGICAL INFORMATION	
Acute toxicity:	(R32) LC50/inhalation/4 hours/lab. rats >760 ml/l (R125) LC50/inhalation/4 hours/lab. rats >3480 mg/l
Local effects:	Concentrations substantially above the TLV can cause narcotic effects. Inhalation of products in decomposition can lead to respiratory difficulty (pulmonary oedema).
Long-term toxicity:	Has not shown any cancerogenic, teratogenic or mutagenic effects in experiments on animals.
ECOLOGICAL INFORMATION	
Global warming potential HGWP (R11=1):	1730
Ozone depletion potential ODP (R11=1):	0
Considerations on disposal:	Usable with reconditioning.

CHAPTER 3

DESCRIPTION

3.1 Casing

The casing is built with galvanised panels and painted with polyester resins.

3.2 Operating principle

All the refrigerators described in this manual work on the basis of the same principle.

The cooling circuit is composed of two or four distinct and independent circuits which cool a water flow thanks to the use of one or two evaporators, in which on one side the refrigerant fluid evaporates, while on the other side the liquid to be cooled flows.

The cooling compressors are controlled by an electronic control board that controls:

- the evaporator water inlet temperature, in order to maintain it within the preset limits;
- the evaporator water outlet temperature to maintain it within the preset limits and the pressure difference between the evaporator water inlet and outlet to eliminate the risk of freezing caused by zero flow.

3.3 Refrigerant gases

R410A is used as refrigerant in these units.

To clean out a very heavily contaminated refrigerant system, e.g. after a refrigerant compressor burnout, a qualified refrigeration engineer must be consulted to carry out the task.

The manufacturer instructions and local safety regulations should always be observed when handling and storing high pressure gas cylinders.

For further information see Chapter 12 *"Refrigerant safety schedule"*.

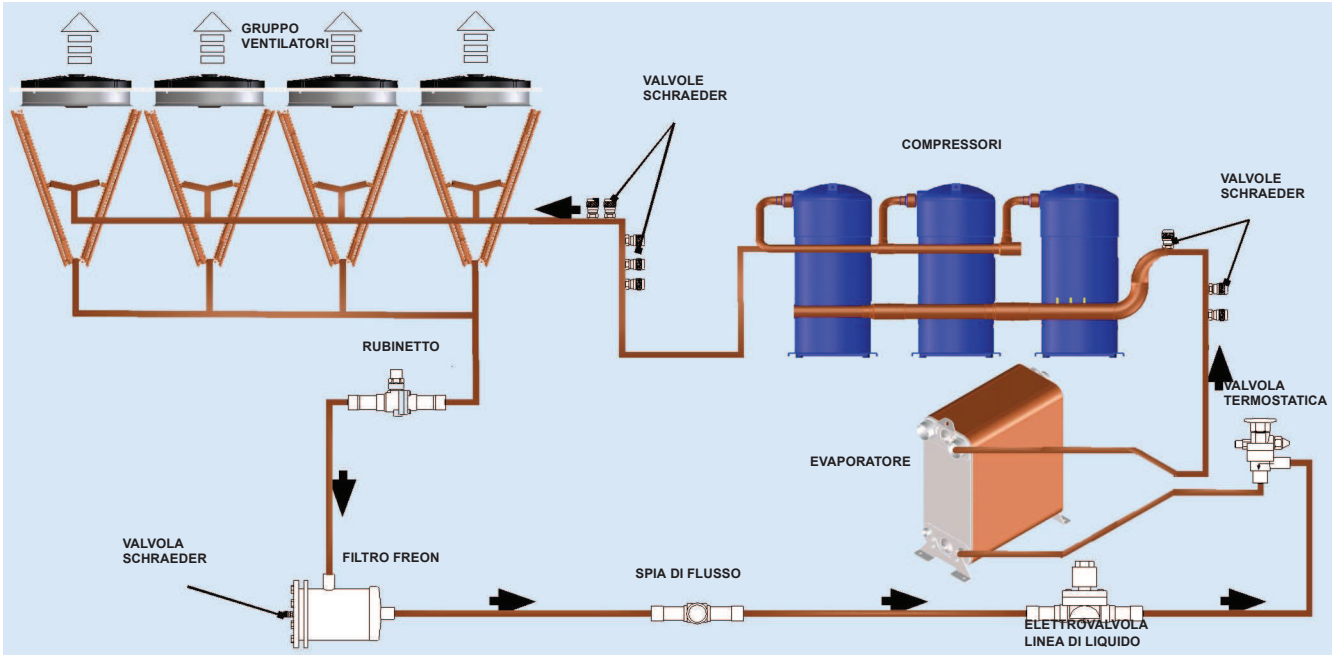
3.4 Cooling circuit

See enclosures

The refrigerant in the gaseous state is compressed by the compressor and sent to the condenser. Here the gas condenses, exchanging heat with the ambient air. It exits in a liquid state. It passes the cock and the dryer filter. After passing the flow indicator, the liquid is laminated by the thermostat valve and enters the evaporator. Here it exchanges heat with the water circuit as it evaporates. Having returned to the gaseous state, it is sucked in by the compressor/s and the cycle is repeated.

Information about the components of the standard machine are described below.

Components other than standard ones may be used to meet particular requirements. In this case please refer to the offer data.

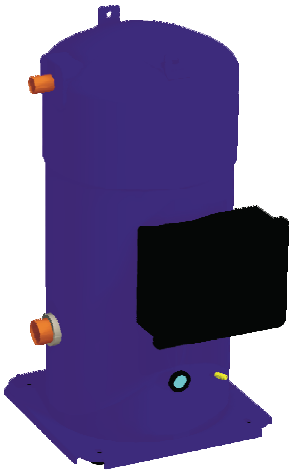


The circuits of the GALAXY units have the following components:

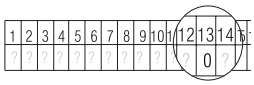
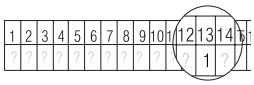
- high and low pressure transducers, which, reading the condensing and evaporating pressures, allow fan management, the unloading and high/low pressure alarms to trip;
- interception cocks on the liquid line positioned after the condenser;
- solenoid valve on the liquid line;
- expansion thermostatic valve with external equaliser;
- double series of pressure switches to check the max. condensing pressure, as foreseen by the european normative;
- high and low pressure freon manometers for each circuit;
- safety valve on each high and low pressure circuit;

All connections of components are welded with silver alloy and the copper tubes are covered with thermal insulating material in the cold parts to avoid the condensate formation.

3.4.1 Compressors



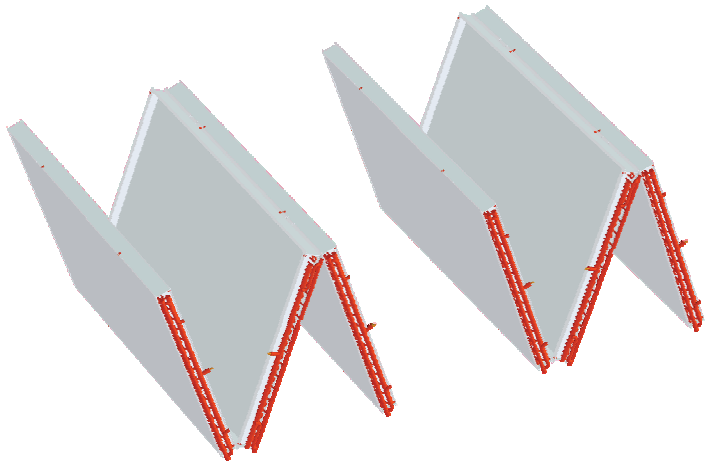
The compressors used in the GALAXY units are of SCROLL type, and they permit to obtain an high energetic efficiency (high COP evaluations a low vibration level, that means a silent running. The unit is furnished with an electric 2- poles motor, which is cooled through the gas drew in by the compressor and it is protected from the overheating of the windings by an inner modulus, that checks their temperature. This one controls even the phases sequence to avoid the inverse rotation. The start up is of direct type. Moreover the compressors are protected by magnetic switches. The units are furnished with a minimum of 4 or a maximum of 12 compressors, set up on two. three or four cooling circuits, in order to obtain high CPO values, above all during shutting mode. The (/N) versions can be equipped with caps (optional) for the acoustic insulation of the compressors, while the noiseless units (/SN, /SSN) are always equipped with caps, sound-absorbent material is utilized. Each compressor, in the lower part, is equipped with an indicator that allows to check the oil level in the carter resistance. On request, each compressor can be equipped with an heating carter resistance. The presence of the carter resistance depends on the alphanumeric string-code. For further information see paragraph 1.6 “How to interpret the alphanumeric string-code”:

position 13 value 0 WITHOUT carter resistances	position 13 value 1 WITH carter resistances
	

NOTE

The first time the machine is started after several days stoppage, turn the main switch on closing position (“I”) and wait at least 4 hours before pressing the ↑ + ← buttons of the board (units equipped with carter resistance).

3.4.2 Condensing coils

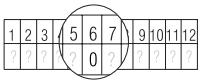
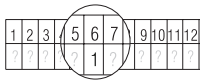


They are fins coils composed of inner scratched tubes, to increase the thermal exchange, copper connections, aluminium corrugate fins and galvanized sheet iron or aluminium. The coils are connected in parallel by connectors, in order to obtain a modular unit. The heat produced by the condensing process is dissipated by two or three couple of coils according to the model or to the version.

Painted coils (optional)

On request the Galaxy units can have coils with painted fins (edges and connections) to be utilized in seaside resorts. The fins are treated with polyurethan paint that prevent from the corrosion. The edges are made up of galvanized sheet.

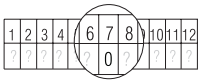
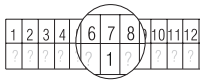
The presence of the painted coils depend on the alphanumeric string-code. For further information see paragraph 1.6 “How to interpret the alphanumeric string-code”:

position 6 value 0 WITHOUT painted coils	position 6 value 1 WITH painted coils
	

Air filters in the condensers (optional)

On request, the units can be equipped with air filter made up of galvanized sheet and aluminium, that are installed to prevent accidental contacts with the fins and to protect the frontal surface of the coils.

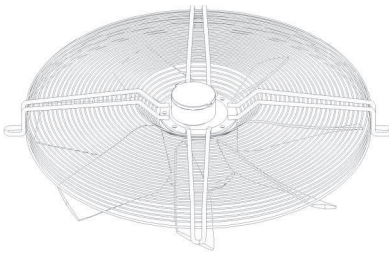
The presence of the filters depends on the alphanumeric string-code. For further information see paragraph 1.6 “How to interpret the alphanumeric string-code”:

position 7 value 0 WITHOUT filters	position 7 value 1 WITH filters
	

ATTENTION

If the unit is not equipped with filters, the customer has to prevent a safety area only for the authorized personnel.

3.4.3 Fans



The fans are of axial type and they have safety grids.

they are controlled by a pressure transducer that stop them when the pressure drops under a preset value.

The fans number of revolution of the /SN versions is lower than the one of the /N versions (high and low speed connection).

The fans number of revolution of the /SSN versions is the lowest, because the units are equipped with 8 poles fans.

The protection rating of the whole machine is IP54 with insulation class F.

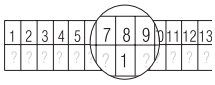
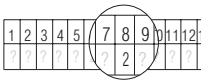
The locking is made up of aluminium and it has an aerodynamic shape.

The fans of the GL units can be managed as follow:

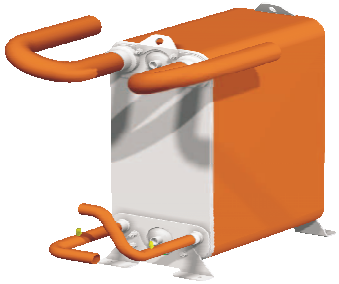
- **Step**: each circuit has a group of fans. Each group is progressively activated according to condensing pressure value.
- **Fans speed electronic control**: it allows to reduce the fans rotation speed by means of the rating regulation and the condensing pressure control (fans capacity control).

Both are managed by the pCO electronic control.

The fans control type depends on the alphanumeric string-code. For further information see paragraph 1.6 “How to interpret the alphanumeric string-code”:

position 8 value 1, ELECTRONIC CONTROL:	POSITION 8 valUE 2, STEP regulation:
	

3.4.4 Evaporator



The evaporators of the GALAXY units are plate exchangers made up of galvanized stainless steel. Through the plates flows both the refrigerant fluid and the process fluid that has to be cooled.

These exchangers are very efficient and compact, they need really few space inside the unit.

The shell is externally covered with a 9 mm thick insulated and anti-condensate aluminate material.

The evaporator is protected against freezing, due to low evaporating temperatures, by the anti-freeze function of the electronic board, which check the water outlet temperature. Furthermore, each evaporator is furnished with a differential pressure switch, which protects the evaporator against the absence of water flow.

The evaporators can work with antifreeze mixture, or other liquids that must not be incompatible with the materials of the hydraulic circuit.

All evaporators respect the “CE” normative about the pressure vessels.

ATTENTION

The flow rate of the fluid on the plating side must not exceed the values specified in the table in **Chapter 4** *“Installation”.*

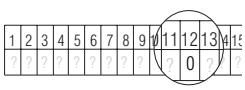
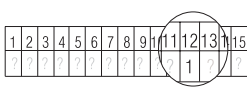
NOTE

The evaporator is equipped with a cock positioned in the lower part, that can be utilized to empty the plant (see chapter “ Conduction and maintenance”).

Evaporator electrical resistance (optional)

on request, the evaporator can be protected from ice formation by means of an electrical resistance (option) controlled by the control panel. For further information see paragraph 3.5.2 “Antifreeze resistance (optional)”.

The presence of the electrical resistance depends on the alphanumeric string-code. For further information see paragraph 1.6 “How to interpret the alphanumeric string-code”:

position 12 value 0 WITHOUT resistance:	position 12 value 1 WITH resistance:
	

3.5 Hydraulic circuit

See enclosures

The hydraulic circuit is composed of the following components:

- plates evaporator
- Water differential pressure switch (IP54) that protects the evaporator from the damage caused by low liquid flows: “one for each evaporator”;
- manual air breather on the higher side of the evaporator;
- drainage cock on the lower side of the evaporator;
- connection tubes between the evaporator and the water connections (the units with two evaporators are equipped with manifolds);
- victaulic type water connections from 5" to 6" according to the model;
- stub pipes with quickcoup joints furnished with the unit;
- holes in the inlet/outlet water pipe lines for the temperature probe.

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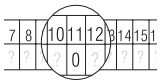
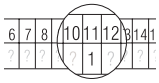
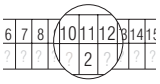
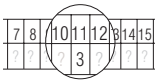
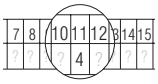
3.5.1 Hydraulic group (optional)

On request the GALAXY units can be equipped with the hydraulic group that is composed of:

- pump P2
- double pump P2+P2
- tank+pump P2
- tank +double pump P2+P2

the presence of the hydraulic group depends on the alphanumeric string-code, for further information see paragraph 1.6 “How to interpret the alphanumeric string-code”: :

position 11 value 0 WITHOUT hydraulic group *“only evaporator”*	position 11 value 1 WITH pump P2	position 11 value 2 WITH double pump P2+P2	position 11 value 3 WITH tank and pump P2	position 11 value 4 WITH tank and double pump P2+P2
				

Pump P2:

It has a lift of 15÷20 m.c.a. The pump is connected to the evaporator and to the water inlets/outlets (see overall dimension diagrams in the manual) by flexible pipes. The pCO manages the pump and the thermal protection alarm. Two cocks (inlet/outlet) allow to insulate the pump during maintenance.

Pump P2+P2 (unit in stand-by):

Each of them has a lift of 15÷20 m.c.a. The two pumps are connected by rigid connections, while to the evaporator and to the water inlets/outlets by flexible connection. The pCO automatically manages the operation of the pumps and the thermal protection alarm. Two cocks (inlet/outlet) allow to insulate the pump during maintenance. For each pump there is a non-return valve positioned in the inlet.

Tank and pump/s group:

It is a cylindric and horizontal tank (500 litres) made up of carbon steel and with an external insulating and anticondensing alluminate covering. For the description of the pump see above. The tank and the pump are installed on the unit base and are connected through rigid pipe lines insulated with armaflex. The connections with the evaporator and with the water inlets/outlets are of flexible type. Other components:

- two expansion tanks (12+12 litres),
- an automatic air breather valve,
- a drain cock,
- an automatic filling group
- a safety valve
- a level sensor

NOTE
The units equipped with the pump have always a water manometer.

NOTE
The pump must never run dry.

3.5.2 Antifreeze resistance (optional)

The antifreeze resistance prevent the evaporator (pump/s and tank if present) from the formation of ice when ambient temperature is lower than 0°C. it is composed of one or more electrical resistances.

- evaporator antifreeze resistance:
  it is an electrical resistance that wraps the evaporator and that is managed by the pCO through an ambient probe.
- evaporator and pump antifreeze resistance:
  it is composed of two electrical resistances, one wraps the evaporator and the second the pump. Both are managed by the pCO through an ambient probe.
- evaporator, pump and tank antifreeze resistance
  it is composed of three electrical resistances. One for the evaporator, one fro the pump (see description above) managed by the pCO (see above), The third is positioned inside the tank and it is managed by a thermostat through a storage probe.

CHAPTER 4

INSTALLATION

ATTENTION

Before carrying out the installation or operating on this machine, ensure that all the personnel has read and understood the " Safety-Inspection" chapter in this manual.

4.1 Overall dimensions

See enclosures.

4.2 Installation precautions

Installation work must be carried out by competent personnel under a qualified supervisor.

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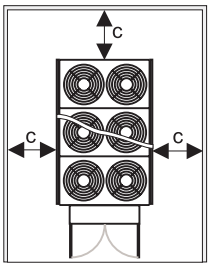
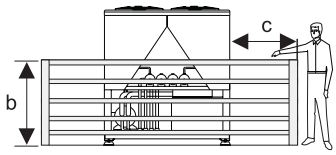
In machines without protection filters for the finned coils, a no-go area must be established around the condensing coils because of the danger from the sharp edges of the fins.

c	1100	900	800	500
b	1400	1600	1800	2000





The electrical supply line of the unit must be protected by equipment chosen and installed by the user as described in the wiring diagram as well as in the paragraph "Electrical connections" of the chapter " Electrical connections" concerning wiring connections.

If the refrigerator is connected to a closed-type hydraulic circuit fitted with an automatic filling system, and the pressure of the filling system exceeds the maximum working pressure of the refrigerator, it is necessary to install a pressure reduction device (e.g. a safety valve which operates at a pressure lower than the maximum working pressure of the machine, and located close to the input connection).

All the piping of the cooled water must be painted or clearly marked in compliance with the local safety in force in the installation place.

Manual on-off valves should be provided for the refrigerator so that the hydraulic circuit can be by-passed to carry out maintenance.

All the electrical connections must comply with the local prescriptions in the installation place. The machine and the auxiliary apparatus must be earthen and protected against short-circuits and overloading.

If raised platforms are required to provide access to the unit they must not interfere with normal operation or obstruct access for lifting or dismantling components. Platforms and stairs should be of grid or plate construction with safety rails on all open sides.

4.3 Positioning

1. The refrigerator may be installed both outdoors and indoors.
2. If installed indoors, the room must be well ventilated. In some cases it may be necessary to install fans or extractors to limit the temperature of the room.
3. The ambient air must be clean and not contain flammable gas or solvents.
4. The minimum and maximum working ambient temperature are specified on the unit data plate. In extreme temperature conditions, the protection devices may trip.
5. The machine can be positioned on any flat surface capable of supporting its weight.
6. Do not obstruct or disturb the cooling air flow of the condenser. The air must enter the machine through the finned coils of the condensers to be expelled to the exterior through the fans. Position the refrigerator in such a way that the cooling air cannot recirculate in the intake grilles. Ensure that the refrigerator is not subject to warm air from the cooling systems of other machines.

ATTENTION

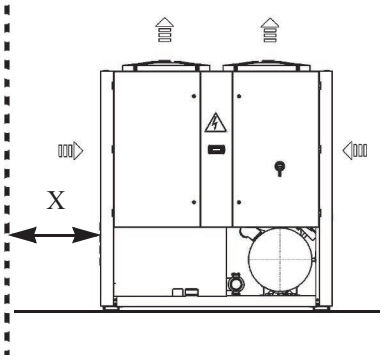
In machines without condenser filters, the sharp edges of the aluminium fins constitute an element of risk. Render the area in which these machines are installed inaccessible to unauthorised personnel or cordon off a no-go area as described in the chapter " Safety-Inspection" of this manual.

4.4 Minimum distances from walls in the installation ambient

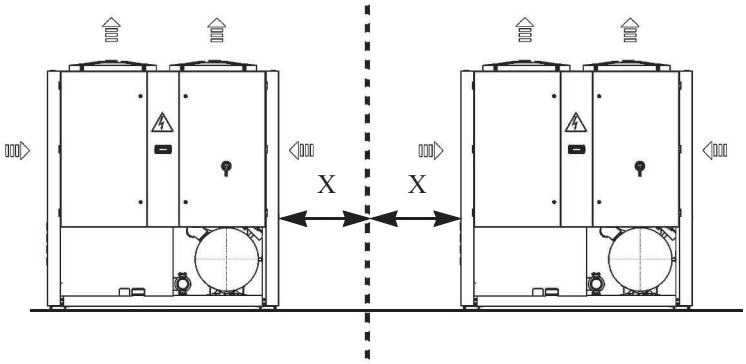
See enclosures

For easy access to units during servicing, please follow these indications.

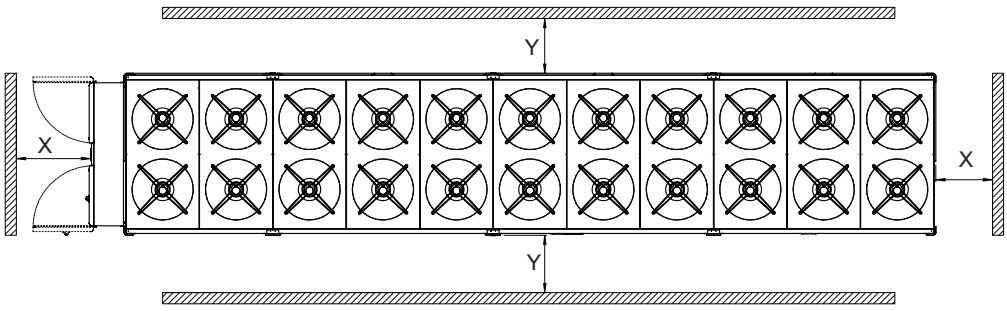
Install unit with a minimum distance (X) between the condenser surface and any walls, as in the illustration on the side.



When two units are placed side by side, it is important to keep enough distance between them; as in the illustration on the side.



For any other type of installation, please provide a minimum area around the unit, as in the illustration on the side.



X and Y distances depend on the type of unit.

NOTE
Consult the overall dimensional drawings annexed to the unit.

4.5 Noise reduction

Locate the unit away from noise sensitive areas.

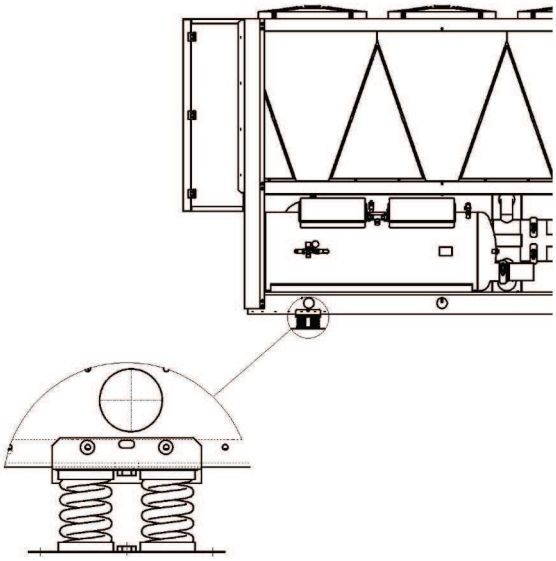
Avoid locations near windows or between structures where normal operating noises may cause problems.

Reduce noise transmitted by installation structures by isolating water lines, by using electrical conduits, and also by isolating the unit itself.

ADDITIONAL METHODS TO REDUCE NOISE LEVELS: Use wall sleeves and rubber isolated piping hangers to reduce the noise transmitted by water or due to vibrations transmitted by the pump.

Also, spring isolators are effective in reducing the low frequency noise generated by reciprocating compressors and for generally isolating the unit from noise sensitive areas.

4.6 Antivibration devices



Antivibration devices are recommended for all roof installations or wherever there are problems of vibration transmission.
For further information see Overall Dimension Drawings here annexed.

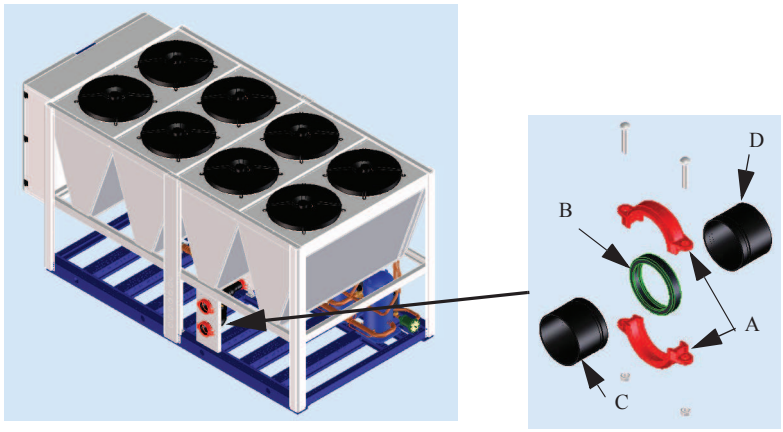
CHAPTER 5

PLUMBING CONNECTIONS

5.1 Liquids to be cooled

The liquids to be cooled must be compatible with the materials used.
These can be water or mixtures of water and glycol, for example.
The addition of anti-corrosive chemical additives and operating in a pH range between 7 and 8 is recommended.
Even in the case of glycol mixtures, the use of appropriate chemical additives (consult the glycol supplier) is very important to protect the refrigerator materials from possible corrosion caused by the chemical degradation to which glycol is subject.
The use of chemical additives is necessary when the refrigerator is part of an hydraulic circuit opened in at least one side to the atmosphere. In this case, in fact, the continuous supply of oxygen facilitates possible corrosive reactions inside the refrigerator. The liquids to be cooled must not be flammable.
If the liquids to be cooled contains dangerous substances (e.g. ethylene glycol) it is very important to collect any liquid which leaks because it could cause damages to the ambient.
Furthermore, when the refrigerator will not be used for a long period, dangerous liquids must be disposed of by firms specialised and authorised for treating them.

5.2 Hydraulic circuit connection



The unit is equipped with victaulic connections (see the picture)

A jawes
B seal
C stub pipe to be welded
D stube piping connceted to the unit

NOTE
The positioning of the water inlet/outlet connections depends on the presence of the hydraulic group, that is decided during the offer.

The unit installation has to follow these indications:

1. connect the refrigerator to the water piping line as indicated in the diagram;
2. provide two cocks (inlet/outlet) to exclude the unit when maintaining, without emptying the user water circuit.;
3. provide drains in the lower part of the plant;
4. provide a flow meter;
5. install a water filter at evaporator inlet (40mesh);
6. if necessary install a water tank
   it will reduce the amplitude of the cooled water temperature huntings

Model	GL T 120	GL T 135	GL T 150	GL T 165	GL T 180	GL T 195	GL T 210	GL T 225	GL T 240
Storage volume [m^3]	2,0	1,4	1,6	1,8	1,9	1,4	1,5	1,6	1,7
Model	**GL T 255**	**GL T 270**	**GL T 285**	**GL T 300**	**GL T 315**	**GL T 330**	**GL T 345**	**GL T 360**	
Storage volume [m^3]	1,8	1,9	1,5	1,6	1,7	1,8	1,8	1,9	

7. provide adequate breakwind barriers near the condensing coils, if the ambient temperature can be lower than 0 °C, and in order to prevent the coils from the wind (the speed has to be higher than 2m/s).
8. if the refrigerant output required is higher than the available with a single unit, the hydraulic circuits of the refrigerators can be connected in parallel. in order to prevent unbalacings in the water flow, choose alike unit.
9. if the temperature differences of the water are too high, the hydraulic circuit of the refrigerators can be connected in series.
10. if it will be necessary to work with a water flow higher than the one designed for the unit, it is necessary to provide a by-pass valve between the refrigerator inlet and outlet.
11. if it will be necessary to work with a water flow lower than the one designed for the unit, it is necessary to provide a by-pass valve between the refrigerator inlet and outlet.
12. the hydraulic circuit has to be breathered, in order to prevent the formation of ice in the evaporator.
13. empty the hydraulic circuit during winter stops, or use antifreeze mixtures. In the event of short stops, request a refrigerator equipped with the antifreeze resistance in the evaporator and provide to install heating resistances on the hydraulic circuit lines.

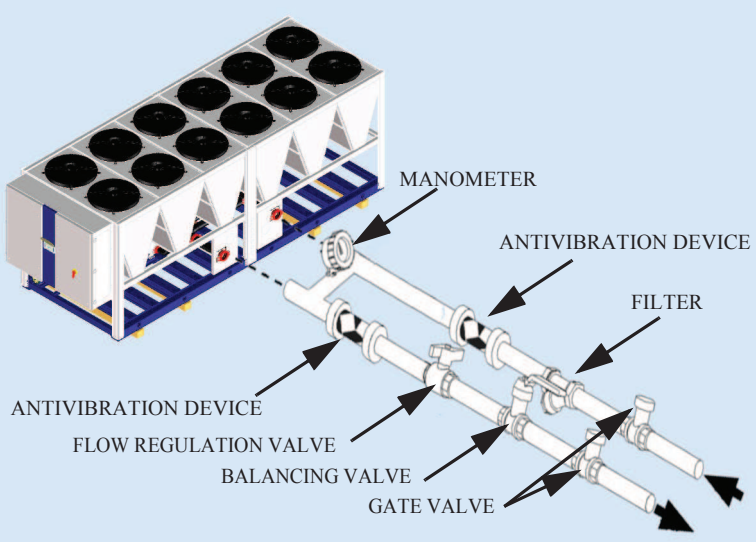
The hydraulic plant has to be dimensioned in order to prevent the inlet water flow pressure value to be higher than the data plate values. The flow rates have to be equal to the data in the tables below:

Minimum and maximum water flow (m^3/h):

GALAXY (GL T) Model	120	135	150	165	180	195	210	225	240
Version	all	all	all	all	all	all	all	all	all
Minimum flow (m^3/h)	29.1	32.5	35.1	39.6	44	48.6	51.2	55.6	60.1
Maximum flow (m^3/h)	111	111	111	111	111	222	222	222	222
GALAXY (GL T) Model	255	270	285	300	315	330	345	360	
Version	all	all	all	all	all	all	all	all	
Minimum water flow (m^3/h)	63.7	68.1	67.6	70.2	74.7	79.1	83.6	88.1	
Maximum water flow (m^3/h)	222	222	222	222	222	222	222	222	

NOTE
The minimum and maximum flow are referred to the versions without pump and tank.

5.2.1 Typical evaporator water piping connection



ATTENTION

Avoid varying the water flow rate through the evaporator while compressor(s) is/are operating.

For further data see the technical catalogue.

5.3 Antifreeze protection

Even if the minimum working ambient temperature is above 0°C it is possible for the refrigerator - during stoppages in the cold seasons - to find itself in an environment with a temperature below 0°C. In these cases, if the refrigerator is not emptied, antifreeze (ethylene glycol) must be added in the following percentages to prevent the formation of ice:

Ambient temperature up to [°C]	Ethylene Glycol [% in weight]
0	0
-5	15
-10	25
-15	30
-20	40

Depending on the cooled water outlet temperature, antifreeze (ethylene glycol) must be added in the following percentages to prevent the formation of ice:

Water outlet temperature up to [°C]	Ethylene Glycol [% in weight]
4	0
0	19
-5	27
-10	34
-15	39
-20	44

Additional technical data can be found in the Technical Catalogue.

CHAPTER 6

ELECTRICAL CONNECTIONS

6.1 Electrical circuit

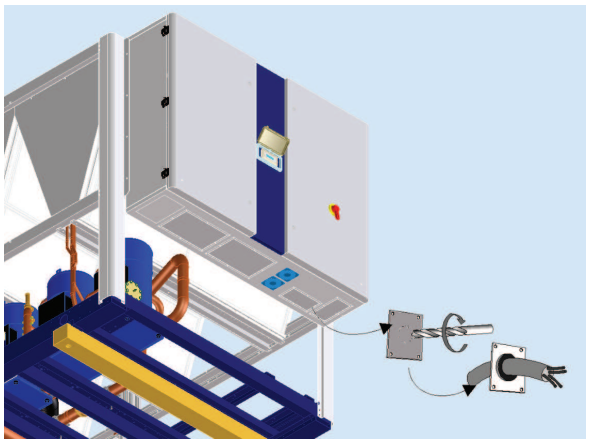
See the enclosed wiring diagrams.

6.2 Electrical connections

Check that the power supply voltage and frequency match the requirements of the unit as shown on the unit data plate and within the tolerances given in the wiring diagram.

Ensure that the electrical installation complies with local wiring and safety regulations.

For the entry of the electrical cables into the machine, used the provided plates as suggested in the drawing below.



To check that the machine is correctly connected to the power supply, see chapter "7.2 Start up".

At the beginning of the power cable,

1. it must be guaranteed a protection from the direct contacts with a protection rating of IP2X or IPXXB at least;
2. It must be installed a safety device which:
   - prevents short-circuiting or overloading of the supply and all other unprotected cables of the plant; (refer to the information indicated on the wiring diagram)
   - limits the 17 kA peak short circuit current to its own nominal cut-off power when the short circuit current at the operation point is higher than 10 kA effective;
   - protects against indirect contacts on the unit, such as short-circuiting between the phase and protection circuit, by cutting off the supply automatically (see IEC 364 - HD 384, CEI 64-8); To do this use a differential switch (with cut-in nominal differential power of 0.03 A)
   - protects against phase failure where the electrical supply is three-phase.

For dimensioning the protection circuit, reference should be made to all the data specified in the wiring diagram (max. absorption, pickup currents, cable section).

ATTENTION

In the event of failure of one cooling circuit it must be cut off electrically to run the machine with the other circuit only.

To cut off one or other cooling circuit separately, use the switches in the power board (see annexed wiring plan).

6.3 Protection rating

The protection rating of the whole machine is **IP54**.

CHAPTER 7

UNIT OPERATION

7.1 Precautions during operation

Operation must be carried out by competent personnel under a qualified supervisor.
Never remove or tamper with the safety devices, guards or insulation materials fitted to the unit or auxiliary equipment.
When main switch is turned on, lethal voltages are present in the electrical circuits and extreme caution must be exercised whenever it is necessary to carry out any work on the electrical system.
The first time the machine is started after several days stoppage, turn on the casing resistance of every compressor at least 4 hours before pressing the ON/OFF button (see "7.2 Start up").
Do not exceed the liquid flow to be cooled specified in chapter (see"7.2 Start up").
Non superare i valori di portata del liquido da raffreddare segnalati nel capitolo " Installation".

7.2 Start up

ATTENTION

Before starting up these units be sure that all personnel have read and understood the " Safety-Inspection"section of this manual.

1. Check that the machine on/off valves are open.
2. If the hydraulic circuit is of the closed type, check that an expansion tank has been installed with an adequate capacity.
3. Check that the ambient temperature is within the limits indicated on the machine data plate.

4. Check that the main switch is in the opening position ("O").
5. Check that the power supply voltage is correct.
6. Power the machine by means of the supply line protection device.
7. Turn the machine main switch ON ("I"). LED ON/OFF on the control panel indicates that the machine is powered.
8. Models without pump: check that water flows through the evaporator.
9. Check that the outlet cocks of the compressors are open.
10. Press the ON/OFF button on the board. **The pump, if installed, starts immediately.** After the delay set on the electronic board **the cooling compressors can start**. The first time the machine is started after several days stoppage, turn the main switch to the ON position ("I") and wait at least 4 hours before starting the machine by means of the buttons ↑ + ↵ of the board. For further information see paragraph 3.4.1 "Compressors".

11. **Check that the rotation direction of the pump, if present, is correct. If not, stop the machine and invert two phases in the supply terminals of the power board. Check that the fan rotation direction is correct (if a pump has been installed and its rotation direction is correct, the fan rotation direction should also be correct). The cooling air must enter the refrigerators from the finned coils of the condensers. If necessary, invert two phases to reverse the rotation direction.**

12. **If with the first start-up**, there is a high ambient temperature and the temperature of the water in the hydraulic circuit is much higher than the working value **(e.g. 25-30°C)** this means that the refrigerator starts up overloaded with the consequence of possible protection device tripping. To reduce this overload, a refrigerator outlet valve can be **gradually** (but not totally!) **closed to reduce the flow of water passing through it**. Open the valve as the water temperature in the hydraulic circuit reaches the working value.

7.3 Operation

The machine operates in completely automatic mode.

It is not necessary to turn it off when there is no thermal load as it turns off automatically when the preset water-inlet temperature is reached.

ATTENTION

Never exceed the water flow values specified in the table in chapter " Installation".
Never turn off the water circuit circulation pump before turning off the machine.
Units without pump: before turning on the machine turn on the circulation pump.

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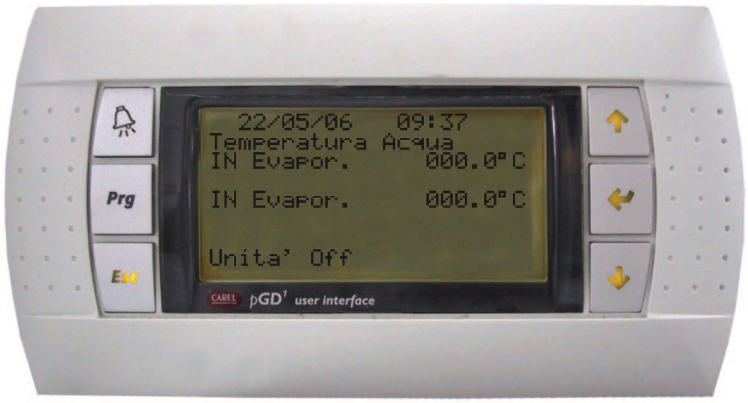
CHAPTER 8

ADJUSTMENT AND CONTROL

8.1 pCO terminal

The pCO manages the unit operation and it is composed of two microprocessor electronic boards and ca terminal.



8.1.1 Terminal buttons

The functions of pGD1 terminal buttons are explained here below:

pGD1 buttons	Function
	If pressed once it is utilized to check if in the pCO there is any alarm on. After removing the alarm cause, a second pressure of this button resets the signalling.
	If pressed once it allows to enter DIRECT loop. If pressed for more than 5" it allows to enter the configuration modality (password needed).
	Utilized to return from the various menus to the main displaying mask.
or	Utilized to scroll the various masks of a loop when the cursor is in HOME position. Utilized to increase or decrease the value of a numeric field (configuration). Utilized to scroll the various sub-sections of a mask. It allows to scroll the list of sub-sections of a loop. If pressed during unit normal operation or when unit is in stand-by, it shows the programme version, the programme code, the BIOS and BOOT versions and the mask with the indication of unit status.
	Utilized to move the cursor on the various adjustable fields of a mask. It allows the access to the selected programming sub-section. Sometimes it is used to confirm the operation.

8.1.2 Function of combined buttons

pGD1 buttons	Function
+	When the unit is on, if pressed together they switch on and off the unit.
+	When the unit is on, if pressed together they access the masks of other units (only when modular function is enabled).
+ +	When the unit is on, keep pressed + buttons and press many times button to increase the contrast.
+ +	When the unit is on, keep pressed + buttons and press many times button to decrease the contrast.
+ +	When the unit is on, if pressed together they are utilized to address the pGD1/network.

8.1.3 Terminal leds

pGD1 Led	Function
Prg	On when the menu loop is displayed, with or without password.
	On when an alarm is present.
↑-↓-←-Esc	On when the terminal is powered.

8.2 Technical characteristics

The pGD terminal has an eight rows display with 22 characters each one, 6 buttons with leds and a buzzer.
The electronic control allows to:

- regulate the evaporator water inlet/outlet temperature or the tank water outlet temperature;
- manage the fans;
- check and dispaly the process water inlet temperature;
- check and dispaly the evaporating and condensing pressures;
- manage the automatic rotation of the compressors starting sequences to reduce the working time of each compressor;
- active the unloading: one or more steps of the reduced capacity system are disactivated, in order to reduce the thermal rating (the cooling rating is reduced);
- set the weekly programming;
- dispaly alarm messages:
  condensing high pressure alarm;
  evaporating low pressure alarm;
  antifreeze alarm on the evaporator water outlet;
  compressor/fans and pump damaged alarm;
  the water that flows through the evaporator is not enough;
  water inlet/outlet high temperature alarm;
  the refrigerator and the compressors have exceeded the programmed number of hour before maintenance;
  minimum/maximum rating alarm (tolerance +/- 10%), phase sequence not correct and rating lack of balance that exceeds the set value.

A contact is available to remote the signalling of a general alarm. See the electrical diagrams for further information.

8.3 Display of the pCO terminal

The display of pCO terminal is utilized to show the information about the unit status and to change the values of programmable parameters.
The top left corner on the display represents the HOME position of cursor.
At the first start up of the electronic control it is displayed the MAIN mask.
However, if during the programming of pCO it is necessary to return to the main mask, it is sufficient to press once or more times the button Esc.

NOTE
If no operation is carried out within 5 minutes the unit will automatically return to the MAIN mask.

The contents of the display are depicted in "Fig.1 Main mask":

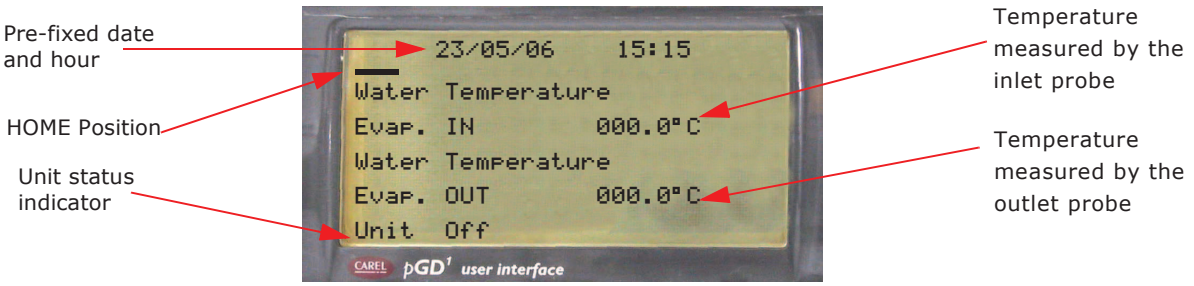
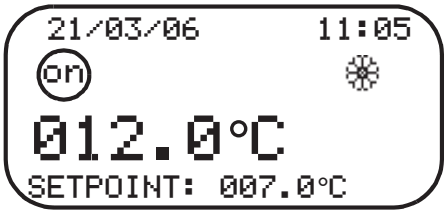
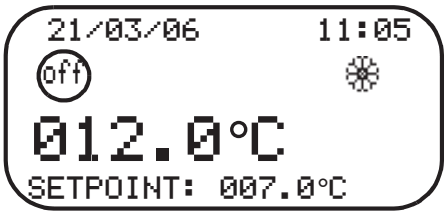
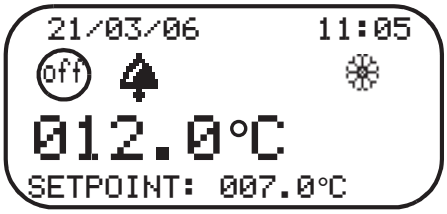


Fig.1 MAIN MASK

8.3.1 Displaying/signalling masks

In the electronic control are available other displaying and signalling masks. These masks are displayed after a period of transition during which no button of pGD is pressed.

	This mask appears if no button of pGD is pressed for 10 minutes. In the top left part of the display is shows the temperature regulation value and the unit ON status; the bottom left part shows the temperature regulation setpoint and the current time.
	This mask is similar to the previous one, it shows the unit OFF status.
	This mask is similar to the previous one, it is displayed only when an alarm trips (the bell flashes). To display the appropriate alarm press button (see Chapter 17 “Alarms settings”)
	When no button of pGD is pressed for 20 minutes it appears the screen saver mask.

8.4 Unit start-up and stop

When the installation and electrical connections have been carried out, operate on the unit general switch-breaker (on the electrical panel) putting it in ON position.

The terminal unit is correctly **connected to the power supply line** when the LED of the buttons , , and light up.

After the net has stabilized, the main mask will appear.

NOTE

Every time the unit is switched on by means of the main switch-breaker, it is recommended to leave the unit in STAND-BY for any second to allow the pCO net to stabilize.

Press the buttons + of the pGD1 terminal to switch on the unit and consequently start the setting procedure.

When the unit is on it will displayed the message “Unit On”.

To switch off the unit press + buttons on pGD1 terminal.

The unit will switch off and the message “Unit Off” will be displayed.

8.4.1 Automatic restart

If the electrical supply is cut-off, when the power returns the machine starts in ON, if the mode was ON and remains in OFF, if the mode was OFF (function to be enabled).

8.5 Access to the programming

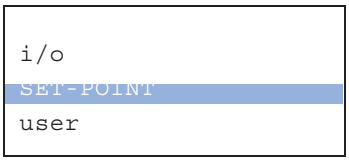
The electronic control is furnished with two main menus:

1. FREE menu (PASSWORD NOT needed) see "8.5.1 How to modify a parameter in "Free Menu""
   It can be accessed by pressing and releasing Prg.
2. PASSWORD menu (PASSWORD needed) see "8.5.2 How to modify a parameter of "Password Menu""
   It can be accessed by pressing and releasing for 5 sec. Prg.

8.5.1 How to modify a parameter in "Free Menu"

1. Press and release l on the terminal to access the loop mask (**free menu**):

2. It is possible to scroll the different loops using ↑ or ↓ button on the terminal.



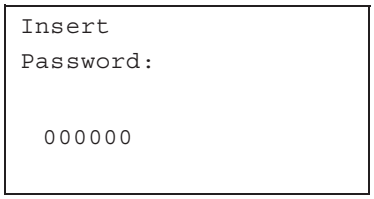
3. After selecting the desired loop (e.g. "User") press ← to access the mask of this loop (HOME position).
   It will be possible to scroll the masks using ↑ or ↓ button.

4. Find the parameter that has to be modified, press ← to move the cursor on the first parameter of the displayed mask.
5. Modify the value using ↑ or ↓.
6. Press again the button ← to confirm the value.
   If in the mask there is more than one parameter the cursor will move to the following one and, when the last one is reached, the cursor will return to HOME position.
7. To move to another mask of the loop press ↑ or ↓, when the cursor is in HOME position.
   To access a new loop press once the button Esc and it will be possible to go back to the loop mask.
8. To go back to the MAIN mask press twice Esc button on the terminal.

8.5.2 How to modify a parameter of "Password Menu"

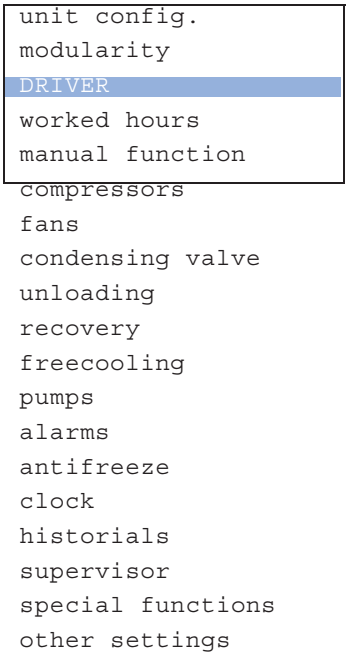
1. Enable the password menu pressing for 5 sec. the button Prg on the terminal;

2. The password is required;
3. Insert the correct password using ↑ or ↓ on the terminal;

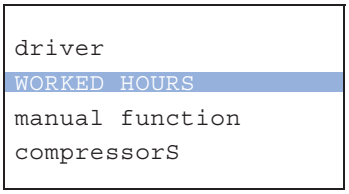


4. Press the button ↵ again to confirm the password.

5. If the password is wrong, the message "`>>WRONG PASSWORD<<`" will appear, it will be necessary to insert it again.
If the password is right, the various scrolling loops will be accessed;
It is possible to scroll the loops using ↑ or ↓ button on the terminal.
The loops will be displayed in groups of three.



6. Find the desired loop (e.g. "`worked hours`") press ↵ to access the mask of the loop (HOME position).
To scroll the masks use ↑ or ↓.



ATTENTION

The access to the loops depends on the password.

7. Follow the same procedure described on paragraph "8.5.1 How to modify a parameter in "Free Menu"" from point 4. to point 8.

ATTENTION

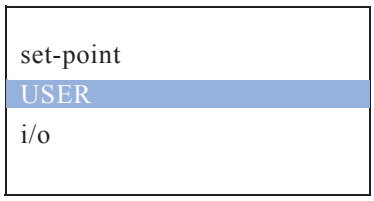
All the parameter masks are grouped by LOOP they belong to and are joined to an alpha-numeric reference.

8.6 Main settings

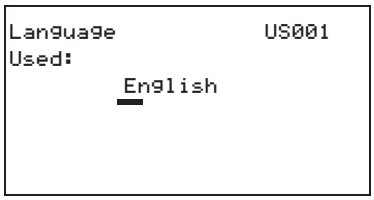
8.6.1 How to set the language

The pCO allows to choose the language of the masks.
The available languages are: Italian, English, German, French and Spanish.

1. To access "User" loop follow the same procedure described in chapter "8.5.1 How to modify a parameter in "Free Menu"".



2. Press ↑ or ↓ to reach the mask with the languages;
3. Press ↵: the cursor starts flashing under the current language;
4. Choose the language using the button ↑ or ↓;
5. Press ↵ to confirm the language;
   The display automatically returns to show the main mask translated on the language selected and, consequently, also all the other masks.

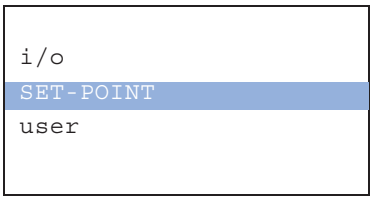


ATTENTION

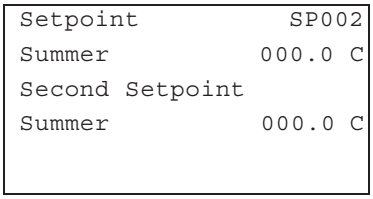
Each unit is delivered ready to work, therefore all the control parameters have been already set during the testing operation and it isn't necessary to modify them.
On particular cases it is possible to modify the set point values by following the instruction indicated below.

8.6.2 How to modify the setpoint value

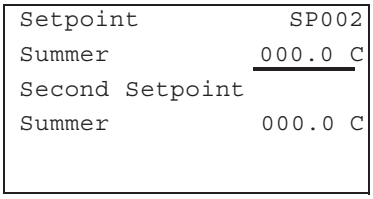
1. Follow the same procedure described in chapter "8.5.1 How to modify a parameter in "Free Menu"".
2. Select the Set-Point loop and press ↵ on the terminal.



3. The first mask of the loop Setpoint will be visualized, press the button ↑ or ↓ to visualize the mask displayed on the side;



4. Press ↵ on the terminal:
   the cursor will go to the field "Summer Setpoint".



NOTE
The second setpoint will be visualized only if it has been enabled.

5. Use the button ↑ or ↓ to change the value;
6. Press ↵ to store the new value;
7. Press twice the button Esc to go back to the Main mask.

ATTENTION

Modify the SETPOINT only if necessary, making sure that they are neither too low nor too high.

DANGER

A Summer Setpoint which is too low may cause ice formation so that antifreeze must be added.
Generally the differential values must not be too low.
If the differential value must be modified, consider also the delays for compressor starts and stops.

8.7 Setpoint management

The pCO electronic control can manage the setpoint in five different ways:

- fixed setpoint;
- compensated setpoint;
- double setpoint;
- adjustable setpoint by daily bands;
- setpoint by analogue input.

8.8 Fixed set-point

The pCO controller manages water temperature control according to a fixed set-point and differential that cannot be altered by external agents or actions.

8.9 Compensated set-point

The compensated set-point is measured on the basis of the ambient air temperature detected by probe (**-BAT1**) and the values of the "Set-point Summer Compensation" and "Maximum Compensation Value" parameters. The following diagram shows the set-point trend on the basis of the various parameter settings:
Diagram with positive "Compensation Differential";

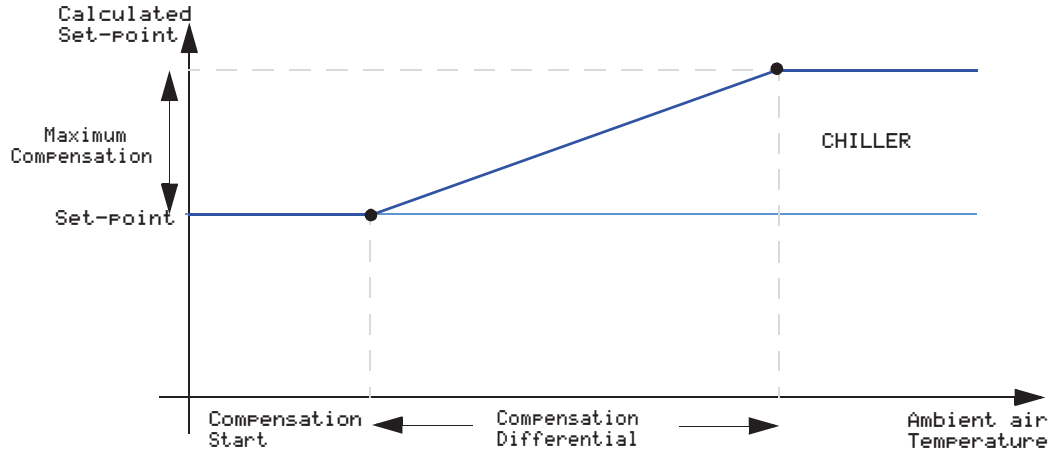
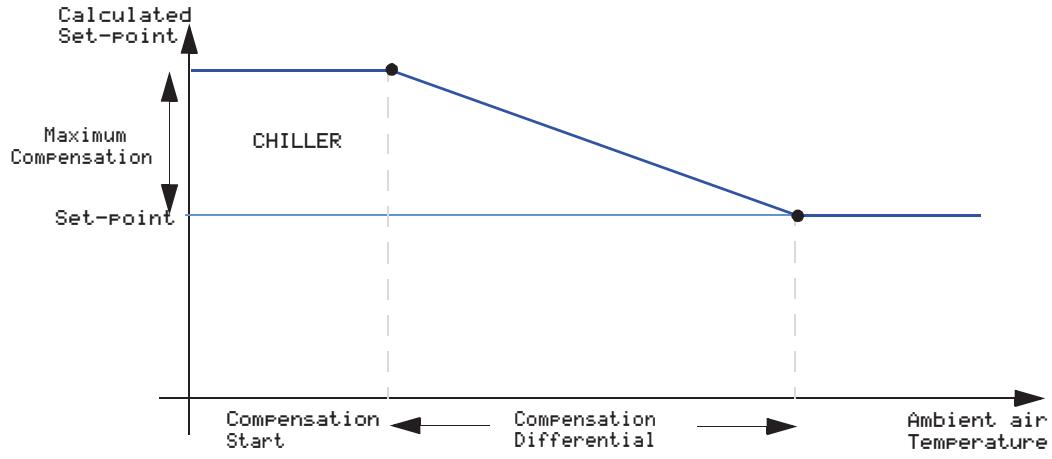


Diagram with negative "Compensation Differential";



8.10 Dual set-point

A second operating set-point can be programmed, with selection between the two set-points performed by switching the electronic board digital input (see electrical diagram).

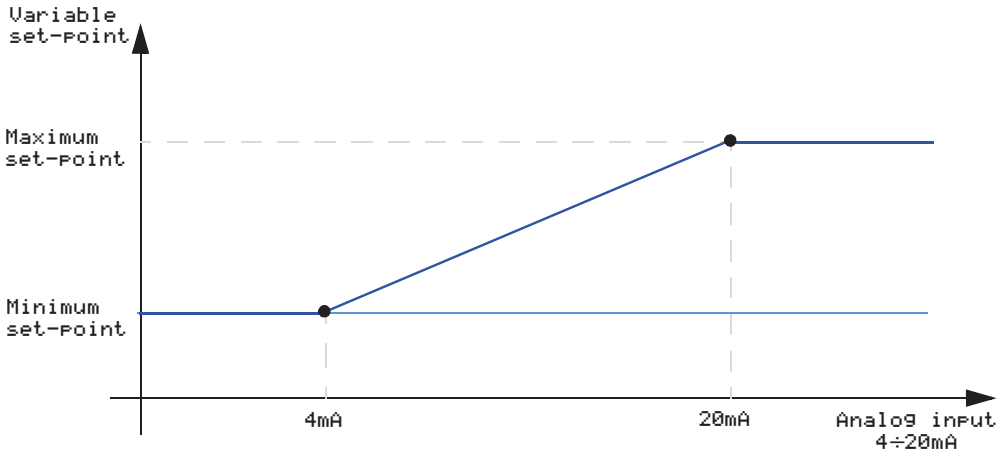
8.11 Time band variable set-point

With time-band variable set-point operation four time-bands can be programmed with different set-points. Once the programmed time has been reached, the controller changes the unit set-point according to the value programmed for the time-band in question.

8.12 Variable set-point from digital input (Multifunction)

The set-point is variable in accordance with the temperature value detected by a probe set as “analog input 4÷20mA”.

The following diagram shows the operating logic:



8.13 Proportional Integral Derivative temperature regulation (PID)

The P+I+D temperature regulation considers:

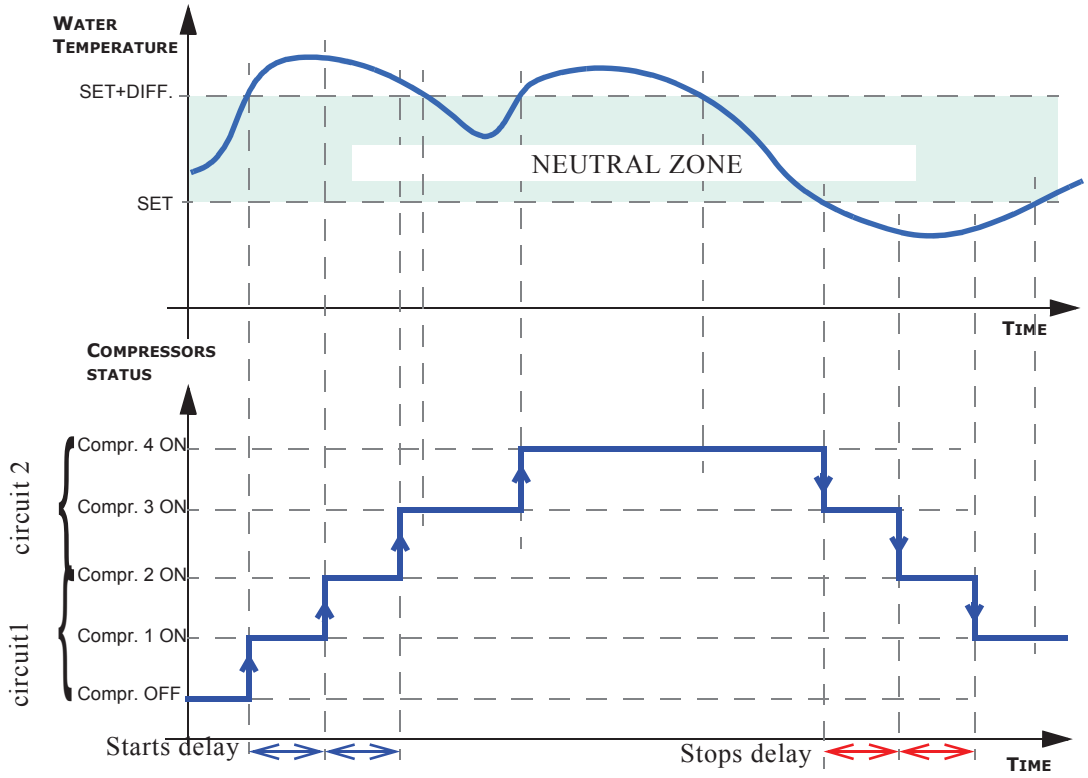
- the difference between the temperature value detected by the probe and the preset value: **Proportional value P**.
- the time during which the temperature value remains stable through the **Integral Error I** ;
- the speed of the using water temperature variation through the **Derivative D** value.

The addition of these parameters generates the **Temperature Regulation Variable**, and according to it the compressor are switched on or off.

8.14 Neutral Zone temperature regulation

When the temperature measured by the probe will be lower than the setpoint value (so under the Neutral Zone) it will be required the stopping of one or more compressors (the compressors consecutive stopping will be done with a pre-fixed delay time) until the temperature measured will return within the limits of the Neutral Zone. When the temperature measured by the probe will be higher than the setpoint + differential value (so above the Neutral Zone), it will be required the starting of one or more compressors (the compressors consecutive starting will be done with a pre-fixed delay time) until the temperature measured will return within the limits of the Neutral Zone.

The graphic of the Neutral Zone Logic explains how the increasing or decreasing requirement of "cold" fixes the compressors starting or stopping, following the logic of the Neutral Zone.



8.15 Antifreeze control

The anti-freeze control depends on the temperature measured at the evaporator outlet (**-BEWOT** probe).
When the temperature decreases below the preset antifreeze threshold the pCO will produce an alarm which will block the unit.
It will persist until the temperature increases and reaches a value higher than setpoint + differential.

8.16 Supervision System

The pCO can manage the following supervision protocols:

- CAREL
- MODBUS
- GSM
- DIRECT MODEM (Rs 232)
- LONWORKS

8.17 Alarms signals

8.17.1 Alarms displaying

During unit operation, some alarm conditions could happen. Depending on their danger they could be controlled by pCO by means of a simple signal or by means of the partial / complete block of the unit.
When an alarm occurs, on the pCO display appears "ENABLED ALARM" and the red led of the button lights up.

Press the button on the terminal to visualize the alarm mask, consisting of 2 alarm LOOPS:

- Unit alarms,
- Driver alarms;

On the right corner it will be visualized the number of active alarm.
Press to move the cursor in the desired LOOP, then use the button or on the terminal to scroll the other alarm messages.
The alarm loops are enabled only if there is an alarm. They are enabled when the loop indication is in capital letters and the symbol is displayed.

```
N Active Alarms:   000
Unit Alarms
Driver Alarms
```

Use the alarm list to identify the alarm displayed and to have more information (see paragraph Chapter 12 “Alarms settings”).

8.18 Alarms reset

When the alarm cause has been resolved, if it was of automatic reset type the unit will automatically return to normal operation.

If the alarm was of manual reset type, press button for more times until reaching the reset.

The message “No Alarm Active” will appear on the display if the button is pressed without any alarm on.

To return to the main mask press Esc button.

8.19 Compressors management

The pCO stores the working hours and the number of startings of each compressor and of the unit.

Furthermore, in the appropriate mask, it is possible to set a working threshold.

When the compressors and the unit reach a number of working hours higher than the preset threshold, an **alarm message** will be displayed to indicate that prompt maintenance is needed.

There are other function for compressors management:

- Compressors capacity control according to the thermal request
- Proportional Integral Derivative control (PID) and Neutral Zone
- Pump-down, it controls the stopping of compressors in order to avoid the presence of liquid at compressor suction.

8.20 Compressors unloading procedure

One or more capacity control steps are disabled, reducing the condenser thermal power. They are enabled when the max. ambient temperature is reached or when the condenser thermal power is too high caused by the water inlet temperature too high.

8.21 Compressor integral protection (PI)

This protection consists of three or six thermostatic sensors, each sunk in the winding of one motor phase; they are connected together in series and their terminals are taken to the outside.

This system ensures complete protection against most of the problems which can give rise to burning of the windings.When it trips, it is necessary to find and eliminate the cause; then it is necessary to energize and de-energize the unit operating on the circuit breaker.

8.22 Circulation pump

The circulation pump is installed only on request.

Its installation foresees different configurations, see chapter 3.5.1 “Hydraulic group (optional)” .

Switch on the unit with the buttons + and the pump will start working.

Turn off the unit with the buttons + , the pump will work for the preset delay time. The pump stops only if specific alarms trip.

NOTE
The pump must never run dry.

8.22.1 Automatic rotation-Manual Rotation

The pCO allows to select an adjustable parameter that manages the pump automatic rotation, in order to balance their working hours.

When the automatic rotation is enabled the pump in stand-by starts working at each unit restarting and when the “Rotation Interval” threshold has been reached.

When the “Automatic Evap. Pump Rotation” is not enabled, the pCO allows to manually manage the single pump using the mask “Enabling: Pump”.

8.22.2 Antifreeze pump operation

The pumps prevent the formation of ice inside the evaporator.

The antifreeze function can be enabled.

For each enabled pump group it is possible to choose the probe, the setpoint and the differential in order to be able to manage its start up even if the unit is off or in stand-by.

CHAPTER 9

OTHER COMPONENTS

9.1 Electronic thermostatic valve (optional)

The electronic thermostatic valve regulates the refrigerant fluid flow at evaporator inlet, according to the superheating value measured by the evaporation pressure and the temperature value at compressor suction.
The pCO allows to manage until max. four electronic thermostatic valves (one for each circuit).
They are installed only if requested.

9.2 Forced ventilation of the electrical board

The circulation fan trips when the temperature in the electrical board exceeds about 40°C. The units working with a temperature of -20 °C are equipped with heating resistances, which are installed inside the electronic board in order to protect its components.With the option -20 the fan is activated in tandem with the anti-freeze resistances.

9.3 Antifreeze resistances with -20 function (optional)

This option is present only if the fan electronic regulation, the electronic thermostatic valve, the compressor carter resistance and the electrical panel resistances are present. Antifreeze resistance kits are option furnished, in alternative to the glycol. They protect the water circuit from ice formation with ambient temperatures until -20°C

9.4 High pressure switches (HP)

High pressure switches provide an additional electromechanical protection with respect to the protection offered by the high pressure transducers installed in the unit.
HP switches are installed on the refrigerant compressor discharge line to prevent the arrival at pressure levels that are potentially hazardous for proper operation of the unit and for personal safety.

- All refrigerant circuits are equipped with an automatic reset pressure switch on the high pressure side. Tripping of this pressure switch opens the compressor power supply circuit (see electrical diagram). When pressure decreases and falls below the reset point, the pressure switch resets automatically and the unit can be restarted by pressing the electronic controller ALARM button.
- All refrigerant circuits are equipped also with a pressure switch with manual reset on the high pressure side of each circuit. Tripping of this pressure switch opens the compressor power supply circuit (see electrical diagram). When pressure decreases and falls below the reset point, the pressure switch must be reset manually, after which the unit can be restarted by pressing the ALARM button on the electronic controller.

The high pressure switches are connected to the refrigerant circuit pipes by means of SCHRAEDER valves (with needle) so there is no risk of refrigerant escaping if the pressure switches are to be replaced.
For correct operation of the unit the pressure switch trip and reset values must not differ from those shown in the following table:

COMPONENT	REFRIGERANT	TRIP			RESET		
		bar	°C	°F	bar	°C	°F
High pressure switch with manual reset	R410A	40.4	63.4	146.2	36.4	58.8	137.8
High pressure switch with automatic reset (pressure cartridge type)	R410A	39.0	61.9	143.4	30.4	51.0	123.9

As an alternative to the pressure cartridge type automatic reset HP switch the unit can be supplied with an automatic reset HP switch of the manual calibration type. The TRIP and RESET values of the pressure switches are given in the following table and must not be changed:

COMPONENT	REFRIGERANT	TRIP			RESET		
		bar	°C	°F	bar	°C	°F
High pressure switch with automatic reset (manual calibration type)	R410A	39.8	62.8	145.0	33.8	55.6	132.1

9.5 Pressure and temperature transducers

The units are furnished with two types of transducers:

- pressure transducers, directly powered by the electronic control
- temperature transducers, of Negative Temperature Coefficient (NTC) resistitive type

9.5.1 Transducers function

Pressure transducers (**P**) and temperature transducers (**T**) are connected to the appropriate inlets of pCO board.
Each transducer has its own function and is identified by a **B** associated to the name of the probe.
The "Table 1 transducers utilization" the transducer and their function.

MASTER BOARD		
Probe-Transducer	**Description**	**Function**
-BHP1	High pressure transducer 1	P
-BLP1	Low pressure transducer 1	P
-BHP3	High pressure transducer 3	P
-BLP3	Low pressure transducer 3	P
-BEWIT	Evaporator water inlet temperature	T
-BEWOT 1	Evaporator water outlet temperature 1	T
-BEWOT 2	Evaporator water outlet temperature 2	T
-BAT1	Ambient Temperature 1	T

SLAVE BOARD		
Probe-Transducer	**Description**	**Function**
-BHP2	High pressure transducer 2	P
-BLP2	Low pressure transducer 2	P
-BHP4	High pressure transducer 4	P
-BLP4	Low pressure transducer 4	P
-BTWOT	Evaporator/Tank water outlet temperature	T
-BAT2	Ambient Temperature 2	T

Table 1 TRANSDUCERS UTILIZATION

ATTENTION

The number of transducers connected to the board depends on the type of unit and is fixed during design phase.

9.6 Pressure transducer

They regulate the fan operation according to the condensing pressure setpoint value set by *p*CO.
The units are equipped with an high and low pressure transducer for each cooling circuit.
Through the compressors inlet/outlet pressure value they manage the unit operation according to the pressure setpoint value set in the pCO.

They can manage the following functions of each circuit:

- high pressure alarm;
- low pressure alarm;
- high or low pressure unloading;
- pump-down (low pressure);
- fans step control;
- high and low pressure value measurement.

If the pressure of one circuit is higher or lower than the preset value an alarm could trip and stop the unit, the fans start up/switch off, one or more compressors.

9.6.1 Fan groups

The high pressure transducers connected to the pCO board can be used to manage the fans in three ways:

- by **Step Control**
- by **Speed Control**
- by **Speed Medium Control**

9.6.2 Step Control

The pCO activates step control of the fans on the basis of the pressure values measured by the high pressure transducers on the refrigerant circuit pipes. Condensation control is provided by two steps for each group. The activation of one fans step corresponds to starting of one subgroup composed of several fans. The fans of each refrigerant circuit are started in groups in such a way as to achieve gradual connection with several steps on the basis of the condensing pressure. "Fig.2 Fans step activation logic" describes the operating logic of 2-step control:

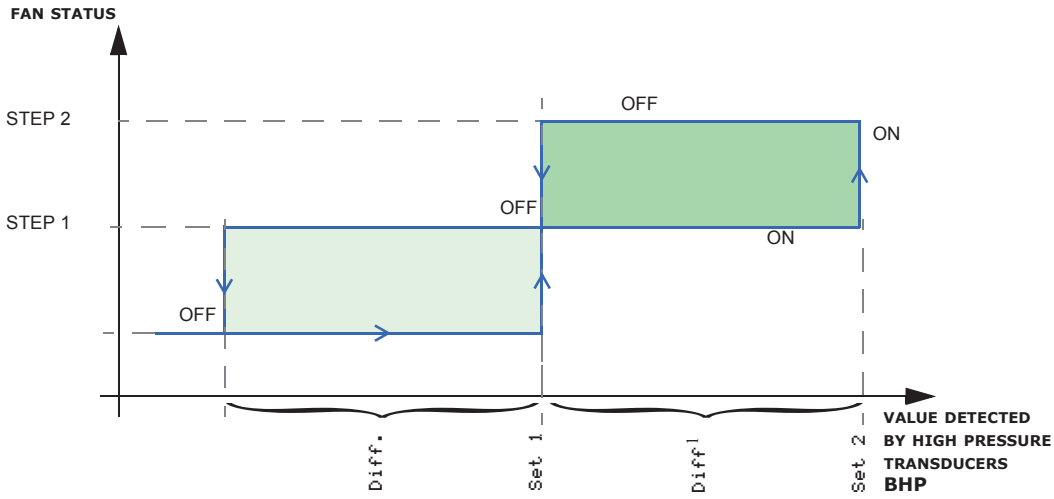
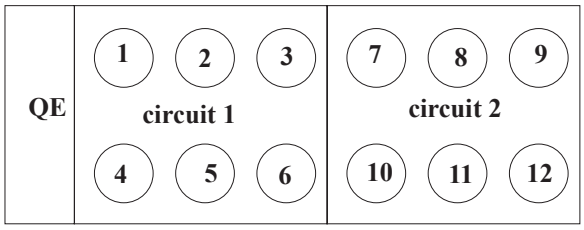


Fig.2 FANS STEP ACTIVATION LOGIC

In the event of step regulation, the fans of each circuit are progressively started-up, according to the condensation pressure.



Fan step management logic: the first fans to start are 1-2-3, then 7-8-9, 4-5-6 and, at the end, 10-11-12. In every circuit all coils must work at the same time.

9.6.3 Variable speed control

Fan speed can be modulated using a phase cut-off regulator controlled by the pCO.
On the units each group of fans can work at a different speed according to the pressure value detected by the corresponding pressure transducer (-BHP transducers).
In normal operation the fans are stopped when pressure read by the high pressure transducers (-BHP) is lower than the set-point value, or when the last compressor is stopped.
"Fig. 3 Fans activation logic with speed control" describes the operating logic of the fan speed control system.

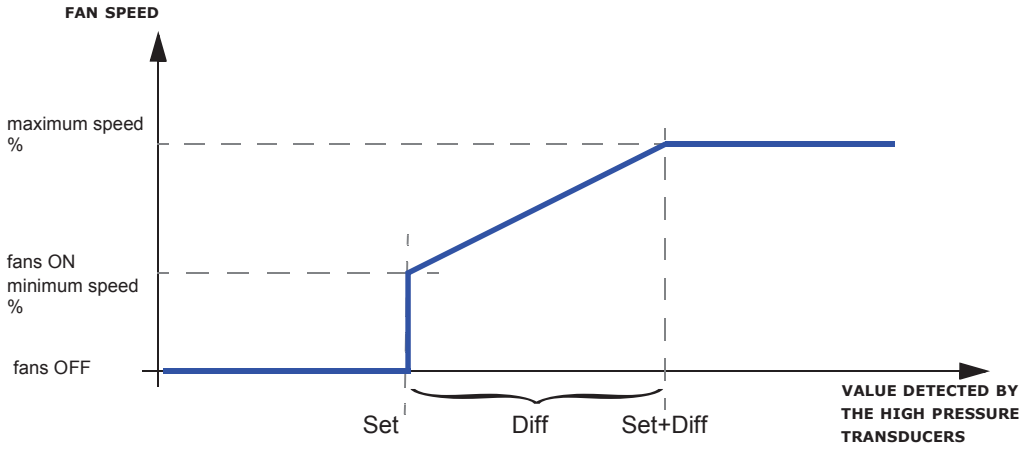


Fig. 3 FANS ACTIVATION LOGIC WITH SPEED CONTROL

9.7 Water differential pressure switch

The machine is provided with a differential pressure switch which measures the water pressure difference between the inlet and outlet manifold of the evaporator. When the pressure switch measures a Δp lower than 50 mbar (500 mmH_2Do), it sends an alarm signal to the board which stops the machine after the preset delay. When the Δp returns above 50 mbar it is possible to restart the machine following the reset procedure explained in the pCO manual.

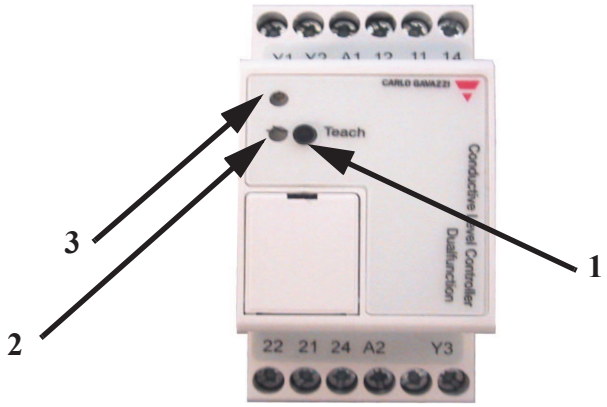
9.8 Level sensor

ATTENTION

- Take all the necessary precautionary measures to avoid accidental contact with powered elements.
- The voltage values inside the electric panel can be lethal for humans.
- The manufacturer is responsible for level sensor calibration and therefore further modifications are not necessary. Key (1) is sealed to prevent tampering by the user.

The level sensor indicates the absence of process water inside the tank. An alarm, with relative blocking of the unit, appears on the control display.
Level sensor calibration **(to be performed only on instruction by the MTA Service Centre)**:

1. Make sure the level probe is immersed in the liquid (at least 1 cm).
2. Power on the system; green LED (3) will illuminate steadily.
3. Amber LED (2) may illuminate or remain off.
4. Press black “Teach” pushbutton (1) and hold down for more than 2 seconds.
5. Green LED (3) will flash while amber LED (2) can:
   - illuminate, if it was previously off
   - remain illuminated, if it was previously lit.
6. This sequence of steps causes the device to self-calibrate in accordance with the electrical resistance of the liquid.



NOTE
If the electrical resistance of the liquid is outside the maximum range of the control device, green LED (3) will flash rapidly for 2 seconds while amber LED (2) remains off, thus signalling a teach-in error.

ATTENTION

The level sensor has been calibrated by MTA to operate at maximum sensitivity admissible on the instrument (220kOhm).
Modifications to this setting may impair correct operation.

CHAPTER 10

CONDUCTION AND MAINTENANCE

10.1 Maintenance operations

ATTENTION

Before proceeding with the installation and maintenance of these units be sure that all personnel concerned have read and understood the " Safety-Inspection" chapter of this manual.

These units will give many years of trouble-free service if they are properly maintained and serviced.

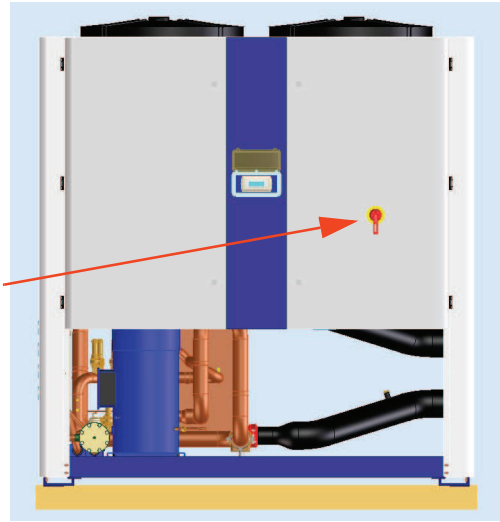
Because there are sharp edges in the rear and internal compartment that can cut and harm, the maintenance technicians must take care to protect themselves from accidental contact with these edges during work inside the compartment.

10.1.1 Access to the inside compartments of the unit

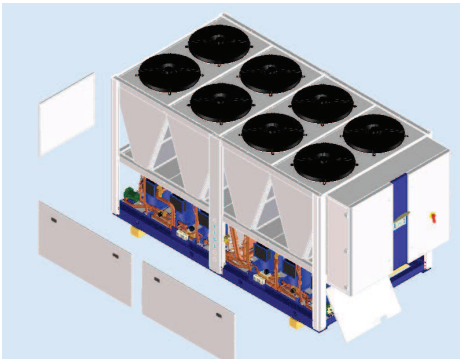
ATTENTION

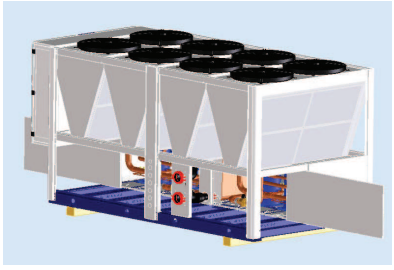
The access to the electronic board is allowed only if the unit is off.

To gain access to the components of the electrical board, turn the main switch/circuit breaker to the open "O" position and open the closing bolts with the provided key.



To remove the lateral inferior side panels which cover the compressors, use a key or a screwdriver to unscrew the screws which fix them at the bottom and on the upper part (the last ones could been covered with a plastic plug).
It is even possible to remove both the central and the inferior side panels of the condensing coils.
Given the presence of sharp and cutting edges in the rear and internal compartment, the maintenance technician must protect himself from accidental contact during work inside the compartment.

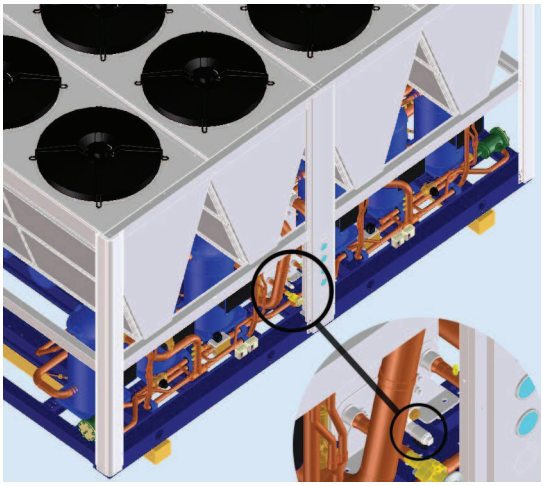




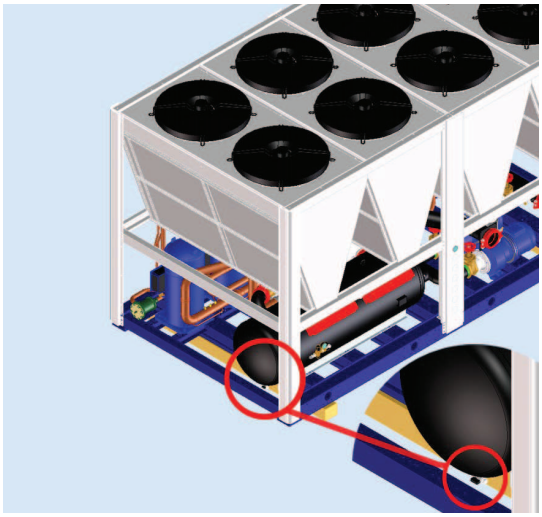
10.1.2 Emptying of the evaporator

The emptying of the evaporator is necessary if the unit tops, if it is not equipped with antifreeze resistances and the ambient temperature reaches water freezing point.

There is a cock at the rear of the evaporator to be used for draining i.



Only the units equipped with the tank have a cock at the rare to be used to drain the hydraulic circuit.



If it will be necessary to empty the water circuit it is possible to:

- discharge the water using the drainage cocks of the unit (see paragraph 5.2 “Hydraulic circuit connection”).
- if the unit has not these cocks it is possible to discharge the water by using the supply pipelines.

ATTENTION

The water circuit emptying operation becomes indispensable when the unit is without antifreeze resistance and must remain OFF for a long time in an ambient with temperatures which could reach the freezing values of water inside the evaporator and inside the condenser (risk of breaking).

10.1.3 Maintenance Schedule

OPERATION	1 Day	1 Month	6 Months	1 Year
Check control panel display for any alarm signals.	◊			
Check that the water outlet temperature is within the envisaged range.	◊			
Check that the water inlet temperature is lower than the value used for selecting the refrigerator.		◊		
Check that the difference between the pump output pressure (if installed) and intake pressure (measured by a pressure gauge with the pump stopped) is within the limits envisaged and, in particular, is not lower than the value corresponding to the maximum flow.		◊		
Check that the liquid indicator is full or with a small stream of bubbles when the compressor is running.			◊	
Check that the unit current absorption is within the data plate values.			◊	
Carry out visual inspection of refrigerant circuit, looking out for any deterioration of the piping or any traces of oil which might indicate a refrigerant leak.			◊	
Check the condition and security of piping connections.			◊	
Check the condition and security of wiring and electrical connections.			◊	
Using a spanner, check that the connections to the refrigerant compressor have not slackened.			◊	
Check that the ambient air temperature is lower than the value used for selecting the refrigerator. Check that the environment is well ventilated.		◊		
Check that every fan is turned on automatically. Check that fan operation is not noisy. Thoroughly clean the fins of the condenser with soft brush and/or jet of clean compressed air. Check that the grilles of the unit are free from dirt and any other obstructions.			◊	
Clean condenser fins with a mild detergent.				◊

IMPORTANT:

- This plan is based on an average working situation.
- In some installations it may be necessary to increase the frequency of maintenance.

CHAPTER 11

TROUBLE SHOOTING

PROBLEM	CAUSE	SYMPTOM	REMEDY
A Water outlet temperature BEWOT1-BEWOT2 higher than the expected value.	**A1** Water flow too high	**A1.1** Difference between BEWIT and BEWOT1-BEWOT2 lower than 5°C with both circuits on.	Increase the pressure drop in the water circuit (e.g.: by partially closing a pump outlet cock).
	A2 Thermal load too high (water flow) x (input temperature - water outlet) = Thermal load.	**A2.1** • Temperature BEWOT1-BEWOT2 greater than expected value; • alarm high water outlet temperature trips.	Restore the ambient temperature to within the preset limits.
	A3 Ambient temperature too high.	**A3.1** See A2.1	Restore the ambient temperature to within the preset limits.
	A4 Condenser fins dirty.	**A4.1** See A2.1	Clean the condenser fins.
	A5 Front surface of the condenser obstructed.	**A5.1** See A2.1	Free the front surface of the condenser.
	A6 The fans rotate in the wrong direction.	**A6.1** See A2.1	Invert the position of 2 of the 3 power supply phases.
	A7 No refrigerant fluid in the plant.	**A7.1** • See A2.1; • low evaporation pressure; • a lot of bubbles in the liquid indicator	Get a refrigerator technician to check for leaks and eliminate them. Fill the plant.
B Low pressure drop (water pressure) at the pump outlet (if installed).	**B1** Water flow too high. Wrong working of the pump (high flow, low discharge head, high absorption).	**B1.1** • Possible increase in the outlet temperature B2 (see A2.1); • with pump installed on the machine: pressure difference, read on the machine pressure gauge, too low with pump stopped and pump running.	Reduce water flow within design limits, for example by partially closing a pump outlet cock.
	B2 See point C. Before ice obstructs the whole evaporator, there is an increase in the pressure drop.	**B2.1** Se point C.	See point C.
	B3 Evaporator obstructed because of dirt transported by the water to be cooled.	**B3.1** High water temperature difference between inlet and outlet.	Depending on the type of dirt: • clean the evaporator by running a detergent solution which is not aggressive for steel and copper; • run a high water flow against the stream. Install a filter upstream from the refrigerator.
C The refrigerator is obstructed and the water doesn't flow.	**C1** Set point too low so that the water freezes.	**C1.1** • Water doesn't flow; • the water differential pressure switch alarm trips; • intake pressure too low.	Choose between: • raise the set point; • add an appropriate % of ethylene glycol (antifreeze) (see " Installation"). ⚠ **The formation of ice can irremediably damage the refrigerator.**

English

PROBLEM	CAUSE	SYMPTOM	REMEDY
D High pressure switch or the high pressure alarm trips.	**D1** One or more fans do not work.	**D1.1** • See problem; • refrigerant compressor stops; • ALARM led lights on; • main alarm relay tripped.	Repair or replace the fan. Verify the heat protection of the fan/s.
	D2 Ambient air temperature too high.	**D2.1** • Ambient air temperature higher than maximum permitted value; • see D1.1.	Reduce ambient temperature within design limits, for example by increasing local ventilation. Press ALARM button to run the unit.
	D3 Recirculation of warm air due to incorrect installation location.	**D3.1** • Condenser cooling air temperature higher than the permitted value; • see D1.1.	Change the position of the unit or the position of any adjacent obstructions to avoid recirculation. Press ALARM button to run the unit.
	D4 See A4.	**D4.1** See D1.1.	Clean the condenser fins. Press ALARM button to run the unit.
	D5 See A5.	**D5.1** See D1.1.	Remove obstruction from the frontal side of the condenser. Press ALARM button to run the unit.
	D6 Ambient temperature high combined with incorrect fan rotation.	**D6.1** • The fan blows air across the condenser coil instead of drawing it across; • refrigerant compressor stops.	Invert the position of two phases of the power supply to the fan (see chapter "7.2 Start up").
	D7 Thermal load = (water flow) x (inlet temperature - water outlet) too high.	**D7.1** • Water outlet temperature too high; • refrigerant compressor stops; • main alarm relay tripped.	Reduce the thermal load to within preset limits. Press ALARM button to run the unit.
E Low pressure switch or low pressure alarm trips.	**E1** No refrigerant fluid in the plant (see also A7).	**E1.1** • Refrigerant compressor stops; • main alarm relay tripped	Call a qualified refrigeration engineer to check for leaks and replenish refrigerant charge. Fill the plant.
F Compressor/s overload alarm.	**F1** Thermal load = (water flow) x (inlet temperature - water outlet) too high in combination with high ambient temperature.	**F1.1** • See problem; • main alarm relay tripped; • refrigerant compressor stops.	Check that the temperature of the cooled water and of the ambient air are within the preset limits (see chapter "1.7 Performances"). Restore the load within the preset limits. Wait a few minutes before turning on again.
	F2 Thermal load = (water flow) x (inlet temperature - water outlet) too high combined with a shortage of refrigerant (also see A7).	**F2.1** See F1.1	Call a qualified refrigeration engineer to check for leaks and replenish refrigerant charge. Fill the plant.
	F3 Problems to the refrigerant circuit (thermostatic valve).	**F3.1** See F1.1	Call a qualified refrigeration engineer to check the thermostatic valve and to replace it, if necessary.
	F4 Problems to the power supply.	**F4.1** See F1.1	Call an electrician to check the power supply of the unit. Find out and eliminate the causes of anomalies to the power supply line.
	F5 Compressor blocked.	**F5.1** See F1.1	Call a qualified refrigeration engineer to check the compressor and to replace it, if necessary.
G Digital display and all LEDs off although main switch On ("I").	**G1** Control board fuse blown. Power supply fluctuations or 'spikes'.	**G1.1** Despite presence of power at the input terminals, the digital display and all LEDs remain unlit.	Replace the fuse. Provide cleaner power supply to the unit.
	G2 Abnormal power consumption by one or more of the control board components.	**G2.1** See G1.1.	Replace the fuse and, if necessary, replace the control board.

PROBLEM	CAUSE	SYMPTOM	REMEDY
H Alarm "Water inlet or outlet probe damaged/ unconnected".	**H1** B1, B2 probes open or in short circuit.	**H1.1** • See problem; • main alarm relay tripped	Check that the temperature sensors are correctly connected to the control board terminals and that the cable is undamaged. If necessary replace the temperature sensors.
I Low water inlet temperature alarm trips.	**I1** The value set in the parameter of the appropriate alarm threshold is higher than value measured by B1 probe.	**I1.1** • See problem; • main alarm relay tripped.	Identify and remove the cause which provoked B1 temperature decreasing to a value lower than the preset one.
J High water inlet temperature alarm	**J1** See points A1 and A7. The value set in the parameter of the appropriate alarm threshold is higher than value measured by B1 probe.	**J1.1** • See problem; • main alarm relay tripped.	Identify and remove the cause which provoked B1 temperature increasing to a value higher than the preset one.
K Water outlet low temperature alarm.	**K1** The value set as LOW WATER OUTLET TEMPERATURE alarm threshold is higher than value measured by B2 probe.	**K1.1** • See problem; • the compressor stops and restarts when the alarm threshold is exceed; • main alarm relay trips.	Identify and remove the cause which provoked B2 temperature decreasing to a value lower than the preset one.
	K2 Water flow too low.	**K2.1** See K1.1.	Increase the water flow.
	K3 Temperature SET POINT value is too low..	**K3.1** See K1.1.	Increase the SET POINT value.
L Water outlet high temperature alarm.	**L1** See points A1and A7. The value set as HIGH WATER OUTLET TEMPERATURE alarm threshold is lower than value measured by B2 probe.	**L1.1** • See problem; • main alarm relay tripped.	Identify and remove the cause which provoked B2 temperature decreasing to a value lower than the preset one.
M Fan(s) overload alarm (fans thermal protection).	**M1** The thermal protection of one of the fans has tripped because the temperature of the air expelled is very high.	**M1.1** • See problem; • main alarm relay tripped; • refrigerant compressor stops; • ALARM led lights up.	Check that the ambient air temperature is within the preset limits.
	M2 See point F4. The motor of one of the fans is blocked or risks seizing.	**M2.1** • See problem; • main alarm relay tripped; • refrigerant compressor stops; • ALARM led lights up; • operation in one of the fans is noisy.	Identify and check the damaged fan and replace it if necessary.
N "Eprom damaged" alarm.	**N1** Board microprocessor initialising error.	**N1.1** Alarm signal and unit blocked.	Turn off and turn on the unit. If this doesn't solve the problem, contact the nearest service centre.

PROBLEM	CAUSE	SYMPTOM	REMEDY
O Pump overload alarm.	**O1** The pump thermal protection device has tripped because the water flow is too high.	**O1.1** • See problem; • main alarm relay tripped; • the refrigerant compressor and pump stop; • ALARM led lights up; • the pressure difference read on the machine gauge with the pump stopped and pump running is lower than the available head with maximum pump flow (see chapter “Plumbing connections”.	Reset the thermal protection device. Increase the pressure drop in the hydraulic circuit, for example by partially closing the pump supply cock.
	O2 The grille through which the pump cooling air passes is obstructed.	**O2.1** • See problem; • main alarm relay tripped; • the refrigerant compressor and pump stop; • ALARM led lights up.	Reset the thermal protection device. Free the grille.
	O3 The pump is defective.	**O3.1** • See problem; • main alarm relay tripped; • the refrigerant compressor and pump stop; • ALARM led lights up; • the current absorbed by the pump is higher than the nominal rating; • the pump may be noisy.	Reset the thermal protection device. Replace the pump.
	O4 Incorrect pump rotation direction.	**O4.1** See O3.1.	Invert the position of two phases of the pump power supply (see chapter “7.2 Start up”).
P Water differential pressure switch alarm trips.	**P1** See point F4. The pump doesn’t work.	**P1.1** • See problem; • main alarm relay tripped; • the refrigerant compressor and pump stop; • ALARM led lights up.	Check the state of the pump.
	P2 The water circuit is obstructed outside the machine.	**P2.1** • See problem; • main alarm relay tripped; • the refrigerant compressor and pump stop; • ALARM led lights up.	Check the external water circuit.
	P3 Water inlet and outlet connections inverted.	**P3.1** • See problem; • main alarm relay tripped; • the refrigerant compressor and pump stop; • ALARM led lights up.	Provide to connect correctly the water inlet and outlet connections (see annexed overall dimension drawings).

CHAPTER 12

ALARMS SETTINGS

12.1 Alarms signals

12.1.1 Alarms displaying

During unit operation, some alarm conditions could happen. Depending on their danger they could be controlled by pCO by means of a simple signal or by means of the partial / complete block of the unit.
When an alarm occurs, on the pCO display appears "ALARM" and the red led of the button lights up.

Press the button on the terminal to visualize the first alarm mask.
On the right corner it will be visualized the number of active alarm.
Use the button or on the terminal to run the other alarm messages.

Use the alarm list to identify the alarm displayed and to have more information (see paragraph 12.3 "Alarms masks").

12.2 Alarms reset

When the alarm cause has been resolved, if it was of automatic reset type the unit will automatically return to normal operation. If the alarm was of manual reset type, press button for more times until reaching the reset.
The message "No Alarm Active" will appear on the display if the button is pressed without any alarm on.
To return to the main mask press Esc button.

12.3 Alarms masks

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 000	No Alarm Active				No active alarm mask.
ALARM 001	N°Active Alarms: 000 >> Alarm 001 << Flash memory malfunction	aut.	Complete stop of the unit and of the pump	---	The pCO memory is irreparably damaged. Try to restart the unit. If the alarm repeats, call an authorised service centre.
ALLAR ME002	N°Active Alarms: 000 >> Alarm 002 << Clock damaged	aut.	Complete stop of the unit and of the pump	---	The Clock board of pCO is irreparably damaged. Try to restart the unit. If the alarm repeats, call an authorised service centre.
ALARM 003	N°Active Alarms: 000 >> Alarm 003 << Water Different. Pressure switch	manual	Complete stop of the unit and of the pump.	ID3	Insufficient water flow throughout the evaporator (differential pressure switch).

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 004	N°Active Alarms: 000 >> Alarm 004 << Tank Level	aut.	Complete stop of the unit and of the pump.	ID3 Master Board	Insufficient water level in the tank. When the water level in the tank is restored, the alarm is automatically reset.
ALARM 005	N°Active Alarms: 000 >> Alarm 005 << Evaporator pump 1 overload	manual	Complete stop of the unit and of the pump.	ID2 Slave Board	Pump 1 overload
ALARM 006	N°Active Alarms: 000 >> Alarm 006 << Evaporator pump 2 overload	manual	Complete stop of the unit and of the pump.	ID3 Slave Board	Pump 2 overload.
ALARM 007	N°Active Alarms: 000 >> Alarm 007 << Fan overload/ regulator fault unit 1	manual	Circuit 1 fans and compressors stop.	ID12 Master Board	This alarm occurs only in the event of fans variable speed regulation, when the regulator has anomalies during its operation or in the event of circuit 1 fans overload.
ALARM 008	N°Active Alarms: 000 >> Alarm 008 << Fan overload/ regulator fault unit 2	manual	Circuit 2 fans and compressors stop.	ID12 Slave Board	This alarm occurs only in the event of fans variable speed regulation, when the regulator has anomalies during its operation or in the event of circuit 2 fans overload.
ALARM 009	N°Active Alarms: 000 >> Alarm 009 << Fan overload/ regulator fault unit 3	manual	Circuit 3 fans and compressors stop.	ID13 Master Board	This alarm occurs only in the event of fans variable speed regulation, when the regulator has anomalies during its operation or in the event of circuit 3 fans overload.
ALARM 010	N°Active Alarms: 000 >> Alarm 010 << Fan overload/ regulator fault unit 4	manual	Circuit 4 fans and compressors stop.	ID13 Slave Board	This alarm occurs only in the event of fans variable speed regulation, when the regulator has anomalies during its operation or in the event of circuit 4 fans overload.
ALARM 011	N°Active Alarms: 000 >> Alarm 011 << Circuit 1 compressor 1 thermal protection	manual	The compressor 1 of circuit 1 stops	ID4 Master Board	Compressor 1 overload (circuit 1).
ALARM 012	N°Active Alarms: 000 >> Alarm 012 << Circuit 1 compressor 2 thermal protection	manual	The compressor 2 of circuit 1 stops	ID5 Master Board	Compressor 2 overload (circuit 1).

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 013	N°Active Alarms: 000 >> Alarm 013 << Circuit 1 compressor 3 thermal protection	manual	The compressor 3 of circuit 1 stops	ID6 Master Board	Compressor 3 overload (circuit 1).
ALARM 014	N°Active Alarms: 000 >> Alarm 014 << Circuit 2 compressor 1 thermal protection	manual	The compressor 1 of circuit 2 stops	ID4 Slave Board	Compressor 1 overload (circuit 2).
ALARM 015	N°Active Alarms: 000 >> Alarm 015 << Circuit 2 compressor 2 thermal protection	manual	The compressor 2 of circuit 2 stops	ID5 Slave Board	Compressor 2 overload (circuit 2).
ALARM 016	N°Active Alarms: 000 >> Alarm 016 << Circuit 2 compressor 3 thermal protection	manual	The compressor 3 of circuit 2 stops	ID6 Slave Board	Compressor 3 overload (circuit 2).
ALARM 017	N°Active Alarms: 000 >> Alarm 017 << Circuit 3 compressor 1 thermal protection	manual	The compressor 1 of circuit 3 stops	ID7 Master Board	Compressor 1 overload (circuit 3).
ALARM 018	N°Active Alarms: 000 >> Alarm 018 << Circuit 3 compressor 2 thermal protection	manual	The compressor 2 of circuit 3 stops	ID8 Master Board	Compressor 2 overload (circuit 3).
ALARM 019	N°Active Alarms: 000 >> Alarm 019 << Circuit 3 compressor 3 thermal protection	manual	The compressor 3 of circuit 3 stops	ID9 Master Board	Compressor 3 overload (circuit 3).
ALARM 020	N°Active Alarms: 000 >> Alarm 020 << Circuit 4 compressor 1 thermal protection	manual	The compressor 1 of circuit 4 stops	ID7 Slave Board	Compressor 1 overload (circuit 4).
ALARM 021	N°Active Alarms: 000 >> Alarm 021 << Circuit 4 compressor 2 thermal protection	manual	The compressor 2 of circuit 4 stops	ID8 Slave Board	Compressor 2 overload (circuit 4).

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Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 022	N°Active Alarms: 000 >> Alarm 022 << Circuit 4 compressor 3 thermal protection	manual	The compressor 3 of circuit 4 stops	ID9 Slave Board	Compressor 3 overload (circuit 4).
ALARM 023	N°Active Alarms: 000 >> Alarm 023 << Wrong pump-down procedure circuit 1	manual	Circuit 1 stop	---	Error in the pump-down procedure in circuit 1: min. pressure level not reached during the pump-down delay time.
ALARM 024	N°Active Alarms: 000 >> Alarm 024 << Wrong pump-down procedure circuit 2	manual	Circuit 2 stop	---	Error in the pump-down procedure in circuit 2: min. pressure level not reached during the pump-down delay time.
ALARM 025	N°Active Alarms: 000 >> Alarm 025 << Wrong pump-down procedure circuit 3	manual	Circuit 3 stop	---	Error in the pump-down procedure in circuit 2: min. pressure level not reached during the pump-down delay time.
ALARM 026	N°Active Alarms: 000 >> Alarm 026 << Wrong pump-down procedure circuit 4	manual	Circuit 4 stop	---	Error in the pump-down procedure in circuit 2: min. pressure level not reached during the pump-down delay time.
ALARM 027	N°Active Alarms: 000 >> Alarm 027 << Three-phase power supply faults	manual	Complete stop of the unit and of the pump	ID1 Slave Board	Anomalies due to the not correct phase sequence of the electrical supply. When the electrical supply is restored the alarm must be manually reset.
ALARM 028	N°Active Alarms: 000 >> Alarm 028 << -BHP1 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on	B1 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 029	N°Active Alarms: 000 >> Alarm 029 << -BLP1 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on	B6 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 030	N°Active Alarms: 000 >> Alarm 030 << -BHP2 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on.	B1 Slave Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 031	N°Active Alarms: 000 >> Alarm 031 << -BLP2 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on.	B6 Slave Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 032	N°Active Alarms: 000 >> Alarm 032 << -BHP3 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on.	B2 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 033	N°Active Alarms: 000 >> Alarm 033 << -BLP3 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on.	B7 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 034	N°Active Alarms: 000 >> Alarm 034 << -BHP4 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on.	B2 Slave Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 035	N°Active Alarms: 000 >> Alarm 035 << -BLP4 pressure transducer damaged or disconn.	manual	Stop of the unit, the pump remains on.	B7 Slave Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 036	N°Active Alarms: 000 >> Alarm 036 << -BEWIT temperature probe damaged or disconn.	manual	Stop of the unit, the pump remains on	B3 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 037	N°Active Alarms: 000 >> Alarm 037 << -BEWOT1 temperature probe damaged or disconn.	manual	Stop of the unit, the pump remains on	B4 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 038	N°Active Alarms: 000 >> Alarm 038 << -BEWOT2 temperature probe damaged or disconn.	manual	Stop of the unit, the pump remains on.	B5 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 039	N°Active Alarms: 000 >> Alarm 039 << -BEWOT temperature probe damaged or disconn.	manual	Stop of the unit, the pump remains on and the antifreeze resistance switch on	B5 Slave Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 040	N°Active Alarms: 000 >> Alarm 040 << -BAT1 temperature probe damaged or disconn.	manual	Stop of the unit, the pump remains on.	B8 Master Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 041	N°Active Alarms: 000 >> Alarm 041 << -BAT2 temperature probe damaged or disconn.	manual	Stop of the unit, the pump remains on.	B3 Slave Board	The probe measures an out-of-range value: it may be damaged, not connected or short-circuited. See Chapter 9 "Pressure and temperature transducers".
ALARM 042	N°Active Alarms: 000 >> Alarm 042 << Evaporator water inlet high temperature	manual	Stop of the unit, the pump remains on.	B3 Master Board	The temperature value measured by the probe is equal to or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 043	N°Active Alarms: 000 >> Alarm 043 << Evaporator water inlet low temperature	manual	Stop of the unit, the pump remains on.	B3 Master Board	The temperature value measured by the probe is equal to or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 044	N°Active Alarms: 000 >> Alarm 044 << Evaporator 1 water outlet high temperature	manual	Stop of the unit, the pump remains on.	B4 Master Board	The temperature value measured by the probe is equal to or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 045	N°Active Alarms: 000 >> Alarm 045 << Evaporator 1 water outlet low temperature	manual	Stop of the unit, the pump remains on.	B4 Master Board	The temperature value measured by the probe is equal to or lower than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 046	N°Active Alarms: 000 >> Alarm 046 << Evaporator 2 water outlet high temperature	manual	Stop of the unit, the pump remains on.	B5 Master Board	The temperature value measured by the probe is equal to or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 047	N°Active Alarms: 000 >> Alarm 047 << Evaporator 2 water outlet low temperature	manual	Stop of the unit, the pump remains on.	B5 Master Board	The temperature value measured by the probe is equal to or lower than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 048	N°Active Alarms: 000 >> Alarm 048 << Tank water outlet high temperature	manual	Stop of the unit, the pump remains on.	B5 Slave Board	The temperature value measured by the probe is equal to or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"

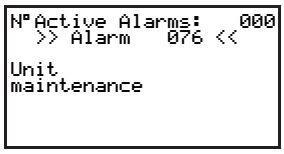
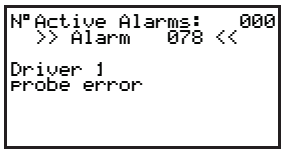
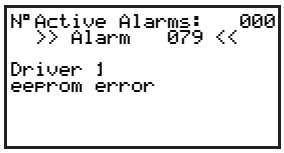
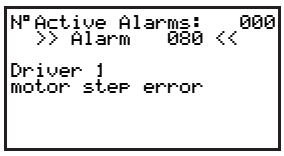
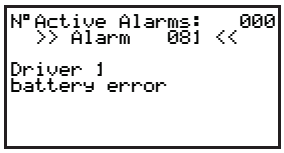
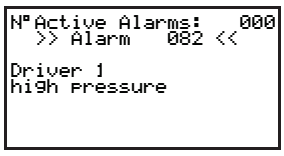
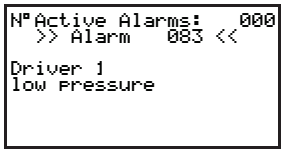
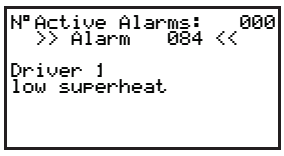
Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 049	N°Active Alarms: 000 >> Alarm 049 << Tank water outlet low temperature	manual	Stop of the unit, the pump remains on.	B5 Slave Board	The temperature value measured by the probe is equal to or lower than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 050	N°Active Alarms: 000 >> Alarm 050 << High pressure circuit 1	manual	Circuit 1 stop	B1 Master Board	The pressure value measured by the high pressure transducer of circuit 1 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 051	N°Active Alarms: 000 >> Alarm 051 << Circuit 1 high pressure switch	manual	Circuit 1 stop	ID14 Master Board	The pressure value in circuit 1 is higher than the set-point of the pressure switch.
ALARM 052	N°Active Alarms: 000 >> Alarm 052 << Low pressure circuit 1	manual	Circuit 1 stop	B6 Master Board	The pressure value measured by the low pressure transducer of circuit 1 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 053	N°Active Alarms: 000 >> Alarm 053 << High pressure circuit 2	manual	Circuit 2 stop	B1 Slave Board	The pressure value measured by the high pressure transducer of circuit 2 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 054	N°Active Alarms: 000 >> Alarm 054 << Circuit 2 high pressure switch	manual	Circuit 2 stop	ID14 Slave Board	The pressure level in circuit 2 is equal or higher than the set-point of the pressure switch.
ALARM 055	N°Active Alarms: 000 >> Alarm 055 << Low pressure circuit 2	manual	Circuit 1 stop	B6 Slave Board	The pressure value measured by the high pressure transducer of circuit 2 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 056	N°Active Alarms: 000 >> Alarm 056 << High pressure circuit 3	manual	Circuit 3 stop	B2 Master Board	The pressure value measured by the high pressure transducer of circuit 3 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 057	N°Active Alarms: 000 >> Alarm 057 << Circuit 3 high pressure switch	manual	Circuit 3 stop	ID15 Master Board	The pressure value in circuit 3 is equal or higher than the set-point of the pressure switch.

English

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 058	N°Active Alarms: 000 >> Alarm 058 << Low pressure circuit 3	manual	Circuit 3 stop	B7 Master Board	The pressure value measured by the low pressure transducer of circuit 3 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 059	N°Active Alarms: 000 >> Alarm 059 << High pressure circuit 4	manual	Circuit 4 stop	B2 Slave Board	The pressure value measured by the high pressure transducer of circuit 4 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 060	N°Active Alarms: 000 >> Alarm 060 << Circuit 4 high pressure switch	manual	Circuit 4 stop	ID15 Slave Board	The pressure value in circuit 4 is higher than the set-point of the pressure switch.
ALARM 061	N°Active Alarms: 000 >> Alarm 061 << Low pressure circuit 4	manual	Circuit 4 stop	B7 Slave Board	The pressure value measured by the low pressure transducer of circuit 3 is equal or higher than the alarm threshold. See Chapter 9 "Pressure and temperature transducers"
ALARM 062	N°Active Alarms: 000 >> Alarm 062 << Compressor 1 maintenance circuit 1	aut.	Warning	---	Compressor 1 maintenance is required (circuit 1). For further information see paragraph 8.19 "Compressors management".
ALARM 063	N°Active Alarms: 000 >> Alarm 063 << Compressor 2 maintenance circuit 1	aut.	Warning	---	Compressor 2 maintenance is required (circuit 1). For further information see paragraph 8.19 "Compressors management".
ALARM 064	N°Active Alarms: 000 >> Alarm 064 << Compressor 3 maintenance circuit 1	aut.	Warning	---	Compressor 3 maintenance is required (circuit 1). For further information see paragraph 8.19 "Compressors management".
ALARM 065	N°Active Alarms: 000 >> Alarm 065 << Compressor 1 maintenance circuit 2	aut.	Warning	---	Compressor 1 maintenance is required (circuit 2). For further information see paragraph 8.19 "Compressors management".
ALARM 066	N°Active Alarms: 000 >> Alarm 066 << Compressor 2 maintenance circuit 2	aut.	Warning	---	Compressor 2 maintenance is required (circuit 2). For further information see paragraph 8.19 "Compressors management".

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 067	N°Active Alarms: 000 >> Alarm 067 << Compressor 3 maintenance circuit 2	aut.	Warning	---	Compressor 3 maintenance is required (circuit 2). For further information see paragraph 8.19 "Compressors management".
ALARM 68	N°Active Alarms: 000 >> Alarm 068 << Compressor 1 maintenance circuit 3	aut.	Warning	---	Compressor 1 maintenance is required (circuit 3). For further information see paragraph 8.19 "Compressors management".
ALARM 069	N°Active Alarms: 000 >> Alarm 069 << Compressor 2 maintenance circuit 3	aut.	Warning	---	Compressor 2 maintenance is required (circuit 3). For further information see paragraph 8.19 "Compressors management".
ALARM 070	N°Active Alarms: 000 >> Alarm 070 << Compressor 3 maintenance circuit 3	aut.	Warning	---	Compressor 3 maintenance is required (circuit 3). For further information see paragraph 8.19 "Compressors management".
ALARM 071	N°Active Alarms: 000 >> Alarm 071 << Compressor 1 maintenance circuit 4	aut.	Warning	---	Compressor 1 maintenance is required (circuit 4). For further information see paragraph 8.19 "Compressors management".
ALARM 072	N°Active Alarms: 000 >> Alarm 072 << Compressor 2 maintenance circuit 4	aut.	Warning	---	Compressor 2 maintenance is required (circuit 4). For further information see paragraph 8.19 "Compressors management".
ALARM 073	N°Active Alarms: 000 >> Alarm 073 << Compressor 3 maintenance circuit 4	aut.	Warning	---	Compressor 3 maintenance is required (circuit 4). For further information see paragraph 8.19 "Compressors management".
ALARM 074	N°Active Alarms: 000 >> Alarm 074 << Evaporator pump 1 maintenance	aut.	Warning	---	Pump 1 maintenance is required. For further information see paragraph 8.22 "Circulation pump".
ALARM 075	N°Active Alarms: 000 >> Alarm 075 << Evaporator pump 2 maintenance	aut.	Warning	---	Pump 2 maintenance is required. For further information see paragraph 8.22 "Circulation pump"

English

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 076		aut.	Warning	---	Complete unit maintenance is required.
ALARM 077		aut.	Local Operation	---	The slave board is disconnected from the net.
ALARM 078		manual	Circuit 1 compressors stop	---	One of the two probes connected to the Driver of the electronic thermostatic valve of circuit 1 is damaged or disconnected.
ALARM 079		manual	Circuit 1 compressors stop	---	The Eeprom of the Driver of the electronic thermostatic valve of circuit 1 is damaged or has any anomaly.
ALARM 080		manual	Circuit 1 compressors stop	---	The step-step motor which manages the electronic thermostatic valve of circuit 1 is damaged or has any anomaly.
ALARM 081		aut.	Warning	---	The battery which powers the Driver of circuit 1 is down or disconnected. This alarm appears only if the battery has been enabled
ALARM 082		aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 1 measures a too high value.
ALARM 083		aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 1 measures a too low value.
ALARM 084		aut.	Warning	---	The superheating value elaborated by the Driver of the electronic thermostatic valve of circuit 1 is too low.

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 85	N°Active Alarms: 000 >> Alarm 085 << Driver 1 valve not closed (when switched off)	manual	Circuit 1 compressors stop	---	At unit stopping, the Driver which elaborates the data of the electronic thermostatic valve of circuit 1 detects that the valve in not completely closed.
ALARM 086	N°Active Alarms: 000 >> Alarm 085 << Driver 1 valve not closed (when switched off)	manual	Compressor 1 stop	---	The probe connected to the Driver of the electronic thermostatic valve of circuit 1 measures a too high temperature of the refrigerant fluid suction during MOP operation.
ALARM 087	N°Active Alarms: 000 >> Alarm 087 << Driver 1 disconnected	manual	Compressor stop	---	The Driver of the electronic thermostatic valve of circuit 1 is disconnected or damaged
ALARM 088	N°Active Alarms: 000 >> Alarm 088 << Driver 2 probe error	manual	Circuit 2 compressors stop	---	One of the two probes connected to the Driver of the electronic thermostatic valve of circuit 2 is damaged or disconnected
ALARM 089	N°Active Alarms: 000 >> Alarm 089 << Driver 2 eeprom error	manual	Circuit 2 compressors stop	---	The Eeprom of the Driver of the electronic thermostatic valve of circuit 2 is damaged or has any anomaly.
ALARM 090	N°Active Alarms: 000 >> Alarm 090 << Driver 2 motor step error	manual	Circuit 2 compressors stop	---	The step-step motor which manages the electronic thermostatic valve of circuit 2 is damaged or has any anomaly.
ALARM 091	N°Active Alarms: 000 >> Alarm 091 << Driver 2 battery error	aut.	Warning	---	The battery which powers the Driver of circuit 2 is down or disconnected. This alarm appears only if the battery has been enabled.
ALARM 092	N°Active Alarms: 000 >> Alarm 092 << Driver 2 high pressure	aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 2 measures a too high value.
ALARM 093	N°Active Alarms: 000 >> Alarm 093 << Driver 2 low pressure	aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 2 measures a too low value.

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 094	N°Active Alarms: 000 >> Alarm 094 << Driver 2 low superheat	aut.	Warning	---	The superheating value elaborated by the Driver of the electronic thermostatic valve of circuit 2 is too low.
ALARM 95	N°Active Alarms: 000 >> Alarm 095 << Driver 2 valve not closed (when switched off)	manual	Circuit 2 compressors stop	---	At unit stopping, the Driver which elaborates the data of the electronic thermostatic valve of circuit 2 detects that the valve in not completely closed.
ALARM 096	N°Active Alarms: 000 >> Alarm 096 << Driver 2 max. suction timeout during MOP	manual	Circuit 2 compressors stop	---	The probe connected to the Driver of the electronic thermostatic valve of circuit 2 measures a too high temperature of the refrigerant fluid suction during MOP operation.
ALARM 097	N°Active Alarms: 000 >> Alarm 097 << Driver 2 disconnected	manual	Circuit 2 compressors stop	---	The Driver of the electronic thermostatic valve of circuit 2 is disconnected or damaged.
ALARM 098	N°Active Alarms: 000 >> Alarm 098 << Driver 3 probe error	manual	Circuit 3 compressors stop	---	One of the two probes connected to the Driver of the electronic thermostatic valve of circuit 3 is damaged or disconnected.
ALARM 099	N°Active Alarms: 000 >> Alarm 099 << Driver 3 eeprom error	manual	Circuit 3 compressors stop	---	The Eeprom of the Driver of the electronic thermostatic valve of circuit 3 is damaged or has any anomaly.
ALARM 100	N°Active Alarms: 000 >> Alarm 100 << Driver 3 motor step error	manual	Circuit 3 compressors stop	---	The step-step motor which manages the electronic thermostatic valve of circuit 3 is damaged or has any anomaly.
ALARM 101	N°Active Alarms: 000 >> Alarm 101 << Driver 3 battery error	aut.	Warning	---	The battery which powers the Driver of circuit 3 is down or disconnected. This alarm appears only if the battery has been enabled.
ALARM 102	N°Active Alarms: 000 >> Alarm 102 << Driver 3 high pressure	aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 3 measures a too high value.

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 103	N°Active Alarms: 000 >> Alarm 103 << Driver 3 low pressure	aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 3 measures a too low value.
ALARM 104	N°Active Alarms: 000 >> Alarm 104 << Driver 3 low superheat	aut.	Warning	---	The superheating value elaborated by the Driver of the electronic thermostatic valve of circuit 3 is too low.
ALARM 105	N°Active Alarms: 000 >> Alarm 105 << Driver 3 valve not closed (when switched off)	manual	Circuit 3 compressors stop	---	At unit stopping, the Driver which elaborates the data of the electronic thermostatic valve of circuit 3 detects that the valve in not completely closed.
ALARM 106	N°Active Alarms: 000 >> Alarm 106 << Driver 3 max. suction timeout during MOP	manual	Circuit 3 compressors stop	---	The probe connected to the Driver of the electronic thermostatic valve of circuit 3 measures a too high temperature of the refrigerant fluid suction during MOP operation.
ALARM 107	N°Active Alarms: 000 >> Alarm 107 << Driver 3 disconnected	manual	Circuit 3 compressors stop	---	The Driver of the electronic thermostatic valve of circuit 3 is disconnected or damaged.
ALARM 108	N°Active Alarms: 000 >> Alarm 108 << Driver 4 probe error	manual	Circuit 4 compressors stop	---	One of the two probes connected to the Driver of the electronic thermostatic valve of circuit 4 is damaged or disconnected.
ALARM 109	N°Active Alarms: 000 >> Alarm 109 << Driver 4 eeprom error	manual	Circuit 4 compressors stop	---	The Eeprom of the Driver of the electronic thermostatic valve of circuit 4 is damaged or has any anomaly.
ALARM 110	N°Active Alarms: 000 >> Alarm 110 << Driver 4 motor step error	manual	Circuit 4 compressors stop	---	The step-step motor which manages the electronic thermostatic valve of circuit 4 is damaged or has any anomaly.
ALARM 111	N°Active Alarms: 000 >> Alarm 111 << Driver 4 battery error	aut.	Warning	---	The battery which powers the Driver of circuit 4 is down or disconnected. This alarm appears only if the battery has been enabled.

Ref.	Masks	Reset	Controller action	Input	Notes
ALARM 112	N°Active Alarms: 000 >> Alarm 112 << Driver 4 high pressure	aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 1 measures a too high value.
ALARM 113	N°Active Alarms: 000 >> Alarm 113 << Driver 4 low pressure	aut.	Warning	---	The pressure probe connected to the Driver of the electronic thermostatic valve of circuit 4 measures a too low value.
ALARM 114	N°Active Alarms: 000 >> Alarm 114 << Driver 4 low superheat	aut.	Warning	---	The superheating value elaborated by the Driver of the electronic thermostatic valve of circuit 4 is too low.
ALARM 115	N°Active Alarms: 000 >> Alarm 115 << Driver 4 valve not closed (when switched off)	manual	Circuit 4 compressors stop	---	At unit stopping, the Driver which elaborates the data of the electronic thermostatic valve of circuit 4 detects that the valve in not completely closed.
ALARM 116	N°Active Alarms: 000 >> Alarm 116 << Driver 4 max. suction timeout during MOP	manual	Circuit 4 compressors stop	---	The probe connected to the Driver of the electronic thermostatic valve of circuit 4 measures a too high temperature of the refrigerant fluid suction during MOP operation.
ALARM 117	N°Active Alarms: 000 >> Alarm 117 << Driver 4 disconnected	manual	Circuit 4 compressors stop	---	The Driver of the electronic thermostatic valve of circuit 4 is disconnected or damaged.

CHAPTER 13

HISTORIAL

The electronic control has a loop named “historial”, in which are stored:

1. the last 50 accesses to the User, Service and Manufacturer menu with date and time;
2. the last 50 alarms and:
   - alarm code;
   - trip date and time;
   - -BEWIT, -BEWOT1, -BEWOT2, -BAT1, -BAT2 e -BTOWT temperatures;
   - low and high pressure;
   - MASTER and SLAVE board inputs and outputs status.
   - fans analogue output status (only if the speed control operation has been enabled).
3. status of the electronic thermostatic valve Driver (if enabled).
4. the last 20 supply alarms (trips and resets).

NOTE
The historial can be reset only with the password.

CHAPTER 14

SETTINGS TABLES

The following tables show the list of all masks which contain adjustable parameters, important for unit operation.
The absence of any mask on the display is not a malfunction.

ATTENTION

The displaying of some masks depends on the settings of other masks and also on the unit configuration, decided during design phase.

All masks are identified by means of a code indicated in **Ref.** column; this code will be used in the manual to identify easily any mask.
On **Factory setting** column are indicated the setting values set during the unit testing; they are referred only to the unit which has the same serial number you can find on the label of the first page of this manual.

DANGER

The wrong programming of pCO could cause big damages to the unit.
The parameters can be modified by specialized personnel only.

The complete list, of adjustable and not- adjustable parameters and of further information about their use and meaning, can be consulted in the tables inside the manual.

SETTINGS NO PASSWORD REQUIRED

ATTENTION

The modifying of the parameters must be carried out by specialized personnel only.

To modify the following parameters see Chapter 8 “How to modify a parameter in “Free Menu””

Ref.	Masks	Factory Setting
SET-POINT		
SP002	Summer ·SP002 setpoint 000.0°C Second Summer Setp. 000.0°C Winter Setpoint 000.0°C Second Setpoint 000.0°C	007.0 010.0 / /
SP003	Maximum ·SP003 compensation setpoint 00.0°C Summer Compensation: Temperature Setpoint Ambient 00.0°C Different. 00.0°C	03.0 30.0 06.0
SP005	Adjustable ·SP005 Setpoint: Min.(4mA) 000.0°C Max.(20mA) 000.0°C	
SP006	Band 1 ·SP006 Setpoint Variation: Starting time 00:00 Temperature Setpoint: summer 000.0°C Setpoint 000.0°C	
SP007	Band 2 ·SP007 Setpoint Variation: Starting time 00:00 Temperature Setpoint: summer 000.0°C Setpoint 000.0°C	
SP008	Band 3 ·SP008 Setpoint Variation: Starting time 00:00 Temperature Setpoint: summer 000.0°C Setpoint 000.0°C	
SP009	Band 4 ·SP009 Setpoint Variation: Starting time 00:00 Temperature Setpoint: summer 000.0°C Setpoint 000.0°C	
SP010	PID ·SP010 Constant Reg.: Dead zone 00.0°C Proportional 00.0°C Integral 00000s Derivative 00000s Required update interval 00000ms	00.0 02.0 00000 00000 01000

Ref.	Masks	Factory Setting
SP011	Regulation band •SP011 Summer 00.0°C Winter 00.0°C	02.0 /
USER		
US001	Language •US001 Used: German Unit working: Chiller	English Chiller
US002	Remote On/Off •US002 Input enable: Remote On/Off No Summer/Winter No Automatic restart after blackout: No	No No Yes

SETTINGS PASSWORD REQUIRED

ATTENTION

The modifying of the parameters must be carried out by specialized personnel only, therefore it is necessary to call an authorized service centre.

To modify the following parameters see Chapter 8 “How to modify a parameter of “Password Menu””

Ref.	Mask	Factory Setting
UNIT CONFIGURATION		
CU002	Adj. Probe: •CU002 Summer working -BEWIT	BTWOT
MODULARITY		
DRIVER		
WORKED HOURS		
MANUAL OPERATION		
COMPRESSORS		

Ref.	Mask	Factory Setting
PUMPS		
PO002	Automatic evap. pump rotation: •PO002 No Enabling: Pump 1 No Pump 2 No Frequency Rotation: h	Yes No No 200
FANS		
CONDENSING VALVE		
UNLOADING		
RECOVERY		
FREECOOLING		
ANTIFREEZE		
AN002	Evaporator pumps operation with antifreeze function: •AN002 No Setpoint 00.0°C Differential 00.0°C	No 03.0 03.0
AN003	Evaporator antifreeze heater operation: •AN003 No Setpoint 00.0°C Differential 00.0°C Activat. No	Lower -BAT 03.0 03.0
DEFROSTING		
ALARMS		
CLOCK		
WT001	Clock setting: •WT001 Time 00:00 Date 00/00/00	
WT002	Unit On/Off weekly band: •WT002 Enabling No Start day Stop day	No Sun Sun

Ref.	Mask	Factory Setting
WT003	On/Off Daily Unit band: ·WT003 Enabling No Starting 00:00 Stopping 00:00	No
WT004	·WT004 Low noise function: Enabling 00:00 Disabling 00:00	
HISTORIAL		
HS012	·HS012 Alarms History Reset: No	No
SUPERVISOR		
SU001	·SU001 Supervision system enabling: No	No
SU002	Number identific. ·SU002 for BMS net: 000 Speed: 1200 bps Protocol: -- On/Off Enable by Supervisor: No	
SU003	Telephon book maximum numbers : ·SU003 0 Telephon book number - Modem password: 0000	

Ref.	Mask	Factory Setting
SU004	Externa: ·SU004 No. of Ringtones 0 Modem Type Tones SMS Send: No	
SPECIAL FUNCTIONS		
OTHER SETTINGS		
AI002	Set-point management mode: ·AI002 FIXED -BAT1	Fixed
AI004	Sensors reading calibration: ·AI004 -BEWIT 00.0°C -BEWOT1 00.0°C -BEWOT2 00.0°C -BTWOT 00.0°C	00.0 00.0 00.0 00.0
AI008	·AI008 New password: User 0000	

English