



WSAN-XSC **65D-70D-75D-80D-85D-90D-
100D-110D-115D-120D-
135E-150F-165F-180F**

AIR TO WATER HEAT PUMP FOR OUTDOOR INSTALLATION



Installation and Use Manual

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GENERAL WARNINGS

MANUAL PURPOSE

This manual has been designed to enable the unit to be installed, started up and maintained correctly.

MANUAL INSTRUCTIONS

It is essential to observe these instructions.

The manufacturer declines all liability for any damage that may be caused whether directly or indirectly to persons or things if these instructions are not heeded.

MANUAL STORE

This manual and the unit's wiring diagram should be carefully stored so that they are readily available to the operator when required.

EXPERT PERSONAL

The unit must be installed, tested and maintained by expert personal who meet the relevant legal requirements (Italian law No. 46 of 5/3/1990).

LOCAL SAFETY REGULATION INSTALLATION

The installation must be performed observing the local safety regulations.

POWER SUPPLY

Make sure the power supply conforms to the data on the unit's rating plate, located inside the door of the main electrical panel.

PACKAGING

The packaging material (plastic bags, polystyrene foam, nails, etc.) is potentially dangerous and should therefore be kept away from children and recycled in compliance with the local regulations in force.

MAINTENANCE

Before performing any service operations, cut off the power. Perform the operations in conformity with the local regulations in force.

PERIODICAL INSPECTIONS

Perform periodical inspections to locate possible loosened or broken parts. If the repairs are not performed, there will be a higher risk for things and peoples to become damaged and injured.

FAULT – POOR OPERATION

Switch off the unit in the event of faults or poor operation.

REPAIR

Only have repairs carried out by a service centre authorised by the manufacturer, and insist on the use of original spare parts only.

Failure to comply with the above may compromise the safety of the unit.

MODIFICATIONS

The manufacturer will not accept any responsibility, and the warranty will lapse, in the event of electric and/or mechanical modifications. Any modification which is not formally authorized, and which does not respect the instructions given in this manual, will cause the warranty to lapse.

INTENDED USE

The unit must only be used for the specific purpose it was designed, as described in the paragraph GENERAL TECHNICAL SPECIFICATIONS. Any use other than that specified does not imply any commitment or constraint by the manufacturer in any way whatsoever.

ADDITIONAL SAFETY PRECAUTIONS

This unit has been especially designed and manufactured so to prevent any risk to persons and health hazard.

For this reason, design solutions fit to eliminate (where possible) any cause of risk and sensibly reduce the probability of danger have been adopted.

Please refer to the "**Residual Risks**" section of this manual and strictly observe the behaviour prescriptions listed there in order to prevent any possible risk that hasn't been possible to avoid in the design stage.

DATA UPDATING

The manufacturer may be able to modify the data without prior notice as a consequence of constant improvements.

INTENDED USE

The unit is designed to cool/heat water or a water and glycol mix for air-conditioning, within the limits defined in the technical bulletin and this manual.

- GENERAL INFORMATION -**STANDARD UNIT SPECIFICATIONS****COMPRESSOR**

scroll compressor complete with: overload thermal protection, high refrigerant discharge temperature, rubber antivibration mounts, oil charge.

A oil heater is automatically switched on at the compressor shut-down to prevent oil dilution by the refrigerant.

STRUCTURE

hot-galvanized and painted plate structure with pre-painted aluminium external panelling to ensure maximum weatherability. The uniform distribution of the weight of the unit is guaranteed by the base structure, made up of galvanized and painted plate section bars, and featuring holes to simplify the lifting and earthing of the unit.

INTERNAL EXCHANGER

direct expansion heat exchanger, with 316 stainless steel braze-welded plates and large exchange surface, complete with external anti-condensate heat insulation. Two independent alternating water / freon refrigerant circuits, with cross flow to optimise heat exchange; complete with safety differential pressure switch on the water side and antifreeze heater to protect against the risk of freezing.

EXTERNAL EXCHANGER

heat exchange coil with aluminium fins and copper tubes in staggered rows. The coils are complete with integral subcooling circuit which assures the correct refrigerant feeling of the expansion valve. Available in different options as per optional list.

FAN

Helical fans with sickle-shaped blades with "Winglets" at the end, coupled directly to a three phase electric external rotor motor with thermal protection incorporated in version IP 54. Housed in aerodynamically shaped nozzles to increase efficiency and minimize noise levels. They are fitted with protective safety guard grilles.

REFRIGERANT CIRCUIT

the units are made with independent refrigerant circuits, each with:

- replaceable anti-acid solid cartridge dehydrator filter
- liquid flow and moisture indicator
- liquid receiver
- electronic expansion valve
- non-return valve
- inlet liquid separator
- 4-way reverse cycle valve
- high pressure switch
- low pressure switch
- low pressure safety valve
- high pressure safety valve
- liquid line shut-off valve
- compressor suction shut-off valve
- compressor discharge shut-off valve

Size 60C and 75C are realized with only one refrigerant circuit.

ELECTRICAL PANEL

the Power Section includes:

- main door lock isolator switch
- isolating transformer for auxiliary circuit power supply
- compressor circuit breaker
- fan overload circuit breakers
- compressor control contactor
- fan control contactors
- phase-cutting fan speed control

the control section includes:

- proportional + integral water temperature control
- antifreeze protection
- compressor overload protection and timer
- self-diagnosis system with immediate display of the error code
- compressor operating hour display
- remote ON/OFF control
- Remote HEAT/COOL control
- automatic compressor start rotation control
- relay for remote cumulative fault signal
- input for demand limit (absorbed power limit according to an external signal 0÷10V or 4÷20mA)
- prealarm function for water anti-ice and high refrigerant gas pressure
- display of the set values, the error codes and the parameter index
- ON/OFF and alarm reset buttons
- interface terminal with graphic display
- Electronic for Elfo Control system (optional)

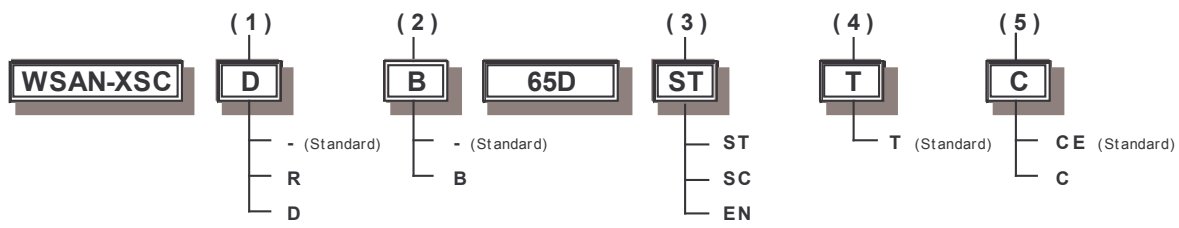
ACCESSORIES

- copper / copper condenser coils
- copper / aluminium condenser coils with acrylic lining
- steel mesh strainer to be mounted at the exchanger inlet. Should the filter not be installed in the water system, Clivet declines all responsibility and the warranty on the equipment automatically expires.
- condenser coil and service compartment protection grilles
- high and low pressure gauges
- Hydro Pack
- aluminium cover for hydronic module
- Anti-ice electric heaters utility side for hydronic group
- phase monitor
- power factor correction capacitors (cosfi > 0.9)
- Free contacts for compressor state
- microprocessor remote control module
- set point compensation with 4-20 mA or 0-10 V signal
- set point compensation according to the outside enthalpy
- data logger (device for the acquisition of status and regulation values, as well as for recording the operation conditions in the surrounding of alarm events)
- spring antivibration mounts
- ECOBreeze
- Master-Slave function
- CAN/LON WORKS serial converter kit
- CAN/MODBUS serial converter kit

TEST

All the units are factory-tested in specific steps, before shipping them. After the approval, the moisture contents present in all circuits are analyzed, in order to ensure the respect of the limits set by the manufacturers of the different components.

CONFIGURATION CODE



(1) ENERGY RECOVERY

Total energy recovery(R)

made using exchangers to recover 100% of the condensing heat for production of hot water.

Partial energy recovery(D)

Performed using braze-welded plate exchangers suitable for recovering the desuperheating heat, up to a maximum of 20% of the total heat of the unit.

(2) LOW TEMPERATURE

Water low temperature(B)

this version allows unit operation in the range of water and glycol mix temperatures between +4 and -8°C.

Two Versions are available:

- Unit only for low temperatures
- Unit with double set-point operating set-point (Please contact our Sales office for special conditions)

(3) ACOUSTIC CONFIGURATION

Standard acoustic configuration(ST)

Acoustic configuration with compressor soundproofing(SC)

this configuration is obtained by inserting the compressors in a soundproofed chamber.

Extremely low noise acoustic configuration(EN)

this configuration is obtained by inserting the compressors in a soundproofed chamber and reducing the speed of the fans, with a larger condensing section.

(4) ENERGY EFFICIENCY

Energy efficiency for temperate climate(T)

standard

(5) HEAT EXCHANGERS APPROVALS

Heat exchangers approvals C = CLIVET (Internal Testing)(CLV)

Heat exchangers approvals CE = PED (European Testing)(PED)

- REGULATIONS AND CERTIFICATIONS -**UNI EN ISO 9001 CERTIFICATION**

CERTIFIED QUALITY SYSTEM
UNI EN ISO 9001:2000

Clivet S.p.A., in order to guarantee customer satisfaction, has chosen the ISO 9001 Quality System as the reference for all its business activities. This is demonstrated by the company's commitment to ongoing improvements in the quality and reliability of its products; its sales, design, purchasing, production and after-sales service activities are the means used to reach such purpose.

CE MARK

Clivet products bear the CE mark, in compliance with the requirements of the following EC directives, including the latest amendments, and with the corresponding national approximated legislation:

- 98/37/CE
- 89/336/CEE as modified by the directives 92/31/CEE and 93/68/CEE
- 73/23/CEE as modified by the directive 93/68/CEE
- 97/23/CE

EUROVENT CERTIFICATION

Clivet is participating in the EUROVENT Certification Programme "Liquid Chilling Packages". Products are listed in the EUROVENT Directory of Certified Products and in the site www.eurovent-certification.com. Eurovent Chillers Certification Programme covers air cooled packaged chillers up to 600 kW and water cooled packaged chillers up to 1500 kW.

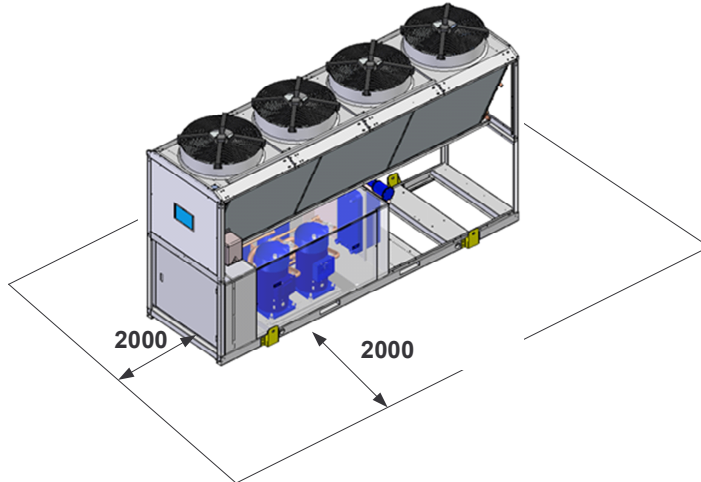
GENERAL

This section lists some of the more common situations which, being beyond the control of the manufacturer, could be a source of risk to persons or property.

DEFINITION OF DANGER AREA

The figure below highlights the area in which only authorised personnel may operate.

- External danger zone, identified by a precise area around the unit and its vertical projection on the ground in the case of hanging unit.
- Internal danger zone, identified by the area that can be entered only after having intentionally removed the protecting panels or parts of these.



Dimensions in mm

HANDLING

- If handling operations are undertaken without adopting all the necessary safety procedures and exercising due care, the unit can fall or topple, causing damage — possibly extremely serious — to persons and/or property, and to the unit itself. Ensure the unit is handled and manoeuvred as directed on the packing and in the present manual, and in accordance with local regulations. In the event of refrigerant gas escaping, refer to the “Safety datasheet” for the particular refrigerant.

INSTALLATION

- Incorrect installation of the unit can result in water leaks, accumulation of condensate, escape of refrigerant, electric shocks, fire, as well as irregular operation or damage to the unit itself. Make certain that the installation is carried out only by a qualified technician, also that the directions contained in this manual are followed and local statutory regulations observed.
- In the event of the unit being installed in a site where there is even the slightest risk of inflammable gas escapes and consequently the possibility of such gases accumulating in area around the unit, the risk of explosion and fire cannot be discounted. Take every care and precaution when selecting the installation site.
- Installation on a structure not able to bear the weight and/or afford a secure anchorage of the equipment may cause the unit to fall and/or topple, resulting in damage to persons or property, or to the unit itself. Make certain that every care and precaution is taken when positioning and securing the unit.
- If the unit is easily accessible to children, unauthorized persons or animals, this is a situation that can give rise accidents and injuries, perhaps serious. Install the unit in a place where access is allowed only to authorized persons, or install barriers or guards preventing unauthorized entry.

GENERAL RISKS

- A smell of burning, smoke or other indications of serious irregularity could signal the onset of situations liable to cause damage to persons or property or to the unit itself. Isolate the unit from the electrical power supply (red-and-yellow switch), and contact an authorized service centre so that the source of the problem can be identified and remedied.
- Accidental contact with heat exchange coils, compressors, pressure pipelines or other components can result in wounding or burns, or both. Always wear suitable clothing, including protective gloves, when working in the danger area.
- Maintenance or repairs carried out by unskilled operatives can result in harm or damage to persons and property, or to the unit itself. Always contact an authorized service centre.
- Failure to close the panels of the unit, or to check that all the fixing screws of the panels are properly tightened, can result in harm or damage to persons or property, or to the unit itself. Verify periodically that all panels are closed and made properly secure.
- In the event of fire, the temperature of the refrigerant can rise to the point that pressure will exceed safety levels and perhaps cause fluid to be projected. It may also happen that parts of the circuit isolated by closed valves will explode. Do not stand near safety valves, and never leave the valves of the refrigerant circuit closed.

ELECTRICAL SYSTEM

- If the power line connecting the unit to the a.c. supply is incomplete, or if the connection is made with cables of incorrect cross section and/or with insufficiently rated protective devices, this can result in electric shock, toxicity hazard, damage to the unit or fire. All work on the electrical system should be carried out referring to the wiring diagram and to the directions given in this manual, and the system itself must be dedicated.

- RESIDUAL RISKS -

- Failure to secure the cover enclosing electrical components can lead to the infiltration of dust and water, ultimately causing electric shocks, damage to the unit, or fire. Always fasten the cover securely to the unit.
- If live metal parts of the unit are not connected properly to the earth system, they can cause electric shock or even death by electrocution. Make absolutely certain that the connection to the earth system is made in accordance with correct practice.
- Contact with live parts rendered accessible internally of the unit when the guards are removed can result in electric shock, burns or death by electrocution. Before exposing these parts, make certain the isolating switch on the power line to the unit is set to the OFF position and padlocked, and post a warning sign.
- Contact with parts that could become live when the unit is started up can result in electric shock, burns or death by electrocution. When there is no need for circuits to be powered up, set the isolating switch on the power line to the OFF position, padlock it and post a warning sign.

MOVING PARTS

- Contact with the fan rotors can cause injury. Before removing the protective grilles or the fans themselves, make certain the isolating switch on the power line to the unit is set to the OFF position and padlocked, and post a warning sign.
- Contact with the fan rotors can cause injury. Before removing the protective grilles or the fans themselves, make certain the isolating switch on the power line to the unit is set to the OFF position and padlocked, and post a warning sign.

REFRIGERANTS

- In the event of safety valves coming into operation and releasing refrigerant gas, persons in the vicinity can be injured or suffer toxic effects. Always wear suitable clothing and protective goggles when working in potential hazard areas. In the event of refrigerant gas escaping, refer to the "Safety datasheet" for the particular refrigerant. After any maintenance operation, they must be resealed in an open position; the non-observance of these instructions could bring the risk of an explosion of the cooling circuit with possible injury to things and people.
- If an open flame or heat source is brought into contact with the refrigerant, or the pressurized gas circuit should overheat (e.g. during welding operations), this can cause explosion or fire. Do not position any heat source within the hazard area. Maintenance or repair operations involving welding must be carried out with the system emptied of refrigerant.

WATER SYSTEM

- Defects affecting pipelines, connections or valves and other control componentry can result in water being leaked or sprayed from the system, occasioning damage to property or causing short circuits in the unit. Make certain all hydraulic connections are securely made, following the directions given in the present manual.

REFRIGERANT SAFETY CHARTS

R-410A		
01	Identification of the product and of the supplier	Chart No FRIG 8 Product R-410A Identification of the supplier. See heading or bottom of page. No of emergency telephone. See heading or bottom of page.
02	Composition / information on ingredients	Substance/ Compound . Compound Elements / Impurities. It contains the following elements Difluorometan (R32) 50 % in weight Pentafluoroetan (R125) 50 % in weight CEE No Non applicable for mixtures. Commercial name /
03	Hazard identification	Hazard identification. Liquefied gas. Vapours are heavier than air and can cause choking by reducing the oxygen available for breathing. A rapid evaporation of the liquid can cause freezing. It can cause cardiac arrhythmia.
04	First aid measures	Inhalation. Do not administer anything to fainted people. Take to open air. Administer oxygen or practice artificial breathing if necessary. Do not administer adrenaline or similar substances. Contact with eyes. Rinse carefully with plenty of water for at least 15 minutes and consult a doctor. Contact with the skin. Rinse immediately with plenty of water. Immediately take off all contaminated cloths. Ingestion. Way of exposure not very probable.
05	Anti-fire measures	Specific hazards. Pressure increase. Dangerous combustible products. Halogen acids, traces of carbonyl halogens. Extinction means. You can use all extinction means available. Special methods. Cool the containers/tanks with sprays of water. Special protection means. In close spaces, use the self-breather.
06	Measures against the accidental leakages of the product.	Personal protections. Evacuate the personnel in safety areas. Foresee an adequate ventilation. Use means of personal protection. Protection for the environment. It evaporates. Methods for eliminating the product. It evaporates.
07	Handling and stocking.	Handling and stocking. Assure a sufficient exchange of air and/or a suction system in work areas. Use only in well-ventilated rooms. Do not breathe vapours or aerosols. Carefully close the containers and keep them in a cool, dry and well-ventilated place. Keep in the original containers. Incompatible products. Explosives, inflammable materials, organic peroxides.

- RESIDUAL RISKS -

08	Check of the exposition / personal protection	<p>Personal protection. Assure an adequate ventilation, especially in closed rooms.</p> <p>Control parameters. Difluorometan (R32): Recommended limits of exposition: AEL (8h and 12h TWA) = 1000 ml/m³</p> <p>Pentafluoroetan (R125): Recommended limits of exposition: AEL (8h and 12h TWA) = 1000 ml/m³</p> <p>Protection of respiratory tract. For the rescue and for service work in the tanks, use an autonomous breather. Vapours are heavier than the air and can cause choking by reducing the oxygen available for breathing.</p> <p>Protection for the eyes. Total protection glasses.</p> <p>Protection for the hands. Rubber gloves.</p> <p>Hygienic measures. Do not smoke.</p>
09	Chemical - physical properties.	<p>Relative density, gas (air=1) Heavier than air.</p> <p>Solubility in water (mg/l). Not known, but probably very low.</p> <p>Aspect. Colorless liquefied gas.</p> <p>Smell. Simile to ether.</p> <p>Point of ignition. Don't ignite.</p>
10	Stability and reactivity.	<p>Stability and reactivity. No decomposition if used following the instructions.</p> <p>Materials to avoid. Alkaline metals, earth alkaline metals, granulated metal salts, Al, Zn, Be etc. in powder.</p> <p>Dangerous decomposition products. Halogen acids, traces of carbonyl halogens.</p>
11	Toxicological information	<p>Local effects. Concentration substantially above the TLV value (1000 ppm) can cause narcotic effects.</p> <p>Inhalation of products at high concentration decomposition can cause respiratory insufficiency (pulmonary edema).</p> <p>Long term toxicity. It has shown no carcinogenic, teratogen or mutagenic effects on animal experiments.</p> <p>Specific effects. A rapid evaporation of the liquid can cause freezing. It can cause cardiac arrhythmia.</p>
12	Ecological information	<p>Effects connected to ecotoxicity</p> <p>Pentafluoroetan (R125) Potential of global heating of halocarbides; HGWP; (R-11 = 1) = 0.84</p> <p>Potential of ozone impoverishment; ODP; (R-11 = 1) = 0</p>
13	Disposal considerations	<p>General considerations. Do not drain where the accumulation can be dangerous</p> <p>Usable as reconditioning.</p> <p>Depressurized containers should be given back to the supplier.</p> <p>Contact the supplier if the use of instructions is necessary.</p>
14	Transport information	<p>Designation for the transport LIQUEFIED GAS N.A.S (DIFLUOROMETAN, PENTAFLUROETAN)</p> <p>UN No 3163</p> <p>Class/Div 2.2</p> <p>ADR /RID Nr 2, 2°A</p> <p>No hazard ADR/RID 20</p> <p>ADR Label. Label 2: not toxic gas not inflammable.</p> <p>CEPIC Groupcard 20g39 - A</p> <p>Other information for the transport. Avoid the transport on vehicles where the loading zone is not separated from the driver compartment.</p> <p>Verify that the driver is informed on the potential risk of the load and that he knows what to do in case of an accident or emergency.</p> <p>Before starting the transport, verify that the load is well fixed and :</p> <p>Verify that the container valve is closed and does not leak</p> <p>Verify that the blind cap of the valve, if supplied, is correctly assembled.</p> <p>Verify that the cap (if supplied) is well assembled and that there is adequate ventilation</p> <p>Verify that the norms in force are respected.</p>
15	Information on the norms in force	<p>The product must be labeled according to the 1999/45/CE normative.</p> <p>Observe the following norms, the relevant updating and the applicable modifications:</p> <p>Circulars no.46/79 and 61/81 of the Work Ministry: risks connected to the use of products containing aromatic amines.</p> <p>Law Decree no. 133/92 : Norms relevant to the draining of dangerous substances in water</p> <p>Law Decree no. 277/91 : Protection of workers for noise, lead and amianthus</p> <p>Law 256/74, Ministerial Decree of 28th Jan. 1992, Legislative Decree no 52 of 3rd Feb. 1997, Ministerial Decree of 28th Apr. 1997 and following modifications: Classification, packaging and labeling of compounds and dangerous substances</p> <p>Decree of the Republic President no.175/88, following modifications and updating: Activities with risks of serious accidents (Seveso Law)</p> <p>Decree of the Republic President no 203/88 : Emissions in the atmosphere</p> <p>Decree of the Republic President no.303/56: Hygiene of work</p> <p>Decree of the Republic President no.547/55 : Norms concerning the accident prevention</p> <p>Legislative Decree. no.152 of 11th May 1999 : Protection of waters.</p>
16	Other information	<p>Suggested uses. Refrigerant.</p> <p>High concentrations can cause asphyxia.</p> <p>Keep in a dry and well-ventilated place.</p> <p>Do not breathe in the gas.</p> <p>The asphyxia risk is often under-evaluated and must be put into evidence during the operator's training.</p>

Verify that all national and regional regulations are observed.

Before using this product in any new process or experiment, a deep study about the safety and the product compatibility with the materials must be performed.

The above information is based on our present know-how and describes the product considering the safety needs. However, they do not represent a guarantee and a warranty of the qualities in a juridical sense. Everyone is personally responsible for the observation of these norms.

Information present in this document is valid at the time of printing. The company is not responsible for any damages caused by the incorrect use of the product and/or for the use in conditions different from the conditions suggested.

- TECHNICAL DATA -

GENERAL TECHNICAL SPECIFICATIONS

Acoustic configuration: Standard (ST) / Compressors insulation (SC)

SIZES		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F		
COOLING																	
Cooling capacity	1 kW	158	170	183	200	216	237	261	279	300	317	342	370	425	494		
Compressor power input	kW	57,7	62,3	66,5	68,2	71,6	79,0	88,6	92,4	100	107	115	125	139	166		
Total power input	2 kW	63,1	68,0	72,1	73,8	78,8	86,7	95,7	101,4	109	116	126	137	153	179		
EER		2,51	2,51	2,54	2,71	2,74	2,73	2,73	2,76	2,74	2,74	2,71	2,71	2,78	2,76		
ESEER		4,04	4,03	4,09	4,36	4,41	4,40	4,39	4,45	4,42	4,41	4,45	4,52	4,64	4,61		
HEATING																	
Heat output	3 kW	166	175	190	205	229	245	263	297	311	326	363	388	449	497		
Compressor power input	kW	51,1	54,7	58,3	62,2	67,6	73,5	80,6	88,3	93,8	100	107	114	131	149		
Total power input	kW	56,7	60,3	63,9	67,8	74,9	80,8	87,9	97,3	103	109	117	125	146	163		
COP		2,93	2,90	2,97	3,02	3,06	3,03	2,99	3,05	3,02	2,99	3,10	3,10	3,08	3,05		
COMPRESSOR																	
Type of compressors		SCROLL															
No. of Compressors	Nr	4				5				6							
Nominal Power (C1)	HP	30	35	35	40	40	45	50	55	55	60	60	75	75	90		
Nominal Power (C2)	HP	35	35	40	40	45	45	50	55	60	60	75	75	90	90		
Std Capacity control steps	Nr	4				5				6							
Oil charge (C1)	l	8	9	9	11	11	10	11	11	13	12	12	21	21	17		
Oil charge (C2)	l	9	9	11	11	10	10	11	13	12	12	21	21	17	17		
Refrigerant circuits	Nr	2															
INTERNAL EXCHANGER																	
Type of internal exchanger	4	PHE															
No. of internal exchangers	Nr	1															
Water flow-rate	l/s	7,5	8,1	8,7	9,6	10,3	11,3	12,5	13,3	14,4	15,1	16,3	17,7	20,3	23,6		
Pressure drop	kPa	37	42	40	45	30	36	40	41	37	43	31	36	34	46		
Water content	l	12	12	14	14	20	20	21	23	26	26	33	33	40	40		
EXTERNAL SECTION FANS																	
Type of fans	5	AX															
Number of fans	Nr	3				4				5				6		8	
Standard air flow	l/s	17902	17902	16729	16729	22574	22574	22574	28329	28329	28329	33459	33459	45147	45147		
CONNECTIONS																	
Water fittings		2" 1/2							3"								
NOISE LEVELS																	
Sound Pressure Level (10m)	6 dB(A)	60 (56)	61 (56)	61 (56)	61 (57)	63 (59)	63 (59)	64 (59)	65 (61)	65 (61)	65 (61)	65 (62)	65 (62)	67 (63)	66 (63)		

(1) data referred to the following conditions:

- internal exchanger water = 12/7°C
- external exchanger air intake 35°C

(2) According to EUROVENT the Total Power Input does not consider the pump share, required to overcome the pressure drop for the solution circulation inside the exchangers.

(3) data referred to the following conditions:

- internal exchanger water = 40/45°C
- external exchanger air intake = 6.1°C W.B.

(4) PHE = plates

(5) AX = axial-flow fan

(6) The dates in brackets refer to SC configuration

OPERATING LIMITS (COOLING)

SIZE		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F
EXTERNAL EXCHANGER															
Max air inlet temperature	1 °C	43	43	42	43	44	44	44	45	45	44	44	44	44	44
Max air inlet temperature	2 °C	46	46	45	46	47	47	47	48	48	47	47	47	47	47
Min air inlet temperature	3 °C	-10													
Min air inlet temperature	4 °C	-7													
Min air inlet temperature	5 °C	2													
Min air inlet temperature	6 °C	11													
INTERNAL EXCHANGER															
Max water inlet temperature	°C	25													
Min. water outlet temperature	7 °C	5													
Min. water outlet temperature	8 °C	-8													

OPERATING LIMITS (HEATING)

SIZE		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F
EXTERNAL EXCHANGER															
Max air inlet temperature W.B.	9 °C	23													
Min air inlet temperature W.B.	°C	-5													
INTERNAL EXCHANGER															
Min water outlet temperature	°C	30													
Max water outlet temperature	°C	55													

data referred to the following conditions:

- internal exchanger water = 12/7°C
- difference between inlet / outlet water temperature = 5°C

Warning: the still air condition is meant as absence of air flow to the unit. Any wind condition can let air pass through the condenser coil thus worsening the operating limits of the unit (see limits with air speed at 0,5 m/s & 1 m/s).

Note: In any case, the unit should never be exposed to or operated, transported and/or stored at temperatures below -10°C.

ATTENTION: IN CASE OF PREDOMINANT WINDS, WINDBREAK BARRIERS ARE NECESSARY.

(1) Max inlet temperature - unit at full load

(2) Max inlet air temperature - capacity-controlled unit with standard limit device

(3) Min inlet air temperature - unit at full load and motionless ambient air

(4) Min inlet air temperature - unit at partial load and motionless ambient air

(5) Min inlet air temperature - unit at partial load and air speed of 0.5 m/s.

(6) Min inlet air temperature - unit at partial load and air speed of 1 m/s.

(7) standard unit

external exchanger air intake 35°C

(8) B = Low Temperature

external exchanger air intake 35°C

Fluid with ethylene glycol of 40%

(9) unit at full load

internal exchanger water = 40/45°C

- TECHNICAL DATA -

Acoustic configuration: extremely low noise (EN)

SIZES		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F	
COOLING																
Cooling capacity	1	kW	153	164	175	191	207	226	249	263	288	308	324	355	403	458
Compressor power input		kW	62,7	66,9	71,7	74,1	76,3	83,4	94,2	98,5	107	116	122	134	149	170
Total power input	2	kW	66,5	71,1	75,8	78,2	81,6	88,7	99,4	105	114	123	129	141	159	180
EER			2,31	2,31	2,31	2,44	2,54	2,55	2,51	2,51	2,53	2,51	2,52	2,51	2,53	2,54
ESEER			4,04	4,04	4,04	4,27	4,44	4,46	4,38	4,39	4,42	4,39	4,48	4,54	4,59	4,61
HEATING																
Heat output	3	kW	157	166	183	197	224	238	256	288	303	317	354	369	436	481
Compressor power input		kW	50,9	54,5	58,1	62,1	67,5	73,3	80,3	88,1	93,5	99	106	114	131	148
Total power input		kW	55	58,6	62,2	66,2	72,8	78,6	85,6	94,6	100	106	114	122	141	159
COP			2,85	2,83	2,94	2,98	3,08	3,03	2,99	3,04	3,03	2,99	3,11	3,02	3,09	3,03
COMPRESSOR																
Type of compressors			SCROLL													
No. of Compressors		Nr	4									5	6			
Nominal Power (C1)		HP	30	35	35	40	40	45	50	55	55	60	60	75	75	90
Nominal Power (C2)		HP	35	35	40	40	45	45	50	55	60	60	75	75	90	90
Std Capacity control steps		Nr	4									5	6			
Oil charge (C1)		l	8	9	9	11	11	10	11	11	13	12	12	21	21	17
Oil charge (C2)		l	9	9	11	11	10	10	11	13	12	12	21	21	17	17
Refrigerant circuits		Nr	2													
INTERNAL EXCHANGER																
Type of internal exchanger	4		PHE													
No. of internal exchangers		Nr	1													
Water flow-rate		l/s	7,3	7,8	8,4	9,1	9,9	10,8	11,9	12,6	13,8	14,7	15,5	17,0	19,3	21,9
Pressure drop		kPa	34	40	38	42	27	33	37	36	34	40	28	33	30	39
Water content		l	12	12	14	14	20	20	21	23	26	26	33	33	40	40
EXTERNAL SECTION FANS																
Type of fans	5		AX													
Number of fans		Nr	3				4			5			6		8	
Standard air flow		l/s	13231	13231	12196	12196	16515	16515	16515	20623	20623	20623	24392	24392	33030	33030
CONNECTIONS																
Water fittings			2" 1/2						3"							
LIVELLI RUMORE																
Sound Pressure Level (10m)		dB(A)	51	51	51	51	53	53	54	55	55	55	56	56	57	57

(1) data referred to the following conditions:

internal exchanger water = 12/7°C
external exchanger air intake 35°C

(2) According to EUROVENT the Total Power Input does not consider the pump share, required to overcome the pressure drop for the solution circulation inside the exchangers.

(3) data referred to the following conditions:

internal exchanger water = 40/45°C
external exchanger air intake = 6.1 °C W.B.

(4) PHE = plates
(5) AX = axial-flow fan

OPERATING LIMITS (COOLING)

SIZE		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F
EXTERNAL EXCHANGER															
Max air inlet temperature	1	°C	40	40	40	42	43	43	43	44	44	43	43	43	43
Max air inlet temperature	2	°C	43	43	42	43	44	44	44	45	45	44	44	44	44
Max air inlet temperature	3	°C	46	46	45	46	47	47	47	48	48	47	47	47	47
Min air inlet temperature	4	°C	-10												
Min air inlet temperature	5	°C	-7												
Min air inlet temperature	6	°C	2												
Min air inlet temperature	7	°C	11												
INTERNAL EXCHANGER															
Max water inlet temperature		°C	25												
Min. water outlet temperature	8	°C	5												
Min. water outlet temperature	9	°C	-8												

OPERATING LIMITS (HEATING)

SIZE		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F	
EXTERNAL EXCHANGER																
Max air inlet temperature W.B.	10	°C	23													
Min air inlet temperature W.B.		°C	-5													
INTERNAL EXCHANGER																
Min water outlet temperature		°C	30													
Max water outlet temperature		°C	54	54	54	54	55	55	55	55	54	55	54	54	55	55

data referred to the following conditions:

internal exchanger water = 12/7°C

difference between inlet / outlet water temperature = 5°C

Warning: the still air condition is meant as absence of air flow to the unit. Any wind condition can let air pass through the condenser coil thus worsening the operating limits of the unit (see limits with air speed at 0,5 m/s & 1 m/s).

Note: In any case, the unit should never be exposed to or operated, transported and/or stored at temperatures below -10°C.

ATTENTION: IN CASE OF PREDOMINANT WINDS, WINDBREAK BARRIERS ARE NECESSARY.

(1) Max inlet temperature - unit at full load

(2) Inlet air Max Temperature - unit at full load with standard limit device

For the sound levels in this operation condition please refer to the SC version data

(3) Max inlet air temperature - capacity-controlled unit with standard limit device

(4) Min inlet air temperature - unit at full load and motionless ambient air

(5) Min inlet air temperature - unit at partial load and motionless ambient air

(6) Min inlet air temperature - unit at partial load and air speed of 0.5 m/s.

(7) Min inlet air temperature - unit at partial load and air speed of 1 m/s.

(8) standard unit external exchanger air intake 35°C

(9) B = Low Temperature external exchanger air intake 35°C

Fluid with ethylene glycol of 40%

(10) unit at full load internal exchanger water = 40/45°C

- TECHNICAL DATA -

OVERLOAD AND CONTROL DEVICE CALIBRATION

		On	Off	Value
High pressure safety switch	kPa	4050	3300	--
Low pressure safety switch	kPa	200	350	--
Low pressure safety switch (Brine)	kPa	200	350	--
Antifreeze protection	°C	3	5,5	
High pressure safety valve	kPa	--	--	4500
Low pressure safety valve	kPa	--	--	2800
Max no. of compressor starts per hour	Nr	--	--	10
High compressor discharge temperature safety thermostat	°C	--	--	120

FOULING CORRECTION FACTOR

m ² °C/W	INTERNAL EXCHANGER	
	Cooling capacity correction factors	Compressors input power correction factors
0.44 x 10 ⁻⁴	1.00	1.00
0.88 x 10 ⁻⁴	0.97	0.99
1.76 x 10 ⁻⁴	0.94	0.98

CORRECTION FACTOR FOR ANTIFREEZE SOLUTIONS

% ethylene glycol by weight		5%	10%	15%	20%	25%	30%	35%	40%
Freezing temperature	°C	-2.0	-3.9	-6.5	-8.9	-11.8	-15.6	-19.0	-23.4
Safety temperature	°C	3.0	1.0	-1.0	-4.0	-6.0	-10.0	-14.0	-19.0
Cooling Capacity Factor	Nr	0.995	0.990	0.985	0.981	0.977	0.974	0.971	0.968
Compressor input Factor	Nr	0.997	0.993	0.990	0.988	0.986	0.984	0.982	0.981
Internal exchanger Glycol solution flow Factor	Nr	1.003	1.010	1.020	1.033	1.050	1.072	1.095	1.124
Pressure drop Factor	Nr	1.029	1.060	1.090	1.118	1.149	1.182	1.211	1.243

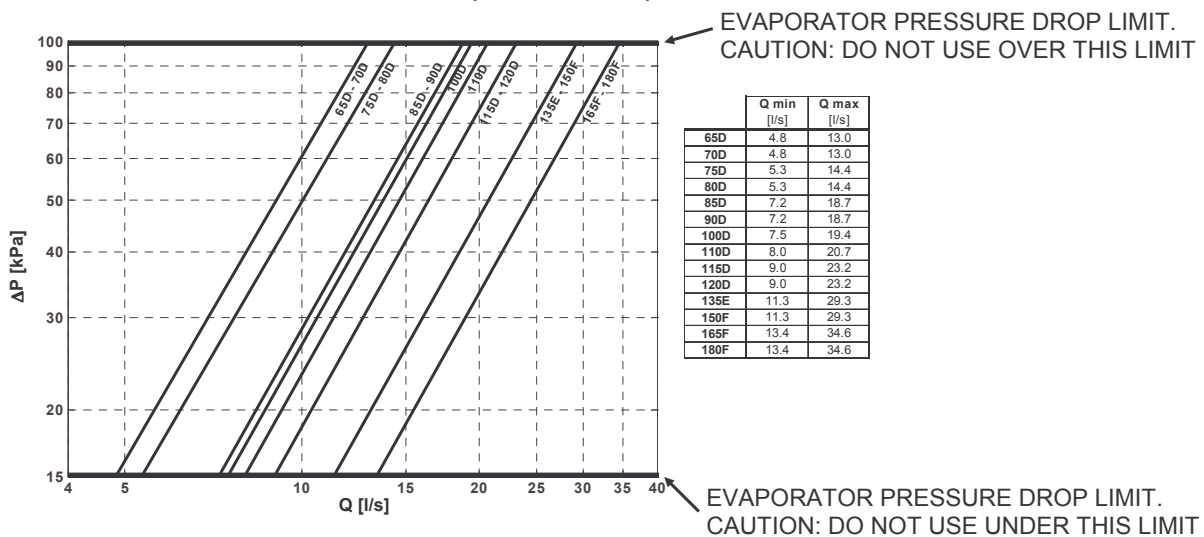
The correction factors shown refer to water and glycol ethylene mixes used to prevent the formation of frost on the exchangers in the water circuit during inactivity in winter.

EXCHANGER OPERATING LIMITS (SC-EN)

	INTERNAL EXCHANGER		
	Maximum operating pressure on refrigerant side (kPa)		Maximum operating pressure on water side (kPa)
	Standard	Base temperature - B	
CLIVET (C)	4500	4500	2500
PED (CE)	4500	4500	2500

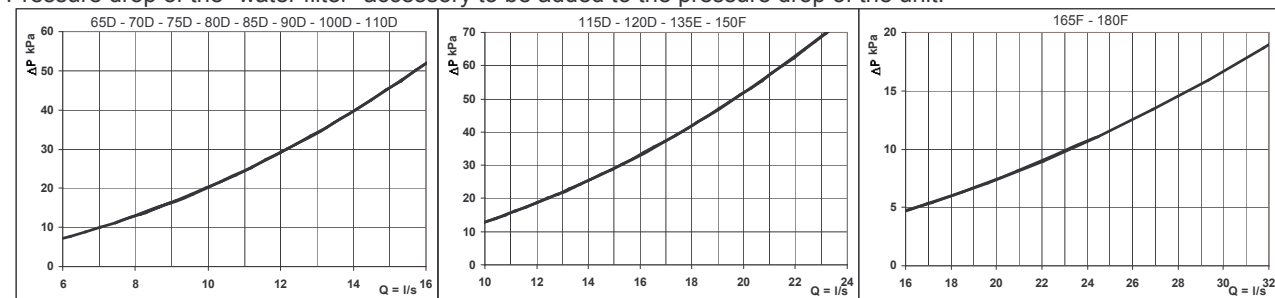
for different approvals contact our sales office

INTERNAL EXCHANGER PRESSURE DROP (EVAPORATOR): ST STANDARD - SC - EN



ACCESSORIES WATER FILTER

Pressure drop of the "water filter" accessory to be added to the pressure drop of the unit.



Q = water flow

dP = pressure drop

M01140A7-01

Acoustic configuration: Standard (ST)

SIZES	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
65D	82	79	83	90	85	86	80	75	74	92
70D	84	79	83	90	85	88	81	76	74	93
75D	87	79	83	91	86	87	80	76	74	92
80D	89	79	83	92	86	85	80	75	74	92
85D	91	83	86	94	89	88	82	78	76	95
90D	91	82	86	94	88	87	82	77	76	95
100D	89	81	85	91	87	92	85	79	77	96
110D	96	84	87	97	91	90	84	80	78	98
115D	95	84	87	97	91	90	84	79	78	97
120D	95	84	87	97	91	90	84	79	78	97
135E	95	84	87	97	91	90	84	79	78	97
150F	95	84	87	97	91	90	84	79	78	97
165F	96	87	90	98	92	91	85	81	79	99
180F	96	86	89	98	92	91	85	81	79	99

Acoustic configuration: compressors soundproofing (SC)

SIZES	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
65D	77	76	84	89	79	80	74	71	70	88
70D	78	76	83	88	79	81	75	72	70	88
75D	81	76	83	89	79	80	74	71	70	88
80D	84	76	84	91	80	79	74	71	71	89
85D	85	78	86	92	82	80	75	73	72	91
90D	85	78	85	92	82	80	75	72	72	91
100D	84	78	86	90	82	86	79	75	72	91
110D	90	80	87	95	85	83	77	75	74	94
115D	90	80	87	95	85	83	77	75	74	94
120D	90	80	87	95	85	83	77	75	74	94
135E	90	81	88	95	85	83	78	75	75	94
150F	90	81	88	95	85	83	78	75	75	94
165F	91	83	90	97	86	85	79	77	76	95
180F	91	83	90	97	86	85	79	77	76	95

Acoustic configuration: Extremely low noise (EN)

SIZES	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
65D	78	74	75	82	74	76	69	68	64	83
70D	81	74	75	82	74	78	70	69	65	83
75D	84	74	75	83	74	77	69	69	65	83
80D	85	74	75	84	75	75	68	68	65	83
85D	87	75	76	86	76	76	69	69	66	85
90D	87	75	76	86	76	76	69	69	66	85
100D	85	76	78	83	76	82	73	73	67	86
110D	91	76	77	88	79	78	71	71	68	87
115D	91	78	78	88	79	78	71	71	68	87
120D	91	78	78	88	79	78	71	71	68	87
135E	92	79	79	89	80	79	72	72	69	88
150F	92	79	79	89	80	79	72	72	69	88
165F	93	80	80	90	81	80	73	73	70	89
180F	93	80	80	91	81	81	73	73	70	90

Measures according to ISO 3744 regulations, with respect to the EUROVENT 8/1 certification.

The sound levels refer to the unit at full load, in the rated test conditions.

The sound pressure level refers to a distance of 1m from the external surface of the units operating in an open field.

data referred to the following conditions:

internal exchanger water = 12/7°C

outside air temperature 35°C

The sound levels EN version is valid within the operation limits relative to these acoustic versions; make reference to the noise data relative to SC version for higher external air temperature and in any case included within the operation limits of SC version.

- RECEPTION -

INSPECTION UPON RECEPTION

Check on arrival that the unit has not suffered damage during transit and that it is complete in every part as specified in the order. In the event of visible damage/deficiencies being discovered, make a note immediately on the delivery document with the comment: "CONDITIONAL ACCEPTANCE — CLEAR EVIDENCE OF DEFICIENCIES/DAMAGE DURING TRANSIT", then inform both the supplier and the carrier of the details by fax and by registered mail with advice of receipt not later than 8 days after taking consignment. Notifications sent after 8 days have elapsed will be ignored.

STORAGE

Shelter from: direct sunlight, rain, sand and wind
 Temperature: maximum 50°C minimum -10°C
 Maximum humidity: 90%

The respect of the instructions on the exterior side of the packaging assures the physical and functional integrity of the unit for the final user's advantage.

It is recommended to:

- Handle carefully
- Keep in a dry place
- Avoid putting other objects on top of the unit (respect the limits of levels of superimposition shown in the package)
- Avoid placing the unit with thermoretractable protection under the sun since the pressure of the circuits can assume values which activate the safety valves.

HANDLING

The operation of handling the unit must be carried out respecting the instructions of the safety norms in force (Legislative Decree 626/94 and following modifications)

Before starting the handling operations:

- Value the critical points during handling (stairs, flights, disconnected routes, doors, etc.)
- Verify that the lifting capacity of the means used is adequate to the unit weight
- Consider that the barycentre could be moved with respect to the center of the unit
- Before starting to lift, verify that the unit is at a stable balance.

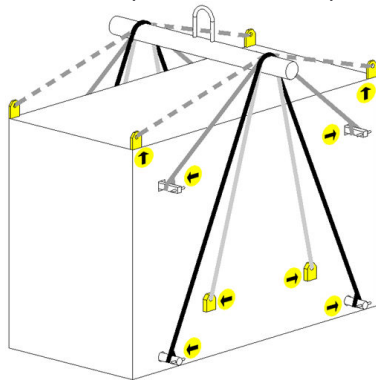
The following examples are indications; the choice of the means and of the handling modes will depend on factors, such as:

- The unit weight
- Type and overall dimensions of the unit
- Place and route for the handling (dirt yard, asphalted square, etc.)
- Condition of the place of destination (roof, square, etc.)
- Handling distance characteristics (distances, flights, steps, doors).

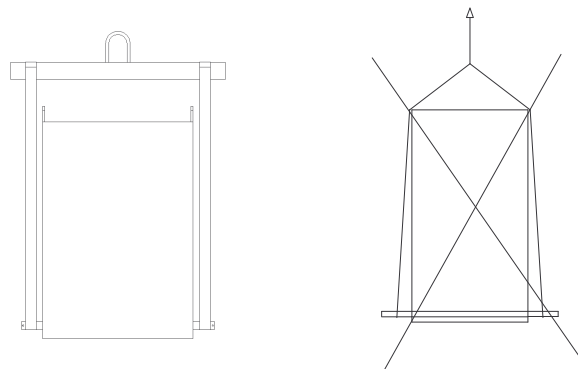
labels / yellow brackets show the lifting points

2 lifting points

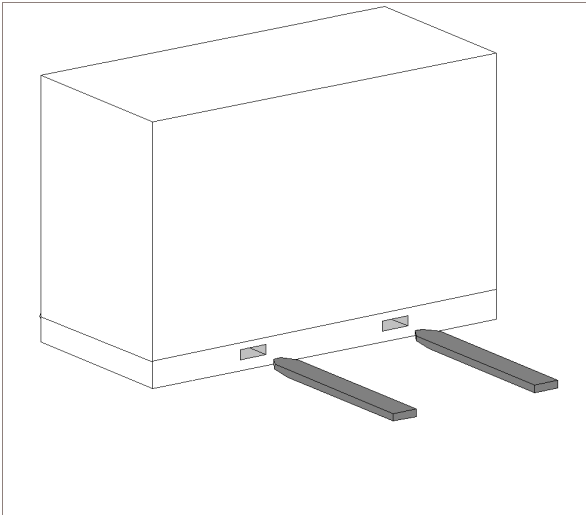
use 2-arm uprights
 (2 slopes/chains/slings per each side of the unit)
 according to the unit type, the holes and/or lifting brackets are placed at different points



use a spacer bar to avoid damaging the unit

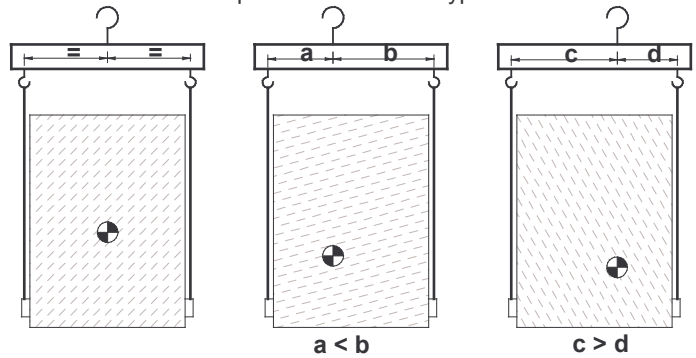


- RECEPTION -



How to balance the charge

Move the upper hook or the lower hooks, according to the spring equalizer rocker arm type



⊕ Baricentro unità
unit barycentre

REMOVING THE PACKING

For removing the packaging, use specific personal protection for the operator (gloves, glasses, etc.).

While removing the packaging, pay attention not to damage the unit.

Check for any visible damage.

Dispose of the packaging by taking it to specialist collection or recycling centres in accordance with local regulations.

- POSITIONING -

GENERAL

For installing air-conditioning systems, it is necessary to consider the following:

- the technical spaces necessary for the machine and system
- the place where the machine will be installed
- the transport of thermal carrier fluids and relevant connections to the unit:
 - water
 - air
 - refrigerant (unit in more sections)
- electrical connections

If these aspects are not evaluated carefully, they can affect the performances and the working life of the unit.

FUNCTIONAL CLEARANCES

When placing the unit, please respect the functional clearances indicated in DIMENSIONS section.

The functional spaces need to be observed because of the following:

- to guarantee the good operation of the unit
- to allow the performance of all maintenance operations
- to protect the authorized operators and exposed people

If more units are placed close to one another, the functional spaces must be doubled.

POSITIONING

The units are designed for the installation:

- outdoor installations must be performed in fixed positions and in areas accessible only to qualified and authorized personnel.
1. SAFETY VALVE (only if present on the unit): the installer is responsible for evaluating the opportunity of installing drain tubes, in conformity with the local regulations in force (EN 378)
 2. Install the unit raised from the ground
 3. Avoid installations in places subject to flooding
 4. Consider the maximum level which can be reached by snow
 5. Verify that the fixing/supporting points are level and suitable to support the weight of the unit (see the weight and the weights distribution).
 6. Put a rubber layer between the supporting plan and the unit to avoid noise and vibrations. It is recommended to put the unit on specific anti-vibration devices (in this case, flexible joints are necessary on all the hydraulic/ aeraulic connections – the joints are not supplied by Clivet).
 7. Anchor the unit to the ground; foresee windbreak barriers in case of places where there are strong prevalent winds
 8. In winter operating is produced a considerable quantity of condensate that has to be disposed by the unit. Verify that the condensation drain tube does not cause any problems to people or things (for example, dropping from terraces, walking places, etc.).

In case of long periods of working in the heat pump with external temperature lower than 0°C the condensation could freeze and create ice accumulation; evaluate the opportunity of installing anti-freeze resistances.

For units equipped with the condensation drain tube connection, it is possible to see it in the dimensional drawing.

The choice of where to position the unit is of fundamental importance for its use and working; therefore, there are things to avoid:

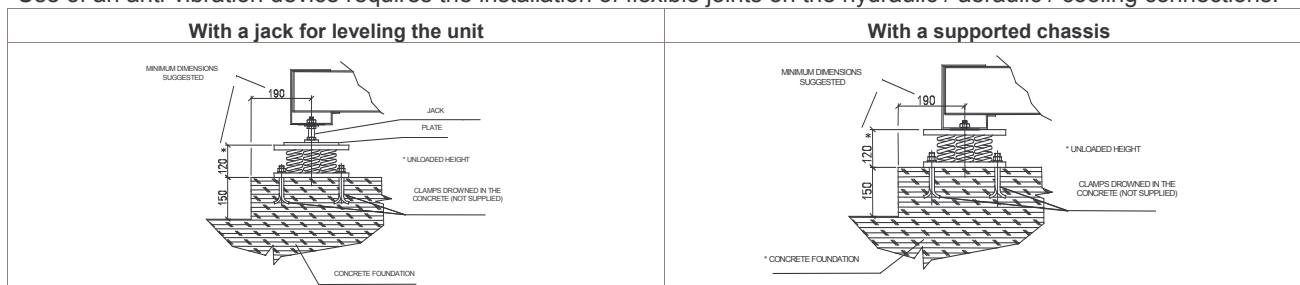
- Obstacles to the air flow
- Difficulties of air circulation
- Leaves or other objects which can obstruct the exchange coils.
- Winds which contrast or favour too much air flow
- Phenomena's of stratification or of air circulation
- Sources of heat in the nearby vicinity
- Positioning under the round level or near very high walls (evaluate with attention)

The previous situations cause working anomalies or stop the machine and cause:

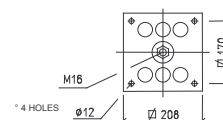
- During SUMMER operation, increase of the condensation pressure with the decay of performances and possible stops due to high pressure.
- During WINTER operation, decrease of the evaporation pressure with increase to the amount of defrosting and consequent decay of the performances and possible stops due to high pressure.

INSTALLATION OF ANTIVIBRATION MOUNTS

Use of an anti-vibration device requires the installation of flexible joints on the hydraulic / aeraulic / cooling connections.



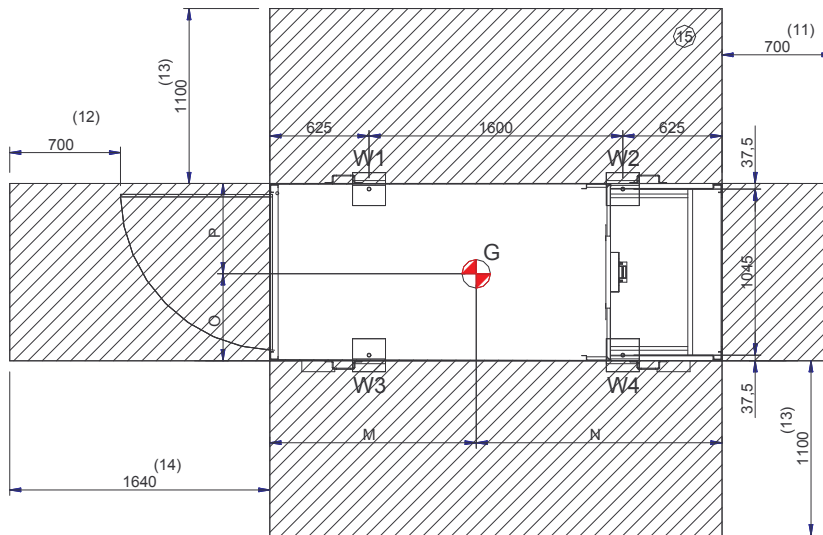
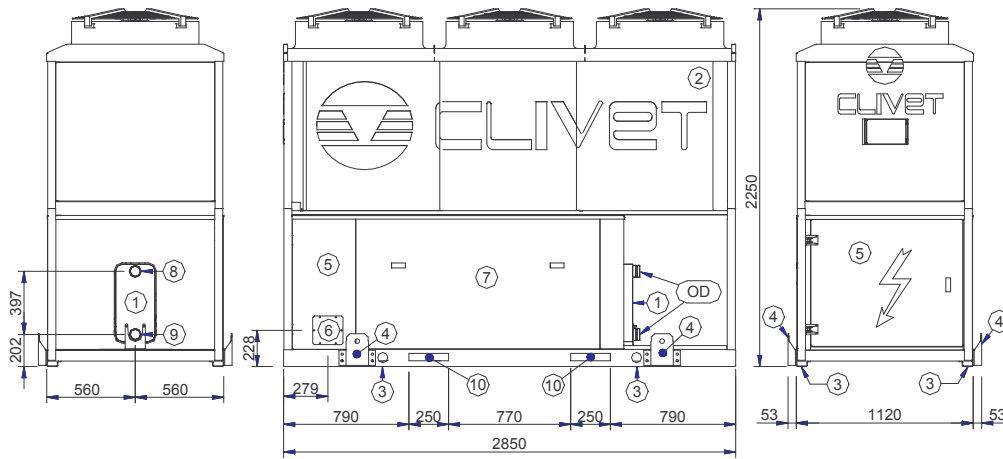
Each supporting point of the unit supports a different weight, so each anti-vibration device is dimensioned for a specific supporting point and only on this point can it be positioned. The anti-vibration devices must be placed in accordance of the tables and the dimensional drawings where the supporting points are shown by W1, W2, W3 etc. On each anti-vibration point, the relative identification code is printed, for ex. C6100100.



- POSITIONING -

DIMENSIONS

Sizes 65D-70D-75D-80D



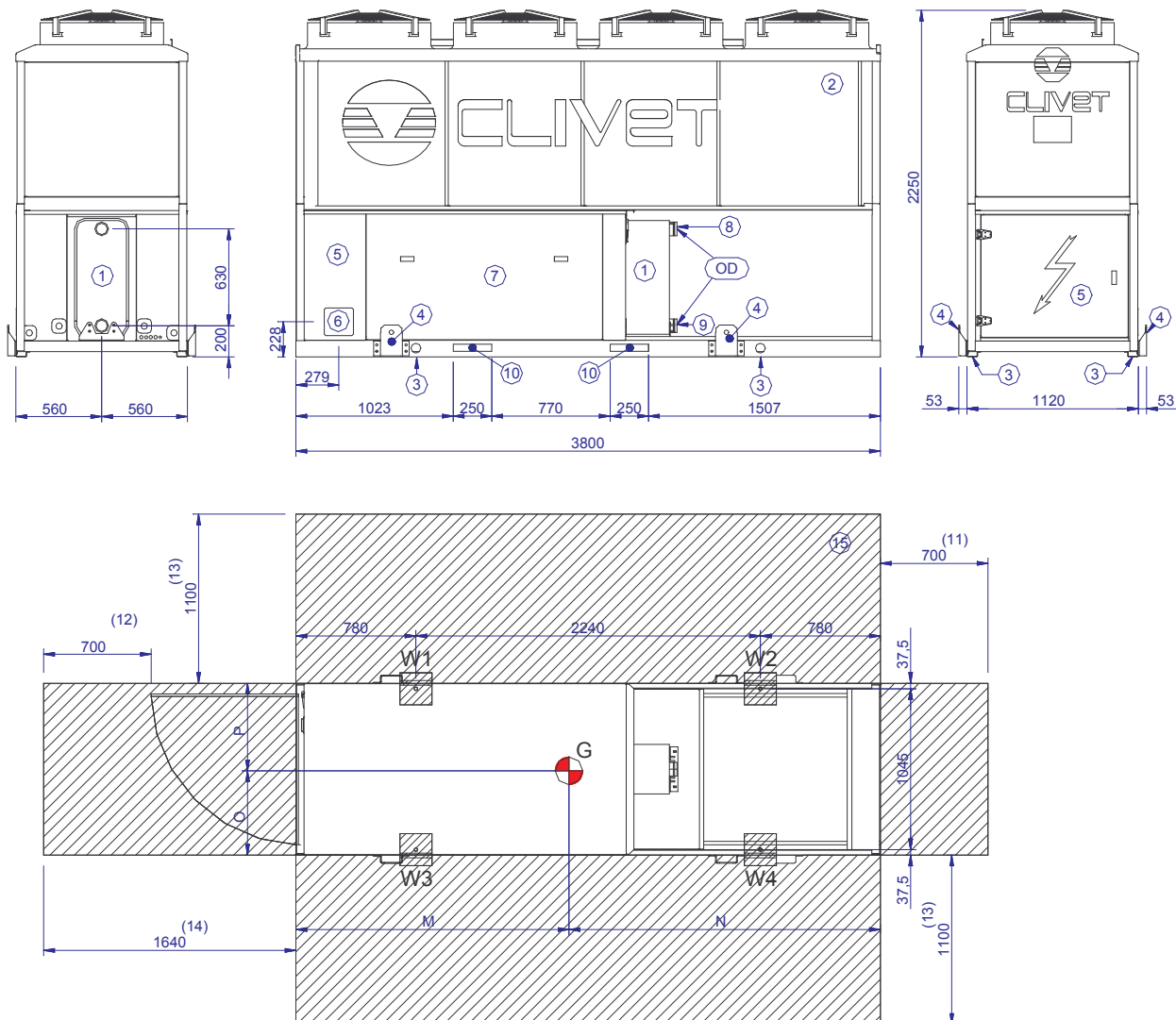
- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) HOLE TO HANG UNIT
- (4) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT)
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS)
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) LIFTING LUGS
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN
- (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL
- (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE
- (15) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE

SIZE		ST				SC				EN			
		65D	70D	75D	80D	65D	70D	75D	80D	65D	70D	75D	80D
Length	mm	2850	2850	2850	2850	2850	2850	2850	2850	2850	2850	2850	2850
Depth	mm	1120	1120	1120	1120	1120	1120	1120	1120	1120	1120	1120	1120
Height	mm	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250
M	mm	1273	1267	1282	1290	1272	1267	1281	1289	1272	1267	1281	1289
N	mm	1577	1583	1568	1560	1578	1583	1569	1561	1578	1583	1569	1561
O	mm	570	563	561	563	570	563	561	562	570	563	561	562
P	mm	550	557	559	557	550	557	559	558	550	557	559	558
OD	mm	76.1	76.1	76.1	76.1	76.1	76.1	76.1	76.1	76.1	76.1	76.1	76.1
W1	kg	435	444	455	466	452	461	472	483	452	461	472	483
W2	kg	360	365	380	393	374	378	394	407	374	378	394	407
W3	kg	427	442	454	464	444	459	470	481	444	459	470	481
W4	kg	352	362	379	391	366	376	393	405	366	376	393	405
Operating weight	kg	1574	1613	1668	1714	1636	1674	1729	1776	1636	1674	1729	1776
Shipping weight	kg	1561	1601	1653	1700	1623	1663	1715	1762	1623	1663	1715	1762

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

- POSITIONING -

Sizes 85D-90D-100D



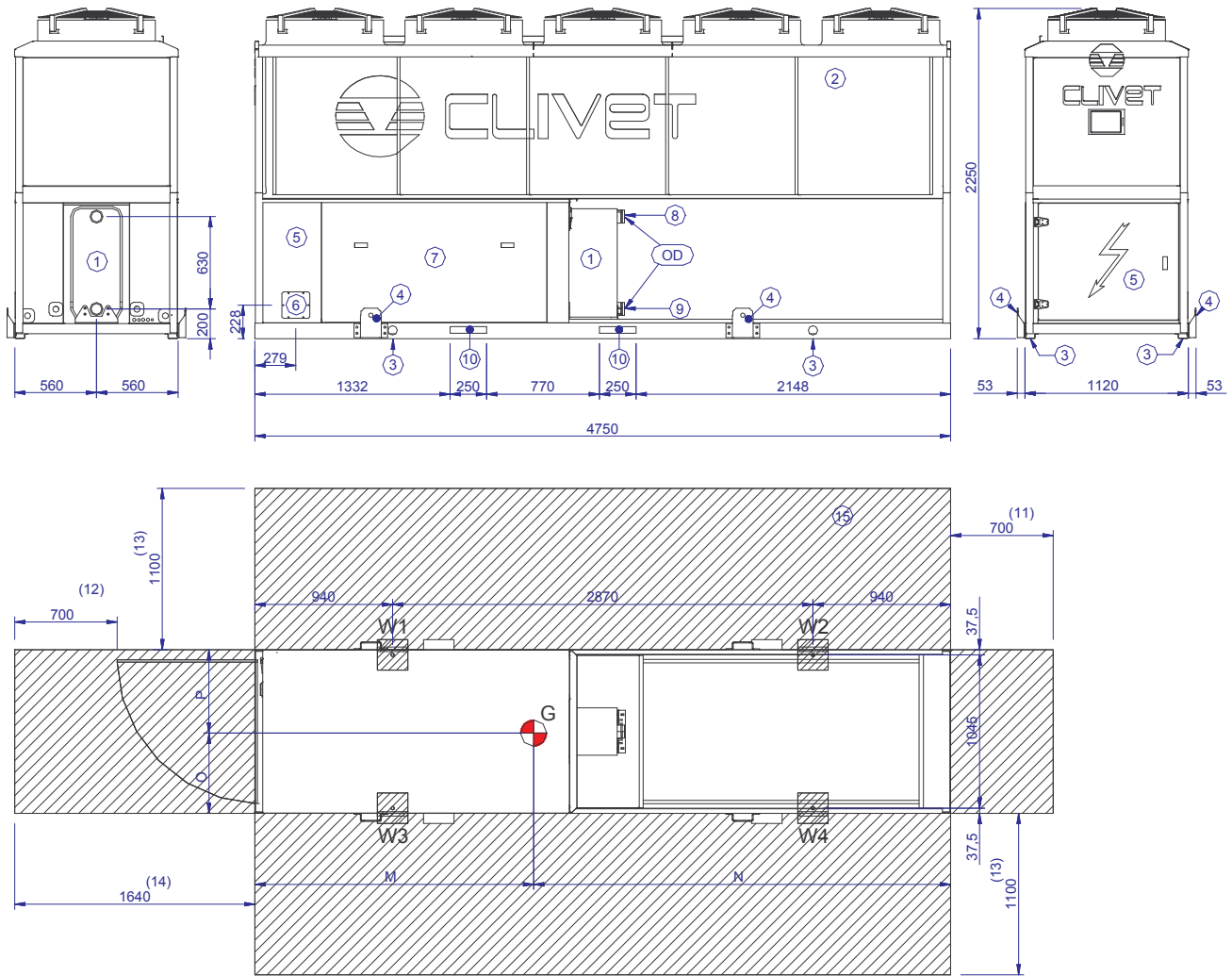
- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) HOLE TO HANG UNIT
- (4) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT)
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS)
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) LIFTING LUGS
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN
- (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL
- (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE
- (15) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE

SIZE		ST			SC			EN		
		85D	90D	100D	85D	90D	100D	85D	90D	100D
Length	mm	3800	3800	3800	3800	3800	3800	3800	3800	3800
Depth	mm	1120	1120	1120	1120	1120	1120	1120	1120	1120
Height	mm	2250	2250	2250	2250	2250	2250	2250	2250	2250
M	mm	1589	1587	1583	1583	1581	1577	1583	1581	1577
N	mm	2211	2213	2217	2217	2219	2223	2217	2219	2223
O	mm	561	559	559	561	559	559	561	559	559
P	mm	559	561	561	559	561	561	559	561	561
OD	mm	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9
W1	kg	537	539	549	554	556	567	554	556	567
W2	kg	406	407	413	417	418	424	417	418	424
W3	kg	536	539	550	554	557	567	554	557	567
W4	kg	405	407	414	416	418	424	416	418	424
Operating weight	kg	1884	1892	1926	1941	1949	1982	1941	1949	1982
Shipping weight	kg	1863	1871	1904	1919	1927	1960	1919	1927	1960

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

- POSITIONING -

Sizes 110D-115D-120D



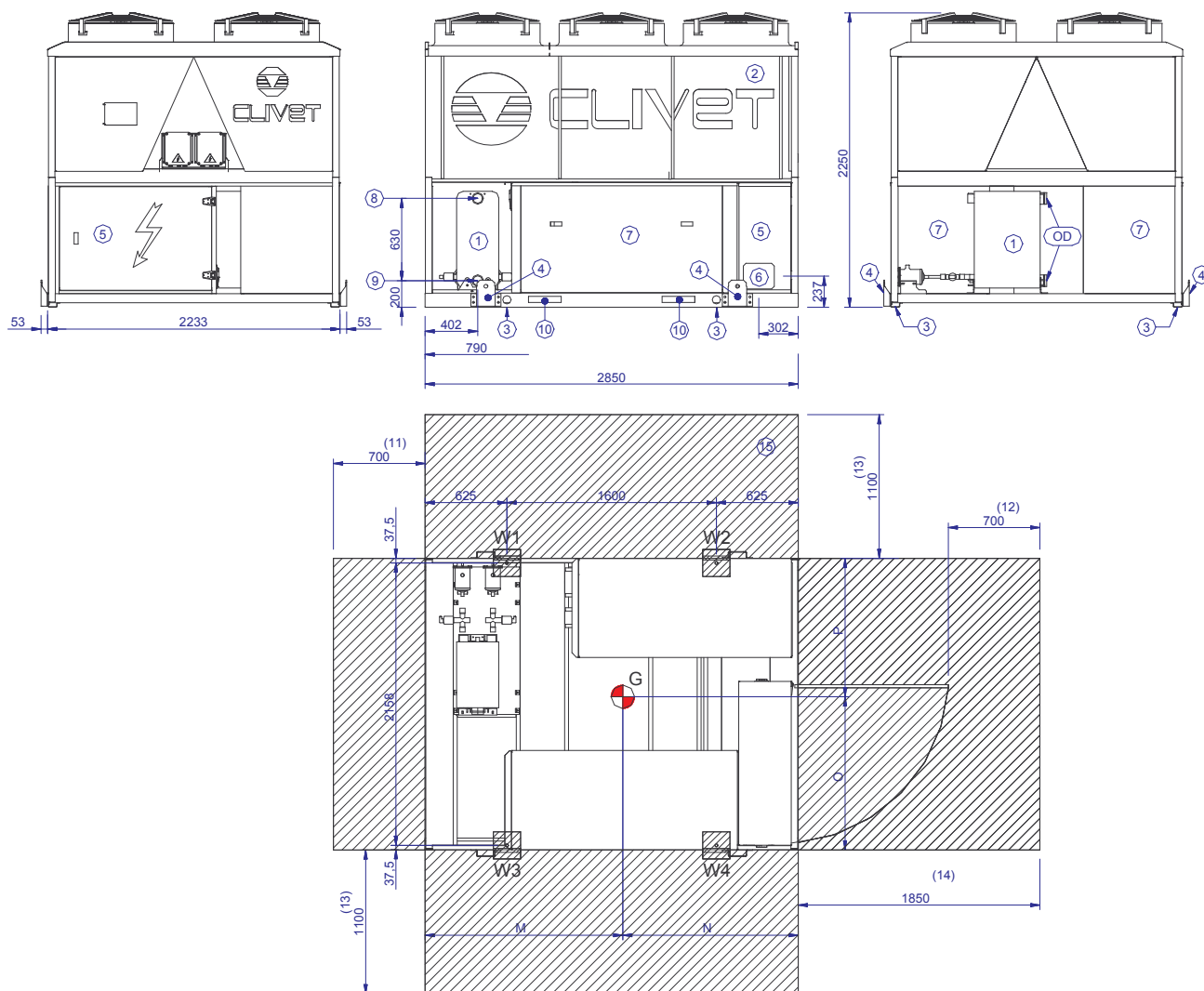
- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) HOLE TO HANG UNIT
- (4) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT)
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS)
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) LIFTING LUGS
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN
- (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL
- (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE
- (15) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE

SIZE		ST			SC			EN		
		110D	115D	120D	110D	115D	120D	110D	115D	120D
Length	mm	4750	4750	4750	4750	4750	4750	4750	4750	4750
Depth	mm	1120	1120	1120	1120	1120	1120	1120	1120	1120
Height	mm	2250	2250	2250	2250	2250	2250	2250	2250	2250
M	mm	1814	1820	1826	1789	1809	1818	1789	1809	1818
N	mm	2936	2930	2924	2961	2941	2932	2961	2941	2932
O	mm	559	558	559	559	558	559	559	558	559
P	mm	561	562	561	561	562	561	561	562	561
OD	mm	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9	88.9
W1	kg	648	649	650	665	667	671	665	667	671
W2	kg	436	438	441	439	447	453	439	447	453
W3	kg	649	651	651	666	669	672	666	669	672
W4	kg	437	440	442	440	449	454	440	449	454
Operating weight	kg	2170	2178	2184	2210	2232	2250	2210	2232	2250
Shipping weight	kg	2144	2151	2158	2187	2205	2222	2187	2205	2222

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

- POSITIONING -

Sizes 135E-150F



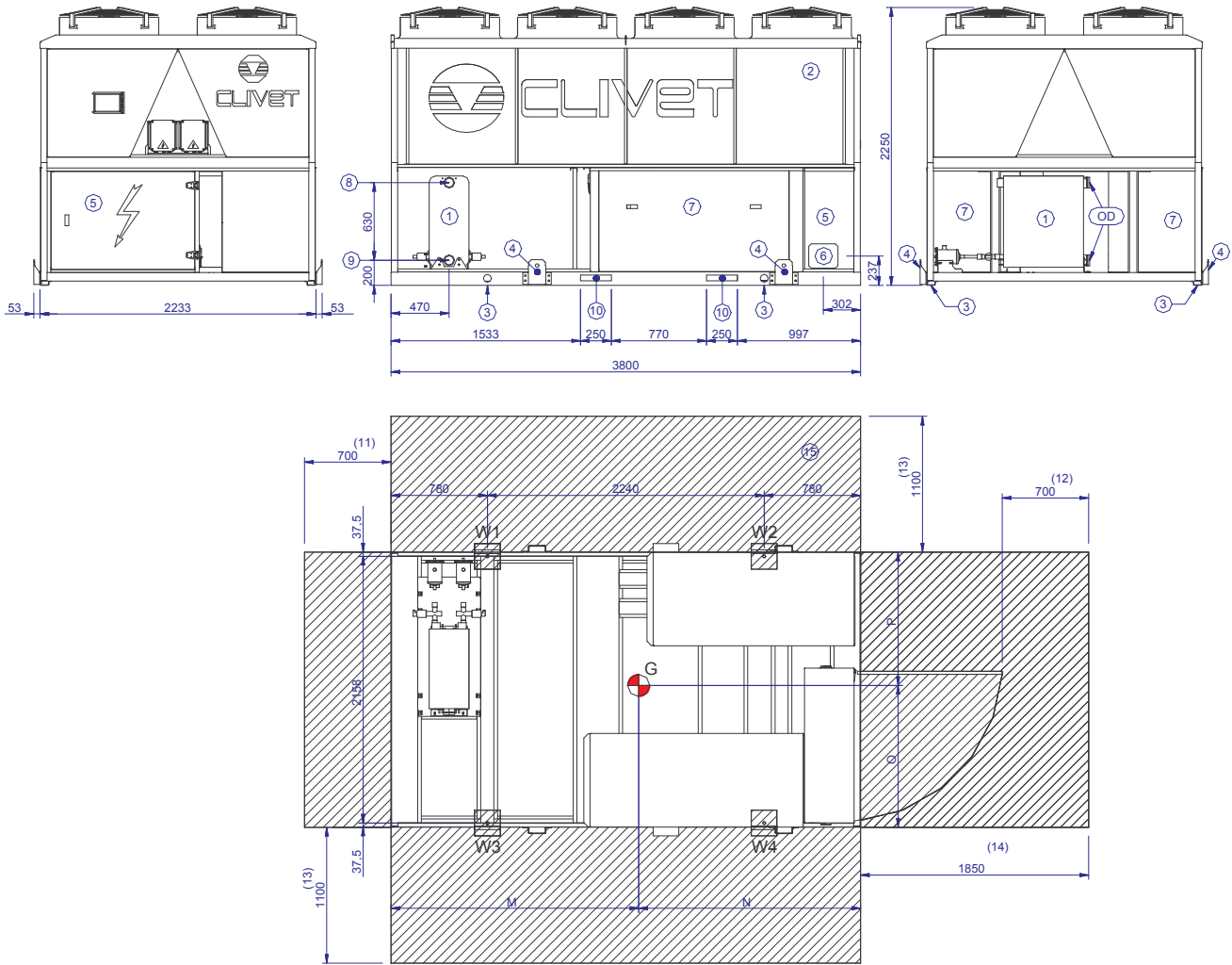
- | | |
|---|---|
| (1) INTERNAL EXCHANGER (EVAPORATOR) | (9) INTERNAL EXCHANGER WATER OUTLET |
| (2) EXTERNAL EXCHANGER (CONDENSER) | (10) LIFTING LUGS |
| (3) HOLE TO HANG UNIT | (11) MINIMUM DIMENSION FOR A SAFE PASSAGE |
| (4) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT) | (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN |
| (5) ELECTRICAL PANEL | (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL |
| (6) POWER INPUT | (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE |
| (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS) | (15) CLEARANCE ACCESS RECOMMENDED |
| (8) INTERNAL EXCHANGER WATER INLET | (G) BARYCENTRE |

SIZE	ST		SC		EN	
	135E	150F	135E	150F	135E	150F
Length	mm 2850	2850	2850	2850	2850	2850
Depth	mm 2233	2233	2233	2233	2233	2233
Height	mm 2250	2250	2250	2250	2250	2250
M	mm 1554	1513	1573	1525	1573	1525
N	mm 1296	1337	1277	1325	1277	1325
O	mm 1262	1136	1258	1134	1258	1134
P	mm 971	1097	975	1099	975	1099
OD	mm 88.9	88.9	88.9	88.9	88.9	88.9
W1	kg 668	705	694	737	694	737
W2	kg 777	786	826	834	826	834
W3	kg 577	691	600	724	600	724
W4	kg 686	772	732	821	732	821
Operating weight	kg 2708	2954	2852	3116	2852	3116
Shipping weight	kg 2672	2917	2815	3079	2815	3079

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department

- POSITIONING -

Sizes 165F-180F



- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) HOLE TO HANG UNIT
- (4) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT)
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUND PROOF ENCLOSURE (ONLY IN THE EXPECTED VERSIONS)
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) LIFTING LUGS
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN
- (13) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL
- (14) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE
- (15) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE

SIZE		ST		SC		EN	
		165F	180F	165F	180F	165F	180F
Length	mm	3800	3800	3800	3800	3800	3800
Depth	mm	2233	2233	2233	2233	2233	2233
Height	mm	2250	2250	2250	2250	2250	2250
M	mm	2083	2069	2110	2096	2110	2096
N	mm	1717	1731	1690	1704	1690	1704
O	mm	1107	1114	1107	1113	1107	1113
P	mm	1126	1119	1126	1120	1126	1120
OD	mm	88.9	88.9	88.9	88.9	88.9	88.9
W1	kg	782	795	808	821	808	821
W2	kg	922	925	975	979	975	979
W3	kg	789	798	816	824	816	824
W4	kg	929	927	983	982	983	982
Operating weight	kg	3422	3445	3582	3606	3582	3606
Shipping weight	kg	3382	3402	3542	3562	3542	3562

Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

GENERAL WARNINGS

Piping must be designed with the least possible number of bends and head variations. If the pressure chute of the installation is above the useful prevalence of the pump, the water delivery capacity is reduced as well as, as a consequence, the thermal exchange and the yield.

1. INTERCEPTING VALVES

Install on the input and output (of the user parts (exchangers, coils, humidifiers, etc) So that it will be possible to carry out all the service operations and possible substitutions without emptying the installation.

2. PRESSURE AND TEMPERATURE INDICATOR, BLEEDING COCK

Install on the input and output of the user parts (exchangers, coils, humidifiers, etc) So that it will be possible to carry out all the service operations and possible substitutions without emptying the installation.

3. AUTOMATIC OR MANUAL ESCAPE VALVES

Install the highest points of tubes in a way that the air can escape from the circuit.

4. LEAKAGE TESTS

Before performing the insulation of the tubes, carry out a leakage test.

5. TUBE INSULATION

All tubes of water must be insulated so that to avoid the formation of condensation and thermal dispersions along the tubes themselves. Verify that the insulation is the vapour coil type. The connections for the air escape and for the emptying must be out of the insulating thickness to assure the accessibility.

6. CONNECTIONS SUPPORTS

The weight of the hydraulic connections must be supported in the exterior of the unit. The exchanger connections must not be stressed.

7. ANTI-VIBRATION DEVICES

In case of units with anti-vibration devices, it is necessary to assemble elastic joints, even on water connections.

8. RISK OF FREEZE

If the unit and the relevant water connections are subject to temperatures near 0°C:

- mix the water of the system with glycol and/or
- protect the tubes with heating cables under the tubes insulation and / or
- empty the system by verifying that in the system or in the unit:
 - no taps are closed so they can not trap the water, even after emptying
 - there are no low points where the water can stagnate even after emptying; blow if necessary

9. INTALLATION EMPTYING

The refilling of the water present in the installation increase the oxidation phenomena and lime deposits: only empty or refill the installation if necessary.

10. EXPANSION TANK

The installation must be kept at the right pressure by both an expansion tank and a combined valve of pressure reduction and discharge; if the components are present on the unit, they must be installed on the installation. The expansion tank must be dimensioned in function of the water in the installation.

CONNECTION OF THE EVAPORATOR

1. FILTER

If the filter is not present on the machine, it must be immediately installed upstream from the unit, in a position which can be easily reached for cleaning.

2. FLOW SWITCH

The flow switch must be present as a component of the system. It must be installed in a straight tract of the tubes, not near the elbows, which can generate harmful turbulence.

3. UNFREEZABLE LIQUIDS

If the unit is used when the water temperature is lower than + 4°C, avoid the formation of ice by using unfreezable liquids (ex. Ethilenic Glycol) in the necessary percentage. The use must also be determined for room temperatures near 0°C.

4. ANTIFREEZE RESISTANCES

If the unit is equipped with antifreeze resistances on the exchanger side (standard or optional according to the models), verify that they are electrically fed during periods that the machine is stopped (night, weekends, long stops).

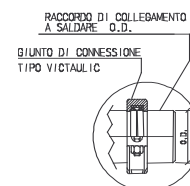
5. WASHING THE SYSTEM

Carefully wash the system by using clean water and discharge it before connecting the unit.

VICTAULIC CONNECTIONS

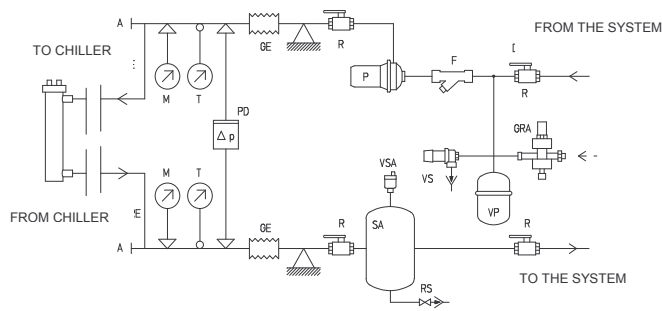
DO NOT WELD THE INSTALLATION PIPE WITH THE VICTAULIC CONNECTION JOINT ATTACHED. THE RUBBER GASKETS COULD BE IRREPARABLY DAMAGED.

1. Take away the supplied connection union by acting on the connection joint Victaulic.
2. Weld the union to the installation pipe.
3. Perform the connection between the installation pipe and the evaporator, using the joint.



- WATER CONNECTIONS -

SUGGESTED CONNECTION DIAGRAM



- F = Impurity collector with filter
- GE = Flexible joint
- GRA = Automatic filling assembly with gate valve
- M = Pressure gauge
- P = Pump
- PD = Differential pressure switch
- R = Ball valve
- RS = Discharge cock
- SA = Storage tank (if necessary)
- T = Thermometer
- VP = Expansion vessel
- VS = Safety valve
- VSA = Automatic air relief valve

The accumulation tank is necessary in the event of the following:

- the water in the system is very low
- the unit will not be used in a private house, but in an industrial process or other

HYDROPACK

The modular pumping system allows for the automatic reduction of the water rate, in case the temperature is above the operating limit.

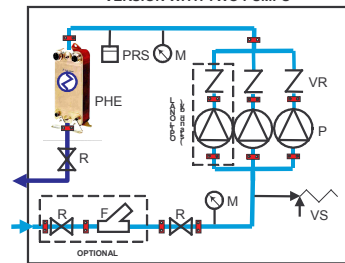
This device is very useful during starts-up, weekend pauses, and after a long period of inactivity. When the water temperature of the hydronic circuit is very high, possible blocks for overcharging are avoided, as well as the consequent interventions of specialized personnel for the assisted start-up.

Moreover, Hydropack assures a variable water rate when necessary.

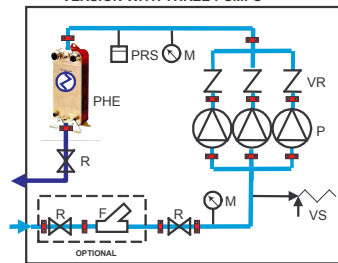
The equipment of refrigerant groups with the Hydropack accessory allows the supply of the necessary rate/head with different solutions:

- HYDROPACK with 2 pumps. For less power units, the standard solution with 2 pumps can be chosen. If a pump gets blocked, the unit will go on working till about 60% of the charge. This solution is more reliable than the traditional ones with a single great power pump.
- HYDROPACK with 2 pumps + 1 stand-by. 1 reserve pump can be foreseen for assuring a total reliability. So the design water rate is assured (in fact, in the event of a failure, the reserve pump is automatically activated and the unit control signals if the broken pump is blocked).
- HYDROPACK with 3 pumps, for units of greater power. With the solution of 3 pumps which are always activated, the possible blocking of a pump always assures the regular working up to 80% of the charge (always with the signalization of the blocking). In this case, it is possible, upon request, to supply a reserve pump (not connected). The replacement is performed in few minutes time, thanks to the simple foreseen connections.

VERSION WITH TWO PUMPS



VERSION WITH THREE PUMPS



Multi pump hydronic group including:

- R = shut-off valves
- F = steel mesh filter(optional),
- M = manometers
- VS = safety valve (6 Bar)
- P = high efficiency single-structure and single-rotor electric pumps

VR = check valves

- PRS = safety pressure switch (avoids pumps operation in case of water absence),
- PHE = evaporator-kit including two blind plugs needed in case of pump removal for maintenance operations.

RECOVERY EXCHANGER (OPTIONAL)

The unit can be equipped with exchangers to recover the condensation heat.

The recovery can be:

- TOTAL, with 100% recovery of the condensation heat
 - the thermoregulation is performed by CLIVET control system
- PARTIAL with 20% recovery
 - The customer is responsible for the management of the circulation pump, valves, thermostats, etc.

The recovery input water must not be below 25°C, in the event that, wrongful operations and breakages of the unit can occur.

Water connections must be performed carefully as for the evaporator (filter, circuit washing, etc).

Perform all necessary interventions to avoid the RISK OF FREEZING (tubes insulation, emptying of circuit, addition of glycol, anti-freeze resistances).

Water temperature can reach high temperatures (up to 100°C), therefore:

- avoid the RISK OF BURNS by adopting the necessary precautions (insulation of tubes, temperature detecting station on water if the sanitary use is foreseen, etc.)
- Install safety valves and specifically dimensioned expansion tanks in the hydraulic circuit.

- ELECTRICAL CONNECTIONS -

GENERAL WARNINGS

The characteristics of the electrical lines and relevant components must be determined by specialized personnel able to design electrical installations; moreover, the lines must be in conformity with professional procedures and the regulations in force.

All electrical operations should be performed by trained personnel having the necessary requisites under law and being informed about the risks relevant to these activities.

Before performing any operation on the electrical system, make sure that the unit supply line is **SELECTED AT START**.

For all electrical type operations, refer to the electrical diagram attached to the unit; the number of the diagram is shown on the registration plate positioned on the electrical board or next to it.

The electrical diagram should be carefully kept together with this manual and should be available for future intervention on the unit.

LINE OF UNIT POWER SUPPLY

The electrical data of the unit are shown in the technical chart of this manual and on the unit registration plate.

The presence of accessories can vary according to the unit; the electrical data shown in the technical chart refer to standard units. In the event of differences between the data of the registration plate and the data shown in this manual, as well as in the technical chart, please refer to the data shown in the registration plate.

The protection device of the unit power supply line should break off the short circuit power whose value should be determined according to the plant features.

The section of supply cables and protection cable must be seized according to the characteristics of the protections used.

SIGNALS / DATA LINES

Do not overpass the maximum power allowed, which varies, according to the type of signal.

Lay the cables far from power cables or cables having a different tension and that are able to emit electromagnetic disturbances.

Do not lay the cable near devices which can generate electromagnetic interferences.

Do not lay the cables parallel to other cables; cable crossings are possible, only if laid at 90°.

Connect the screen to the ground, only if there are no disturbances.

Assure the continuity of the screen during the entire extension of the cable.

Observe, if any, the requirements about impedance, capacity, attenuation.

ELECTRICAL DATA

Voltage: 400/3/50

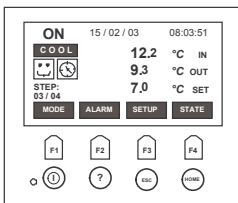
SIZE		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F
F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS															
F.L.A. - Total	A	144,7	154	165,3	176,6	187,3	193,9	212,7	239,4	246,0	252,6	294,8	332,9	360,9	380,7
F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION															
F.L.I. - Total	kW	84,9	91,2	96,3	101,4	109,6	116	128,8	140,8	147,2	153,5	172,3	189,3	212,1	231,1
M.I.C. MAXIMUM INRUSH CURRENT															
M.I.C. - Value	A	319,7	329	374	385,3	464,4	471	489,8	516,5	523,1	529,7	571,9	541,6	638,0	657,8

power supply: 400/3/50 Hz +/-6%

CONNECTION TO THE MAINS

1. Make sure that the sectioning device at the beginning of the unit's power line is opened, locked and equipped with a signal.
2. Open the general line disconnecting switch (if present)
3. Verify that the net is in conformity with the data shown in the registration plate placed on the electrical board.
4. Check the dimensional drawing for the input of the electrical lines
5. Take away the closing plate placed on the electric board (ONLY IF PRESENT) and drill a hole through it to pass the cables through.
6. Protect the cables, using the fairlead of an adequate size.
7. Using the layout of the electrical diagram, single out the connecting terminals of the electrical supply cables, of the neutral (if foreseen) and the PE protection cable
8. Connect the cables to the relevant terminal boards
9. Before supplying power to the unit, make sure that all the safety devices that were removed during electrical connections are positioned again.

FUNCTIONAL CONNECTIONS



Use voltage-free remote control devices that are suitable to commute very low loads (12V, 10mA).

Few functionalities and inputs must be activated by configuration parameters whose access is reserved to authorized assistance centers (in order to avoid unauthorized modifications).

ON / OFF FROM REMOTE CONTROL

It allows the remote start and stop, not by keypad.

It can be used to disable the unit during the night, the weekend etc., so with ON or OFF periods relatively long (some hours).

It has not to be used with ON or OFF cycles too much short: they compromise the operating logic and they can cause malfunctions or faults. In summer operating, for example, ON –OFF cycles lower than one hour can compromise the thermoregulation logic, that implements an integral check.

If this function is not used, jump the respective terminals.

CHANGING FROM SUMMER TO WINTER USING THE REMOTE CONTROL

It allows the remote changing COOLING/HEATING, rather than by keypad.

Generally the unit is delivered with disabled input and the changing can be activated from keypad.

If this function is used, it is necessary to set the parameter 12 accessible only to the service centre; in this way the changing by keypad is no mere possible.

With selection switch open, the unit operates in heating, with selection switch closed it operates in cooling.

SIGNALIZATION OF MALFUNCTIONING/ UNIT FUNCTIONING

Remote signalization of the proper function (ex. green light) or signalization of blocks of the machine (ex. red light).

Maximum voltage at the terminal ends is 24v ac and maximum power is 1A.

SECOND SET-POINT

It allows the use of a secondary set-point, such as, for example, for a night operation, which can be activated by a remote contact.

When the contact is CLOSED, the secondary set-point is activated.

DEMAND LIMIT

It allows one to temporarily limit the electric power absorbed by the unit, according to a 10 vcc or 4-20 mA external signal. The higher the signal is, the lower the number of compressors available to meet the thermal need.

The parameters must be configured by the assistance center.

MENU	NUM	Parameter name	meaning
thermoregulation-demandlimit	7	DmandLimitEn	Enables the function: <ul style="list-style-type: none"> • 0=disabled • 1=by signal • 2=by parameter
parameter-set-sensors	82	TypeDI	Signal type: 0=0-10V; 1=4-20mA

- ELECTRICAL CONNECTIONS -

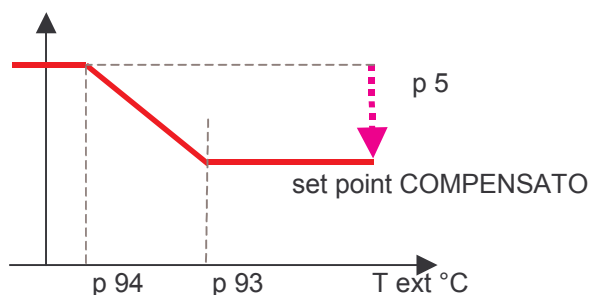
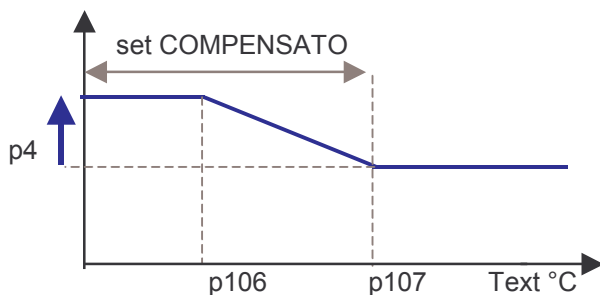
EXTERNAL AIR TEMPERATURE PROBE - Optional

It allows the automatic correction of the set-point according to the external air temperature.
For example, the summertime with low external temperatures, it is possible to have the internal comfort even with set-points higher than the standard.
The parameter configuration must be carried out.

MENU	NUM	Parameter name	meaning
parameter control compext	1	EnCompExt	External compensation enabling 0 = no; 1 = COOL only; 2 = HEAT only; 3 = always
	4	MaxCExtC	Max. ext. compensation value of cooling
	5	MaxCExtH	Max. ext. compensation value of heating
	93	CextMaxH	Max. ext. temp. of heating compensation
	94	CextMinH	Min. ext. temp. of heating compensation
	106	CextMaxC	Max. ext. temp. of cooling compensation
	107	CextMinC	Min. ext. temp. of cooling compensation
parameter-set-sensors	9	ProbeText	It enables ext. temp. probe: 0=yes ; 1=non

SUMMER

WINTER



EXTERNAL AIR HUMIDITY PROBE - Optional

It allows the automatic correction of the set-point according to the external air enthalpy.
During the winter operation, the correction takes place only on the temperature.
The operation is the same as described above.
The parameter configuration must be carried out.

MENU	NUM	Parameter name	meaning
parameters thermoregulation compext	4	MaxCExtC	Max. Summer correction value
	110	HexMinC	Min. correction ext. enthalpy
	111	HexMaxC	MAX. correction ext. enthalpy
parameter-set-sensors	23	ProbeURExt	Enables external humidity probe: 1=YES / 0=NO

WATER RESET - Optional

It allows the automatic correction of the set-point, according to an external signal of 4-20 mA or 0-10 vcc.
The working process is similar to the above mentioned process.
The parameter configuration must be carried out.

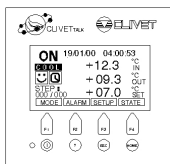
MENU	NUM	Parameter name	meaning
parameter control waterreset	11	MaxCWRC	WR Summer correction max. value
	24	MaxCWRH	WR Winter correction max. value
	75	WaterReset	Water Reset enabling: 0 = no; 1 = COOL only; 2 = HEAT only; 3 = always
	102	SWRMaxH	Winter MAX correction signal
	104	SWRMinH	Winter MIN correction signal
	105	SWRMaxC	Summer MAX correction signal
	108	SWRMinC	Summer MIN correction signal
parameter-set-sensors	83	TypeWR	Inlet signal type: 0=0-10V; 1=4-20mA

SUMMER

WINTER

CLIVET TALK MODULAR SYSTEM COMPOSITION

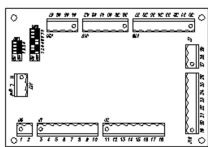
CLIVET TALK system is made up of different modules connected to each other with the CAN OPEN protocol.
The system configuration varies according to the typology of the unit and of the accessories: not always the represented electric modules are all presents on the unit.



INTERFACE

code C5110821

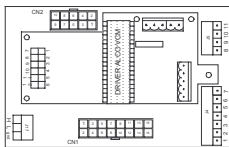
The interface module allows for the control of the operations of the whole machine, the programming of the different adjustment parameters and also to display the alarms and the unit status.



CENTRAL MODULE

code C5110694

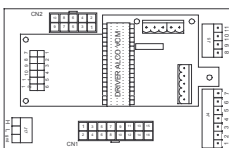
The central module manages the system configuration, the working mode, the set point, the thermal adjustment, remote inputs.



SCREW COMPRESSOR MODULE

code C5110801

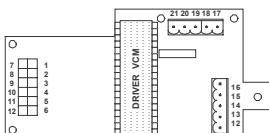
It manages the cooling circuit (compressors, fans, valves) and relative safety devices.



COMPRESSOR MODULE - TANDEM / TRIO

code C5110804 (tandem) – C5110801 (trio)

It manages the cooling circuit (compressors, fans, valves) and relative safety devices.



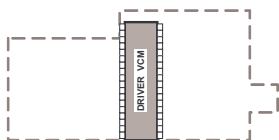
EXPANSION MODULE OF THE ELECTRONIC THERMOSTATIC VALVE

code C5110802

It controls the electronic thermostatic valve and the relevant temperature/pressure sensors.

It is mounted on the compressor module.

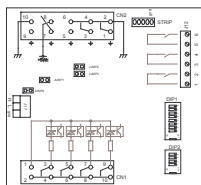
- ELECTRICAL CONNECTIONS -



DRIVER MODULE

code C5110803

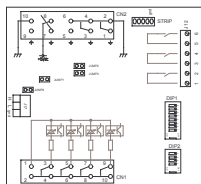
The electronic thermostatic valve management firmware is located here. It is mounted on the expansion module.



EVAPORATOR MODULE

code C5110674

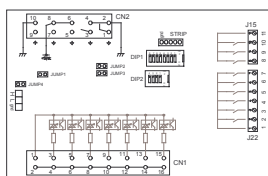
It manages components, safety devices, inputs and outputs relative to the water circuit (pumps, differential manostat, temperature probes).



PUMP MODULE

code C5110701

It manages controls and safety devices relative to the circulation pumps.



RECOVERY MODULE

code C5110679

It manages the electrovalves and the pumps relative to the recovery circuit.

REMOTE TERMINAL

cod PE1W0005

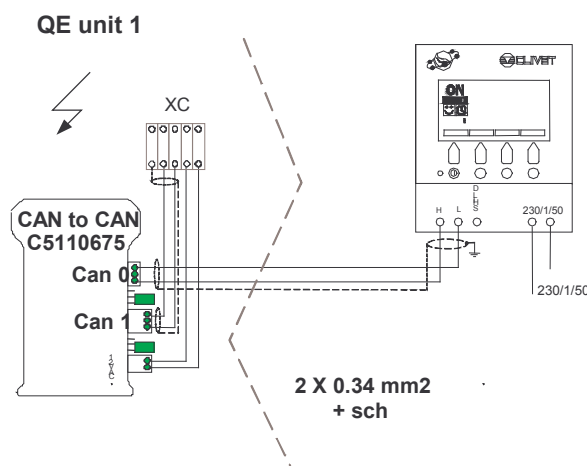
The remote keyboard has the same functions of the keyboard on board of the machine.

The connection of the remote keyboard to the system on board of the machine is carried out, using the "CAN to CAN" converter, which must be placed in the electric board of the machine.

The REMOTE KEYBOARD must be configured with the software address = 27 (only an authorised service centre can perform this operation).

If the unit is managed by timetables, they must be activated only on one of the two keyboards of the machine, better if the remote keyboard.

CONNECTIONS: refer to the electric diagram and to the SIGNAL/DATA LINES paragraph.



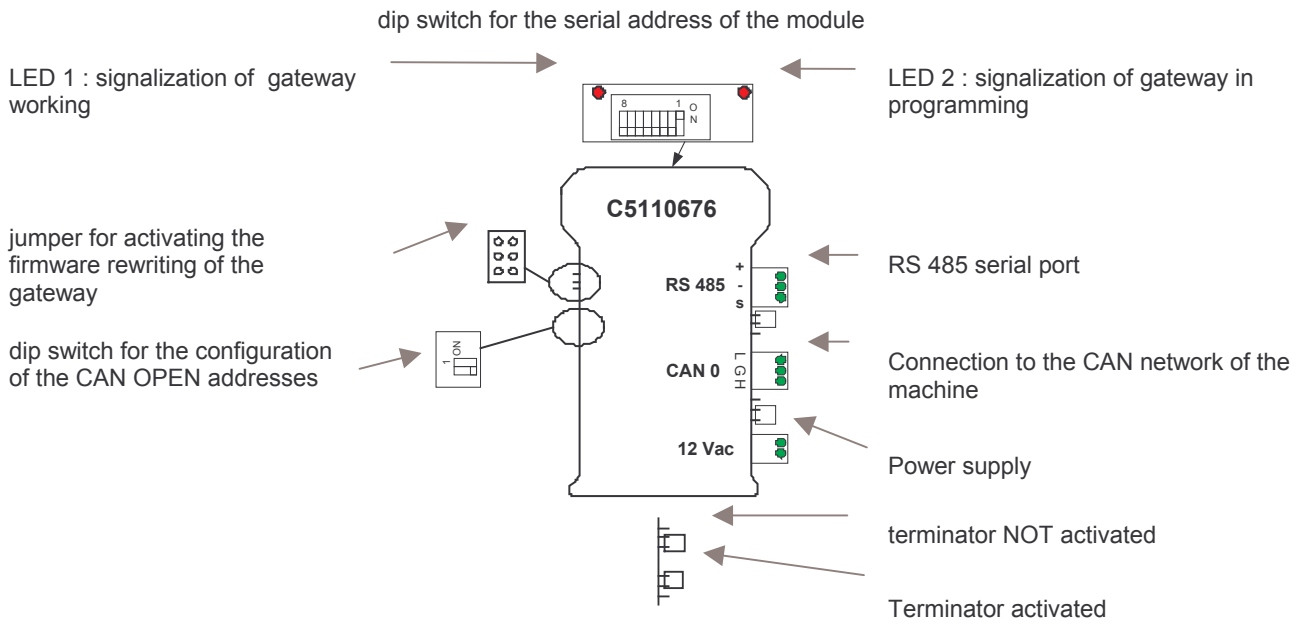
MODBUS - CONVERTER CAN to MODBUS via RS 485

Interfacing via RS 485 is performed using a converter for each unit.

Upon request, the unit is equipped with the converter already mounted on the electric board; it can eventually be mounted later.

CONNECTIONS: refer to the electric diagram and to the SIGNAL/DATA LINES paragraph.

- ELECTRICAL CONNECTIONS -

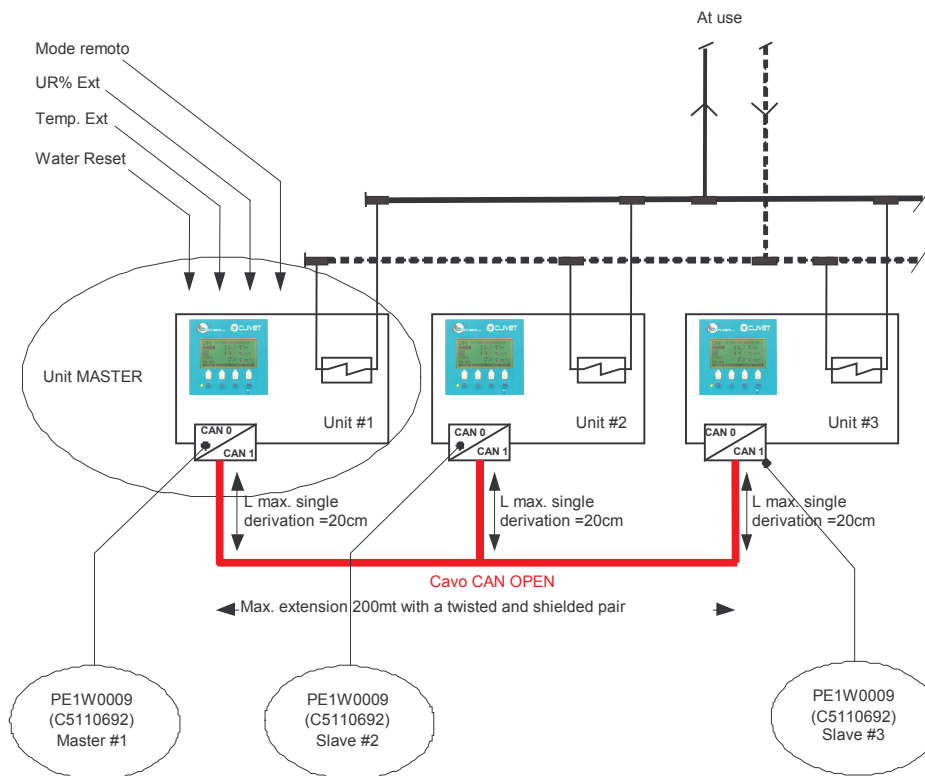


UNIT NETWORK – MINI NETWORK – MASTER SLAVE

The *CLIVET TALK Local Network* system allows to connect up to 6 machines in a network which all serve the same installation.

To interact with the network which controls the working of the system, it is necessary to have a CAN to CAN converter code C5110692 for each machine.

Each single machine is equipped with the standard electronic devices: if necessary, it can function as an independent unit.



CONNECTION CABLE:

Section (nominal)	0.34mm ²
Heater	70mΩ/meter
Impedance	120mΩ/meter
Propagation delay	5nS/meter
Length MAX	200meters

DATALOGGER

cod PE1W0006

CONNECTIONS : make reference to the electrical panel and to SIGNALS/DATA LINES paragraph

- ELECTRICAL CONNECTIONS -

KIT LONWORKS

Upon request, the unit is equipped with the kit already mounted on the electric board; it can eventually be mounted later. Refer to the electric diagram and to the LONWORKS MANUAL.

For information about cables for the Lonworks network, visit the web site www.echelon.com.

LONWORKS technology is a complete platform to implement the network system control. These networks consist of intelligent control instruments, or *nodes*, which interact with their environment and communicate to each other by using a common message based on the (*LonTalk*®) protocol. A LONWORKS network can have up to 32,385 nodes subdivided into 255 sub-networks (127 nodes/sub-network).

The Gateway device is already configured, according to the Echelon classification for the type of the unit it is designed for, with a number of managed variables, which is a sub-array of those managed originally by the machine and able to accept the Echelon standard profiles. The supply of this device does not include the activity of configuration and management of the LonWorks network to which it is connected; as usual, they are supplied by the Supervision System supplier.

CAN TO MODBUS

GATEWAY LON-WORKS

Signalization led of gateway in programming

Dip switch for setting the module serial address

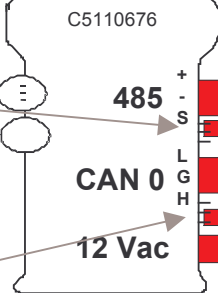
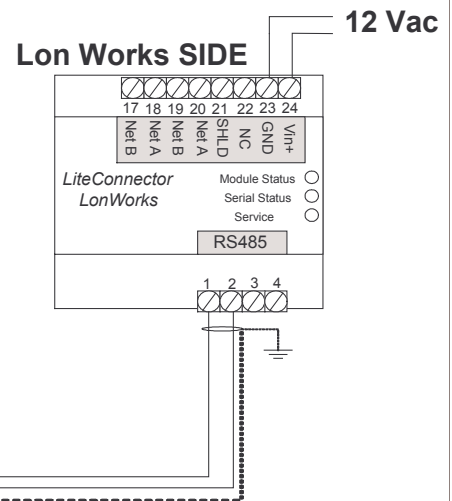
Signalization led of gateway operation

jumper to activate the gateway firmware rewriting

terminator INSERTED

Dip switch configuration of CAN OPEN addresses

Terminator NOT ACTIVATED



- START-UP -

ALL THE EQUIPMENT MUST BE COMMISSIONED BY AUTHORISED SERVICE CENTRES.
THIS SERVICE IS LIMITED TO START-UP OF THE UNIT ONLY AND NOT THE CONNECTIONS OR INSTALLATION OF THE SYSTEM.

ONLY QUALIFIED TECHNICIANS MUST PERFORM THE FOLLOWING OPERATIONS.

PRELIMINARY CHECKS

Before checking, please verify the following:

- the unit should be installed properly and in conformity with this manual.
- the electrical power supply line should be sectioned at the beginning.
- the sectioning device is locked and the proper warning "not to operate" sign is placed on the handle.
- using a Voltmeter or a tension finder, make sure no tension is present
- the coils must be clean and free of obstacles
- the ventilators must be free of leaves, cardboard, fixed obstacles (beams, barriers, etc.), snow, etc.
- the external ventilators must not be blocked
- the external ventilators can be subject to a temporary block, especially if the inactivity period before the first start-up was quite long or if external temperature is very low. It is also possible to unblock them manually (ONLY WHEN THE UNIT IS UNPLUGGED – RISK OF INJURES) so that jams or electric overloads are avoided when the unit is restarted.

REFRIGERANT SYSTEM

Carefully check the refrigerating circuit: the presence of oil stains can mean leakage caused by transportation, movements or other.

Using the unit manometers, if present, or service manometers, verify that the refrigerating circuit is in pressure.

Make sure that all the service outlets are closed with proper caps; if caps are not present, a leak of refrigerant can be possible.

WATER SYSTEM

Check that the water circuit has been filled and pressurised.

Make sure that there are no leaks.

Check that the shut-off valves in the circuit are in the "OPEN" position.

Check that there is no air in the circuit. If required, bleed it using the vent valves in the system.

When using antifreeze solutions, make sure the glycol percentage is suitable for the type of use envisaged.

% weight of ethylene glycol	10%	20%	30%	40%
Freezing point	- 4°C	- 9°C	- 15°C	- 23°C
Safety temperature	- 2°C	- 7°C	- 13°C	- 21°C

ELECTRICAL SYSTEM

Check the proper tightening of the screws that fix the conductors to the electrical components in the board (during handling and transportation, the vibrations could have loosened them).

Verify that the unit is connected to the ground plant.

Control that all panels and protection devices of the unit are repositioned and blocked.

Charge the unit by closing the sectioning device, but leave it on OFF.

Make sure that the tension and net frequency values are within the limit of

230 +/- 6% single phase unit and 400/3/50 +/- 6% three-phase unit

Control the unbalancing of the phases: it must be lower than 2%.

Example: L1 - L2 = 388V L2 - L3 = 379V L3 - L1 = 377V

average of the measured values = $(388 + 379 + 377) / 3 = 381$

maximum deviation from the average = $388 - 381 = 7V$

Unbalancing = $(7/381) \times 100 = 1.83\% = \text{ACCEPTABLE}$

Operating out of the indicated limits causes the loss of the guarantee as well as very serious damages.

IF THE CRANKCASE HEATERS ARE FITTED

when the unit is started up for the first time and following all prolonged periods of inactivity is OBLIGATORY to connect the oil heaters on the compressor crankcase at least 8 hours before the compressor is to be started.

BEFORE POWERING THE RESISTANCES, OPEN THE COMPRESSORS COCKS, IF PRESENT.

To supply the heaters is necessary to switch off the isolator switch on the unit.

To make sure that the heaters are working, check the power input with amperometric pliers.

At start-up the compressor crankcase temperature on the lower side must be higher at least of 10°C than the external temperature.

DO NOT START THE COMPRESSOR WITH THE CRANKCASE OIL BELOW OPERATING TEMPERATURE.

- START-UP -**VERIFY TENSIONS – ABSORPTIONS**

Check that the temperatures of the fluids are included in the WORKING LIMITS.
If the controls of the previous paragraphs are positive, it is possible to restart the unit.
For information on the control panel, refer to the paragraph SETTING.
While the unit is working (ATTENTION ELECTRIC RISK: WORK SAFELY) check:

- Power supply tension
- Phase unbalance
- Total absorption of the unit
- Absorption of the single electric loads

UNIT EQUIPPED WITH SCROLL COMPRESSORS

The GENERAL TECHNICAL DATA table shows the type of compressor on the unit.

The Scroll compressors have only one direction of rotation.

In the event that the direction is reversed, the compressor will not be damaged, but its noisiness will increase and pumping will be negatively affected. After a few minutes, the compressor will stop because of the activation of the thermal protection. In this event, cut the power and reverse the 2 phases on the machine power.

Prevent the compressor from working with in reverse rotation: more than 2-3 anomalous starts up can damage it.

Make sure the direction of rotation is correct, measure the condensation and suction pressure. Pressure must clearly differ: at the start, the suction pressure decreases whilst the condensation pressure increases.

The phase optional monitor, which controls the phase sequence, can be installed later.

REMOTE INPUT CONFIGURATIONS

Check used remote inputs are activated (ON-OFF etc.) as given in the instructions in the ELECTRIC WIRING chapter.

SETTING THE SET-POINT

Check if it is necessary to modify the set-points shown in the SETTING chapter.

WATER-FLOW CHECK

Verify that the difference between the water at the input and at the output of the exchanger is related to the capacity according to the formula:

refrigerating capacity of the unit (kW) x 860 = Dt (°C) x flow rate (L/h).

The refrigerating capacity is shown in the GENERAL TECHNICAL FEATURE chart of this manual and it refers to specific water/air conditions or to the tables of COOLING PERFORMANCES on TECHNICAL CHART that refer to different use conditions.

Verify the loss of charge of the exchanger at the water side:

determine the water capacity

measure the difference of pressure between the input and output of the exchanger and compare it with the graph

LOSS OF CHARGE OF THE EXCHANGER AT THE WATER SIDE

The pressure measurements will be easier if “M” gauges are installed as shown in the HYDRAULIC CONNECTION DIAGRAM.

REFRIGERANT CIRCUIT PARAMETER CHECK

Detecting the operational conditions is useful to control the unit along time: the performed records must be kept and be available during maintenance interventions.



When the unit works in stable conditions and according to the operating limits, take note of the following data:

1. compressor discharge temperature (WARNING – BURN DANGER)
2. condensing pressure
3. liquid temperature
4. dehydrator filter upstream and downstream temperature
5. inlet pressure
6. inlet temperature
7. exchanger input water temperature
8. exchanger output water temperature
9. external air temperature (battery input)
10. air temperature coming out from fans

- CONTROL -

CONTROL INTERFACE

COOL cooling
HEAT heating

alarm ; OK 
inserted steps on total
ALARM menu access

HEAT / COOL
changement

off = unit OFF
on = unit ON

ON / OFF unit

unit status
ON – ECO – OFF

Enabled timing bands

INLET temperature

OUTLET temperature

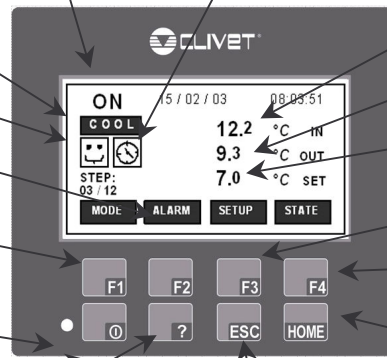
Current set point
SET POINT, TIMING
BANDS, CLOCK access

Stata MENU access

Back to main menu

HELP parameter
descriptions

Back to previous shield



UNIT START-UP

To turn the unit on or off, hold the ON/OFF switch down for a few seconds. When the unit is on, the “ON” message is displayed; when the unit is off, the “OFF” message is displayed.

It is also possible to access the different menus when the unit is in the “OFF” mode.

It is possible to check the ON/OFF condition at a distance, using a remote device (see the ELECTRICAL CONNECTIONS chapter).

CHARACTERISTICS

THERMOREGULATION

The thermal regulation is based on the INLET temperature.

The unit is set for a specific TOTAL DIFFERENCE between the inlet and outlet water temperatures.

Usually the designed difference is 5°C, in the event that a different value is foreseen, the 17 and 18 parameters must be set again by the assistance center.

According to the total difference, the system defines the level of difference that each compressor can give : the STEP DIFFERENCE.

The regulations tend to gradually insert the compressors when the inlet temperature is over the set-point + the step difference.

The compressors are activated one per time at the end of the SCANNING TIME.

This time varies according to the gap between the water inlet temperature and the Set-point value. The higher the gap value is (both negative and positive), the shorter the interval among the scanning points will be.

The value of the scanning time is displayed at the status 6; when the status 7 has reached the value of the status 6, the request of operation of the compressor is activated.

The counting of the scanning time starts together with the activation of the compressor.

The compressor to be activated is chosen to make the shut circuits operate in order to minimize the wear of the entire refrigerating circuit, as well as the single compressor.

At the end of the counting, if the inlet temperature is higher than the step difference, another compressor is inserted.
temp. H2O > set-point + step difference.

What above described is referred to the COOLING operating, in HEATING the logics is the same but overturned (compressor insertion for outlet temp. < set-point – step jump).

SET-POINT COMPENSATIONS

The compensations are evolved functions that aim at protecting the compressors and fit as much as possible, the operation of the unit to the characteristics of the system and its use.

The compensations make the time of the compressors’ operation longer and limit the number of starts-up, to make them delay the insertion time by adding an offset.

- The compensation on the DURATION is useful when the water contained in the system is limited.
- The compensation on the CHARGE is useful when a variable charge is present.

Optional components are necessary; the modifications of the parameters performed by the assistance centers have to be performed to enable and configure. In industrial applications, where a precise control of the temperature is necessary, it is possible to deactivate the COMPENSATIONS. The Status menu displays the value of the compensations on ext. temp. (status 9) and WR (status 10).

- CONTROL -

DEFROSTING

The defrosting maintains the external coil free from ice: to do that the unit is periodically commuted in “summer” operating for few minutes and the fans are stopped.

The defrosting phase is started when the evaporating pressure falls below the fixed value. Now starts a count and when it finishes, if the temperature on the coil is lower than the threshold, the real defrosting is performed.

The count can change according to the external temperature/humidity and (through some indirect variables) to the ice quantity on the coil.

SET-POINT CORRECTIONS

The correction aim at optimising the energetic efficiency of the unit.

To do this, the corrections dynamically modify the set-point according to some variables. For example, in the summertime with very low external temperatures, therefore with a reduced load, it is possible to obtain the internal comfort even with set-points higher than the standard with a consequent higher energetic efficiency.

The *static* set-point can therefore be modified dynamically with two CORRECTIONS based on two factors external to the unit:

- Correction based on the External temp. / enthalpy
- Correction based on the Water reset (4-20 mA signal supplied by the Customer)

The *correct* set-point, to which all corrections have been added or detracted, is called PRESENT set-point and is visible at status 2.

For further details, see the ELECTRICAL CONNECTIONS chapter.

MAINTENANCE SET-POINT

It can be used to maintain the installation inside the working limits, even if the unit is deactivated.

The MAINTENANCE Set Point checks the water temperature when the unit is put on OFF or Stand-by.

To do this, it periodically activates the circulation pump, tests the water temperature and even activates one or more compressors.

Access reserved to the assistance centres.

MENU	NUM	Parameter name	meaning
PARAMETER CONTROL MAINTENANCE	25	MantCoolEn	It enables Summer Maintenance
	26	MantHeatEn	It enables Winter Maintenance
	114	SetMantCool	Summer maintenance set-point
	117	SetMantHeat	It enables Winter Maintenance

DEMAND LIMIT

The function of the DEMAND LIMIT allows the limit of power so that the electric consumptions can be controlled by a signal external to the unit supplied by the customer.

On the STATUS menu, no. 22, the external signal of DEMAND LIMIT is displayed.

For further information, see the ELECTRICAL CONNECTIONS chapter.

SECOND SET-POINT

The secondary set point is activated by remote authorization (see the ELECTRICAL CONNECTIONS chapter).

It is possible to limit the minimum power which can be delivered during the time in which the secondary set point is activated by configuring the 276 MinPot2Set parameter (access reserved to the assistance centres).

TIMETABLES

The system is factory equipped with a clock function, found on the board.

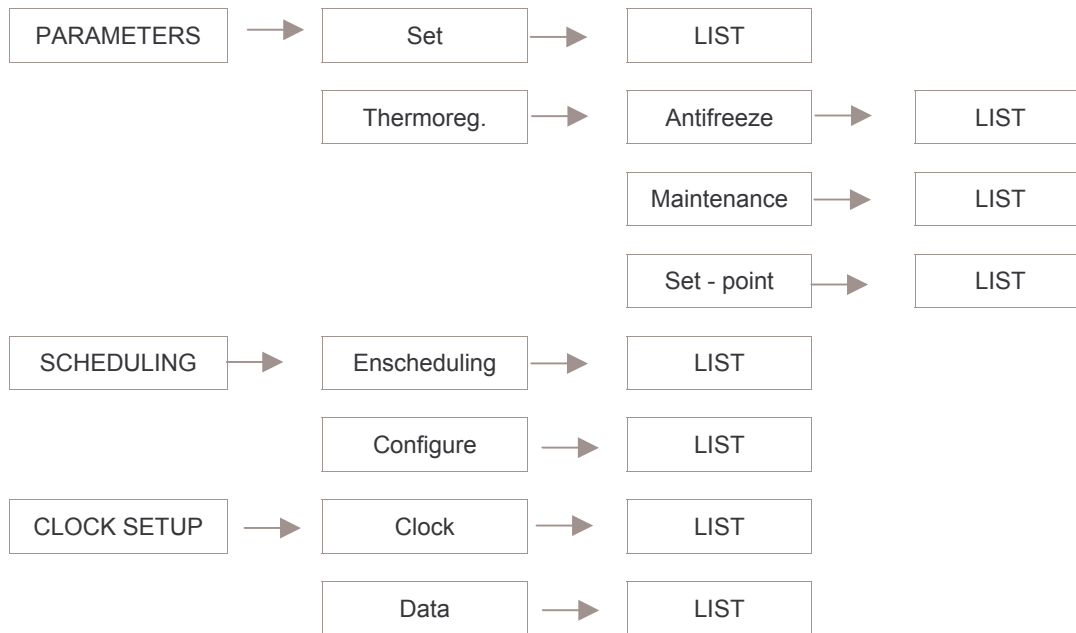
By activating the timetables, it is possible to set up to 6 events for each day of the week.

If there is also a remote keyboard, the operations relative to the time and the date must be repeated on both keyboards, so that the two clocks (which are different) are synchronized.

- CONTROL -

ACCESSIBLE PARAMETERS

PARAMETER MENU STRUCTURE









menu: PARAMETERS – THERMOREG. – SET POINT			DEFAULT values
90 / CEN	SecondSetC	Secondary cooling Set Point	12
91 / CEN	SecondSetH	Secondary heating Set Point	35
118 / CEN	SetCool	Cooling Set Point	6.5
119 / CEN	SetHeat	Heating Set Point	45
272 / CEN	SetRecovery	NOT USED	35
menu: PARAMETERS – THERMOREG. – MAINTENANCE			
114 / CEN	SetMantCool	Summer maintenance setpoint	15
117 / CEN	SetMantHeat	Winter maintenance setpoint	30
menu: PARAMETERS - THERMOREG.- ANTIFREEZE			
115 / CEN	AllFreeze	Antifreeze alarm set	4
121 / CEN	PreAF	Antifreeze pre-alarm set	4.5
261 / CEN	SetResist	Antifreeze heater set	4
menu: PARAMETERS – SET – UNIT - EVAPORATORS			
37 / EVAP	SetResist	Antifreeze heater set	4
39 / EVAP	ALLFreeze	Antifreeze alarm set	4
41 / EVAP	PreAF	Antifreeze pre-alarm set	4.5

KEYPAD USE

SET UP menu:

- PARAMETERS**
set point modification
- SCHEDULING**
enables/disables timing bands
- CLOCK SETUP**
Set the clock
- ID Tast-Cen**
(ATC ONLY)
- PASSWORD**
(ATC ONLY)

To enter in the SETUP menu		button F3 SETUP
To select the submenu		buttons ▲ ▼ F2 – F3
To access		button F1 ENTER
To scrolling voices		buttons ▲ ▼ F2 - F3
To go back a level of the menu		button ESC
To go back to the main menu		button HOME

- CONTROL -







SETUP – PARAMETERS:

THERMOREG.

Set the setpoint and the operating modes

SET

(ATC ONLY)

To enter in the SETUP menu		button F3 SETUP
To select the submenu		buttons ▲ ▼ F2 – F3
To access		button F1 ENTER
To access the desired parameter		buttons ▲ ▼ F1 – F2
To modify the parameter value		buttons + - F3 – F4
To go back to the main menu		button HOME














SETUP – SCHEDULING:

EnSCHEDULING

enables/disables timing bands

CONFIGURE

Set the timing bands

To enter in the SETUP menu		button F3 SETUP
To select the CONFIGURE submenu		buttons ▲ ▼ F2 – F3
To access		button F1 ENTER
To select DAY		buttons ▲ ▼ F1 – F2
To change week day		button F3
To select one of the 6 available daily events		button F4
To select TIME		buttons ▲ ▼ F1 – F2
To set the event hour and minutes		buttons + + F3 – F4
To select STATE		buttons ▲ ▼ F1 – F2
Select ON/OFF/ECO mode		button F4
To select Setpoint		buttons ▲ ▼ F1 – F2
Set the manual setpoint of the event		buttons + - F3 – F4
To go back to the main menu		button HOME

- CONTROL -







SETUP – CLOCK SETUP

CLOCK

Set the clock

DATA

Set the dater

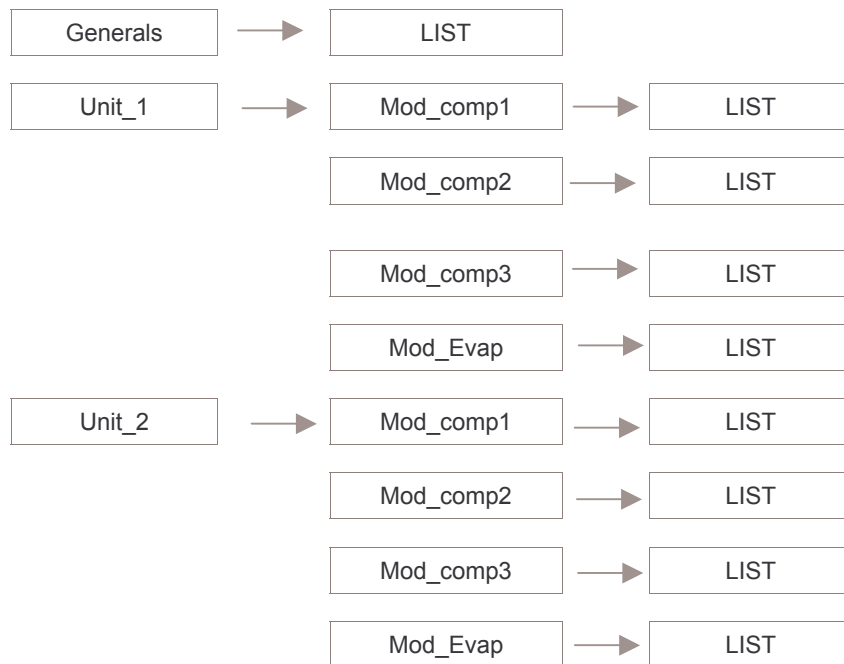
To enter in the SETUP menu		button F3 SETUP
To select the CLOCK SETUP submenu		buttons ▲ ▼ F2 – F3
To access to CLOCK		button F1 ENTER
To set HOURS MINUTES SECONDS		buttons F2 F3 F4
To confirm the single setting		button F1 ENTER
To go back to the main menu		button HOME

UNIT STATUS

A sub-menu is associated with each electronic module of the unit. It displays the system status.

According to the unit configuration, and then with electronic modules and options, some sub-menus and statuses can not be used.

STATA STRUCTURE

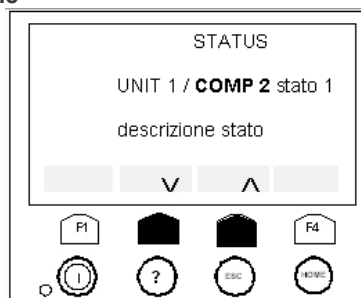


example

Visualized stata referring to

UNIT 1

COMP 2 MODULE



- CONTROL -

submenu:







GENERALS

UNIT 1

- mod_comp1
- mod_comp2
- mod_comp3
- mod_evap

UNIT 2

- mod_comp1
- mod_comp2
- mod_comp3
- mod_evap

To enter in the STATA menu		button F4 STATE
To select the module		buttons ▲ ▼ F2 – F3
To access		button F1 ENTER
To scroll the stata		buttons ▲ ▼ F2 - F3
To go back a level of the menu		button ESC
To go back to the main menu		button HOME

Index	GENERAL stata	UM
0	Machine status	1=ON / 0=OFF
1	Machine mode	0=Cool, 1= Heat
2	Actual set point	°C (tenths)
3	Inlet temperature	°C (tenths)
4	Outlet temperature	°C (tenths)
5	Number of steps activated	
6	Current step value (compensations)	°C (tenths)
7	Step activation timer	sec
8	Step activation dynamic TimeScan	sec
9	CompExt	°C (tenths)
10	CompWR	°C (tenths)
11	CompCar	°C (tenths)
12	CompSpunti	°C (tenths)
13	CompDuty	°C (tenths)
14	Ambient temperature	°C (tenths)
15	Ambient humidity	%
16	Free Cooling valve percentage	%
17	Free Cooling flow percentage	%
18	Free Cooling valve control	1=ON / 0=OFF
19	Pump 1 status	1=ON / 0=OFF
20	Pump 2 status	1=ON / 0=OFF
21	Water Reset	%
22	Demand Limit	%
60	Digital input	bit map of a byte
68	Water flow analogic out	
69	Pump module digital out	bit map of a byte
71	BitMap connected nodes MS	bit map of a byte
72	Hours pump 1 PMP	
73	Hours pump 2 PMP	
74	Hours pump 3 PMP	

Index	UNIT_1 – MOD COMP_1 Stata	UM
29	---	1=ON / 0=OFF
30	Compressor 2	1=ON / 0=OFF
31	Compressor 3	1=ON / 0=OFF
32	Cp 1 timer status	1=ON / 0=OFF
33	Cp 2 timer status	1=ON / 0=OFF
34	Cp 3 timer status	1=ON / 0=OFF
35	Valve 1 c1 status	1=ON / 0=OFF
36	Valve 2 c1 status	1=ON / 0=OFF
37	Valve 3 c1 status	1=ON / 0=OFF
38	Valve 1 c2 status	1=ON / 0=OFF
39	Valve 2 c2 status	1=ON / 0=OFF
40	Valve 3 c2 status	1=ON / 0=OFF
41	Valve 1 c3 status	1=ON / 0=OFF

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- CONTROL -

Index	UNIT_1 – MOD COMP_1 Stata	UM
42	Valve 2 c3 status	1=ON / 0=OFF
43	Valve 3 c3 status	1=ON / 0=OFF
44	Liquid solenoid	1=ON / 0=OFF
45	Coil temperature	°C (tenths)
46	Recovery temperature	°C (tenths)
47	Condensation pressure	bar
48	Evaporation pressure	bar
49	Fan Status	bar
50	Defrost Status	1=ON / 0=OFF
51	Defrost count time	sec
52	Compressor 1 operating time	
53	Comp. 1 starts	
54	Compressor 2 operating time	
55	Comp. 2 starts	
56	Compressor 3 operating time	
57	Comp. 3 starts	
58	Recovery valve	1=ON / 0=OFF
59	Recovery PREHP delay	sec
61	Digital input	bit map of a byte

Index	UNIT_1 – MODEVAP_1 Stata	UM
23	Tout1	°C (tenths)
24	Tout2	°C (tenths)
25	Tinput	°C (tenths)
26	Pump 1 status	1=ON / 0=OFF
27	Pump 2 status	1=ON / 0=OFF
28	Heater status	1=ON / 0=OFF
62	Digital input	bit map of a byte

ALARMS

BEFORE RESETTING THE ALARM, IDENTIFY AND ELIMINATE THE CAUSE OF ITS ACTIVATION. REPEATED RESETS CAN CAUSE IRREVERSIBLE DAMAGES.



The presence of an alarm is signaled by the icon flashing.

The cumulative block relay activates simultaneously, according to the type of alarm.

Alarms can be reset once the conditions that caused them to trip have been removed.

ALARMS and faults show a potentially dangerous situation for the machine integrity. An immediate analysis is necessary to detect the causes of the block. A repeated reset can provoke irreversible damage. That is why reset is MANUAL.

PRE-ALARMS AND SIGNALIZATIONS show a situation similar to that one described above. The occurrence of an alarm is acceptable if it is occasional and/or in transitory situations (for example, when the plant starts). In uncertain cases, please contact the authorized assistance center.

VIEW ALARM

To visualize the alarm in progress

STORE ALARM

To visualize the historical alarm

DEL STORE

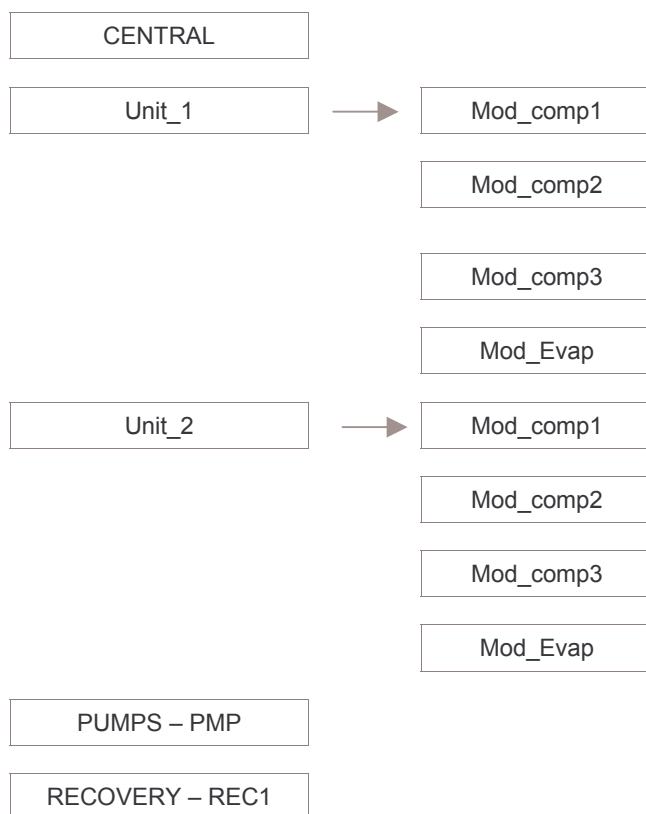
To delete the historical alarm

To enter in the ALARM menu		button F2 ALARM
To select VIEW ALARM		buttons ▲ ▼ F2 – F3
To access		button F1 ENTER
To scroll the active alarms		buttons ▲ ▼ F2 - F3
To reset the alarm in progress		button F1 ENTER
To go back a level of the menu		button ESC
To go back to the main menu		button HOME

- CONTROL -

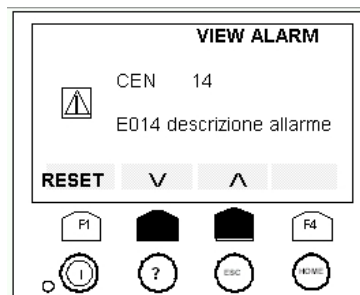
An alarm list is associated with the inputs of each electronic module of the unit. According to the unit configuration, and then with electronic modules and options, some lists and/or ALARMS can not be used.

ALARM STRUCTURE



example

CEN : central module alarm
14 : alarm identificative string
E014 : alarm description



CENTRAL MODULE	
Str	Name
1	E001 H2O IN temp. probe fault on control module
2	E002 H2O OUT temp. probe fault on control module
3	E003 Outside air temp. probe fault
4	E004 Water Reset input fault
5	E005 Outside RH% probe fault
6	E006 Thermal cut-out alarm pump 1 on control module
7	E007 Thermal cut-out alarm pump 2 on control module
8	E008 Flow switch alarm on control module
9	E009 System pressure alarm
10	E010 Phase monitor alarm
11	E011 Antifreeze alarm on control module
12	E012 Antifreeze pre-alarm on control module
13	E013 Change CENTRAL pump
14	E014 Unit configuration alarm
15	E015 Demand Limit input fault
16	E016 Can net disconnectedness on control module

- CONTROL -

COMPRESSOR MODULE		
Str	Name	
16	E101	Cond./ Evap. temp. probe fault
17	E102	Condensing pressure probe fault
18	E103	Evaporation pressure probe fault
19	E104	Recovery temp. probe fault
20	E105	High pressure alarm
21	E106	Low pressure alarm
22	E107	Fan/Pump thermal cut-out alarm
23	E111	Cond. / Evap. H2O flow alarm
24	E112	High pressure pre-alarm 1
25	E113	High pressure pre-alarm 2
26	E114	Low pressure pre-alarm
27	E115	Force defrost alarm
28	E116	Max Press. diff. alarm
29	E117	Recovery H2O flow alarm
30	E118	Heat recovery HP pre-alarm
31	E108	Compressor 1 thermal cut-out alarm
32	E109	Compressor 2 thermal cut-out alarm
33	E110	Compressor 3 thermal cut-out alarm
47	E213	Module not connected
49	E119	Oil differential pressure alarm
58	E120	Condenser frost alarm

PUMP MODULE		
Str	Name	
53	E501	Water flow probe fault
54	E502	Thermal pump 1alarm Pump Module
55	E503	Thermal pump 2alarm Pump Module
56	E504	Thermal pump 3alarm Pump Module
57	E505	Max flow-rate signal Pump Module

RECOVERY EXPANSION MODULE		
St	Name	
50	E301	Out recovery probe alarm
51	E302	Gas temperature probe alarm

EVAPORATOR MODULE		
Str	Name	
34	E201	Evaporator inlet probe fault
35	E202	Evaporator outlet probe 1 fault
36	E202	Evaporator outlet probe 2 probe fault
37	E203	Programmable evaporator input alarm
38	E204	Thermal cut-out alarm, evaporator pump 1
39	E205	Thermal cut-out alarm, evaporator pump 2
40	E206	Evaporator flow switch alarm
41	E207	Evaporator system fill alarm
42	E208	Change pumps on evaporator
43	E209	Antifreeze alarm on evaporator
44	E210	Tout 1, antifreeze pre-alarm on evaporator
45	E211	Tout 2, antifreeze pre-alarm on evaporator
46	E212	System pump lockout
48	E214	Module not connected

- ROUTINE MAINTENANCE -

PREVENTIVE MAINTENANCE

All equipment is subjected to wear out.

The maintenance makes:

1. keeps the unit efficiency
2. the components last longer,
3. keeps their efficiency and limits breakdowns.

Therefore, it is fundamental to perform periodical checks: a few controls can be performed by the user (AUTONOMOUS MAINTENANCE) and they are mainly cleaning activities; otherwise, controls have to be performed by specialized technicians (INSPECTIONS).

The machine should have a log book used to keep track of the performed controls. This will make fixing up breakdowns easier. Take note of the date, type of control (autonomous maintenance, inspection or fixing up), description of the control, actions taken and so on.

BEFORE PERFORMING ANY MAINTENANCE OR CLEANING OPERATIONS, CUT THE POWER TO THE UNIT AND MAKE SURE THAT NO ONE ELSE CAN SUPPLY POWER.

SERVICES

Parts subject to intervention:

- EXTERNAL AIR COIL
- STRUCTURE
- ELECTRIC FANS

EXTERNAL AIR COIL

ATTENTION: contact with the exchanger fins can cause cuts. Wear protective gloves to perform the above described operations.

It is extremely important that the battery gives the maximum thermal exchange; therefore, its surface must be cleaned from dust and deposits. Remove all impurities from the surface.

Using an air pressure gun, clean the aluminum surface of the battery. Be careful to direct the air in the opposite direction of the fan air movement. Hold the gun parallel to the fins to avoid damages. As an alternative, an aspirator can be used to suck impurities from the air input side.

Verify that the aluminum fins are not bent or damaged. In the event of damages, contact the authorized assistance center and get the battery "ironed out" in order to restore the initial condition for an optimal air flow.

STRUCTURE

Check the condition of the parts making up the structure.

Paint so as to eliminate or reduce oxidation at the points in the unit where this problem may occur. Check that the panelling is fastened correctly. Poor fastening may give rise to malfunctions and abnormal noise and vibration.

ELECTRIC FANS

Make sure that the fans and the relative protection grids are well fixed.

Check, if possible, the unbalances of the electro-fan evident by noise and anomalous vibrations. Verify that the terminal protection covers are closed and the cable holders are properly positioned.

MAINTENANCE INSPECTIONS

Foresee inspection assistance carried out by authorized centers or by qualified personnel.

The inspections should be carried out at least:

- - Every year for only the cooling units
- - Every six months for the cooling and warming units

The frequency, however, depends on the use: in the event of frequent use (continuous or very intermittent use, near the operating limits, etc) or critical use (service necessary) it is recommended to plan inspections at close intervals.

The inspections to be performed are as follows:

- verify the power supply tension (when emptied or filled)
- inspect the electrical board (status of solenoid starter contacts, terminal closings, the status of wiring and relevant insulations)
- inspect the absorption of the single electrical loads
- verify the cleaning and the efficiency of the exchangers
- inspect the cleaning of the filters (air/water)
- verify the leakage from the refrigerating circuit
- Verify the protection devices (safety valves, pressure switches, thermostats, etc.), the adjustment systems, the control devices (alarm signalizations, probes, manometers, etc.)
- check the operating parameters of the refrigerating circuit (see the following REFRIGERANT TABLES and the START-UP section)

For units equipped with safety valves, follow the Manufacturer's instructions.

Verify periodically the cleaning of the safety valves and that oxidative / corrosive phenomena are not present, in particular for installations near the sea, in industrial areas or in rooms with a corrosive atmosphere.

97/23 CE PED DIRECTIVE

97/23 CE PED DIRECTIVE gives instructions for installers, users and maintenance technicians as well. Refer to local actuation norms.

In Italy, refer to the Ministerial Decree of 1st December 2004 no. 329 (and following modifications) which defines the performances to be executed; the units of 1st category and those defined by the art. 3.3 97/23/EC are not included in this regulation (see the serial number plate on the unit).

Briefly and as an example, see the following:

1. **COMPULSORY VERIFICATION OF THE FIRST INSTALLATION** only for units assembled on the installer's building site (for ex. Condensing circuit + direct expansion unit)
2. **CERTIFICATION OF SETTING IN SERVICE** for all the units
3. **PERIODICAL VERIFICATIONS** to be executed with the frequency indicated by the Manufacturer (see the **MAINTENANCE INSPECTIONS** paragraph)

PUT AT REST

If a long period of inactivity is foreseen, for example the winter for the cooling unit, the following is recommended:

- to turn the power off in order to avoid electrical risks or damages by lightning strike
- to avoid the risk of frosts as shown in the **HYDRAULIC CONNECTIONS** section, and, in particular
 - to empty or add glycole in the plant sections subjected to temperatures below zero
 - to empty or add glycole in the water heating coils, also in summer
 - to power antifreeze resistances if present

If the period of inactivity is particularly long or in the event of extremely low temperatures, the external fans can be blocked temporarily; therefore, it is recommended to switch them on every month in order to avoid seizures or electrical overloads when the unit will be switched on.

Even pumps can be subjected to motor shaft blocks; therefore, unblock them by using a screwdriver on the discharge hole.

The restarting of the unit has to be carried out by qualified personnel, in particular, after the winter break for cooling units or when seasonal switching should be performed.

When restarting, refer to the **SWITCHING ON** section.

Schedule technical assistance in advance to avoid hitches and be able to use the installation when necessary.

REFRIGERANT TABLES

THIS SECTION IS DEVOTED ONLY TO QUALIFIED TECHNICIANS THAT KNOW THE FOLLOWING:

- THE OPERATIONAL PRINCIPLES OF THE REFRIGERATING CIRCUIT OPERATION
- THE MODES OF DETECTING TEMPERATURE AND PRESSURE
- THE RISKS RELEVANT TO THESE OPERATIONS

The data of the tables allow the testing of the refrigerating circuit operation by the detection of a few objective parameters:

- Condensing pressure
- Liquid temperature
- Inlet pressure
- Inlet temperature

The data are significant if they are detected simultaneously and while the refrigerating circuit is running.

OVERHEATING = inlet temperature – Saturation temperature			
	R-22	R-407C	R-410A
Inlet pressure	3.8 bar	3.8 bar	7.2 bar
Inlet temperature	7.3°C	7.3°C	7.3°C
overheating	7.3 – (- 1.13) = 8.43C	7.3 – 1.18 = 6.12°C for calculation consider the Td (dew point)	7.3 – 0.8 = 6.5°C
SUBCOOLING = condensino temperature (pressure *) – liquid temperature			
	R-22	R-407C	R-410A
Condensing pressure	18.6 bar	18.6 bar	29.6 bar
Liquid temp.	42.9°C	42.9°C	45°C
subcooling	50.39 – 42.9 = 7.49°C	44.74 – 42.9 = 1.84°C for calculation consider the Tb (bubble point)	49.91 – 45 = 4.91°C

* It is important that the condensation pressure is detected as close as possible to the point where the liquid temperature is detected, in the event that the calculation will be effected by the losses of charge (and, therefore, of temperature) caused by the refrigerating circuit components placed between the two measurement points.

For R410A the glide was not considered, since it is close to 0.

The values in the tables refer to a specific refrigerant supplier; slight differences are possible with other suppliers.

Pg = P gauge = relevant pressure (read on the pressure gauge) **Td** = dew point temperature
Ts = saturation pressure **Tb** = bubble point temperature

- ROUTINE MAINTENANCE -

Pg	R-22	R-134a	R-407C		R-410A
	Ts [°C]	Ts [°C]	Td [°C]	Tb [°C]	Ts [°C]
0.0	-41.09	-26.36	-36.90	-43.90	-51.66
0.2	-37.14	-22.31	-33.11	-40.05	-48.02
0.4	-33.67	-18.76	-29.80	-36.67	-44.83
0.6	-30.57	-15.59	-26.83	-33.65	-41.98
0.8	-27.76	-12.71	-24.15	-30.92	-39.40
1.0	-25.18	-10.08	-21.69	-28.41	-37.03
1.2	-22.79	-7.64	-19.41	-26.09	-34.84
1.4	-20.57	-5.37	-17.29	-23.93	-32.81
1.6	-18.48	-3.24	-15.31	-21.90	-30.90
1.8	-16.52	-1.23	-13.44	-19.99	-29.10
2.0	-14.65	0.67	-11.66	-18.19	-27.39
2.2	-12.89	2.48	-9.98	-16.47	-25.78
2.4	-11.20	4.20	-8.38	-14.83	-24.24
2.6	-9.59	5.84	-6.85	-13.27	-22.76
2.8	-8.04	7.42	-5.38	-11.77	-21.35
3.0	-6.56	8.93	-3.97	-10.33	-20.00
3.2	-5.13	10.39	-2.61	-8.94	-18.69
3.4	-3.75	11.79	-1.31	-7.61	-17.44
3.6	-2.41	13.15	-0.04	-6.31	-16.22
3.8	-1.13	14.46	1.18	-5.06	-15.05
4.0	0.12	15.74	2.36	-3.85	-13.91
4.2	1.34	16.97	3.51	-2.68	-12.81
4.4	2.51	18.17	4.62	-1.54	-11.74
4.6	3.66	19.33	5.71	-0.43	-10.69
4.8	4.77	20.47	6.76	0.65	-9.68
5.0	5.86	21.57	7.79	1.70	-8.69
5.2	6.92	22.65	8.79	2.73	-7.73
5.4	7.96	23.70	9.77	3.73	-6.79
5.6	8.97	24.73	10.72	4.71	-5.87
5.8	9.95	25.73	11.65	5.67	-4.97
6.0	10.92	26.71	12.56	6.60	-4.10
6.2	11.87	27.67	13.46	7.52	-3.24
6.4	12.79	28.62	14.33	8.41	-2.40
6.6	13.70	29.54	15.18	9.29	-1.57
6.8	14.59	30.44	16.02	10.15	-0.77
7.0	15.47	31.33	16.85	11.00	0.02
7.2	16.32	32.20	17.65	11.83	0.80
7.4	17.16	33.05	18.45	12.64	1.56
7.6	17.99	33.89	19.22	13.44	2.31
7.8	18.81	34.72	19.99	14.23	3.05
8.0	19.60	35.53	20.74	15.00	3.77
8.2	20.39	36.32	21.48	15.76	4.48
8.4	21.17	37.11	22.20	16.51	5.18
8.6	21.93	37.88	22.92	17.25	5.87
8.8	22.68	38.64	23.62	17.97	6.55
9.0	23.42	39.39	24.32	18.69	7.22
9.2	24.14	40.13	25.00	19.39	7.88
9.4	24.86	40.85	25.67	20.08	8.53
9.6	25.57	41.57	26.34	20.77	9.16
9.8	26.27	42.27	26.99	21.44	9.79
10.0	26.95	42.97	27.63	22.11	10.42
10.2	27.63	43.66	28.27	22.76	11.03
10.4	28.30	44.33	28.90	23.41	11.63
10.6	28.96	45.00	29.51	24.05	12.23
10.8	29.62	45.66	30.13	24.68	12.82

Pg	R-22	R-134a	R-407C		R-410A
	Ts [°C]	Ts [°C]	Td [°C]	Tb [°C]	Ts [°C]
11.0	30.26	46.32	30.73	25.30	13.40
11.2	30.90	46.96	31.32	25.92	13.97
11.4	31.53	47.59	31.91	26.52	14.54
11.6	32.15	48.22	32.49	27.12	15.10
11.8	32.76	48.84	33.07	27.72	15.66
12.0	33.37	49.46	33.63	28.30	16.20
12.2	33.97	50.06	34.19	28.88	16.74
12.4	34.57	50.66	34.75	29.46	17.28
12.6	35.15	51.26	35.30	30.03	17.81
12.8	35.73	51.84	35.84	30.59	18.33
13.0	36.31	52.42	36.37	31.14	18.85
13.2	36.88	53.00	36.90	31.69	19.36
13.4	37.44	53.56	37.43	32.23	19.87
13.6	38.00	54.13	37.95	32.77	20.37
13.8	38.55	54.68	38.46	33.31	20.86
14.0	39.10	55.23	38.97	33.83	21.36
14.2	39.64	55.78	39.47	34.35	21.84
14.4	40.17	56.32	39.97	34.87	22.32
14.6	40.70	56.85	40.46	35.38	22.80
14.8	41.23	57.38	40.95	35.89	23.27
15.0	41.75	57.91	41.43	36.39	23.74
15.2	42.26	58.43	41.91	36.89	24.20
15.4	42.78	58.94	42.39	37.39	24.66
15.6	43.28	59.45	42.86	37.87	25.12
15.8	43.78	59.96	43.32	38.36	25.57
16.0	44.28	60.46	43.78	38.84	26.01
16.2	44.77	60.95	44.24	39.32	26.46
16.4	45.26	61.44	44.69	39.79	26.90
16.6	45.75	61.93	45.14	40.26	27.33
16.8	46.23	62.42	45.59	40.72	27.76
17.0	46.71	62.90	46.03	41.18	28.19
17.2	47.18	63.37	46.47	41.64	28.62
17.4	47.65	63.84	46.90	42.09	29.04
17.6	48.11	64.31	47.33	42.54	29.45
17.8	48.58	64.77	47.76	42.99	29.87
18.0	49.03	65.23	48.18	43.43	30.28
18.2	49.49	65.69	48.60	43.87	30.69
18.4	49.94	66.14	49.02	44.30	31.09
18.6	50.39	66.59	49.43	44.74	31.49
18.8	50.83	67.04	49.84	45.16	31.89
19.0	51.27	67.48	50.25	45.59	32.28
19.2	51.71	67.92	50.65	46.01	32.68
19.4	52.15	68.36	51.05	46.43	33.07
19.6	52.58	68.79	51.45	46.85	33.45
19.8	53.01	69.22	51.85	47.26	33.84
20.0	53.43	69.64	52.24	47.67	34.22
20.2	53.85	70.07	52.63	48.08	34.59
20.4	54.27	70.49	53.01	48.49	34.97
20.6	54.69	70.90	53.39	48.89	35.34
20.8	55.10	71.32	53.77	49.29	35.71
21.0	55.51	71.73	54.15	49.69	36.08
21.2	55.92	72.14	54.53	50.08	36.44
21.4	56.33	72.54	54.90	50.47	36.81
21.6	56.73	72.95	55.27	50.86	37.17
21.8	57.13	73.35	55.64	51.25	37.52

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- ROUTINE MAINTENANCE -

Pg	R-22	R-134a	R-407C		R-410A
	Ts [°C]	Ts [°C]	Td [°C]	Tb [°C]	Ts [°C]
22.0	57.53	73.74	56.00	51.63	37.88
22.2	57.92	74.14	56.36	52.01	38.23
22.4	58.31	74.53	56.72	52.39	38.58
22.6	58.70	74.92	57.08	52.77	38.93
22.8	59.09	75.31	57.43	53.14	39.28
23.0	59.48	75.69	57.79	53.51	39.62
23.2	59.86	76.07	58.14	53.88	39.96
23.4	60.24	76.45	58.48	54.25	40.30
23.6	60.62	76.83	58.83	54.62	40.64
23.8	60.99	77.21	59.17	54.98	40.98
24.0	61.36	77.58	59.51	55.34	41.31
24.2	61.74	77.95	59.85	55.70	41.64
24.4	62.10	78.32	60.19	56.05	41.97
24.6	62.47	78.68	60.53	56.41	42.30
24.8	62.84	79.04	60.86	56.76	42.62
25.0	63.20	79.41	61.19	57.11	42.95
25.2	63.56	79.76	61.52	57.46	43.27
25.4	63.92	80.12	61.84	57.81	43.59
25.6	64.27	80.48	62.17	58.15	43.90
25.8	64.63	80.83	62.49	58.49	44.22
26.0	64.98	81.18	62.81	58.83	44.53
26.2	65.33	81.53	63.13	59.17	44.85
26.4	65.68	81.87	63.45	59.51	45.16
26.6	66.03	82.22	63.76	59.85	45.47
26.8	66.37	82.56	64.07	60.18	45.77
27.0	66.71	82.90	64.38	60.51	46.08
27.2	67.05	83.24	64.69	60.84	46.38
27.4	67.39	83.58	65.00	61.17	46.69
27.6	67.73	83.91	65.31	61.50	46.99
27.8	68.07	84.24	65.61	61.82	47.28
28.0	68.40	84.58	65.91	62.14	47.58
28.2	68.73	84.90	66.21	62.46	47.88
28.4	69.06	85.23	66.51	62.78	48.17
28.6	69.39	85.56	66.81	63.10	48.46
28.8	69.72	85.88	67.10	63.42	48.76
29.0	70.04	86.20	67.40	63.73	49.05
29.2	70.37	86.52	67.69	64.05	49.33
29.4	70.69	86.84	67.98	64.36	49.62
29.6	71.01	87.16	68.27	64.67	49.91
29.8	71.33	87.47	68.56	64.98	50.19
30.0	71.64	87.79	68.84	65.29	50.47
30.2	71.96	88.10	69.13	65.59	50.75
30.4	72.27	88.41	69.41	65.90	51.03
30.6	72.59	88.72	69.69	66.20	51.31
30.8	72.90	89.03	69.97	66.50	51.59
31.0	73.21	89.33	70.25	66.80	51.86
31.2	73.52	89.64	70.52	67.10	52.14
31.4	73.82	89.94	70.80	67.40	52.41
31.6	74.13	90.24	71.07	67.69	52.68
31.8	74.43	90.54	71.34	67.99	52.95
32.0	74.73	90.83	71.61	68.28	53.22
32.2	75.03	91.13	71.88	68.57	53.49
32.4	75.33	91.43	72.15	68.87	53.75
32.6	75.63	91.72	72.42	69.15	54.02
32.8	75.93	92.01	72.68	69.44	54.28

Pg	R-22	R-134a	R-407C		R-410A
	Ts [°C]	Ts [°C]	Td [°C]	Tb [°C]	Ts [°C]
33.0	76.22	92.30	72.94	69.73	54.54
33.2	76.52	92.59	73.21	70.02	54.80
33.4	76.81	92.88	73.47	70.30	55.06
33.6	77.10	93.16	73.72	70.58	55.32
33.8	77.39	93.45	73.98	70.87	55.58
34.0	77.68	93.73	74.24	71.15	55.84
34.2	77.97	94.01	74.49	71.43	56.09
34.4	78.26	94.29	74.75	71.70	56.34
34.6	78.54	94.57	75.00	71.98	56.60
34.8	78.82	94.85	75.25	72.26	56.85
35.0	79.11	95.12	75.50	72.53	57.10
35.2	79.39	95.40	75.75	72.81	57.35
35.4	79.67	95.67	75.99	73.08	57.60
35.6	79.95	95.94	76.24	73.35	57.85
35.8	80.23	96.21	76.48	73.62	58.09
36.0	80.50	96.48	76.73	73.89	58.34
36.2	80.78	96.75	76.97	74.16	58.58
36.4	81.05	97.01	77.21	74.43	58.82
36.6	81.32	97.28	77.45	74.69	59.07
36.8	81.60	97.54	77.69	74.96	59.31
37.0	81.87	97.80	77.92	75.22	59.55
37.2	82.14	98.06	78.16	75.49	59.78
37.4	82.40	98.32	78.39	75.75	60.02
37.6	82.67	98.58	78.62	76.01	60.26
37.8	82.94	98.84	78.86	76.27	60.50
38.0	83.20	99.09	79.09	76.53	60.73
38.2	83.47	99.34	79.31	76.79	60.96
38.4	83.73	99.60	79.54	77.05	61.20
38.6	83.99	99.85	79.77	77.31	61.43
38.8	84.25	100.09	79.99	77.56	61.66
39.0	84.51	100.34	80.22	77.82	61.89
39.2	84.77	100.59	80.44	78.07	62.12
39.4	85.03	100.83	80.66	78.33	62.35
39.6	85.29	-	80.88	78.58	62.57
39.8	85.54	-	81.10	78.83	62.80
40.0	85.80	-	81.31	79.08	63.02
40.2	86.05	-	81.53	79.33	63.25
40.4	86.30	-	81.74	79.58	63.47
40.6	86.55	-	81.95	79.83	63.69
40.8	86.80	-	82.16	80.08	63.92
41.0	87.05	-	82.37	80.33	64.14
41.2	87.30	-	82.58	80.57	64.36
41.4	87.55	-	82.79	80.82	64.58
41.6	87.80	-	82.99	81.06	64.79
41.8	88.04	-	83.19	81.31	65.01
42.0	88.29	-	83.40	81.55	65.22
42.2	88.53	-	83.60	81.80	65.44
42.4	-	-	-	-	65.65
42.6	-	-	-	-	65.87
42.8	-	-	-	-	66.08
43.0	-	-	-	-	66.29
43.2	-	-	-	-	66.50
43.4	-	-	-	-	66.71
43.6	-	-	-	-	66.92
43.8	-	-	-	-	67.13

- TROUBLESHOOTING -

THE OPERATIONS MUST BE CARRIED OUT BY TECHNICAL QUALIFIED PERSONNEL HAVING THE REQUISITES UNDER LAW REQUISITES AND IN CONFORMITY WITH THE SAFETY REGULATIONS IN FORCE.

THE INTERVENTIONS WITHIN THE WARRANTY PERIOD WILL BE CARRIED OUT BY AUTHORIZED SERVICE CENTERS.

BEFORE RESETTING AN ALARM, IDENTIFY AND ELIMINATE ITS CAUSE.

REPEATED RESETS MAY CAUSE SERIOUS DAMAGES.

Below is a list of the possible causes of alarms.

PROBE BROKEN

1. Identify the part on the wiring diagram.
2. Are the electric contacts/terminals loose? Are the leads broken or damaged?
3. Check the correct probe ohmic level using a tester.
4. Change the probe.
5. Check the electronic module configuration (only an authorised service centre can do this)
6. Change the electronic module

PRESSURE TRANSDUCER BROKEN

1. Identify the part on the wiring diagram
2. Are the electric contacts/terminals loose? Are the leads broken or damaged?
3. Check the pressure test points are in working order
4. Change the part
5. Check the electronic module configuration (only an authorised service centre can do this)
6. Change the electronic module

IN CERTAIN MACHINE CONFIGURATIONS, CERTAIN SAFETY DEVICES MAY BE IN SERIES AND REPORT TO A SINGLE INPUT ON THE ELECTRONIC MODULE.

CHECK THE WIRING DIAGRAM TO SEE IF THE DEVICE RELATIVE TO THE ALARM IS CONNECTED IN SERIES TO OTHER DEVICES OR SAFETY DEVICES.

IN COOLING**HUGH PRESSURE**

1. Is water temperature within the operating limits? (See paragraph: GENERAL - limits)
2. Is air temperature within the operating limits? (See paragraph: GENERAL - limits)
3. Is the coil clean?
4. Do the fans work?
5. Manostat/transducer: are the electric contacts/terminals loose? Are the wires broken or damaged?
6. Anti-condensation gas in the cooling circuit?
7. Too much refrigerant in the circuit?
8. Check the trigger point for the manostat and transducer.
9. Check the manostat or transducer pressure control point (deposits of oil, dirt, pin blocked mechanically)

LOW PRESSURE

1. Is air temperature within the operating limits? (See paragraph: GENERAL - limits)
2. Is water temperature within the operating limits? (See paragraph: GENERAL - limits)
3. Check the water flow to the exchanger (and the thermal jump between intake and outlet)
4. Is flow CONSTANT or does it change in certain situations? (For example, if the pumps are turned off, certain areas of the plant are excluded or included, other uses are isolated, etc.).
5. Water filter clean / valves open /air bubbles in the plant?
6. Check the exchanger is clean
7. Manostat/transducer: are the electric contacts/terminals loose? Are the wires broken or damaged?
8. Is the cooling circuit pressurised? Are there visible leaks of coolant? Is it correctly filled?
9. Blocked dehydrator filter?
10. The expansion valve works correctly?
11. Check the trigger point for the manostat and transducer.
12. Check the manostat or transducer pressure control point (deposits of oil, dirt, pin blocked mechanically)

IN HEATING

HIGH PRESSURE

1. Is water temperature within the operating limits? (See paragraph: GENERAL - limits)
2. Is air temperature within the operating limits? (See paragraph: GENERAL - limits)
3. Check the water flow to the exchanger (and the thermal jump between intake and outlet)
4. Is flow CONSTANT or does it change in certain situations? (For example, if the pumps are turned off, certain areas of the plant are excluded or included, other uses are isolated, etc)
5. Water filter clean / valves open /air bubbles in the plant?
6. Check the exchanger is clean
7. Manostat / transducer: are the electric contacts / terminals loose? Are the wires broken or damaged?
8. Too much refrigerant in the circuit?
9. Check the trigger point for the manostat and transducer.
10. Check the manostat or transducer pressure control point (deposits of oil, dirt, pin blocked mechanically).

LOW PRESSURE

1. Is water temperature within the operating limits? (See paragraph: GENERAL - limits)
2. Is air temperature within the operating limits? (See paragraph: GENERAL - limits)
3. Is the coil clean?
4. Do the fans work?
5. Manostat / transducer: are the electric contacts / terminals loose? Are the wires broken or damaged?
6. Check the trigger point for the manostat and transducer
7. Is the cooling circuit pressurised? Are there visible leaks of coolant? Is it correctly filled?
8. Blocked dehydrator filter?
9. Does the thermostat work correctly?
10. Check the manostat or transducer pressure control point (deposits of oil, dirt, pin blocked mechanically).

COMPRESSOR PROTECTION

1. Identify the part on the wiring diagram
2. Are the electric contacts/terminals loose? Are the leads broken or damaged?
3. Check electric coil continuity using a tester.
4. Is vacuum power voltage below the limits?
5. Check the power contactors and relative contacts.
6. Is start-up power voltage lower than the limits?
7. Check electric input
8. Compressor discharge temperature higher than 120°C? Yes > check the thermostat and the coolant level.

FAN PROTECTION

1. Identify the part on the wiring diagram
2. Is the fan blocked manually? Check the bearings and drive belt (if fitted)
3. Are the electric contacts/terminals loose? Are the leads broken or damaged?
4. Check electric coil continuity using a tester
5. Is vacuum power voltage below the limits?
6. Check electric input

PUMP PROTECTION

1. Identify the part on the wiring diagram
2. Is the fan blocked manually? Check the bearings and drive belt (if fitted)
3. Are the electric contacts/terminals loose? Are the leads broken or damaged?
4. Check electric coil continuity using a tester
5. Is vacuum power voltage below the limits?
6. Check electric input

- DECOMMISSIONING OF THE UNIT -

DISCONNECTING THE UNIT

The units must be disconnected by authorised personnel, who before proceeding must first read the Residual Risks section in this manual.

Before disconnecting the unit, the following must be recovered, if present:

- the refrigerant (if the circuits cannot be isolated): the refrigerant must be removed using suction devices operating in a closed circuit, so as to ensure that none of the compound is released into the atmosphere.
- the antifreeze in the circuits: when removing this fluid, make sure that it does not leak and that it is not released into the environment. The antifreeze fluid must be stored in special containers.

When recovering the substances present in the unit, all measures must be taken to avoid damaging persons and things and polluting the surrounding area.

Awaiting dismantling and disposal, the unit can also be stored outdoors, as bad weather and rapid changes in temperature will not cause damage to the environment, if electric, cooling and hydraulic circuits of the unit are integral and closed.

DISMANTLING AND DISPOSAL

THE UNIT MUST ALWAYS BE SENT TO AUTHORISED CENTRES FOR DISMANTLING AND DISPOSAL.

When dismantling the unit, the fan, the motor and the coil, if operating, may be recovered by the specialist centres for reuse.

All the materials must be recovered or disposed of in compliance with the corresponding national standards in force.

For further information on the decommissioning of the unit, contact the manufacturer.

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