



# WDAT-3

**2.160-2.180-2.200-2.220-  
2.250-2.280-2.300-2.320-  
2.340-2.360-2.390-2.420-  
2.450-2.480-3.480-3.500-  
3.540-3.630 -3.660**

AIR COOLED WATER CHILLER FOR OUTDOOR INSTALLATION



Installation and Use Manual

M02J40M6-04



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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 authorized 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 behavior 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 water or a water and glycol mix for air-conditioning, within the limits defined in the technical bulletin and this manual.

## STANDARD UNIT SPECIFICATIONS

### COMPRESSOR

Compact semi hermetic helicoidal twin screw compressors: the main screw (male, with five lobes) is driven directly by the electric motor, while the secondary screw (female with six vanes) is driven by the primary one. The intrinsic volumetric ratio is precisely planned to be applied in the field of air-conditioning with ecological refrigerant R-134a. The screws are made from steel alloy and the axial bearings are in tandem configuration for greater sturdiness. The seal is guaranteed by extremely accurate tolerances in the machining of all moving parts and by the specific circulation of oil between the screws. Continuous modulation of cooling capacity (Stepless) with oilcontrol dynamic. The free flow lubrication system resulting from pressure differences, is equipped with a highly efficient separator, level indicator and oil filter (replaceable). An oil heater prevents excessive dilution of the oil by the refrigerant, and is automatically activated at all stages where the compressor is switched off. The asynchronous three-phase two pole motor is suction gas cooled, reduced load start of the star delta type or Part Winding (according the compressor's size) Fully protected electronic module, with safety sensor for monitoring discharge temperature, sensors for monitoring maximum temperature of the windings, device to monitor the motor rotation direction and device to monitor absence of phase. Incorporated silencer non return valve and shut-off valve on the compressor discharge. Filter on the suction line, at the inlet to the compressor. Automatic internal safety valve between HP & LP.

### STRUCTURE

The bearing structure is made from hot-galvanized and painted plate and the external panelling from pre-painted aluminium, ensuring maximum weatherability. The uniform unit weight distribution is guaranteed by the base structure, realized with galvanized and painted plate section bars, featuring holes and/or stirrups to simplify the unit lifting and earthing.

### INTERNAL EXCHANGER

Direct expansion exchanger with independent circuit on the refrigerant side for each compressor. The tube bundle is removable and allows easy maintenance. The exchanger is made from a carbon steel shell. The high-efficiency tubes, anchored to the tube plate by mechanical expansion, are made from copper, fluted to increase heat exchange and studied to be used with the modern ecological refrigerants. In addition, complete with safety differential pressure switch on the water side, antifreeze heater to protect against the risk of ice, and closed-cell heat insulation that prevents the formation of condensate and heat exchange with the outside.

### EXTERNAL EXCHANGER

Finned exchanger, made from copper pipes arranged in staggered rows and mechanically expanded for better adherence to the collar of the fins. The exchangers are planned, designed and produced directly by CLIVET. The fins are made from aluminium with a special corrugated surface, set a suitable distance apart to ensure maximum heat exchange efficiency. The coils are complete with integral subcooling circuit which assures the correct refrigerant feeding of the expansion valve. Available in different options as in 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:

- refrigerant circuit with economizer (in the estimated sizes)
- electronic expansion valve (see details further on)
- low pressure switch
- high pressure switch
- low pressure safety valve (safety valve with shut-off valve sealed with lead, open for possible inspection)
- high pressure safety valve (safety valve with shut-off valve sealed with lead, open for possible inspection)
- high and low pressure gauges
- replaceable anti-acid solid cartridge dehydrator filter
- sight glass with moisture indicator
- compressor discharge shut-off valve
- liquid line shut-off valve

## ELECTRICAL PANEL

the Power Section includes:

- isolating transformer for auxiliary circuit power supply
- fan overload circuit breakers
- compressor control contactor
- fan control contactors 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
- prealarm function for water anti-ice and high refrigerant gas pressure
- compressor operating hour display
- phase monitor
- remote ON/OFF control
- automatic compressor start rotation control
- relay for remote cumulative fault signal
- display of the set values, the error codes and the parameter index
- input for demand limit (absorbed power limit according to an external signal 0÷10V or 4÷20mA)
- ON/OFF and alarm reset buttons
- UP and DOWN buttons to increase and decrease the values
- interface terminal with graphic display
- Electronic for Elfo Control system (optional)

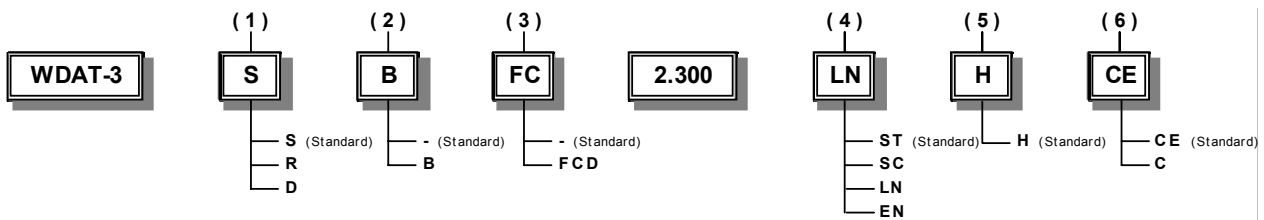
## ACCESSORIES

- copper / copper condenser coils
- copper / aluminium condenser coils with acrylic lining
- condenser coil and compressor compartment protection grill.
- Anti-hail protection grilles
- compressor suction shut-off valve
- Hydropack (pump group onboard: see details further on), in options with 2 and 4 poles type motors (EN version: only 4 poles type)
- Anti-ice electric heaters utility side for hydronic group
- power factor correction capacitors (cosφ > 0.9)
- compressor overload circuit breakers
- main door lock isolator switch (compulsory per have certification CE)
- Master-Slave function
- Free contacts for compressor state
- Free contacts for compressor state and enabling
- set point compensation according to the outside enthalpy
- set point compensation with 4-20 mA signal
- set point compensation with outside temperature probe
- double set point with units in "Brine" version
- 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)
- remote microprocessor control unit
- variable fan speed control for operation at low ambient temperatures
- spring antivibration mounts
- ECOBreeze (see details further on)
- CAN/MODBUS serial converter kit
- CAN/LON WORKS 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.

## UNIT CONFIGURATIONS



### (1) VERSION

#### Standard (S)

#### Total Recovery (R)

made using tube bundle exchangers to recover 100% of the condensing heat for production of hot water. The version in question is supplied as standard with a variable-speed low temperature device.

The compatibility of this Version with Hydropack has to be checked with Our Commercial Department.

#### Partial Recovery (D)

it is achieved using tube bundle exchangers, suitable for recovering the heat from the desuperheating zone, up to a maximum of 20% of the total heat of the unit.

The compatibility of this Version with Hydropack has to be checked with Our Commercial Department.

### (2) LOW TEMPERATURE

#### Low water temperature (B)

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

Two versions are available:

- Unit only for low temperatures.
- Unit with double operation set-point.

The availability of reduction capacity steps by means of compressor capacity control depends on the application temperature range. Please call our commercial dept. for details.

### (3) ENERGY SAVINGS

#### Direct free-cooling (FCD)

Version that allows to recovery free-cooling from ambient when the ambient air temperature is lower than the system outlet water temperature.

### (4) ACOUSTIC CONFIGURATION

#### Standard (ST)

#### compressors soundproofing (SC)

this configuration is obtained by inserting the compressors in a soundproof enclosure.

#### Low noise (LN)

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

#### Extremely low noise (EN)

with reference to configuration LN, the speed of the fans is reduced further with a larger condensing section, and the Low outside temperature kit is supplied as standard with variable speed fans. The compressors are enclosed in a soundproofed enclosure and fitted on rubber antivibration mounts, with flexible suction and discharge pipes.

### (5) ENERGY EFFICIENCY

#### High efficiency (H)

### (6) HEAT EXCHANGERS APPROVALS

C = CLIVET (Internal testing)

CE = PED (European testing)

#### 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](http://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.



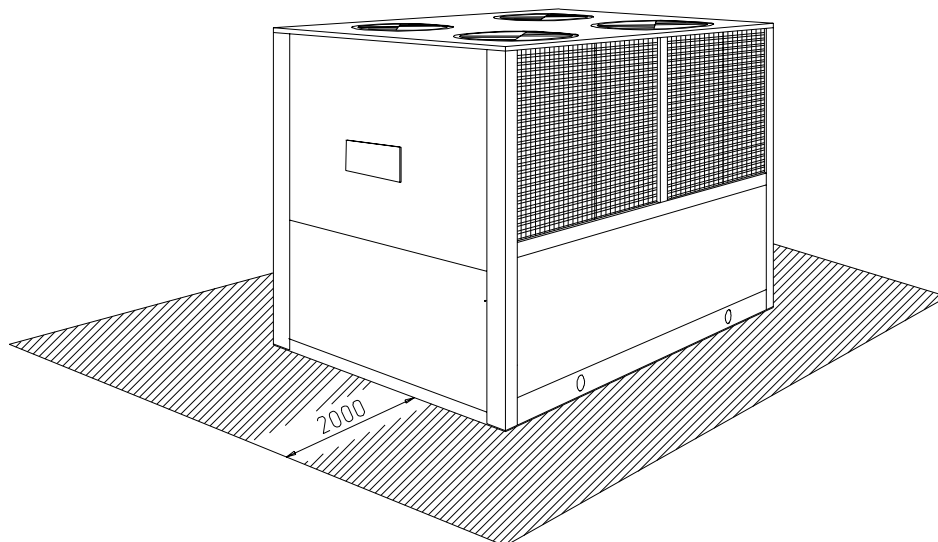
**GENERAL**

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.

**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 to 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.
- 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**

01	Identifying elements for the substance	<b>Product name:</b> forane 134a N°SDS 00941 Supplier: ELF ATOCHEM ITALIA Via Degli Artigianelli 10, 20159 Milano tel. 02/668111
02	Information concerning composition of components	<b>Chemical name of the compound</b> 1.1.1.2 - tetrafluoroethane General name: halogenated hydrocarbon CAS: 811-97-2 EINECS: 212-377-0
03	Identification of risk	<b>Effects on health:</b> practically non-toxic <b>Greatest physical and chemical dangers:</b> Thermal decomposition in toxic and corrosive products
04	First-aid measures	<b>Inhalation:</b> Carry the victim into the open air. Resort to oxygen or artificial respiration if necessary. <b>Contact with skin:</b> Frostbite must be treated in the same way as burns. <b>Contact with the eyes:</b> Immediate rinsing in abundant water. <b>Instructions for the physician:</b> Do not administer catecholamine (due to the sensitisation provoked by the product)
05	Fire prevention measures	<b>Specific dangers:</b> Thermal decomposition into toxic and corrosive products. Hydrofluoric acid. Hydrochloric acid in gaseous form. Phosgene Carbon monoxides (CO). <b>Specific means of intervention:</b> Cool containers/cisterns with jets of water. Prevent any sparks or flames. Do NOT smoke. <b>Special protection systems for fire-fighting squads:</b> Carry breathing apparatus and wear protective clothing.
01	Identifying elements for the substance	<b>Product name:</b> forane 134a N°SDS 00941 Supplier: ELF ATOCHEM ITALIA Via Degli Artigianelli 10, 20159 Milano tel. 02/668111
06	Measures to take in case of accidental spillage	<b>Individual precautions:</b> Avoid contact with the skin, eyes and inhalation of vapours. In an enclosed space: ventilate or use breathing apparatus (risk of suffocation). NO SMOKING ALLOWED. Remove all risk of sparks or flames.

## - RESIDUAL RISKS -

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07	Manipulation and storage	<p><b>Manipulation:</b>  <b>Technical measures/precautions.</b>  Form of storage and manipulation applicable to the products: PRESSURIZED GAS.  Ensure adequate ventilation and evacuation for the level of equipment.  <b>Advice for use:</b> Prevent sparks and contact with hot surfaces. DO NOT SMOKE..  <b>Storage:</b>  <b>Technical measures/Storage procedures:</b> Store at room temperature in the original container. Keep away from flames, hot surfaces and sparks. Store in a cool, well-ventilated place. Protect full containers from sources of heat to avoid excessive pressures.  <b>Packing:</b>  <b>Recommended:</b> Ordinary steel, Stainless steel.  <b>Avoid:</b> Alloy containing more than 2% magnesium.  Plastics.</p>
08	Control of individual exposure/protection	<p><b>Precautionary measures to be taken:</b> Ensure a sufficient exchange of air and/or suction in workplaces.  <b>Control parameters.</b>  <b>Exposure limits:</b> recommended by ELF ATOCHEM: VME = 1000ppm=4420mg/m<sup>3</sup>  <b>Individual protective equipment:</b>  Respiratory protection: In case of insufficient ventilation, carry suitable breathing apparatus.  Protection for the hands: Gloves  Protection for the eyes: Protective eyewear.  Specific hygiene measures: avoid contact with the skin, eyes and inhalation of the vapours. DO NOT SMOKE.</p>
09	Physical and chemical properties	<p><b>Physical state (20°C):</b> liquid gas  <b>Colour:</b> colourless  <b>Smell:</b> Slightly similar to ether; pH: not applicable.  <b>Boiling point/interval:</b> -26,4°C  <b>Melting point/interval:</b> -101°C  <b>Flash point:</b> No flare up at test conditions  <b>Self-ignition temperature:</b> 743°C (1bar) 215°C (3bar)  <b>Vapour pressure:</b> (25°C): 0.665MPa (6.65bar) a (50°C): 1.32MPa (13.2bar) a (70°C): 2.12MPa (21.2bar)  <b>Vapour density:</b> (25°C): 4.26kg/m<sup>3</sup>  <b>Density:</b> (25°C): 1206kg/m<sup>3</sup> a (50°C): 1102kg/m<sup>3</sup> a (70°C): 996kg/m<sup>3</sup>  <b>Solubility:</b>  <b>water:</b> (25°C): 0,9g/l  <b>Distribution coefficient:</b> log Pow = 1.06 (n-octanole/water)  <b>Other data:</b>  Henry constant: 1.53Pa m<sup>3</sup>/mol  Not dissociated in water  Solubility of water in the product at 25°C: 0,097% in weight.  Critical temperature: Tc=101°C  Critical pressure. Pc=4.07MPa (40.7bar)</p>
10	Stability and reactivity	<p><b>Conditions to avoid:</b> <b>Avoid</b> contact with flames and red-hot metal surfaces.  <b>Dangerous decomposition products:</b> Thermal decomposition into toxic and corrosive products: hydrofluoric acid, hydrochloric acid in gaseous form, phosgene, carbon monoxide (CO)  <b>Other information:</b> Stable product at ambient temperature.  In presence of air the product can mix up into a flammable blend at particular temperature and pressure conditions.</p>
11	Toxicological information	<p><b>Acute toxicity:</b>  <b>Inhalation:</b> Practically non-toxic in experiments conducted on animals.  CL50/inhalation/4 hrs/on rats&gt;500000ppm  As with other volatile aliphatic halogenated compounds, with the accumulation of vapours and/or the inhalation of large quantities, the product can cause: loss of consciousness and heart problems aggravated by stress and lack of oxygen; risk of death.  <b>Local effects:</b>  <b>Contact with skin:</b> Frostbite possible from splashes of liquefied gas.  Practically non-irritating for skin in experiments conducted on animals (rabbits).  <b>Contact with the eyes:</b> practically non-irritating for eyes in experiments conducted on animals (rabbits).  <b>Sensibilisation:</b>  <b>Contact with skin:</b> <b>Experim,ental for the animal:</b>  No skin sensitizer (guinea pig).  <b>Chronic toxicity:</b> Studies on animal protracted inhalation do not highlight any chronic toxic effect (rat/ years(s)/ Inhalation: 50000ppm)  <b>Specific effects:</b> Genotoxicity according experimental available data NOT Genotoxic  <b>Cancerogenesis:</b> experiments on animals do not highlight carcinogen effect clearly demonstrated (rat /Inhalation – for oral administration)  <b>Toxicity for reproduction:</b> Foetal growth no toxic effect for foetal development (rat/rabbit/inhalation).  Fertility, according the available data on animal: no toxic effects on fertility (rats/inhalation)</p>

This document refers to the product as is and which conforms to the specifications supplied by ELF ATOCHEM.

If combinations or mixtures are made, check that there are no new dangers resulting from this action. The information provided in this report has been provided in good faith and is based on our latest knowledge of the product in question as of the date of publication of the same. The attention of users is drawn to the potential risks of employing the product for any use other than that for which it is intended. This report must be used and reproduced solely for purposes of prevention and safety. The list of legislative, regulatory or administrative texts must not be considered exhaustive. The product user is under obligation to refer to all the official texts concerning the use, conservation and manipulation of the product for which he is sole responsible. The product user must also provide all those who might come into contact with the product with the information necessary for their safety at work and the protection of their health and that of the environment, giving them a copy of this safety information report.

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## GENERAL TECHNICAL SPECIFICATIONS

Acoustic configuration: standard (ST) / compressors insulation (SC) / energy efficiency: high efficiency (H)

SIZES			2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
COOLING																
Cooling capacity	1	kW	365	406	474	527	584	675	736	801	869	915	954	1015	1085	1116
Compressor power input		kW	111	125	145	163	183	202	221	246	256	272	282	307	340	357
Total power input	2	kW	125	139	163	181	200	223	242	267	278	293	305	332	365	382
EER		Nr	2.92	2.92	2.92	2.91	2.92	3.03	3.04	3	3.13	3.12	3.13	3.06	2.97	2.92
ESEER		Nr	4.03	4.02	4.03	4.01	4.03	4.18	4.19	4.13	4.32	4.31	4.32	4.22	4.11	4.02
COMPRESSOR																
Type of compressors	3		DSW													
No. of Compressors		Nr	2													
Std Capacity control steps		Nr	stepless/6													
Refrigerant circuits		Nr	2													
INTERNAL EXCHANGER																
Type of internal exchanger	4		S&T													
No. of internal exchangers		Nr	1													
Water flow-rate		l/s	17.4	19.4	22.7	25.2	27.9	32.2	35.2	38.3	41.5	43.7	45.6	48.5	51.8	53.3
Pressure drop		kPa	43	31	41	35	50	27	41	38	56	61	66	74	43	45
EXTERNAL EXCHANGER																
Front surface		m <sup>2</sup>	19	19	24	24	29.4	29.4	29.4	29.4	35	35	35	35	35	35
EXTERNAL SECTION FANS																
Type of fans	5		AX													
Number of fans		Nr	8	8	10	10	10	12	12	12	12	12	13	14	14	14
Standard air flow		l/s	44914	44914	52083	56179	59670	68099	68099	68099	79186	79186	84900	87508	87508	87508
CONNECTIONS																
Water fittings			5"	6" / 8	6" / 8"	6" / 8"	6" / 8"	8"								
POWER SUPPLY																
Standard power supply		V	400/3/50													
STANDARD UNIT WEIGHTS																
Shipping weight ST		kg	4240	4256	5073	5550	5850	6145	6810	7313	7980	8400	8560	8620	8810	8830
Operating weight ST		kg	4402	4418	5257	5772	6072	6397	7105	7696	8442	8862	8983	9043	9216	9236
Shipping weight SC		kg	4655	4671	5573	6050	6265	6560	7225	7728	8390	8620	8780	9040	9030	9250
Operating weight SC		kg	4817	4833	5757	6272	6487	6812	7520	8111	8852	9082	9203	9463	9436	9656

(1) data referred to the following conditions :

internal exchanger water = 12/7°C

outside air temperature 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) DSW = twin-screw compressor

(4) S&amp;T = tube bundle

(5) AX = axial-flow fan

## OPERATING LIMITS

SIZES			2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
<b>EXTERNAL EXCHANGER</b>																
Max air intake temperature	1	°C	47.5	46.5	47	45	45.5	45	44.5	44.5	44	46	45	44.5	43.5	43.5
Max air intake temperature	2	°C	52	51	52	50	50	50	49	49	49	51	50	49	48	48
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Min. air intake temperature	4	°C	-8	-9	-7	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9
Min. air intake temperature	5	°C	1	1	7	3	5	3	3	1	2	2	-1	-2	-2	-5
Min. air intake temperature	6	°C	12	13	17	14	15	13	14	13	14	14	12	12	11	9
<b>INTERNAL EXCHANGER</b>																
Max water inlet temperature	7	°C	21													
Min. water outlet temperature	8	°C	5													
Min. water outlet temperature	9	°C	-8													

Note: the Standard unit shall never be exposed, at temperatures below -10°C while supplied. On request it's possible to take countermeasures for the operation also in more critical environmental conditions. For special conditions contact our Sales Office.

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). In order to avoid such situation, windbreak barriers are necessary. The minimum ambient temperature is given for units equipped with low ambient control or with ECOBreeze fans. For standard unit without these options, this value is of about 18°C with still air and unit operating at full load.

(1) unit at full load

internal exchanger water = 12/7°C

(2) capacity-controlled unit (automatic capacity control)

(3) unit at full load

external exchanger air in quiet

(4) capacity-controlled unit (automatic capacity control)

external exchanger air in quiet

(5) capacity-controlled unit (automatic capacity control)

air to external exchanger = 0.5m/sec

(6) capacity-controlled unit (automatic capacity control)

external exchanger air = 1m/sec

(7) external exchanger air intake 35°C

(8) Standard Version

external exchanger air intake 35°C

(9) Low temperature version

external exchanger air intake 35°C

Fluid with ethylene glycol of 40%

**Acoustic configuration: standard (ST) / compressors insulation (SC) / energy efficiency: high efficiency (H)**

SIZES			3.480	3.500	3.540	3.630	3.660
COOLING							
Cooling capacity	1	kW	1196	1268	1367	1456	1525
Compressor power input		kW	375.3	392.9	414.8	431.1	468.7
Total power input	2	kW	406.9	427.9	449.8	469.5	507.1
EER		Nr	2.94	2.96	3.04	3.1	3.01
ESEER		Nr	4.09	4.12	4.22	4.31	4.18
COMPRESSOR							
Type of compressors	3		DSW				
No. of Compressors		Nr	3				
Std Capacity control steps		Nr	stepless/9				
Refrigerant circuits		Nr	3				
INTERNAL EXCHANGER							
Type of internal exchanger	4		S&T				
No. of internal exchangers		Nr	1				
Water flow-rate		l/s	57.1	60.6	65.3	69.6	72.8
Pressure drop		kPa	55	69	79	89	97
EXTERNAL SECTION FANS							
Type of fans	5		AX				
Number of fans		Nr	18	20	20	22	22
CONNECTIONS							
Water fittings			8"				
POWER SUPPLY							
Standard power supply		V	400/3/50				
STANDARD UNIT WEIGHTS							
Shipping weight ST		kg	11136	12242	13235	13987	14087
Operating weight ST		kg	10730	11767	12752	13422	13522
Shipping weight SC		kg	11806	12907	13905	14657	14757
Operating weight SC		kg	11400	12432	13422	14092	14192

(1) data referred to the following conditions :

internal exchanger water = 12/7°C

outside air temperature 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) DSW = twin-screw compressor

(4) S&T = tube bundle

(5) AX = axial-flow fan

## OPERATING LIMITS

SIZES			3.480	3.500	3.540	3.630	3.660
<b>EXTERNAL EXCHANGER</b>							
Max air intake temperature	1	°C	43	43	43	44	43
Max air intake temperature	2	°C	49	49	49	50	49
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10
Min. air intake temperature	4	°C	-9	-9	-9	-8	-9
Min. air intake temperature	5	°C	1	1	1	2	1
Min. air intake temperature	6	°C	13	13	13	14	13
<b>INTERNAL EXCHANGER</b>							
Max water inlet temperature	7	°C	21				
Min. water outlet temperature	8	°C	5				
Min. water outlet temperature	9	°C	-8				

Note: the Standard unit shall never be exposed, at temperatures below -10°C while supplied. On request it's possible to take countermeasures for the operation also in more critical environmental conditions. For special conditions contact our Sales Office

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). In order to avoid such situation, windbreak barriers are necessary. The minimum ambient temperature is given for units equipped with low ambient control or with ECObreeze fans. For standard unit without these options, this value is of about 18°C with still air and unit operating at full load.

(1) unit at full load

(2) capacity-controlled unit (automatic capacity control)

(3) unit at full load

external exchanger air in quiet

(4) capacity-controlled unit (automatic capacity control)

external exchanger air in quiet

(5) capacity-controlled unit (automatic capacity control)

air to external exchanger = 0.5m/sec

(6) capacity-controlled unit (automatic capacity control)

external exchanger air = 1m/sec

(7) external exchanger air intake 35°C

(8) Standard Version

external exchanger air intake 35°C

(9) Low temperature version

external exchanger air intake 35°C

Fluid with ethylene glycol of 40%

## - ELECTRICAL DATA -

## Acoustic configuration: low noise (LN) / energy efficiency: high efficiency (H)

SIZES			2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
COOLING																
Cooling capacity	1	kW	363	399	469	526	576	670	738	802	857	896	939	1018	1102	1137
Compressor power input		kW	114	127	149	168	184	207	225	247	261	275	281	311	336	349
Total power input	2	kW	124	137	161	181	197	222	240	262	277	293	304	336	361	374
EER		Nr	2.92	2.91	2.92	2.91	2.92	3.01	3.07	3.06	3.09	3.06	3.09	3.03	3.05	3.04
ESEER		Nr	4.18	4.18	4.18	4.18	4.17	4.31	4.38	4.37	4.42	4.38	4.43	4.33	4.36	4.36
COMPRESSOR																
Type of compressors	3		DSW													
No. of Compressors		Nr	2													
Std Capacity control steps		Nr	stepless/6													
Refrigerant circuits		Nr	2													
INTERNAL EXCHANGER																
Type of internal exchanger	4		S&T													
No. of internal exchangers		Nr	1													
Water flow-rate		l/s	17.3	19.1	22.4	25.1	27.5	32	35.3	38.3	40.9	42.8	44.9	48.6	52.7	54.3
Pressure drop		kPa	43	30	40	35	49	27	41	38	54	59	64	75	44	47
EXTERNAL EXCHANGER																
Front surface		m <sup>2</sup>	19	19	24	24	29.4	29.4	35	35	35	35	43	48	48	48
EXTERNAL SECTION FANS																
Type of fans	5		AX													
Number of fans		Nr	8	8	9	10	10	12	12	12	13	14	18	20	20	20
Standard air flow		l/s	33264	33264	38688	41604	44377	49938	59950	59950	62648	65347	74868	83208	83208	83208
CONNECTIONS																
Water fittings			5"	6" / 8"	6" / 8"	6" / 8"	6" / 8"	8"								
POWER SUPPLY																
Standard power supply		V	400/3/50													
STANDARD UNIT WEIGHTS																
Shipping weight		kg	4835	4851	5683	6270	6525	6820	7820	8413	8700	8800	10254	10654	11064	11304
Operating weight		kg	4997	5013	5867	6492	6747	7072	8115	8796	9162	9262	10677	11077	11470	11710

(1) data referred to the following conditions :  
internal exchanger water = 12/7°C

outside air temperature 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) DSW = twin-screw compressor

(4) S&T = tube bundle

(5) AX = axial-flow fan

## OPERATING LIMITS

SIZES		2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
<b>EXTERNAL EXCHANGER</b>															
Max air intake temperature	1	°C	46.5	45.5	42	44	44	43.5	44	43	43	42.5	42.5	42.5	44.5
Max air intake temperature	2	°C	51	50	47	49	49	48	49	48	48	47	47	47	49
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Min. air intake temperature	4	°C	-8	-9	-7	-9	-9	-9	-9	-9	-9	-9	-9	-9	-9
Min. air intake temperature	5	°C	1	1	7	3	5	3	5	5	2	3	3	4	4
Min. air intake temperature	6	°C	12	13	17	14	15	13	15	15	14	14	14	14	14
<b>INTERNAL EXCHANGER</b>															
Max water inlet temperature	7	°C	21												
Min. water outlet temperature	8	°C	5												
Min. water outlet temperature	9	°C	-8												

Note: the Standard unit shall never be exposed, at temperatures below -10°C while supplied. On request it's possible to take countermeasures for the operation also in more critical environmental conditions. For special conditions contact our Sales Office.

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). In order to avoid such situation, windbreak barriers are necessary. The minimum ambient temperature is given for units equipped with low ambient control or with ECO breeze fans. For standard unit without these options, this value is of about 18°C with still air and unit operating at full load.

(1) unit at full load  
internal exchanger water = 12/7°C

(2) capacity-controlled unit (automatic capacity control)

(3) unit at full load  
external exchanger air in quiet

(4) capacity-controlled unit (automatic capacity control)

external exchanger air in quiet

(5) capacity-controlled unit (automatic capacity control)

air to external exchanger = 0.5m/sec

(6) capacity-controlled unit (automatic capacity control)

external exchanger air = 1m/sec

(7) external exchanger air intake 35°C

(8) Standard Version

external exchanger air intake 35°C

(9) Low temperature version

external exchanger air intake 35°C

Fluid with ethylene glycol of 40%



**Acoustic configuration: low noise (LN) / energy efficiency: high efficiency (H)**

SIZES			3.480	3.500	3.540	3.630
COOLING						
Cooling capacity	1	kW	1207	1271	1344	1450
Compressor power input		kW	378.9	395.2	420.6	454.1
Total power input	2	kW	403.9	420.2	448	481.5
EER		Nr	2.99	3.02	3	3.01
ESEER		Nr	4.27	4.32	4.29	4.31
COMPRESSOR						
Type of compressors	3		DSW			
No. of Compressors		Nr	3			
Std Capacity control steps		Nr	stepless/9			
Refrigerant circuits		Nr	3			
INTERNAL EXCHANGER						
Type of internal exchanger	4		S&T			
No. of internal exchangers		Nr	1			
Water flow-rate		l/s	57.7	60.7	64.2	69.3
Pressure drop		kPa	56	68	76	88
EXTERNAL SECTION FANS						
Type of fans	5		AX			
Number of fans		Nr	20	20	22	22
CONNECTIONS						
Water fittings			8"			
POWER SUPPLY						
Standard power supply		V	400/3/50			
STANDARD UNIT WEIGHTS						
Shipping weight		kg	13072	13337	13442	14092
Operating weight		kg	13478	13812	13925	14657

(1) data referred to the following conditions :

internal exchanger water = 12/7°C

outside air temperature 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) DSW = twin-screw compressor

(4) S&T = tube bundle

(5) AX = axial-flow fan

**OPERATING LIMITS**

SIZES			3.480	3.500	3.540	3.630
<b>EXTERNAL EXCHANGER</b>						
Max air intake temperature	1	°C	41	42	42	41
Max air intake temperature	2	°C	47	48	48	47
Min. air intake temperature	3	°C	-10	-10	-10	-10
Min. air intake temperature	4	°C	-9	-9	-9	-9
Min. air intake temperature	5	°C	1	1	1	1
Min. air intake temperature	6	°C	13	13	13	13
<b>INTERNAL EXCHANGER</b>						
Max water inlet temperature	7	°C	21			
Min. water outlet temperature	8	°C	5			
Min. water outlet temperature	9	°C	-8			

Note: the Standard unit shall never be exposed, at temperatures below -10°C while supplied. On request it's possible to take countermeasures for the operation also in more critical environmental conditions. For special conditions contact our Sales Office

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). In order to avoid such situation, windbreak barriers are necessary. The minimum ambient temperature is given for units equipped with low ambient control or with ECObreeze fans. For standard unit without these options, this value is of about 18°C with still air and unit operating at full load.

(1) unit at full load

(2) capacity-controlled unit (automatic capacity control)

(3) unit at full load

external exchanger air in quiet

(4) capacity-controlled unit (automatic capacity control)

external exchanger air in quiet

(5) capacity-controlled unit (automatic capacity control)

air to external exchanger = 0.5m/sec

(6) capacity-controlled unit (automatic capacity control)

external exchanger air = 1m/sec

(7) external exchanger air intake 35°C

(8) Standard Version

external exchanger air intake 35°C

(9) Low temperature version

external exchanger air intake 35°C

Fluid with ethylene glycol of 40%

## - ELECTRICAL DATA -

Acoustic configuration: extremely low noise (EN) / energy efficiency: high efficiency (H)

SIZES			2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
COOLING																
Cooling capacity	1	kW	353	387	447.5	503.9	567.2	655.2	709.3	770.8	814.7	851.5	918.3	1007.7	1075.5	1105.4
Compressor power input		kW	123.1	135.5	156	180.6	195.3	223.1	250.6	274.8	292.3	308.1	305.7	327.3	367.4	382.1
Total power input	2	kW	133.4	145.8	168.7	193.3	208	238.2	265.7	289.9	308.6	325.6	330.7	352.3	392.4	407.1
EER		Nr	2.65	2.65	2.65	2.61	2.73	2.75	2.67	2.66	2.64	2.62	2.78	2.86	2.74	2.72
ESEER		Nr	3.98	3.98	3.98	3.91	4.1	4.12	4	3.99	3.96	3.93	4.16	4.29	4.12	4.07
COMPRESSOR																
Type of compressors	3		DSW													
No. of Compressors		Nr	2													
Std Capacity control steps		Nr	stepless/6													
Refrigerant circuits		Nr	2													
INTERNAL EXCHANGER																
Type of internal exchanger	4		S&T													
No. of internal exchangers		Nr	1													
Water flow-rate		l/s	16.9	18.5	21.4	24.1	27.1	31.3	33.9	36.8	38.9	40.7	43.9	48.1	51.4	52.8
Pressure drop		kPa	40	28	37	33	47	26	38	35	50	54	62	73	42	45
EXTERNAL EXCHANGER																
Front surface		m²	19	19	24	24	29.4	29.4	35	35	35	35	48	48	48	48
EXTERNAL SECTION FANS																
Type of fans	5		AX													
Number of fans		Nr	8	8	9	10	10	12	12	12	13	14	20	20	20	20
Standard air flow		l/s	26396	26396	31036	33270	35911	39919	50615	50615	53573	56531	66541	66541	66541	66541
CONNECTIONS																
Water fittings			5"	6" / 8"	6" / 8"	6" / 8"	6" / 8"	8"								
POWER SUPPLY																
Standard power supply		V	400/3/50													
STANDARD UNIT WEIGHTS																
Shipping weight		kg	4835	4851	5683	6270	6525	6820	7820	8413	8700	8800	10814	11094	11284	11304
Operating weight		kg	4997	5013	5867	6492	6747	7072	8115	8796	9162	9262	11237	11517	11690	11710

(1) data referred to the following conditions :  
internal exchanger water = 12/7°C  
outside air temperature 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) DSW = twin-screw compressor

(4) S&T = tube bundle

(5) AX = axial-flow fan

**OPERATING LIMITS**

SIZES			2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
EXTERNAL EXCHANGER																
Max air intake temperature	1	°C	44.5	43	44	41.5	42	41	39	39.5	39	39.5	40.5	42.5	41.5	41.5
Max air intake temperature	2	°C	49	48	49	46	47	46	44	44	44	44	45	47	46	46
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
Min. air intake temperature	4	°C	-8	-9	-7	-9	-9	-9	-9	-9	-9	-9	-10	-9	-9	-9
Min. air intake temperature	5	°C	1	1	7	3	5	3	5	5	2	2	6	3	4	4
Min. air intake temperature	6	°C	12	13	17	14	15	13	15	15	14	14	16	14	14	14
INTERNAL EXCHANGER																
Max water inlet temperature	7	°C	21													
Min. water outlet temperature	8	°C	5													
Min. water outlet temperature	9	°C	-8													

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

Note: the Standard unit shall never be exposed, at temperatures below -10°C while supplied. On request it's possible to take countermeasures for the operation also in more critical environmental conditions. For special conditions contact our Sales Office.

Note: the Standard unit shall never be exposed, at temperatures below -10°C while supplied.

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). In order to avoid such situation, windbreak barriers are necessary. The minimum ambient temperature is given for units equipped with low ambient control or with ECObreeze fans. For standard unit without these options, this value is of about 18°C with still air and unit operating at full load.

(1) unit at full load  
internal exchanger water = 12/7°C  
(2) capacity-controlled unit (automatic capacity control)

(3) unit at full load  
external exchanger air in quiet

(4) capacity-controlled unit (automatic capacity control)  
external exchanger air in quiet

(5) capacity-controlled unit (automatic capacity control)  
air to external exchanger = 0.5m/sec

(6) capacity-controlled unit (automatic capacity control)  
external exchanger air = 1m/sec

(7) external exchanger air intake 35°C

(8) Standard Version  
external exchanger air intake 35°C

(9) Low temperature version  
external exchanger air intake 35°C

Fluid with ethylene glycol of 40%



**Acoustic configuration: extremely low noise (EN) / energy efficiency: high efficiency (H)**

SIZES			3.480	3.500	3.540
<b>COOLING</b>					
Cooling capacity	1	kW	1158	1208	1291
Compressor power input		kW	407.3	427	459.5
Total power input	2	kW	432.3	452	486.9
EER		Nr	2.68	2.67	2.65
ESEER		Nr	4.05	4.03	4
<b>COMPRESSOR</b>					
Type of compressors	3			DSW	
No. of Compressors		Nr		3	
Std Capacity control steps		Nr		stepless/9	
Refrigerant circuits		Nr		3	
<b>INTERNAL EXCHANGER</b>					
Type of internal exchanger	4			S&T	
No. of internal exchangers		Nr		1	
Water flow-rate		l/s	55.3	57.7	61.7
Pressure drop		kPa	51	63	71
<b>EXTERNAL SECTION FANS</b>					
Type of fans	5			AX	
Number of fans		Nr	20	20	22
<b>CONNECTIONS</b>					
Water fittings				8"	
<b>POWER SUPPLY</b>					
Standard power supply		V		400/3/50	
<b>STANDARD UNIT WEIGHTS</b>					
Shipping weight		kg	13092	13337	13442
Operating weight		kg	13498	13812	13925

(1) data referred to the following conditions :  
internal exchanger water = 12/7°C  
outside air temperature 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) DSW = twin-screw compressor  
(4) S&T = tube bundle  
(5) AX = axial-flow fan

**OPERATING LIMITS**

SIZES			3.480	3.500	3.540
<b>EXTERNAL EXCHANGER</b>					
Max air intake temperature	1	°C	39	38	38
Max air intake temperature	2	°C	45	44	44
Min. air intake temperature	3	°C	-10	-10	-10
Min. air intake temperature	4	°C	-9	-9	-9
Min. air intake temperature	5	°C	1	1	1
Min. air intake temperature	6	°C	13	13	13
<b>INTERNAL EXCHANGER</b>					
Max water inlet temperature	7	°C		21	
Min. water outlet temperature	8	°C		5	
Min. water outlet temperature	9	°C		-8	

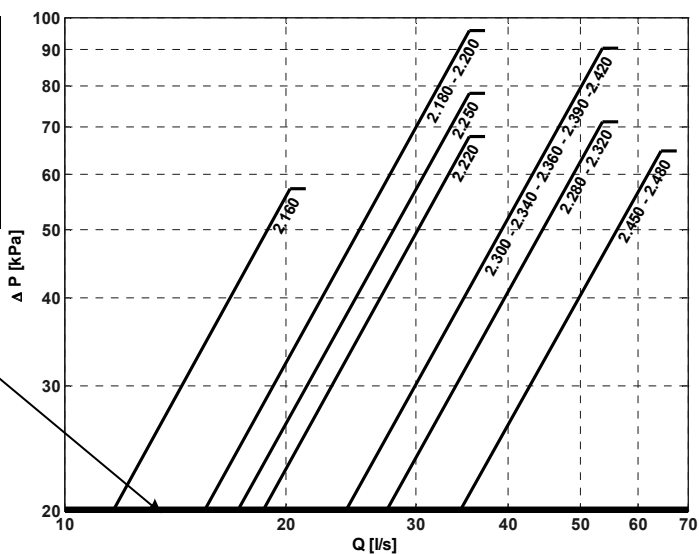
Note: the Standard unit shall never be exposed, at temperatures below -10°C while supplied. On request it's possible to take countermeasures for the operation also in more critical environmental conditions. For special conditions contact our Sales Office.  
Warning: the still air condition is meant as 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). In order to avoid such situation, windbreak barriers are necessary. The minimum ambient temperature is given for units equipped with low ambient control or with ECObreeze fans. For standard unit without these options, this value is of about 18°C with still air and unit operating at full load.

(1) unit at full load  
(2) capacity-controlled unit (automatic capacity control)  
(3) unit at full load  
external exchanger air intake 35°C  
(4) capacity-controlled unit (automatic capacity control)  
external exchanger air in quiet  
(5) capacity-controlled unit (automatic capacity control)  
air to external exchanger = 0.5m/sec  
(6) capacity-controlled unit (automatic capacity control)  
external exchanger air = 1m/sec  
(7) external exchanger air intake 35°C  
(8) Standard Version  
external exchanger air intake 35°C  
(9) Low temperature version  
external exchanger air intake 35°C  
Fluid with ethylene glycol of 40%

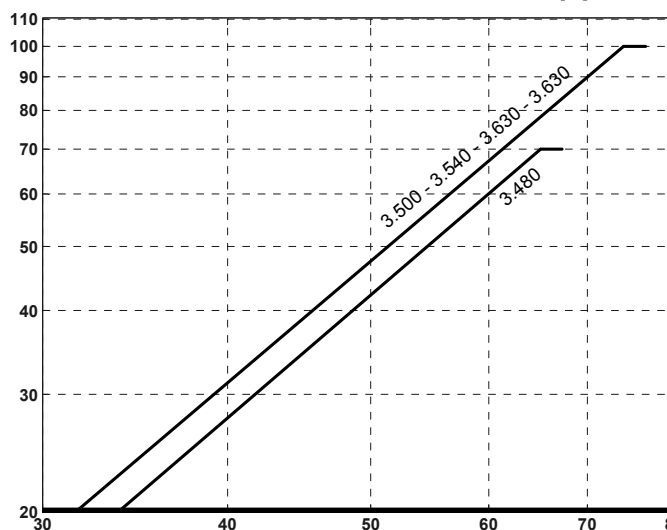
## - ELECTRICAL DATA -

### INTERNAL EXCHANGER PRESSURE DROP

	Q <sub>MIN</sub> [l/s]	Q <sub>MAX</sub> [l/s]
2.160	11.6	20.2
2.180	15.5	35.4
2.200	15.5	35.4
2.220	18.6	35.4
2.250	17.2	35.4
2.280	27.3	53.6
2.300	24.1	53.6
2.320	27.3	53.6
2.340	24.1	53.6
2.360	24.1	53.6
2.390	24.1	53.6
2.420	24.1	53.6
2.450	34.4	64.4
2.480	34.4	64.4



EVAPORATOR PRESSURE DROP LIMIT. CAUTION:  
DO NOT USE UNDER THIS LIMIT.



	Q <sub>MIN</sub> [l/s]	Q <sub>MAX</sub> [l/s]
3.480	33.7	65.0
3.500	31.6	74.0
3.540	31.6	74.0
3.630	31.6	74.0
3.660	31.6	74.0

EXCHANGER PRESSURE DROP LIMIT. CAUTION: DO NOT  
USE UNDER THIS LIMIT

### FOULING CORRECTION FACTOR

m <sup>2</sup> °C/W	INTERNAL EXCHANGER	
	Cooling capacity correction factors	Cooling capacity correction factors
0.44 x 10 <sup>-4</sup>	1.00	1.00
0.88 x 10 <sup>-4</sup>	0.97	0.99
1.76 x 10 <sup>-4</sup>	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.

### OVERLOAD AND CONTROL DEVICE CALIBRATION

		OPEN	CLOSED	VALUE
High pressure switch	kPa	1730	1170	--
Low pressure switch	kPa	70	170	--
Antifreeze protection	°C	3	5,5	--
High pressure safety valve	kPa	--	--	2700
Low pressure safety valve	kPa	--	--	1650
Max no. of compressor starts per hour	Nr	--	--	6
High compressor discharge temperature safety thermostat	°C	--	--	120

**EXCHANGER OPERATING LIMITS**

	<b>INTERNAL EXCHANGER</b>	
	Maximum operating pressure on refrigerant side	Maximum operating pressure on refrigerant side
	kPa	kPa
CLIVET (C)	1650	1600
PED (CE)	1650	1600

**SOUND LEVELS**

**Acoustic configuration ST**

Size	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)
<b>2.160</b>	101	98	94	93	96	93	87	78	80	100
<b>2.180</b>	101	98	94	94	97	94	88	77	81	101
<b>2.200</b>	102	99	95	95	98	95	89	78	81	101
<b>2.220</b>	102	99	95	95	98	95	89	78	81	101
<b>2.250</b>	102	99	95	94	98	96	90	78	81	102
<b>2.280</b>	102	100	96	95	98	96	90	78	81	102
<b>2.300</b>	102	100	96	95	98	95	92	80	81	102
<b>2.320</b>	101	99	95	95	98	94	93	81	81	102
<b>2.340</b>	103	101	97	97	100	96	94	82	82	103
<b>2.360</b>	105	102	98	98	101	97	95	83	83	104
<b>2.390</b>	105	102	98	98	101	97	95	83	83	105
<b>2.420</b>	106	103	99	99	102	98	96	84	84	105
<b>2.450</b>	106	103	99	99	102	98	96	84	84	106
<b>2.480</b>	107	104	100	100	103	99	97	85	85	106
<b>3.480</b>	104	102	98	98	101	97	96	84	83	105
<b>3.500</b>	106	103	99	99	102	98	97	85	84	106
<b>3.540</b>	108	105	101	101	104	100	98	86	85	107
<b>3.630</b>	109	106	102	102	105	101	99	87	86	108
<b>3.660</b>	110	107	103	103	106	102	100	88	87	109

**Acoustic configuration SC**

Size	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)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
<b>2.160</b>	98	95	91	90	93	90	84	75	77	97
<b>2.180</b>	98	95	91	91	94	91	85	74	78	98
<b>2.200</b>	99	96	92	92	95	92	86	75	78	98
<b>2.220</b>	99	96	92	92	95	92	86	75	78	98
<b>2.250</b>	99	96	92	91	95	93	87	75	78	99
<b>2.280</b>	99	97	93	92	95	93	87	75	78	99
<b>2.300</b>	99	97	93	92	95	92	89	77	78	99
<b>2.320</b>	98	96	92	92	95	91	90	78	78	99
<b>2.340</b>	100	98	94	94	97	93	91	79	79	100
<b>2.360</b>	102	99	95	95	98	94	92	80	80	101
<b>2.390</b>	102	99	95	95	98	94	92	80	80	102
<b>2.420</b>	103	100	96	96	99	95	93	81	81	102
<b>2.450</b>	103	100	96	96	99	95	93	81	81	103
<b>2.480</b>	104	101	97	97	100	96	94	82	82	103
<b>3.480</b>	101	99	95	95	98	94	93	81	80	102
<b>3.500</b>	103	100	96	96	99	95	94	82	81	103
<b>3.540</b>	105	102	98	98	101	97	95	83	82	104
<b>3.630</b>	106	103	99	99	102	98	96	84	83	105
<b>3.660</b>	107	104	100	100	103	99	97	85	84	106

**Acoustic configuration LN**

Grand.	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000		
<b>2.160</b>	98	86	86	89	91	86	82	73	74	93
<b>2.180</b>	98	85	85	90	91	88	83	70	74	94
<b>2.200</b>	98	85	85	90	91	88	83	70	74	95
<b>2.220</b>	98	85	85	90	91	88	83	70	74	95
<b>2.250</b>	99	86	86	90	92	90	85	72	75	95
<b>2.280</b>	99	86	87	91	92	90	85	72	75	96
<b>2.300</b>	98	85	86	91	92	88	86	73	75	96
<b>2.320</b>	98	85	86	92	93	87	88	75	75	96
<b>2.340</b>	99	86	87	92	94	88	88	75	76	97
<b>2.360</b>	99	86	87	92	94	88	88	75	76	97
<b>2.390</b>	100	87	88	93	95	89	89	76	77	98
<b>2.420</b>	100	87	88	93	95	89	89	76	77	98
<b>2.450</b>	101	88	89	94	96	90	90	77	78	99
<b>2.480</b>	101	88	89	94	96	90	90	77	78	99
<b>3.480</b>	102	89	90	96	97	91	92	79	78	101
<b>3.500</b>	103	90	91	96	98	92	92	79	78	101
<b>3.540</b>	103	90	91	96	98	92	92	79	79	101
<b>3.630</b>	104	91	92	97	99	93	93	80	80	102

**Acoustic configuration EN**

Grand.	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)
<b>2.160</b>	86	76	77	81	84	78	78	68	67	87
<b>2.180</b>	84	74	75	84	84	80	77	64	68	88
<b>2.200</b>	85	75	76	85	85	81	78	65	68	88
<b>2.220</b>	85	75	76	85	85	81	78	65	68	88
<b>2.250</b>	85	75	76	82	85	82	80	66	68	89
<b>2.280</b>	86	77	77	84	86	83	81	67	69	90
<b>2.300</b>	86	77	77	86	87	82	83	69	70	91
<b>2.320</b>	85	76	77	87	88	80	84	71	70	91
<b>2.340</b>	86	76	77	87	88	80	84	71	70	91
<b>2.360</b>	87	77	78	87	88	80	84	71	70	91
<b>2.390</b>	88	78	79	88	89	81	85	72	70	92
<b>2.420</b>	89	79	80	89	90	82	86	73	71	93
<b>2.450</b>	89	79	80	89	90	82	86	73	71	93
<b>2.480</b>	90	80	81	90	91	83	87	74	72	94
<b>3.480</b>	88	79	80	90	91	83	87	74	72	94
<b>3.500</b>	88	79	80	90	91	83	87	74	72	94
<b>3.540</b>	90	80	81	90	91	83	87	74	72	94

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

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

## 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 60°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:

- 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

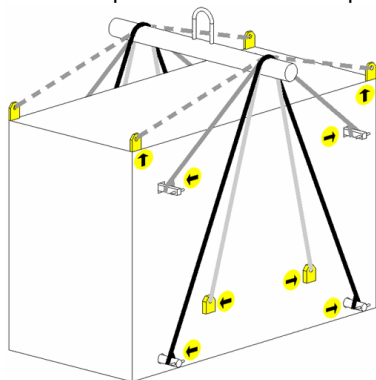
- Type and overall dimensions of the unit
- Place and route for the handling (dirt yard, asphalted square, etc. )
- Condition of the place of destination (roof, square, etc.)
- Distances, drops and gradients.

### labels / yellow brackets show the lifting points

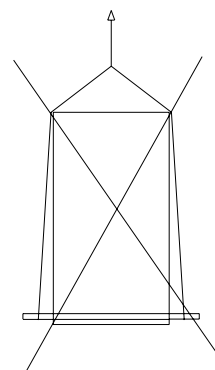
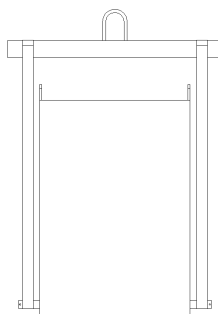
#### 2 lifting points

use 2-boom tie rods

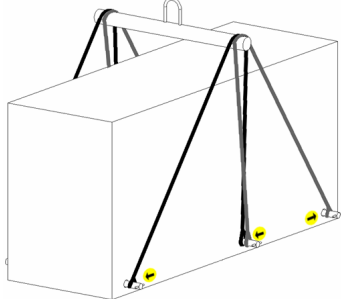
(2 cables/chains/straps for each unit side)  
according to the unit type, holes and/or lifting  
brackets are positioned in different points



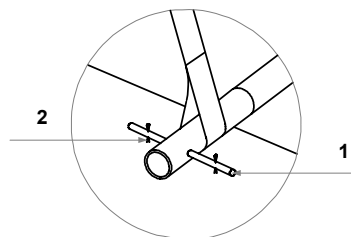
#### use a spacer bar to avoid damaging the unit



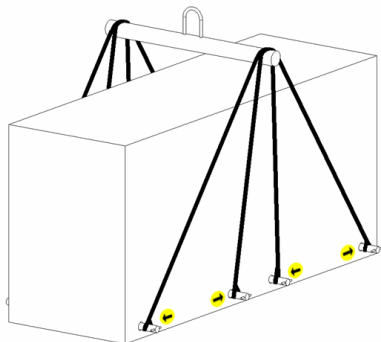
**3 lifting points**  
use 3-boom tie rods  
(3 cables/chains/straps for each unit side)



**Insert safety pins ( 1 )  
and split pins ( 2 )**

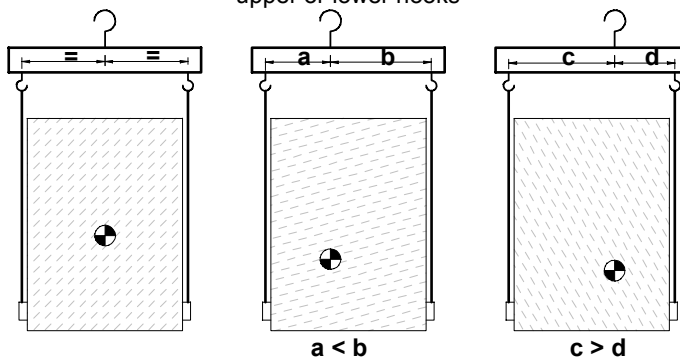


**4 lifting points**  
use 4-boom tie rods  
(4 cables/chains/straps for each unit side)



### Charge balancing

According to the spring equalizing rocker arm type, move the upper or lower hooks



● 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.

**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 exterior installation in a fixed position and in areas which can be easily reached by qualified and specialized personnel.

1. Install the unit raised from the ground, also considering the maximum level which can be reached in case of snow.
2. Verify that the fixing/supporting points are level and suitable to support the weight of the unit (see the weight and the weights distribution).
3. 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).
4. Anchor the unit to the ground; foresee windbreak barriers in case of places where there are strong prevalent winds.

The choice of the location of the unit is of fundamental importance for correct operation; to avoid:

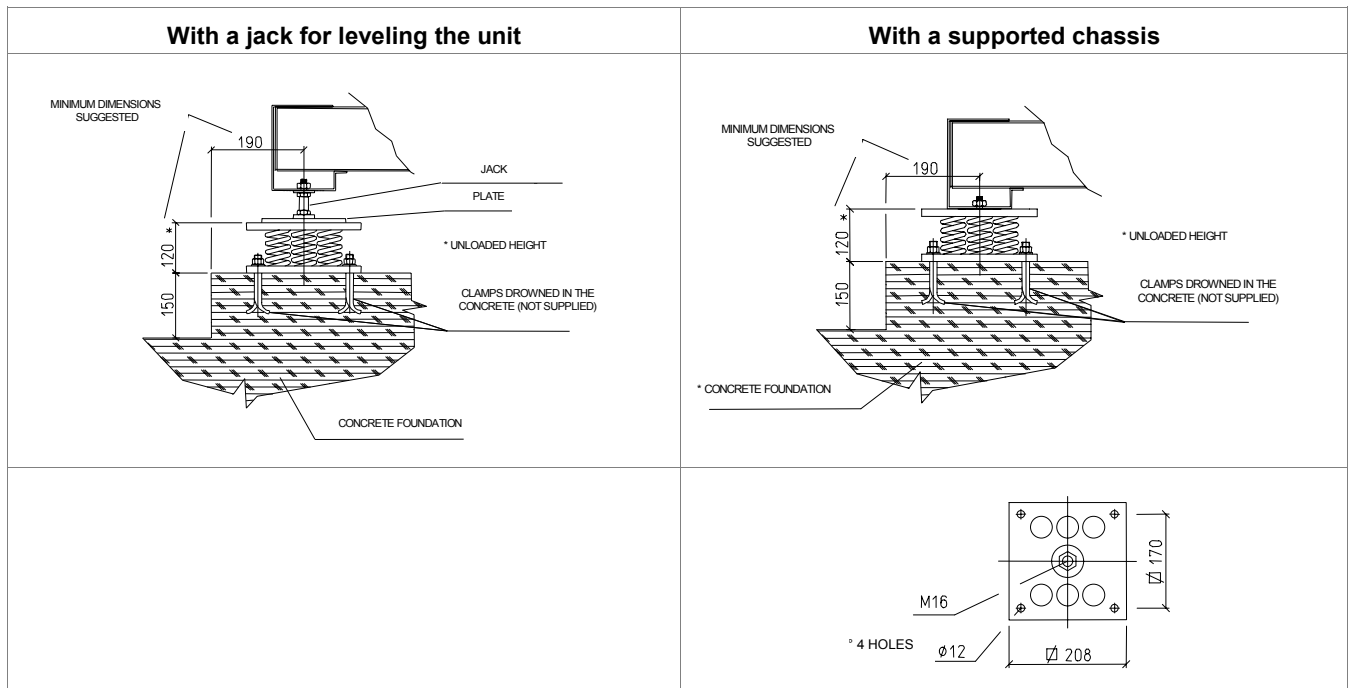
- Obstacles that block the flow of air,
- difficulty in air circulation
- leaves or other objects that may block the exchanger coils
- winds that contrast or excessively assist the air flow
- phenomena of stratification or air re-circulation
- nearby sources of heat
- Positioning under the round level or near very high walls (evaluate with attention)
- Installation in places where flooding can be verified.

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.

## 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.

## Acoustic configuration ST

Size	Ant.vibration code	W1	W2	W3	W4	W5	W6	W7	W8
2.160	PE581030	C6100100	C6100100	C6100090	C6100090	--	--	--	--
2.180	PE581030	C6100100	C6100100	C6100090	C6100090	--	--	--	--
2.200	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--
2.220	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--
2.250	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--
2.280	PE581069	C6100095	C6100095	C6100095	C6100095	--	--	--	--
2.300	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.320	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.340	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.360	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.390	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.420	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.450	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.480	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
3.480	PE581203	C6100101	C6100101	C6100095	C6100095	C6100101	C6100100	--	--
3.500	PE581227	C6100101	C6100101	C6100095	C6100101	C6100100	C6100101	C6100095	C6100101
3.540	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.570	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.630	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.660	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100



## - POSITIONING -

### Acoustic configuration SC

Size	Ant.vibration code	W1	W2	W3	W4	W5	W6	W7	W8
2.160	PE581086	C6100100	C6100100	C6100100	C6100100	--	--	--	--
2.180	PE581086	C6100100	C6100100	C6100100	C6100100	--	--	--	--
2.200	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--
2.220	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--
2.250	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.280	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.300	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.320	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.340	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.360	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.390	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.420	PE581225	C6100090	C6100101	C6100095	C6100086	C6100101	C6100100	--	--
2.450	PE581225	C6100090	C6100101	C6100095	C6100086	C6100101	C6100100	--	--
2.480	PE581225	C6100090	C6100101	C6100095	C6100086	C6100101	C6100100	--	--
3.480	PE581203	C6100101	C6100101	C6100095	C6100095	C6100101	C6100100	--	--
3.500	PE581228	C6100101	C6100101	C6100095	C6100101	C6100100	C6100101	C6100095	C6100101
3.540	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.570	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.630	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.660	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100

### Acoustic configuration LN

Size	Ant.vibration code	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
2.160	PE581086	C6100100	C6100100	C6100100	C6100100	--	--	--	--	--	--
2.180	PE581086	C6100100	C6100100	C6100100	C6100100	--	--	--	--	--	--
2.200	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--	--	--
2.220	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--	--	--
2.250	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--	--	--
2.280	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--	--	--
2.300	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--	--	--
2.320	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--	--	--
2.340	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--	--	--
2.360	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--	--	--
2.390	PE581242	C6100100	C6100101	C6100090	C6100095	C6100101	C6100101	C6100090	C6100095	--	--
2.420	PE581243	C6100100	C6100101	C6100090	C6100095	C6100101	C6100101	C6100090	C6100095	--	--
2.450	PE581243	C6100100	C6100101	C6100100	C6100095	C6100101	C6100101	C6100100	C6100095	--	--
2.480	PE581240	C6100100	C6100101	C6100100	C6100095	C6100101	C6100101	C6100100	C6100095	--	--
3.480	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100	--	--
3.500	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100	--	--
3.540	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100	--	--
3.630	PE581131	C6100090	C6100101	C6100100	C6100100	C6100100	C6100101	C6100101	C6100100	C6100086	C6100086

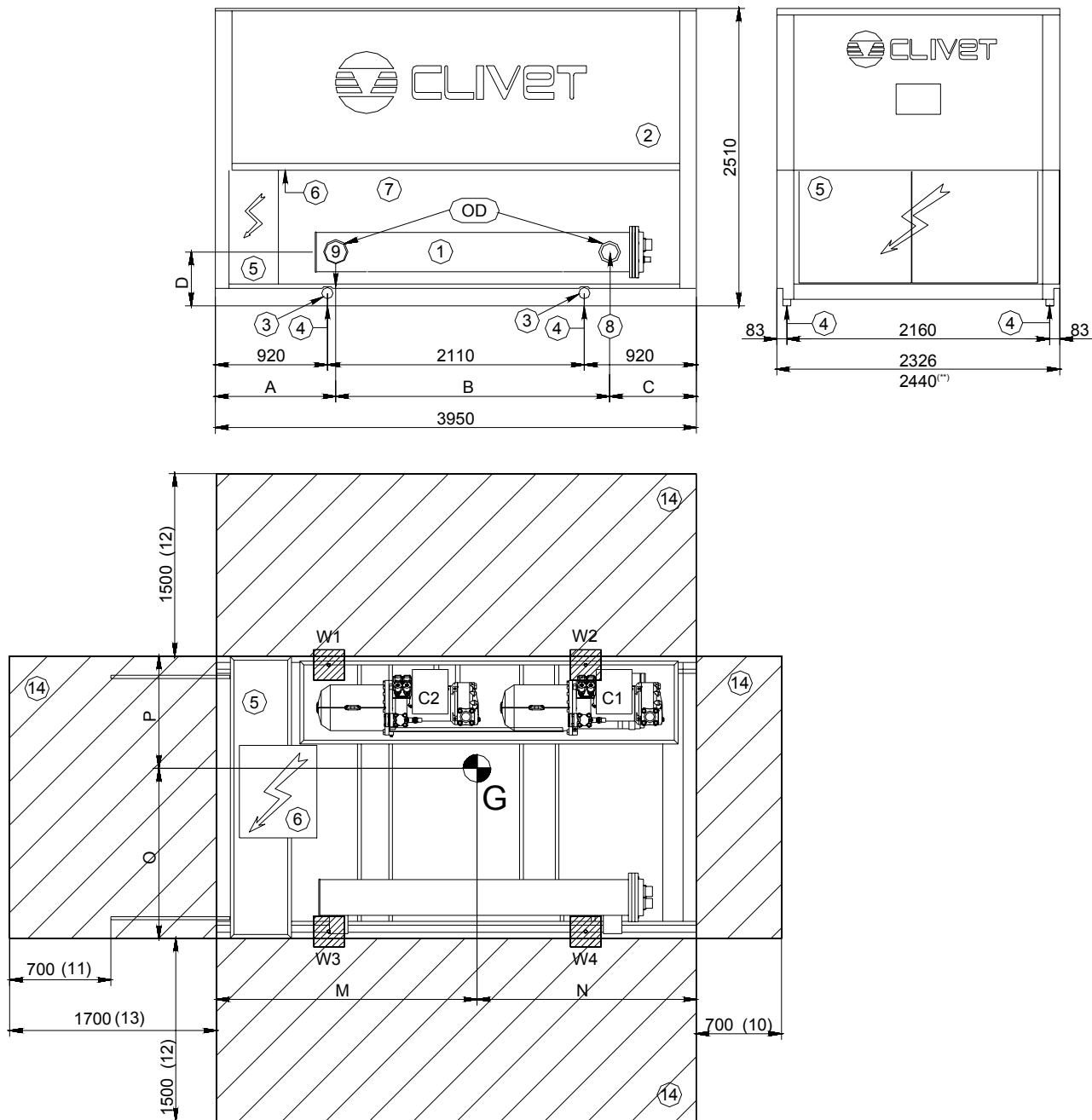
### Acoustic configuration EN

Size	Ant.vibration code	W1	W2	W3	W4	W5	W6	W7	W8
2.160	PE581086	C6100100	C6100100	C6100100	C6100100	--	--	--	--
2.180	PE581086	C6100100	C6100100	C6100100	C6100100	--	--	--	--
2.200	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--
2.220	PE581062	C6100095	C6100095	C6100100	C6100100	--	--	--	--
2.250	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.280	PE581130	C6100101	C6100101	C6100095	C6100095	--	--	--	--
2.300	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.320	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.340	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.360	PE581224	C6100090	C6100101	C6100100	C6100086	C6100101	C6100100	--	--
2.390	PE581243	C6100100	C6100101	C6100100	C6100095	C6100101	C6100101	C6100100	C6100095
2.420	PE581240	C6100100	C6100101	C6100100	C6100095	C6100101	C6100101	C6100100	C6100095
2.450	PE581240	C6100100	C6100101	C6100100	C6100095	C6100101	C6100101	C6100100	C6100095
2.480	PE581240	C6100100	C6100101	C6100100	C6100095	C6100101	C6100101	C6100100	C6100095
3.480	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.500	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100
3.540	PE581229	C6100090	C6100101	C6100100	C6100101	C6100090	C6100101	C6100100	C6100100



# DIMENSIONS / WEIGHT DISTRIBUTION

Sizes 2.160-2.180 ST/SC/LN/EN



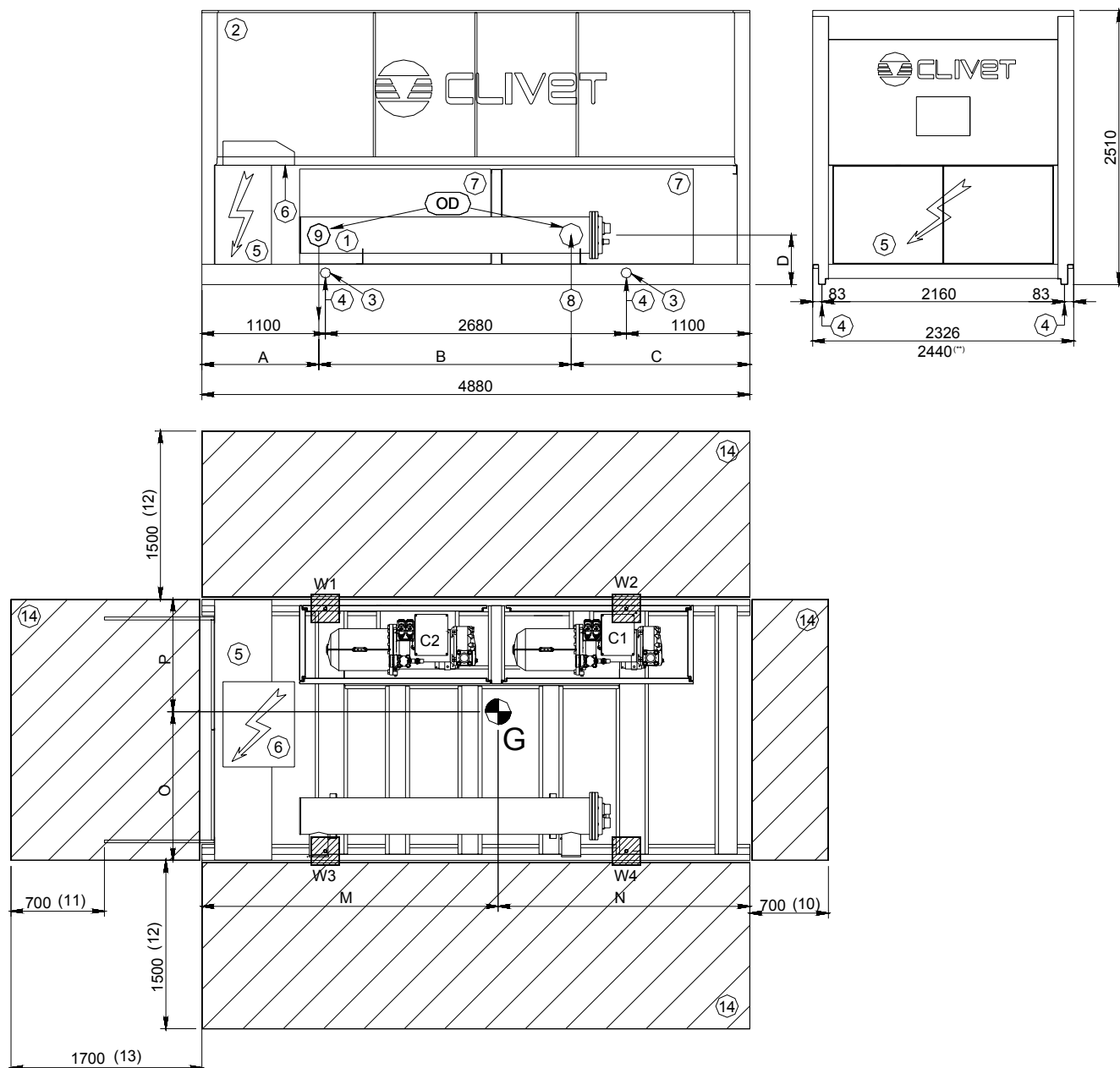
		ST		SC		LN		EN	
Sizes		2.160	2.180	2.160	2.180	2.160	2.180	2.160	2.180
A	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
B	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
C	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
D	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
M	mm	1992	1994	1991	1992	1990	1991	1990	1991
N	mm	1958	1956	1959	1958	1960	1959	1960	1959
O	mm	1216	1219	1280	1282	1276	1278	1276	1278
P	mm	1110	1107	1046	1044	1050	1048	1050	1048
OD	mm	141.3	168.3 / 219.1	141.3	168.3 / 219.1	141.3	168.3 / 219.1	141.3	168.3 / 219.1
W1	kg	1136	1141	1315	1320	1360	1365	1360	1365
W2	kg	1174	1182	1355	1363	1400	1408	1400	1408
W3	kg	1029	1028	1058	1057	1102	1102	1102	1102
W4	kg	1063	1065	1089	1092	1134	1137	1134	1137

- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

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

## - POSITIONING -

Sizes 2.200 -2.220 ST/SC/LN/EN



		ST		SC		LN		EN	
Sizes		2.200	2.220	2.200	2.220	2.200	2.220	2.200	2.220
A	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
B	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
C	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
D	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
M	mm	2498	2473	2516	2491	2514	2490	2514	2490
N	mm	2382	2407	2364	2389	2366	2390	2366	2390
O	mm	1242	1262	1304	1317	1301	1312	1301	1312
P	mm	1084	1064	1022	1009	1025	1014	1025	1014
OD	mm	168.3 / 219.1	168.3 / 219.1	168.3 / 219.1	168.3 / 219.1	168.3 / 219.1	168.3 / 219.1	168.3 / 219.1	168.3 / 219.1
W1	kg	1344	1533	1527	1717	1555	1773	1555	1773
W2	kg	1476	1617	1727	1866	1754	1921	1754	1921
W3	kg	1161	1276	1175	1288	1202	1343	1202	1343
W4	kg	1275	1346	1328	1400	1356	1456	1356	1456

- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

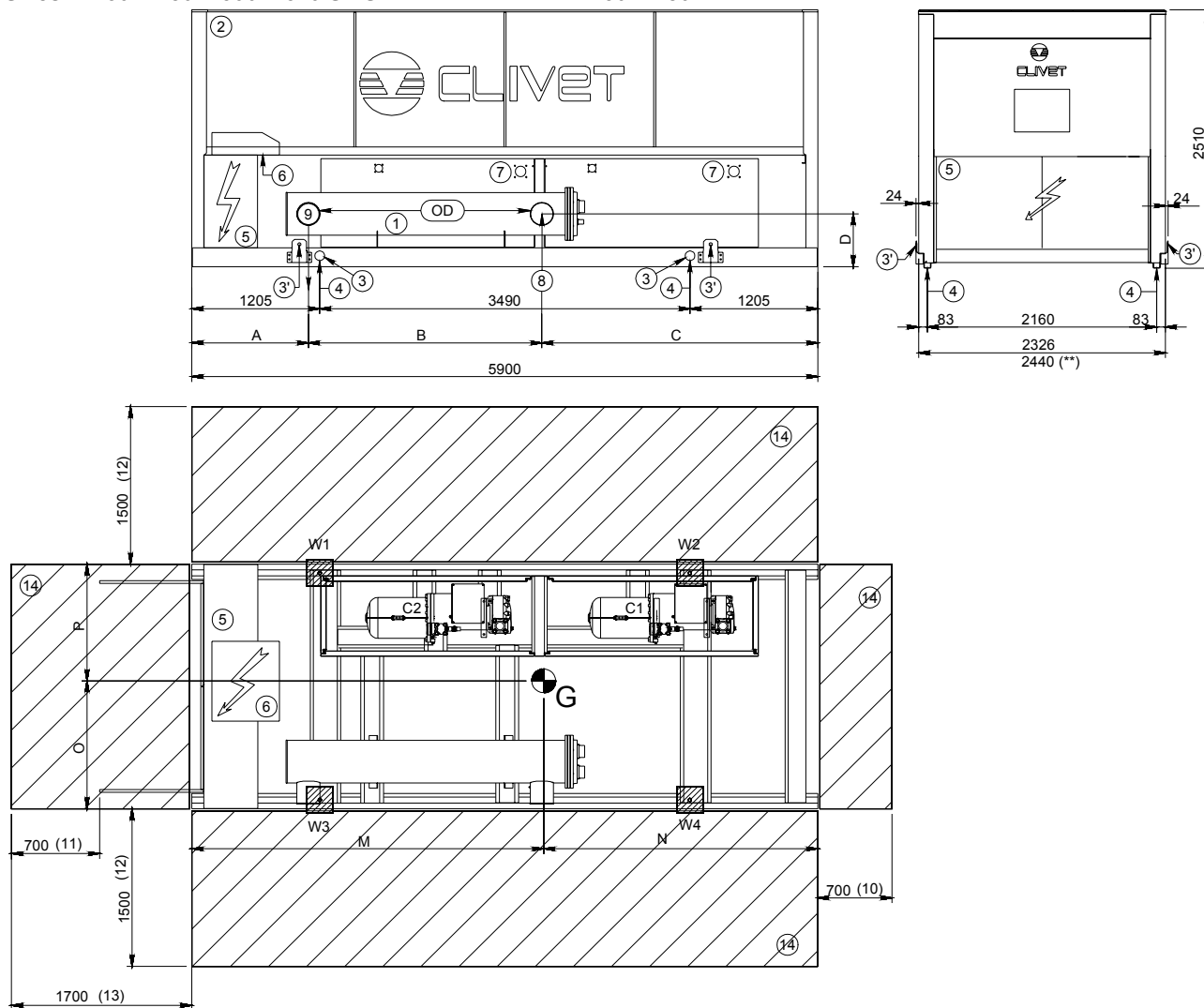
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Please contact our Technical Department.

# - POSITIONING -

WDAT-3  
2.160-3.660

Sizes 2.250-2.280-2.300-2.320 ST/SC

2.250-2.280 LN/EN



		ST				SC				LN		EN	
Sizes		2.250	2.280	2.300	2.320	2.250	2.280	2.300	2.320	2.250	2.280	2.250	2.280
A	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
B	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
C	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
D	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
M	mm	2967	2970	3061	3029	2966	2969	3055	3025	2965	2968	2965	2968
N	mm	2933	2930	2839	2871	2934	2931	2845	2875	2935	2932	2935	2932
O	mm	1264	1248	1269	1298	1309	1291	1307	1332	1303	1287	1303	1287
P	mm	1062	1078	1057	1028	1017	1035	1019	994	1023	1039	1023	1039
OD	mm	168.3/219.1	219.1	219.1	219.1	168.3/219.1	219.1	219.1	219.1	168.3/219.1	219.1	168.3/219.1	219.1
W1	kg	1645	1706	1826	2067	1824	1885	2002	2244	1889	1950	1889	1950
W2	kg	1677	1745	2074	2263	1857	1926	2258	2446	1922	1990	1922	1990
W3	kg	1362	1456	1500	1607	1390	1485	1532	1637	1455	1550	1455	1550
W4	kg	1389	1490	1704	1759	1416	1517	1728	1784	1481	1582	1481	1582

- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

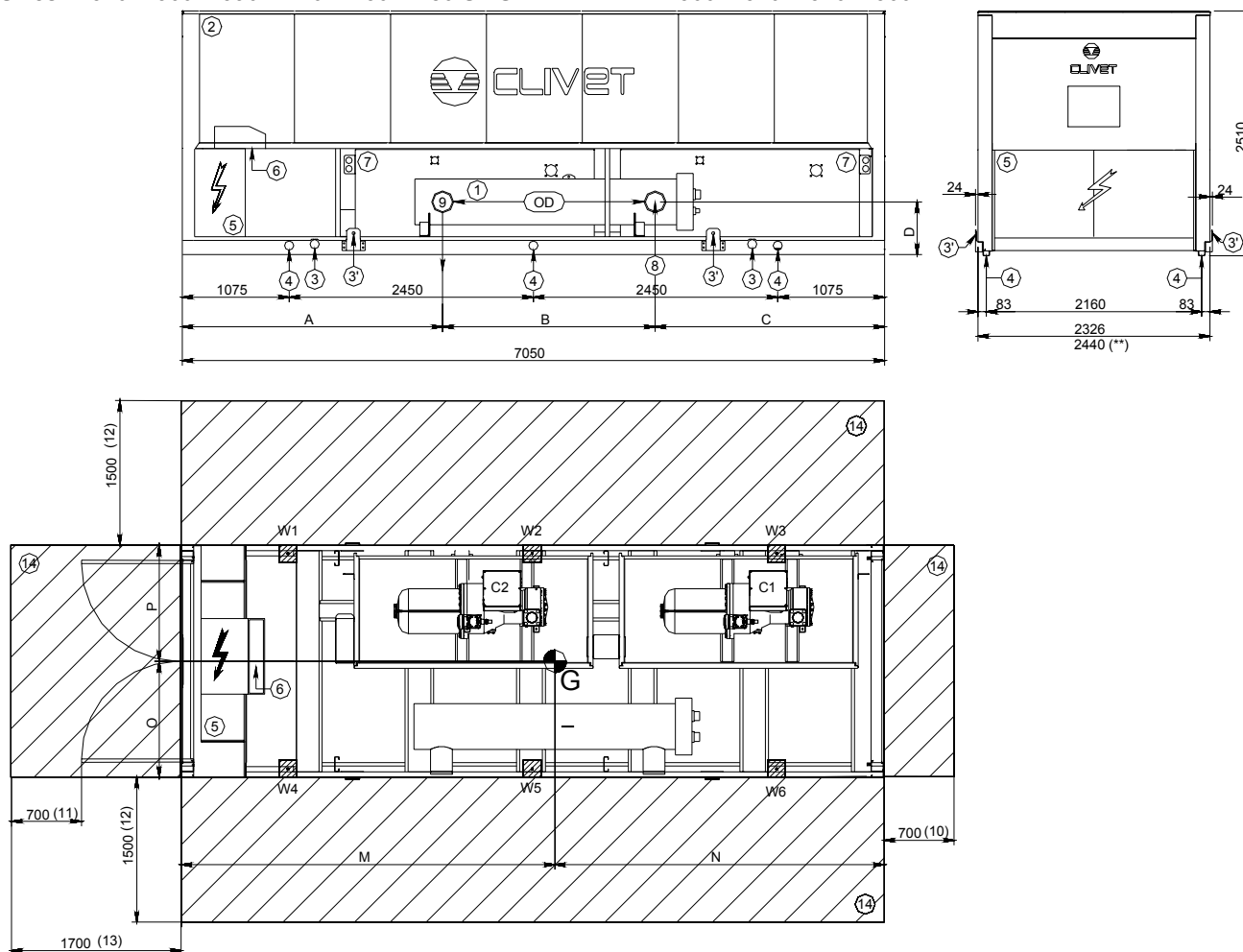
Particular accessories, executions or versions can bring about a great variation of the mass represented here. Please contact our Technical Department.

M02J40M6-04

# - POSITIONING -

Sizes 2.340-2.360-2.390-2.420-2.450-2.480 ST/SC

2.300-2.320-2.340-2.360 LN/EN



- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET

- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

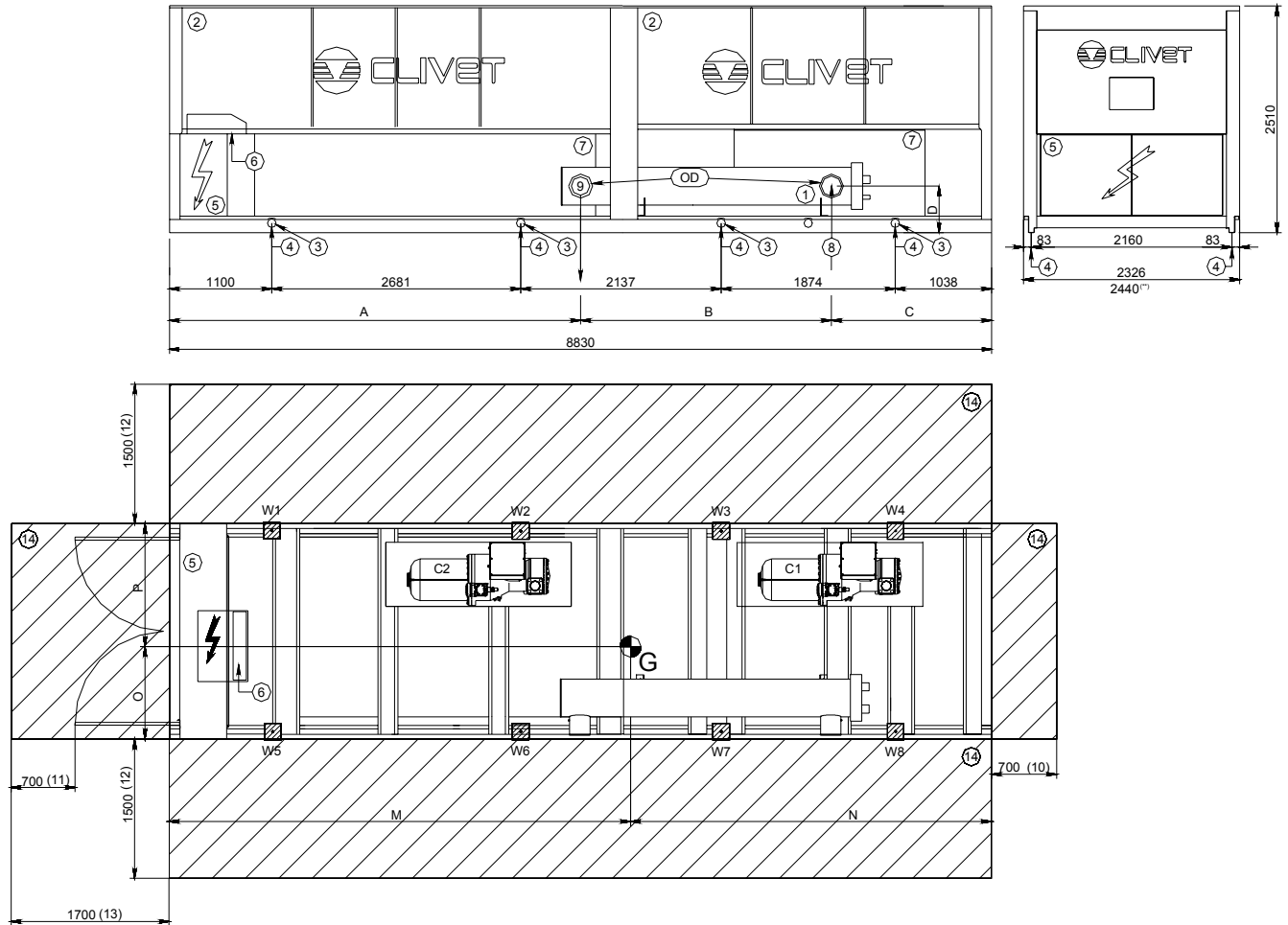
		ST						SC						LN				EN			
		2.340	2.360	2.390	2.420	2.450	2.480	2.340	2.360	2.390	2.420	2.450	2.480	2.300	2.320	2.340	2.360	2.300	2.320	2.340	2.360
A	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
B	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
C	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
D	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
M	mm	3739	3729	3743	3739	3746	3745	3764	3757	3772	3762	3774	3767	3788	3752	3756	3753	3788	3752	3756	3753
N	mm	3311	3321	3307	3311	3304	3305	3286	3293	3278	3288	3276	3283	3262	3298	3294	3297	3262	3298	3294	3297
O	mm	1211	1210	1209	1212	1202	1203	1233	1232	1231	1233	1223	1223	1235	1253	1231	1231	1235	1253	1231	1231
P	mm	1115	1116	1117	1114	1124	1123	1093	1094	1095	1093	1103	1103	1091	1073	1095	1095	1091	1073	1095	1095
OD	mm	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1	219.1
W1	kg	884	950	946	952	939	941	912	948	944	981	937	970	903	971	961	976	903	971	961	976
W2	kg	2244	2327	2359	2396	2453	2465	2412	2459	2491	2566	2586	2636	2041	2355	2470	2493	2041	2355	2470	2493
W3	kg	1269	1332	1362	1364	1369	1370	1370	1404	1434	1467	1440	1472	1366	1411	1418	1432	1366	1411	1418	1432
W4	kg	814	876	875	875	879	879	808	841	840	871	844	875	797	832	855	869	797	832	855	869
W5	kg	2064	2147	2181	2202	2295	2302	2137	2183	2217	2276	2330	2376	1802	2018	2197	2218	1802	2018	2197	2218
W6	kg	1167	1230	1260	1254	1281	1279	1214	1247	1277	1302	1298	1327	1206	1209	1261	1274	1206	1209	1261	1274

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

## - POSITIONING -

**WDAT-3**  
**2.160-3.660**

**Sizes 2.390 LN**



SIZES		LN
2.390		
A	mm	(*)
B	mm	(*)
C	mm	(*)
D	mm	(*)
M	mm	4915
N	mm	3915
O	mm	1319
P	mm	1007
OD	mm	219.1
W1	kg	1337
W2	kg	1914
W3	kg	1013
W4	kg	1450
W5	kg	1864
W6	kg	990
W7	kg	1378
W8	kg	732

- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

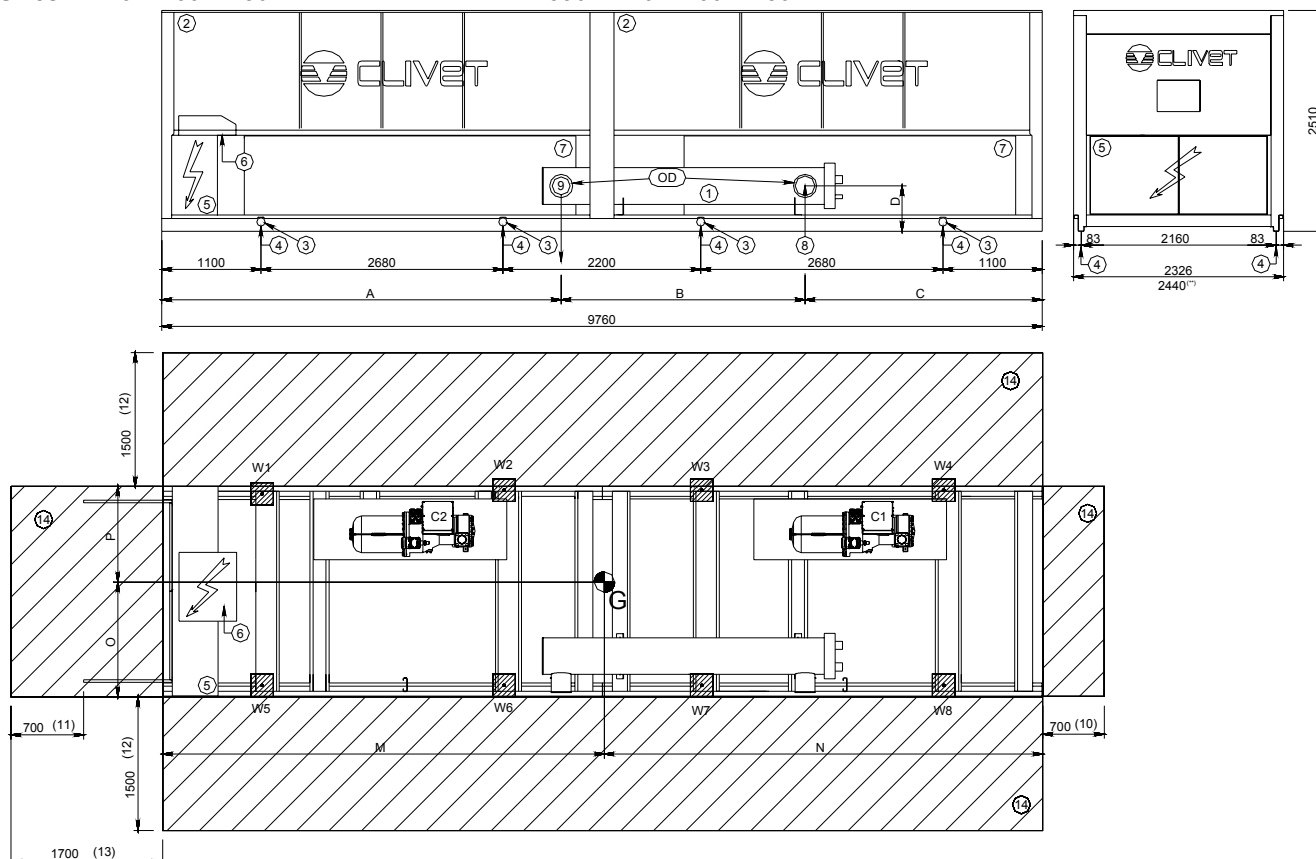
Particular accessories, executions or versions can bring about a great variation of the mass represented here.  
Please contact our Technical Department.

M02J40M6-04

# - POSITIONING -

Sizes 2.420-2.450-2.480 LN

2.390-2.420-2.450-2.480 EN



- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

) WORK IN PROGRESS

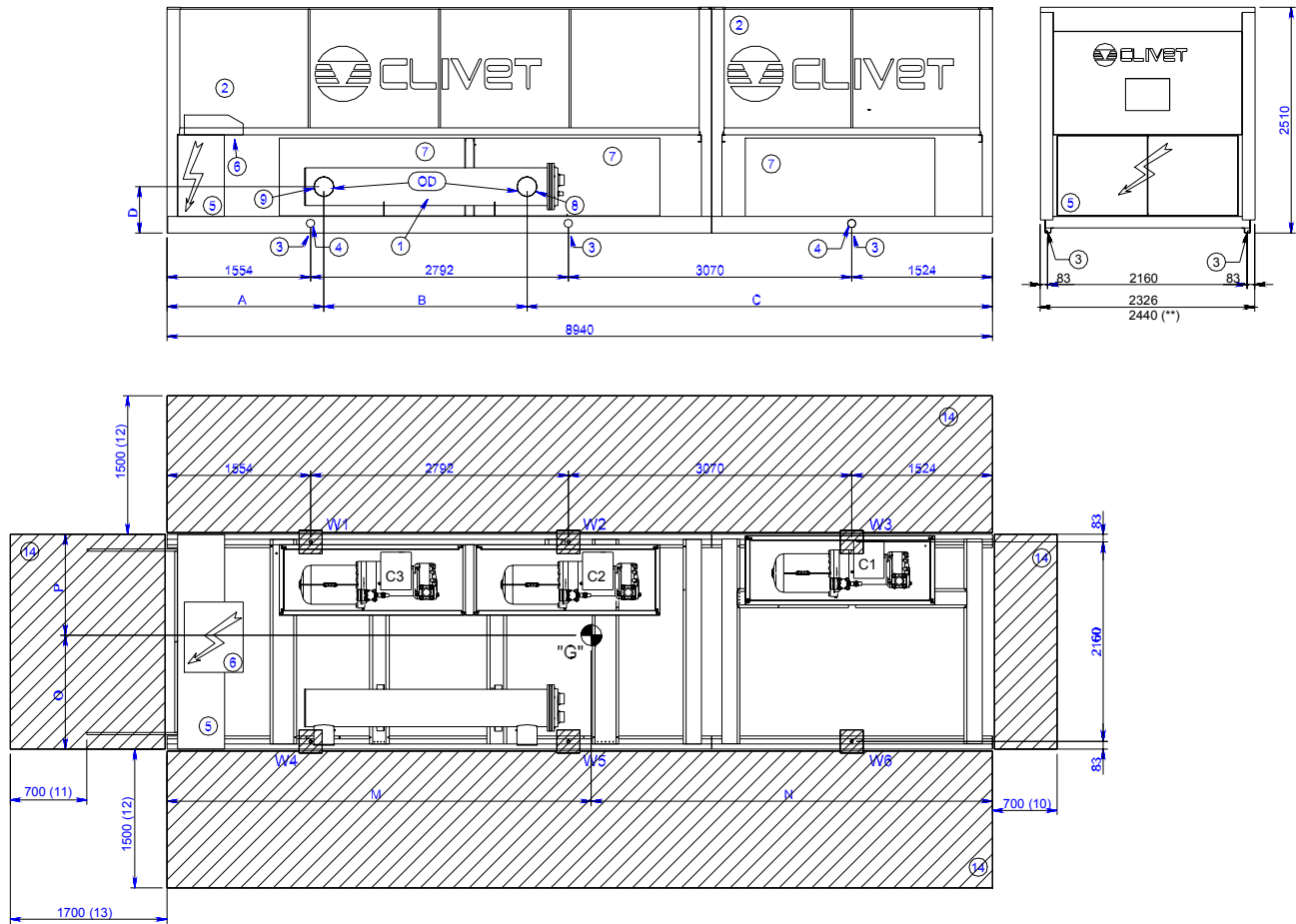
		LN			EN			
SIZES		2.420	2.450	2.480	2.390	2.420	2.450	2.480
A	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)
B	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)
C	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)
D	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)
M	mm	5230	5220	5261	5167	5220	5255	5261
N	mm	4530	4540	4499	4593	4540	4505	4499
O	mm	1318	1306	1304	1311	1312	1303	1304
P	mm	1008	1020	1022	1015	1014	1023	1022
OD	mm	219.1	219.1	219.1	219.1	219.1	219.1	219.1
W1	kg	1337	1369	1369	1393	1393	1369	1369
W2	kg	1914	2026	2026	1968	1968	2026	2026
W3	kg	1013	1063	1063	1066	1066	1063	1063
W4	kg	1450	1573	1573	1506	1506	1573	1573
W5	kg	1998	2044	2107	1969	2050	2097	2107
W6	kg	1078	1048	1113	1055	1135	1105	1113
W7	kg	1486	1552	1610	1485	1544	1610	1610
W8	kg	802	795	850	795	855	848	850

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

## - POSITIONING -

**WDAT-3**  
**2.160-3.660**

**Sizes 3.480 ST/SC**



		ST	SC
SIZES		3.480	3.480
A	mm	(*)	(*)
B	mm	(*)	(*)
C	mm	(*)	(*)
D	mm	(*)	(*)
M	mm	4232	4276
N	mm	4708	4664
O	mm	1023	990
P	mm	1303	1336
OD	mm	219	219
W1	kg	2015	2136
W2	kg	2678	2926
W3	kg	1599	1786
W4	kg	1552	1547
W5	kg	2061	2119
W6	kg	1231	1293

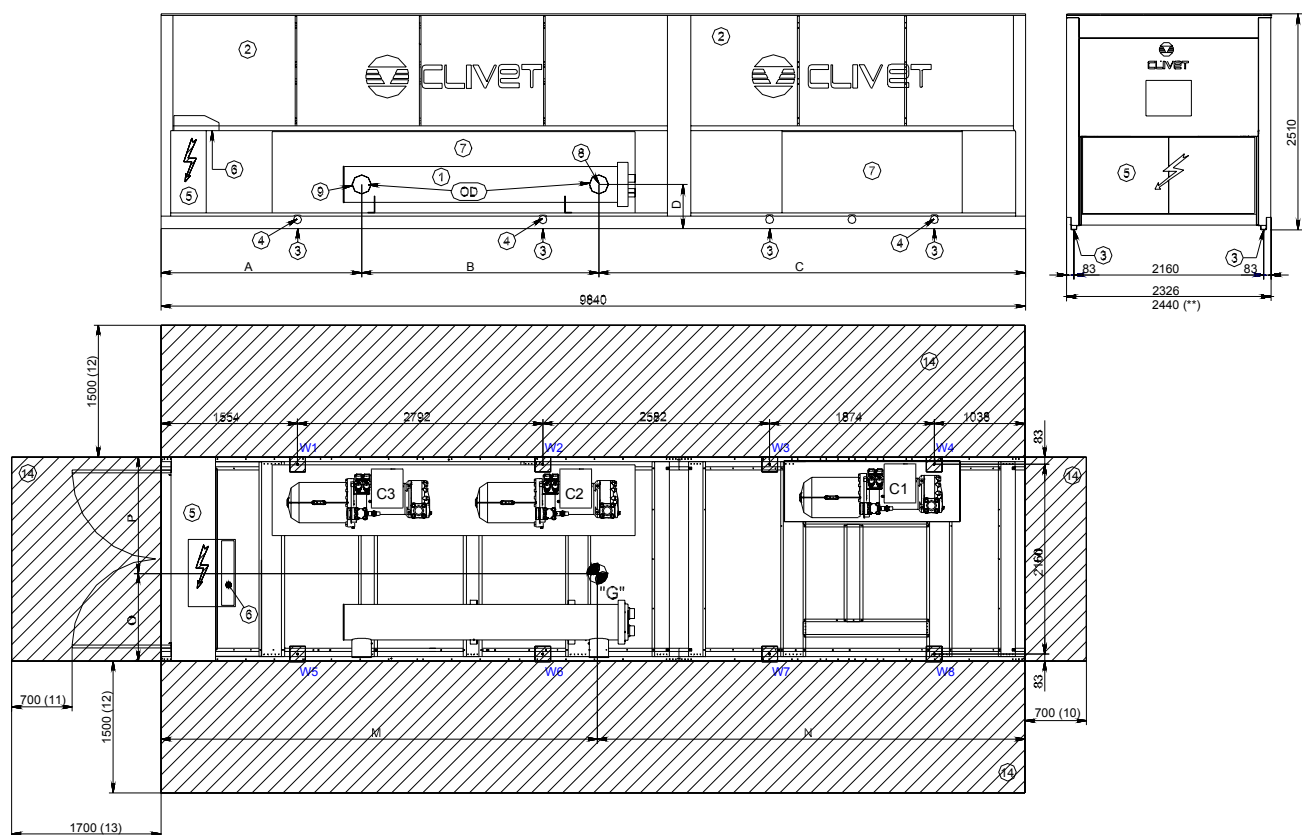
- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

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

M02J40M6-04

# - POSITIONING -

Sizes 3.500 ST/SC



		ST	SC
SIZES		3.500	3.500
A	mm	(*)	(*)
B	mm	(*)	(*)
C	mm	(*)	(*)
D	mm	(*)	(*)
M	mm	5246	5176
N	mm	4594	4664
O	mm	747	754
P	mm	1579	1572
OD	mm	219	219
W1	kg	1986	2126
W2	kg	2481	2701
W3	kg	1784	1792
W4	kg	2229	2276
W5	kg	1101	1198
W6	kg	1235	1355
W7	kg	672	685
W8	kg	754	774

- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

Particular accessories, executions or versions can bring about a great variation of the mass represented here.  
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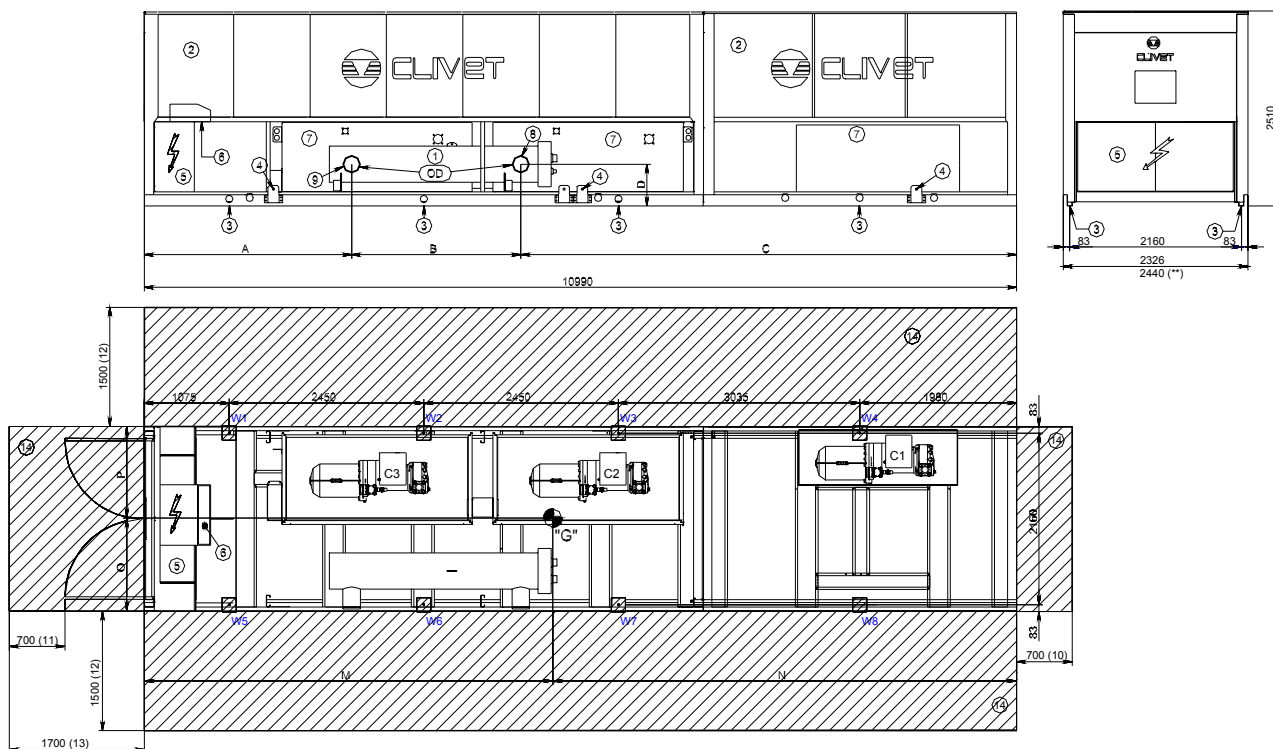


# - POSITIONING -

WDAT-3  
2.160-3.660

Sizes 3.540-3.630-3.660 ST/SC

3.480-3.500-3.540 LN/EN



- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

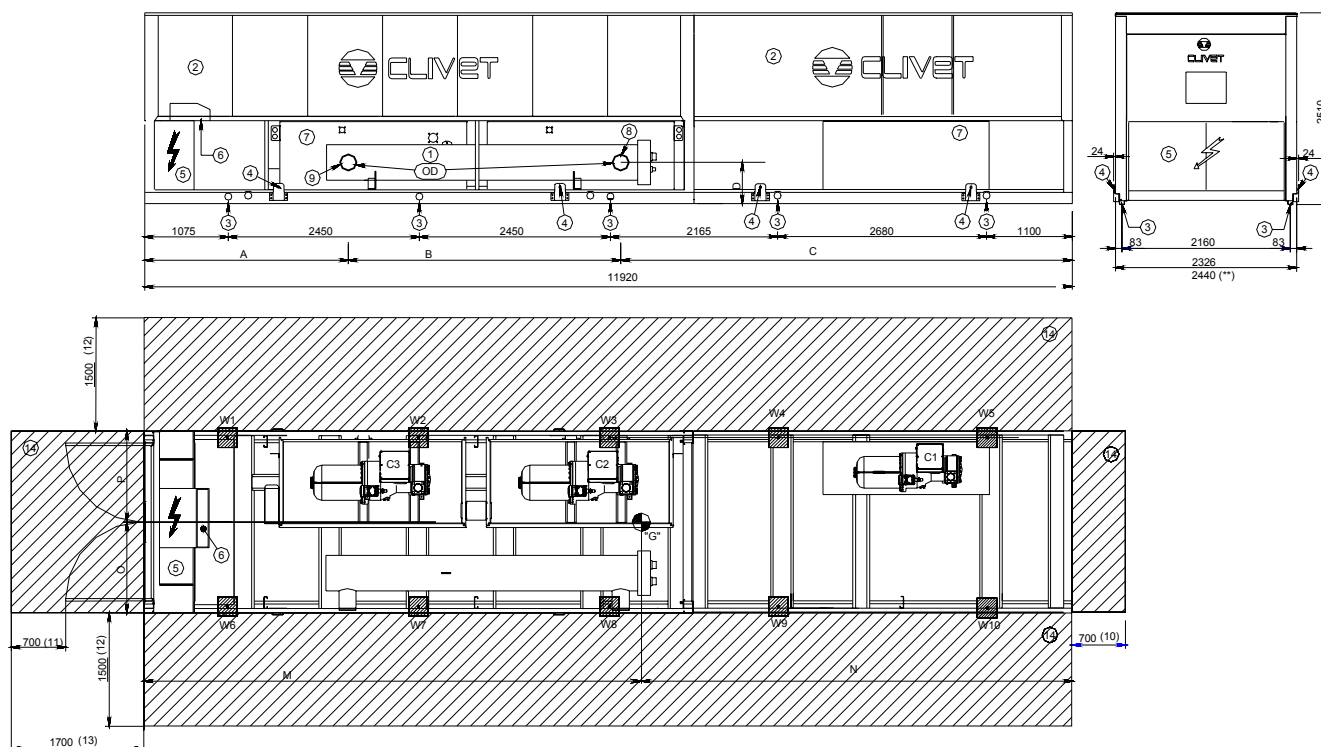
		ST			SC			LN			EN		
SIZES		3.540	3.630	3.660	3.540	3.630	3.660	3.480	3.500	3.540	3.480	3.500	3.540
A	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
B	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
C	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
D	mm	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
M	mm	5237	5193	5188	5275	5232	5226	5314	5291	5280	5320	5291	5280
N	mm	5753	5797	5802	5715	5758	5764	5676	5699	5710	5670	5699	5710
O	mm	1088	1100	1096	1063	1075	1072	1043	1059	1063	1043	1059	1063
P	mm	1238	1226	1230	1263	1251	1254	1283	1267	1263	1283	1267	1263
OD	mm	219	219	219	219	219	219	219	219	219	219	219	219
W1	kg	897	903	909	926	932	938	959	933	926	959	933	926
W2	kg	2538	2744	2784	2709	2916	2957	2564	2669	2709	2564	2669	2709
W3	kg	1309	1358	1386	1410	1459	1487	1420	1408	1410	1420	1408	1410
W4	kg	2336	2398	2398	2553	2615	2615	2544	2563	2563	2554	2563	2563
W5	kg	894	927	925	890	923	921	879	888	890	879	888	890
W6	kg	2530	2818	2831	2603	2889	2902	2351	2541	2603	2351	2541	2603
W7	kg	1305	1395	1410	1355	1445	1460	1302	1341	1355	1302	1341	1355
W8	kg	1426	1444	1444	1459	1477	1477	1458	1469	1469	1468	1469	1469

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

M02J40M6-04

# - POSITIONING -

Sizes 3.630 LN



SIZES		LN
		3.630
A	mm	(*)
B	mm	(*)
C	mm	(*)
D	mm	(*)
M	mm	5437
N	mm	6483
O	mm	1018
P	mm	1308
OD	mm	219
W1	kg	904
W2	kg	2882
W3	kg	1431
W4	kg	1350
W5	kg	1355
W6	kg	896
W7	kg	2855
W8	kg	1417
W9	kg	782
W10	kg	785

- (1) INTERNAL EXCHANGER (EVAPORATOR)
- (2) EXTERNAL EXCHANGER (CONDENSER)
- (3) LIFTING HOLES
- (4) HOLE TO HANG UNIT
- (5) ELECTRICAL PANEL
- (6) POWER INPUT
- (7) SOUNDPROOFED CABIN
- (8) INTERNAL EXCHANGER WATER INLET
- (9) INTERNAL EXCHANGER WATER OUTLET
- (10) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (11) MINIMUM DIMENSION FOR A SAFE PASSAGE WHEN THE DOOR OF THE ELECTRICAL SWITCHBOARD IS OPEN.
- (12) MINIMUM DIMENSION FOR A PROPER AIR FLOW TO THE CONDENSER COIL.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) CLEARANCE ACCESS RECOMMENDED
- (G) BARYCENTRE
- (\*) WORK IN PROGRESS

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 form 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 vapor 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.

## EVAPORATOR CONNECTION

### 1. FILTER

The filter, if not present on the unit, must be installed immediately upstream the unit, in a position accessible for the cleaning.

### 2. FLOW SWITCH

The flow switch must be foreseen, because is a system component. It has to be installed in a duct rectilinear part, not in proximity of curves that cause turbulences.

### 3. ANTIFREEZE SOLUTIONS

In case of unit use with water temperatures lower than + 4°C avoid the ice forming using antifreeze solutions (ex. Ethylene Glycol) in the required percentage. The use must be foreseen also in antifreeze function for ambient temperatures next to 0°C.

### 4. ANTIFREEZE HEATER

If the unit is equipped with antifreeze heater exchanger side (standard or optional according to the models) check that they are electrically supplied in the unit stop periods (nocturnal, weekend, long stops).

### 5. SYSTEM CLEANING

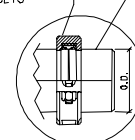
Perform careful system cleaning using clear water and discharging it before the unit connection

## VICTAULIC CONNECTIONS

DO NOT WELD THE INSTALLATION PIPE (TOGETHER WITH THE CONNECTION UNION OF THE EVAPORATOR) WITH THE VICTAULIC CONNECTION JOINT ATTACHED. THE RUBBER GASKETS COULD BE IRREPARABLY DAMAGED.

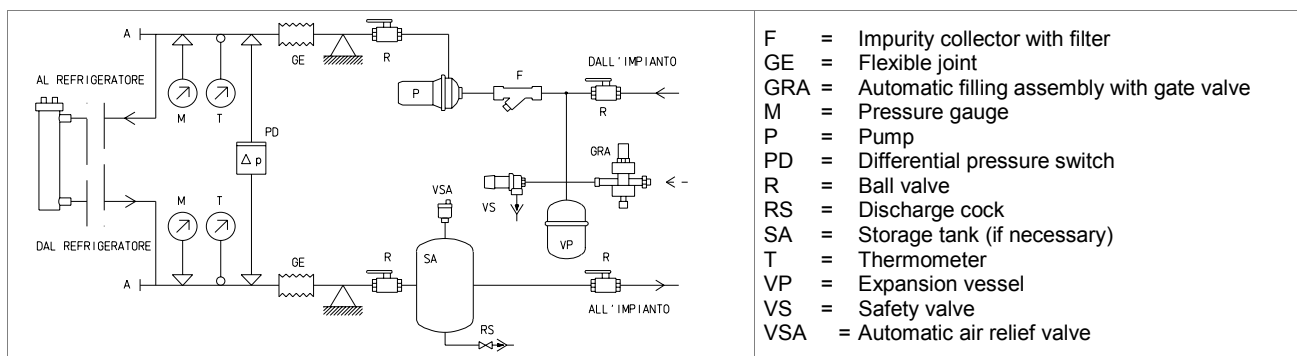
1. Take away the supplied connection union by acting on the connection joint Victaulic.
2. Weld the union to the installation pipe.
3. Perform the connection between the installation pipe and the evaporator, using the joint.

RACCORDO DI COLLEGAMENTO  
A SALDARE O.D.  
GIUNTO DI CONNESSIONE  
TIPO VICTAULIC



## SUGGESTED CONNECTION DIAGRAM

An example of a plan is as follows:



## HYDROPACK

By equipping the refrigerating units with the Hydropack accessory, the necessary flow capacity/head are provided in different versions according to the plants potential.

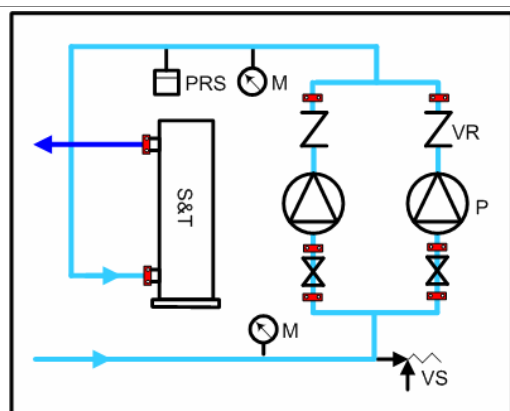
HYDROPACK with 2 pumps:

in case of blockage of a pump, the unit continues to operate normally up to about 60% of the load; this condition is in any case more reliable than the traditional solution with a single-pump of greater power. Electric pumps with 2-pole motor (2950 rpm) for the versions ST/SC/LN and electric pumps with 4-pole motors (1450 rpm) for the versions ST/SC/LN/EN are available. The 4-pole option ensures a lower noise with lower max. useful head.

More specifically, all main components (including the pre-setting of the connection to the system) are hydraulically connected through swift-latch connections instead of the traditional welding, flanging and threading, with obvious advantages for the user:

- They can be easily dismantled, affording an advantage in the inspection and maintenance operations.
- Work times are reduced by 90%.
- The deployment of specialised personnel is not necessary.
- The moving of single components is made very simple.
- Weight is reduced since at even piping dimensions the joints weigh half as much as the flanges.
- Utilisation of standard components that are available anywhere in the market.

In this way connection activities are reduced to hydraulic pipe ones and to electric supply.



Multi pump hydronic group including:

- M =gauges, -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),
- S&T =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.

## 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 exceed the **MAXIMUM ALLOWED DISTANCE**, that varies according to the type of signal.

Observe the requisites relevant to **IMPEDANCE**, **CAPACITY**, **ATTENUATION** (where necessary).

Follow the indication relevant to **SHIELDING** (where necessary).

Place the cables **FAR FROM POWER CABLES** or cables that have a different tension or emit electromagnetic disturbances.

**AVOID LAYING CABLES IN PARALLEL TO OTHER CONDUCTORS AS WELL AS INSIDE THE SAME RACEWAY.**

## STANDARD UNIT ELECTRICAL DATA

### ACOUSTIC CONFIGURATION: STANDARD (ST) / COMPRESSOR SOUNDPROOFING (SC)

#### Voltage: 400/3/50

SIZES		2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
<b>F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS</b>															
F.L.A. - Total	A	262.9	296.5	385.1	385.1	422.5	480.3	512.6	544.9	576.7	608.5	629.1	697.7	739.7	769.7
<b>L.R.A. LOCKED ROTOR AMPERES</b>															
L.R.A. - Single External Fan	A	14	14	14	14	14	14	14	14	14	14	14	14	14	14
<b>F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION</b>															
F.L.I. - Total	kW	155.8	179.6	232.2	232.2	254.6	291.6	316.3	341	360.1	379.2	391.3	428.3	448.9	467.8
<b>M.I.C. MAXIMUM INRUSH CURRENT</b>															
M.I.C. - Value	A	537.6	627.4	580.7	580.7	642.4	685.3	698.3	730.6	809.6	841.4	945.4	1042	1103	1133

voltage unbalance: max 2%

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

#### Voltage: 400/3/50

SIZES		3.480	3.500	3.540	3.630	3.660
<b>F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS</b>						
F.L.A. - Total	A	817.4	857.4	921	978.7	1050.7
<b>F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION</b>						
F.L.I. - Total	kW	511.5	534.4	572.6	607	644.4
<b>M.I.C. MAXIMUM INRUSH CURRENT</b>						
M.I.C. - Value	A	1002.6	1089.8	1153.4	1294.5	1394.5

voltage unbalance: max 2%

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

**- ELECTRICAL CONNECTIONS -****ACOUSTIC CONFIGURATION: LOW NOISE (LN)****Voltage: 400/3/50**

SIZES		2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
<b>F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS</b>															
F.L.A. - Total	A	248.3	281.9	366.8	366.8	404.2	458.3	490.6	522.9	557	591.1	616.7	685.7	727.7	757.7
<b>L.R.A. LOCKED ROTOR AMPERES</b>															
L.R.A. - Single External Fan	A	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
<b>F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION</b>															
F.L.I. - Total	kW	150.4	174.2	225.5	225.5	247.9	283.5	308.2	332.9	353.2	373.6	388.7	426.3	446.9	465.8
<b>M.I.C. MAXIMUM INRUSH CURRENT</b>															
M.I.C. - Value	A	490.7	580.5	522.1	522.1	583.8	614.9	627.9	660.2	743.3	777.4	882	979	1040	1070

voltage unbalance: max 2%      power supply: 400/3/50 Hz +/-6%

**Voltage: 400/3/50**

SIZES		3.480	3.500	3.540	3.630
<b>F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS</b>					
F.L.A. - Total	A	789.0	820.8	888.9	938.4
<b>F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION</b>					
F.L.I. - Total	kW	501.9	521	561.6	592.2
<b>M.I.C. MAXIMUM INRUSH CURRENT</b>					
M.I.C. - Value	A	925.8	1004.8	1074.8	1197.8

voltage unbalance: max 2%      power supply: 400/3/50 Hz +/-6%

**ACOUSTIC CONFIGURATION: EXTREMELY LOW NOISE (EN)****Voltage: 400/3/50**

SIZES		2.160	2.180	2.200	2.220	2.250	2.280	2.300	2.320	2.340	2.360	2.390	2.420	2.450	2.480
<b>F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS</b>															
F.L.A. - Total	A	248.3	281.9	366.8	366.8	404.2	458.3	490.6	522.9	557	591.1	621.2	685.7	727.7	757.7
<b>L.R.A. LOCKED ROTOR AMPERES</b>															
L.R.A. - Single External Fan	A	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
<b>F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION</b>															
F.L.I. - Total	kW	150.4	174.2	225.5	225.5	247.9	283.5	308.2	332.9	353.2	373.6	391.2	426.3	446.9	465.8
<b>M.I.C. MAXIMUM INRUSH CURRENT</b>															
M.I.C. - Value	A	490.7	580.5	522.1	522.1	583.8	614.9	627.9	660.2	743.3	777.4	886.5	979	1040	1070

voltage unbalance: max 2%      power supply: 400/3/50 Hz +/-6%

**Voltage: 400/3/50**

SIZES		3.480	3.500	3.540
<b>F.L.A. FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS</b>				
F.L.A. - Total	A	789	820.8	888.9
<b>F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION</b>				
F.L.I. - Total	kW	501.9	521	561.6
<b>M.I.C. MAXIMUM INRUSH CURRENT</b>				
M.I.C. - Value	A	925.8	1004.8	1074.8

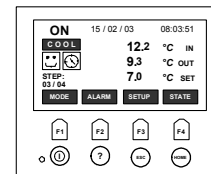
voltage unbalance: max 2%      power supply: 400/3/50 Hz +/-6%

**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

ONLY FOR UNITS IN THE CONSTRUCTIVE CONFIGURATION WITH A STANDARD KEYBOARD:



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

Generally the unit is delivered with bridged terminals; if the control is not used, the bridge should not be removed.

### 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 5a (ac1).

### SECOND SET-POINT

It is possible to activate a secondary set-point with a remote contact (for example for the nighttime).

### DEMAND LIMIT

It is possible to limit the absorbed electric power with an external signal of 10 Vcc or 4-20 mA.

Only an authorised service centre can perform the parameter configuration.

### 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 by an assistance center.

### EXTERNAL AIR HUMIDITY PROBE

Optional – It allows the automatic correction of the set-point, according to external air enthalpy. The working process is similar to the above mentioned process.

Only an authorised service centre can perform the parameter configuration.

### 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.

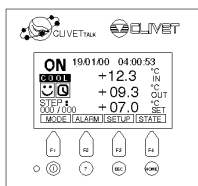
The working process is similar to the above mentioned process.

Only an authorised service centre can perform the parameter configuration.



## CLIVET TALK MODULAR SYSTEM COMPOSITION

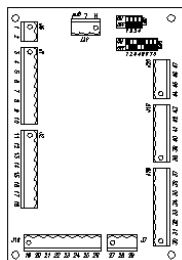
CLIVET TALK system is made up of different modules connected to each other with the CAN OPEN protocol. The system configuration varies according to the typology of the unit and of the accessories: not always the represented electric modules are all presents on the unit.



### INTERFACE

code C5110606

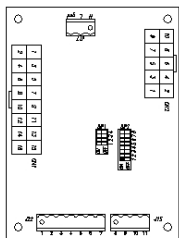
The interface module allows for the control of the operations of the whole machine, the programming of the different adjustment parameters and also to display the alarms and the unit status.



### CENTRAL MODULE

code C5110694

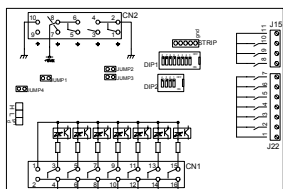
The central module manages the system configuration, the working mode, the set point, the thermal adjustment, remote inputs.



### SCREW COMPRESSOR MODULE

code C5110705

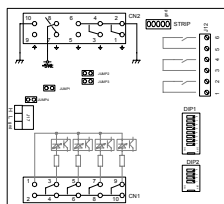
It manages the cooling circuit (compressors, fans, valves) and relative safety devices.



### COMPRESSOR MODULE - TANDEM / TRIO

code C5110673 (tandem) – C5110672 (trio)

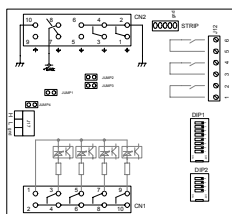
It manages the cooling circuit (compressors, fans, valves) and relative safety devices.



### EVAPORATOR MODULE

code C5110674

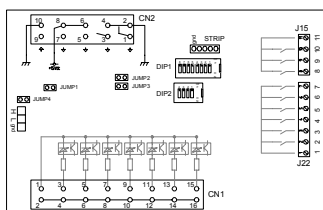
It manages components, safety devices, inputs and outputs relative to the water circuit (pumps, differential manostat, temperature probes)



### 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

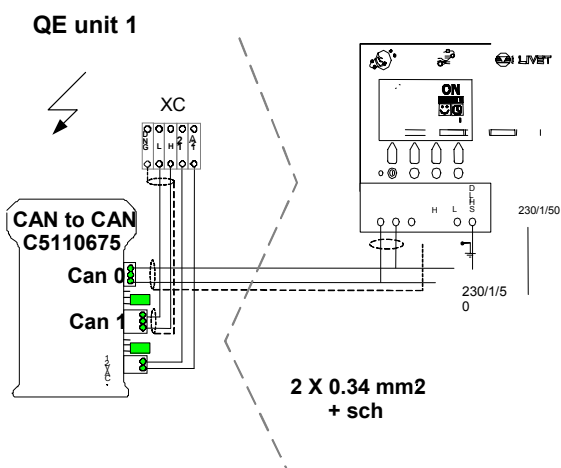
The remote keyboard has the same functions of the keyboard on board of the machine.

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.



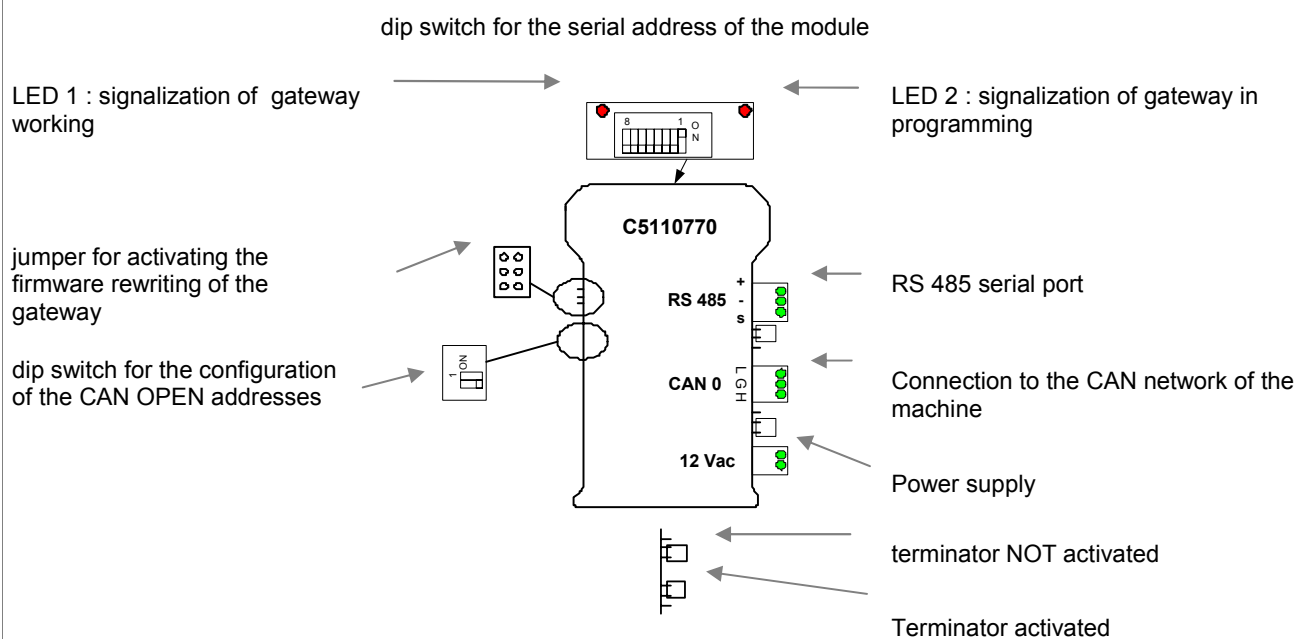
## MODBUS - CONVERTER CAN to MODBUS via RS 485

cod PE1W0003 / 6

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

The converter must be mounted on the electric board of the unit and connected, following the electric diagram attached to the unit.

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

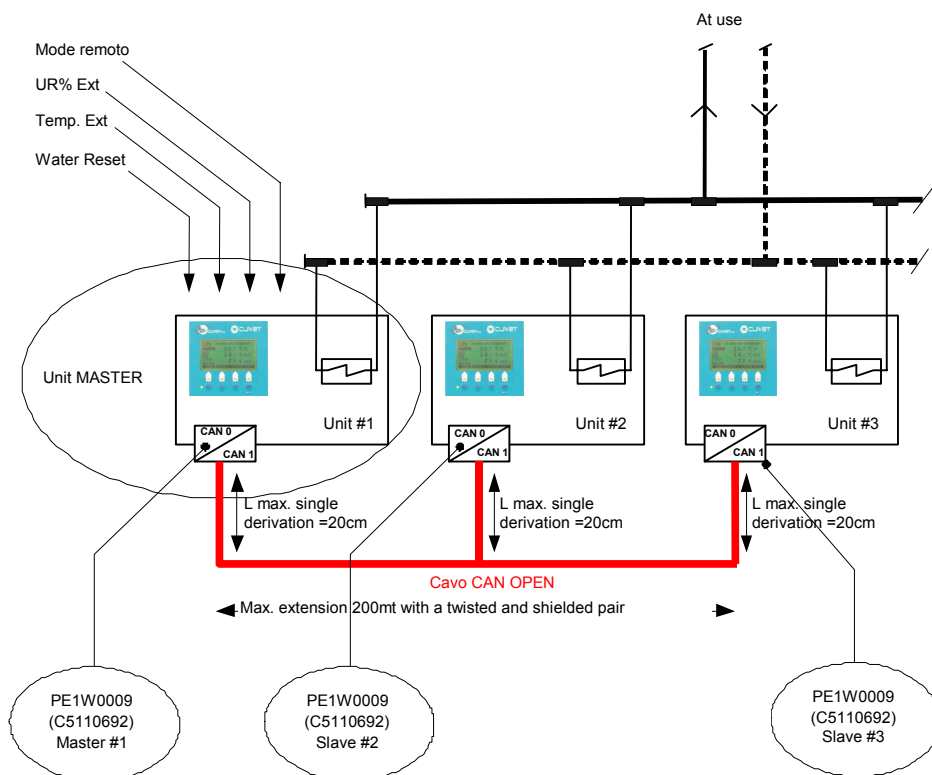


## UNIT NETWORK – MINI NETWORK – MASTER SLAVE

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)	0.34mm2
Heater	70mΩ/meter
Impedance	120mΩ/meter
Propagation delay	5nS/metrer
Length MAX	200meters

DATALOGGER  
cod PE1W0006

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

## LONWORKS

cod PE1W0014 / 25

## - 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 external fans may suffer temporary jamming, especially if they have been inactive for a long time prior to the first start-up or if the outside temperatures are extremely cold.

They can be released manually (ONLY WITH THE UNIT TURNED OFF AT THE MAINS – OTHERWISE THERE IS RISK OF INJURY) to avoid seizure or electric overload when the unit turned on.

The circulators are also subject to jamming in the motor shaft: they are easily released using a screwdriver in the bleeding hole.

### 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.

## 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 SAFETLY) check:

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

## 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

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

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

The data will be useful to check the unit in the future; therefore, it is important that the data are kept carefully and are available when maintenance is performed.

## REDUCED LOAD OPERATION

The units are equipped with partialization steps and they can, therefore, operate with reduced loads.

Nevertheless, a constant and long operation of reduced loading with frequent stops and start-ups of the compressor/s can cause serious damage for the lack of oil return.

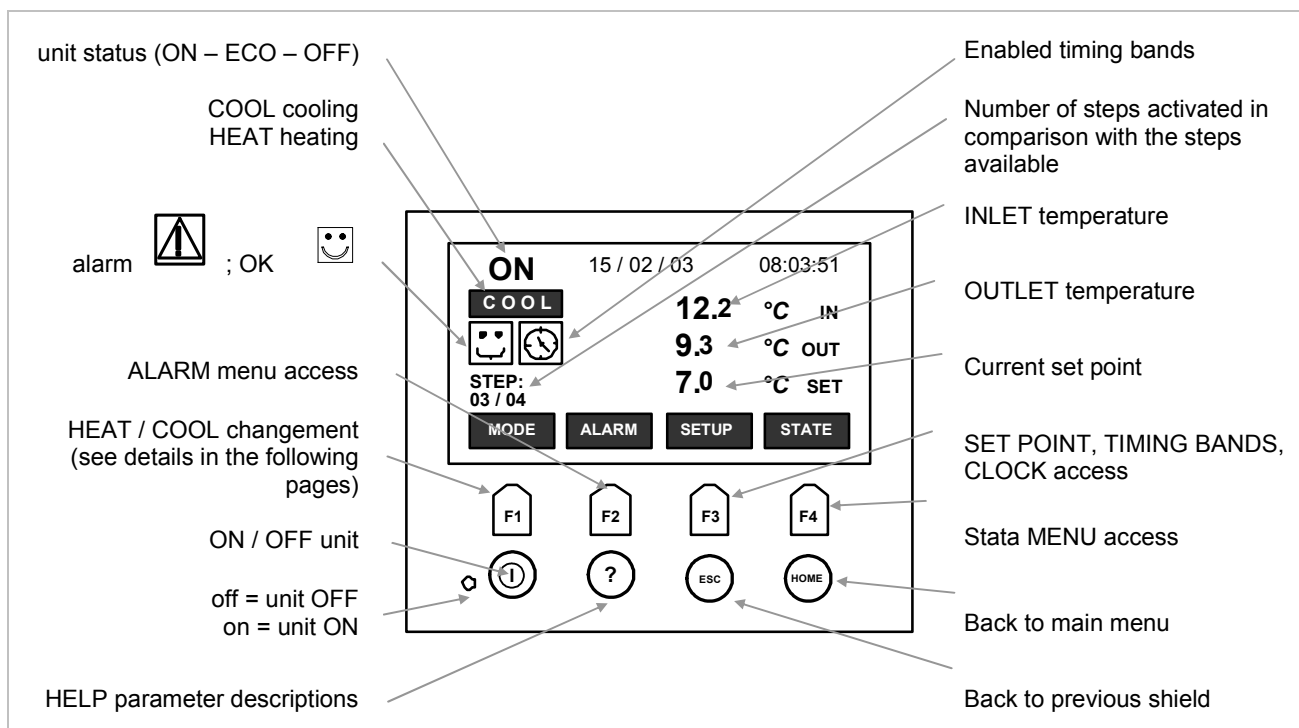
The above-described operations should be considered OUTSIDE the norm.

In the event of failure in the compressors, since the unit operates with the above-mentioned conditions, the guarantee WILL NOT BE VALID and Clivet spa can not be held responsible for it.

Periodically check the average times of operations and the frequency of the compressors pick ups: the minimum thermal load should be enough to ask the operation of a compressor for at least ten minutes.

In the event of average times close to this limit, take the proper corrective actions.

## CONTROL INTERFACE



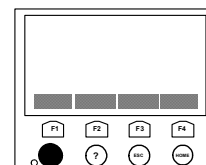
## OPERATING MODE

### 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).



### COOLING SET-POINT

The setting is performed on the OUTLET temperature.

The thermoregulator acts, maintaining the exiting fluid temperature as near to the COOLING SET POINT as possible.

Therefore, it takes away steps of power when the outlet water temperature decreases to the set point and adds steps of power when the outlet temperature increases.

The thermoregulator can only add one step at a time and only when the insertion scan time expires. At any other moment, no action of step insertion can be performed.

The insertion scan time is not fixed, but varies, according to the value of the temperature difference between the water outlet temperature and the Set point value. The higher the difference value (positive or negative), the shorter the interval between the scan points will be.

The value of the scan time is displayed at status 6; when status 7 reaches the value of status 6 the working demand of the compressor is activated.

### SET-POINT COMPENSATIONS

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

To do this, the compensations 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 COMPENSATIONS based on two factors external to the unit:

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

Optional components are necessary and, for the activation and configuration, it is necessary to modify the parameter whose access is reserved to the assistance centres.

The menu STATUS displays the value of the compensations on the ext. temp. (status 9) and WR (status 10).

### PRESENT COOLING SET-POINT

The COMPENSATED set-point, which keeps the compensations into account, is identified as the PRESENT set-point and it is displayed on the main display and at status n° 2.

### 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 (the max. number of compressors which can be activated in maintenance mode can be determinate by par. 27, (access reserved to the assistance centres).

### 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).

### DEMAND LIMIT – POWER LIMIT

The function limits the electric power absorbed by the unit, according to the external 0-10Vcc or 4-20mA signal supplied by the customer.

The higher the signal is, the lower the number of available compressors will be to satisfy the thermal need.

On the STATUS menu, n° 22, the external signal of the DEMAND LIMIT is shown.

For the activation and configuration, it is necessary to modify the parameters with access reserved to the assistance centres.

### TIMETABLES

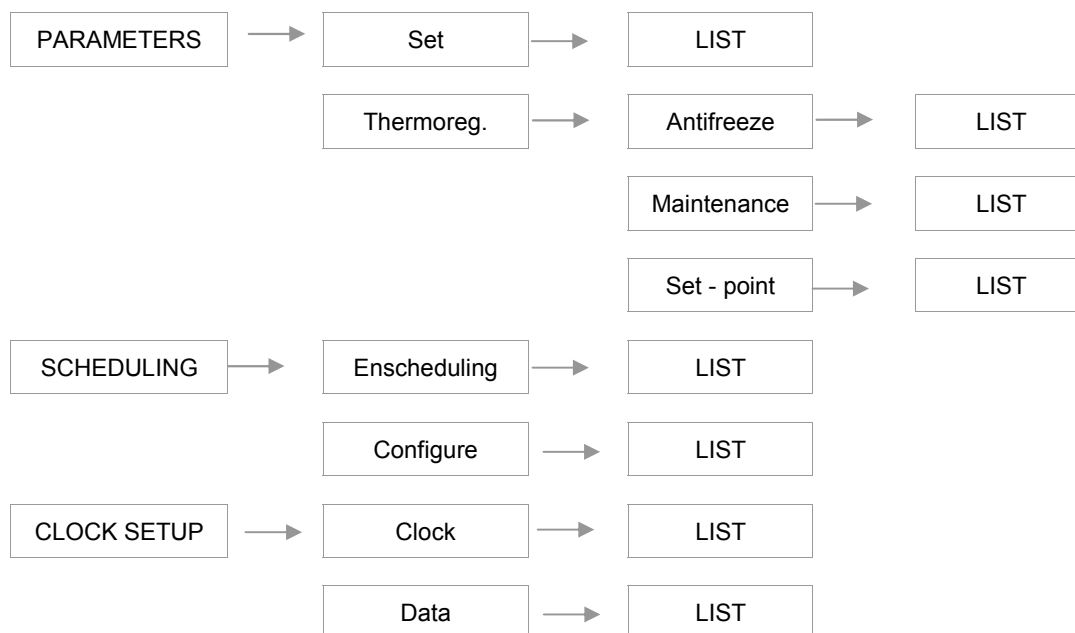
The system is factory equipped with a clock function, found on the board.

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.

### ACCESSIBLE PARAMETERS

#### PARAMETER MENU STRUCTURE



menu: PARAMETERS – THERMOREG. – SET POINT			DEFAULT values
90 / CEN	SecondSetC	Secondary cooling Set Point	12
91 / CEN	SecondSetH	NOT USED - Secondary heating Set Point	35
118 / CEN	SetCool	Cooling Set Point	6.5
119 / CEN	SetHeat	NOT USED - Heating Set Point	45
272 / CEN	SetRecovery	NOT USED	35
menu: PARAMETERS – THERMOREG. – MAINTENANCE			
114 / CEN	SetMantCool	Summer maintenance setpoint	15
117 / CEN	SetMantHeat	NOT USED - 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







## SETUP – CLOCK SETUP

### CLOCK

Set the clock

### DATA

Set the date

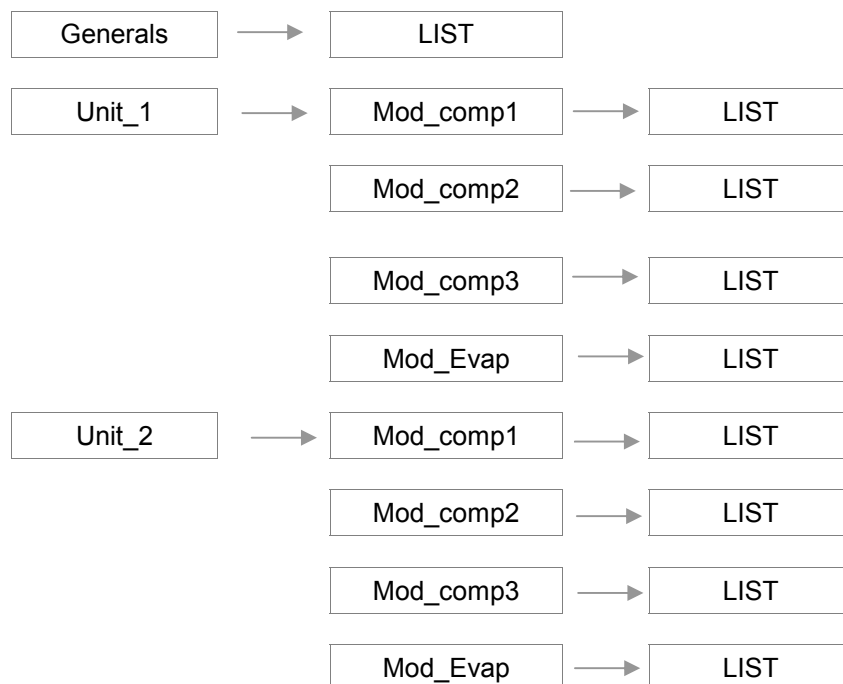
To enter in the SETUP menu		button F3 SETUP
To select the CLOCK SETUP submenu		buttons ▲ ▼ F2 – F3
To access to CLOCK		button F1 ENTER
To set HOURS MINUTES SECONDS		buttons F2 F3 F4
To confirm the single setting		button F1 ENTER
To go back to the main menu		button HOME

## 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

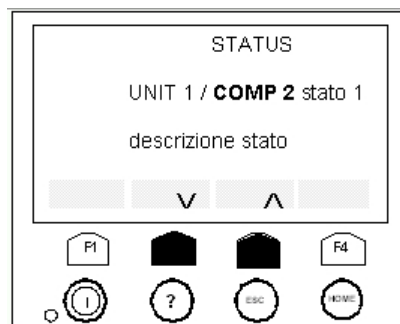


### example

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	Compressor 1	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
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

Index	UNIT_1 – MOD COMP_1 Stata	UM
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

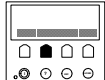
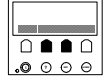
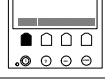
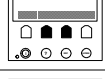



To visualize the alarm in progress

### STORE ALARM

To visualize the historical alarm

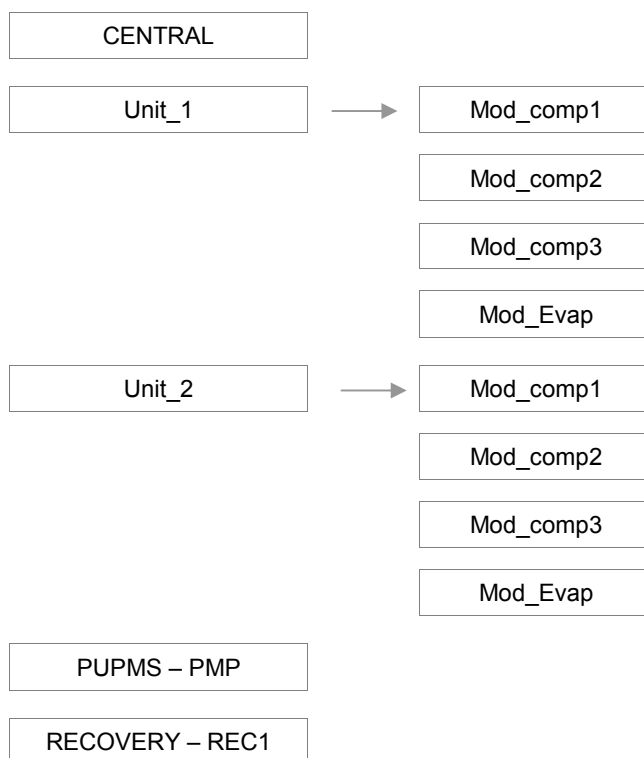
### DEL STORE

To delete the historical alarm

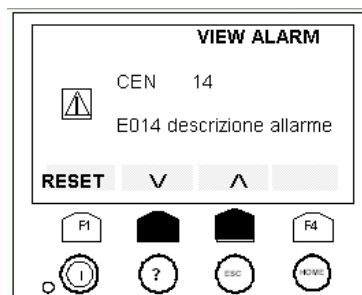
To enter in the ALARM menu		button F2 ALARM
To select VIEW ALARM		buttons ▲ ▼ F2 – F3
To access		button F1 ENTER
To scroll the active alarms		buttons ▲ ▼ F2 – F3
To reset the alarm in progress		button F1 ENTER
To go back a level of the menu		button ESC
To go back to the main menu		button HOME

**- 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

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
	E121	BP2 prealarm
	E123	TEE inlet temp. alarm
	E124	TEE discharge temp. alarm
	E125	MaxTS TEE prealarm
	E126	SPI Faulty alarm (TEE driver disconnection)
	E127	Power Fail alarm
	E128	Stepper Motor Error alarm

PUMP MODULE		
Str Name	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		
	Name	
50	E301	Out recovery probe alarm
51	E302	Gas temperature probe alarm

EVAPORATOR MODULE		
Str Name	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

## 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
- EXTERNAL 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.

### STRUTTURA

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 vibrations. Check the condition of any gaskets..

### EXTERNAL 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.

## 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
- check the operating parameters of the refrigerating circuit (see REFRIGERANT TABLES and START-UP section)



## 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 1<sup>st</sup> December 2004 no. 329 (and following modifications), which defines the performances to be executed; the units of 1<sup>st</sup> 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 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.

<b>OVERHEATING</b> = inlet temperature – Saturation temperature			
	<b>R-22</b>	<b>R-407C</b>	<b>R-410A</b>
Inlet pressure	3.8 bar	3.8 bar	7.2 bar
Inlet temperature	7.3°C	7.3°C	7.3°C
Overheating	$7.3 - (-1.13) = 8.43^{\circ}\text{C}$	$7.3 - 1.18 = 6.12^{\circ}\text{C}$ for calculation consider the Td (dew point)	$7.3 - 0.8 = 6.5^{\circ}\text{C}$

<b>SUBCOOLING</b> = condensing temperature (pressure *) – liquid temperature			
	<b>R-22</b>	<b>R-407C</b>	<b>R-410A</b>
Condensing pressure	18.6 bar	18.6 bar	29.6 bar
Liquid temp.	42.9°C	42.9°C	45°C
subcooling	$50.39 - 42.9 = 7.49^{\circ}\text{C}$	$44.74 - 42.9 = 1.84^{\circ}\text{C}$ for calculation consider the Tb (bubble point)	$49.91 - 45 = 4.91^{\circ}\text{C}$

\* 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
<b>3.8</b>	<b>-1.13</b>	14.46	<b>1.18</b>	-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
<b>7.2</b>	16.32	32.20	17.65	11.83	<b>0.80</b>
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
<b>18.6</b>	<b>50.39</b>	66.59	49.43	<b>44.74</b>	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

Pg	R22	R134a	R407C		R410A
	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
<b>29.6</b>	71.01	87.16	68.27	64.67	<b>49.91</b>
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	R22	R134a	R407C		R410A
	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

**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.

#### **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)

#### **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

### 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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