

MSE-SC 65D - 180F

Condenserless water chiller for outdoor or indoor installation



Dear Customer,

We congratulate you on choosing this product

For many years Clivet has been offering systems that provide maximum comfort, together with high reliability, efficiency, quality and safety.

The aim of the company is to offer advanced systems, that assure the best comfort, reduce energy consumption and the installation and maintenance cost for the life cycle of the system.

The purpose of this manual is to provide you with information that is useful from reception of the equipment, through installation, operational usage and finally disposal so that this advanced system offers the best solution.

Yours faithfully,

CLIVET Spa

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Index of contents

1	General description	4
2	Reception	6
3	Positioning	8
4	Water connections	9
5	Refrigerating connections	11
6	Electrical connections	15
7	Start-up	22
8	Control	25
9	Maintenance	31
10	Decommissioning	34
11	Residual risks	35
12	Accessories	36
13	Dimensional drawings	38
14	Technical information	42

1 General description

1.1 Manual

The manual provides correct unit installation, use and maintenance.

Pay particular attention to:



Warning, identifies particularly important operations or information.



Prohibited operations that must not be carried out, that compromise the operating of the unit or may cause damage to persons or things.

- It is advisable to read it carefully so you will save time during operations.
- Follow the written indications so you will not cause damages to things and injuries people.

1.2 Preliminaries

Only qualified personnel can operate on the unit, as required by the regulation in force.

1.3 Risk situations



The unit has been designed and created to prevent injuries to people.

During designing it is not possible to plane and operate on all risk situation.

Read carefully "Residual risk" section where all situation which may cause damages to things and injuries to people are reported.

Installation, starting, maintenance and repair required specific knowledge; if they are carried out by inexperienced personnel, they may cause damages to things and injuries people.

1.4 Intended use

Use the unit only:

- cooling water or a water and glycol mix for air-conditioning
- Keep to the limits foreseen in the technical schedule and in this manual

The manufacturer accepts no responsibility if the equipment is used for any purpose other than the intended use.

1.5 Installation



The positioning, hydraulic system, refrigerating, electrics and the ducting of the air must be determined by the system designer in accordance with local regulations in force.

Follow local safety regulations.

Verify that the electrical line characteristics are in compliance with data quotes on the unit serial number label.

1.6 Maintenance

Plan periodic inspection and maintenance in order to avoid or reduce repairing costs.



Turn the unit off before any operation.

1.7 Modification



All unit modifications will end the warranty coverage and the manufacturer responsibility.

1.8 Breakdown/Malfuction



Disable the unit immediately in case of breakdown or malfunction.

Contact a certified service agent.

Use original spares parts only.



Using the unit in case of breakdown or malfunction:

- voids the warranty
- it may compromise the safety of the unit
- may increase time and repair costs

1.9 User training



The installer has to train the user on:

- Start-up/shutdown
- Set points change
- Standby mode
- Maintenance
- What to do / what not to do in case of breakdown

1.10 Data update

Continual product improvements may imply manual data changes.

Visit manufacturer web site for updated data.

1.11 Indications for the User



Keep this manual with the wiring diagram in an accessible place for the operator.

Note the unit data label so you can provide them to the assistance centre in case of intervention (see “Unit identification” section).

Provide a unit notebook that allows any interventions carried out on the unit to be noted and tracked making it easier to suitably note the various interventions and aids the search for any breakdowns.

In case of breakdown or malfunction:

- Immediately deactivate the unit
- Contact a service centre authorized by the manufacturer



The installer must train the user, particularly on:

- Start-up/shutdown
- Set points change
- Standby mode
- Maintenance
- What to do / what not to do in case of breakdown

1.12 Unit identification

The serial number label is positioned on the unit and allows to identify all the unit features.



The matriculation plate must never be removed.

The matriculation plate shows the indications foreseen by the standards, in particular:

- unit type
- serial number (12 characters)
- year of manufacture
- wiring diagram number
- electrical data
- manufacturer logo and address

1.13 Serial number

It identifies uniquely each unit.

Must be quoted when ordering spare parts.

1.14 Assistance request

Note data from the serial number label and write them in the chart on side, so you will find them easily when needed.

Series
Size
Serial number
Year of manufacture
Electrical wiring diagram

2 Reception



You have to check before accepting the delivery:

- That the unit hasn't been damaged during transport
- That the materials delivered correspond with that indicated on the transport document comparing the data with the identification label positioned on the packaging.

In case of damage or anomaly:

- Write down on the transport document the damage you found and quote this sentence: "Conditional acceptance clear evidence of deficiencies/damages during transport"
- Contact by fax and registered mail with advice of receipt to supplier and the carrier.



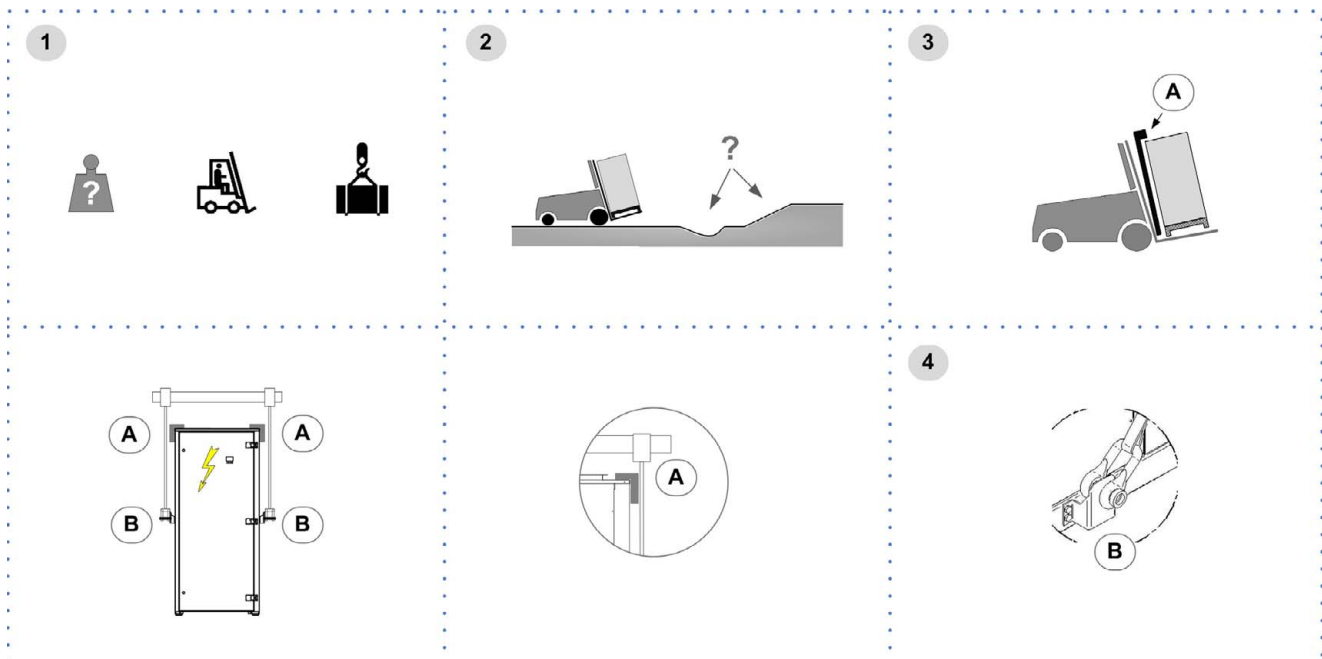
Any disputes must be made within 8 days from the date of the delivery. Complaints after this period are invalid.

2.1 Storage

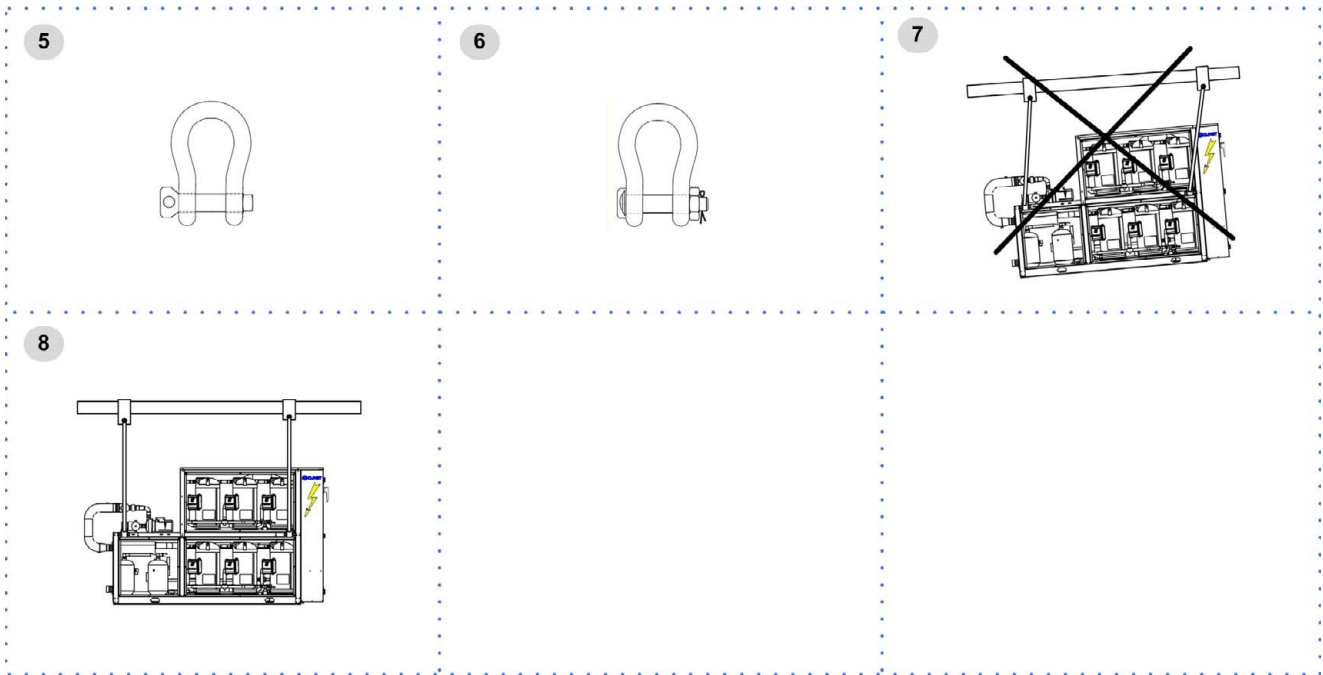
Observe external packaging instructions.

2.2 Handling

1. Verify unit weight and handling equipment lifting capacity.
2. Identify critical points during handling (disconnected routes, flights, steps, doors).
3. Suitably protect the unit to prevent damage.
4. Lifting bracket
5. Screw pin shackle.
6. Safety pin shackle.
7. Before starting the handling, make sure that the unit is stable.
8. Gradually bring the lifting belts under tension, making sure they are positioned correctly.



- A. Protections
- B. Lifting bracket



2.3 Packaging removing

Be careful not to damage the unit.

Keep packing material out of children's reach it may be dangerous.

Recycle and dispose of the packaging material in conformity with local regulations.

3 Positioning

During positioning consider these elements:

- Technical spaces requested by the unit
- Electrical connections
- Water connections

3.1 Functional spaces

Functional spaces are designed to:

- guarantee good unit operation
- carry out maintenance operations
- protect authorized operators and exposed people

Respect all functional spaces indicated in the DIMENSIONS section.

Double all functional spaces if two or more unit are aligned.

3.2 Positioning



Units are designed to be installed:

- INTERNAL / EXTERNAL
- in fixed positions

Limit vibration transmission:

- use antivibration devices on unit bearing points
- install flexible joints on the hydraulic connections

Choose the installation place according to the following criteria:

- safe accessible position
- Standard unit operating range at full load
- verify unit weight and bearing point capacity
- verify that all bearing points are aligned and leveled
- install the unit raised from the ground

3.3 Saftey valve gas side

The installer is responsible for evaluating the opportunity of installing drain tubes, in conformity with the local regulations in force (EN 378).

3.4 Fresh air probe

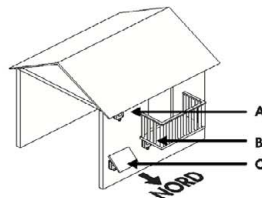
The external probe allows to automatically change the unit set point according to the external enthalpy (temperature + humidity).

It is then possible to optimize the unit energy efficiency.

Positioning



The sensor has not to be influenced by factors that can false the reading (for ex. direct solar irradiation, exhaust air by fan or other sources, contact with the unit structure or other sources of heat, accumulations of snow/ice), it has therefore to be placed in a protected place (possibly to the north), for example in an attic, under a terrace and if it is on a free wall, provide a small roofing.



Examples to position the external probe:

- A. roof
- B. under a terrace
- C. if at free wall provide a small roofing

4 Water connections

4.1 Water quality

Water features

- confirming to local regulations
- total hardness < 14°fr
- within the limits indicated by table

The water quality must be checked by qualified personnel.

Water with inadequate characteristics can cause:

- pressure drop increase
- reduces energy efficiency
- increased corrosion potential

Acceptable water quality values:

PH	7,5 ÷ 9,0	
SO ₄ ²⁻	< 100	ppm
HCO ₃ ⁻ /SO ₄ ²⁻	> 1	
Total Hardness	4,5 ÷ 8,5	dH
Cl ⁻	< 50	ppm
PO ₄ ³⁻	< 2,0	ppm
NH ₃	< 0,5	ppm

Free Chlorine	< 0,5	ppm
Fe ₃ ⁺	< 0,5	ppm
Mn ⁺⁺	< 0,05	ppm
CO ₂	< 50	ppm
H ₂ S	< 50	ppb
Temperature	< 65	°C
Oxygen content	< 0,1	ppm

Provide a water treatment system if values fall outside the limits.



The warranty does not cover damages caused by limestone formations, deposits and impurities from the water supply and / or failure from failed system clearing to clean system.

4.2 Risk of freezing

If the unit or the relative water connections are subject to temperatures close to 0°C:

- mix water with glycol, or
- safeguard the pipes with heating cables placed under the insulation, or
- empty the system in cases of long non-use

4.3 Anti-freeze solution

The use of an anti-freeze solution results in an increase in pressure drop.



Make sure that the glycol type utilized is inhibited (not corrosive) and compatible with the water circuit components.



Do not use different glycol mixture (i.e. ethylene with propylene).

4.4 Water flow-rate

The project water-flow must be:

- inside the exchanger operating limits (see the TECHNICAL INFORMATION section)
- guarantee, also with variable system conditions (for example in systems where some circuits are bypassed in particular situations).

4.5 Hydraulic connections

- take away the supplied connection union by acting on the connection joint
- weld the union to the installation pipe
- perform the connection between the installation pipe and the evaporator, using the joint



Retirer le joint de connexion avant de souder le tuyau de l'installation.



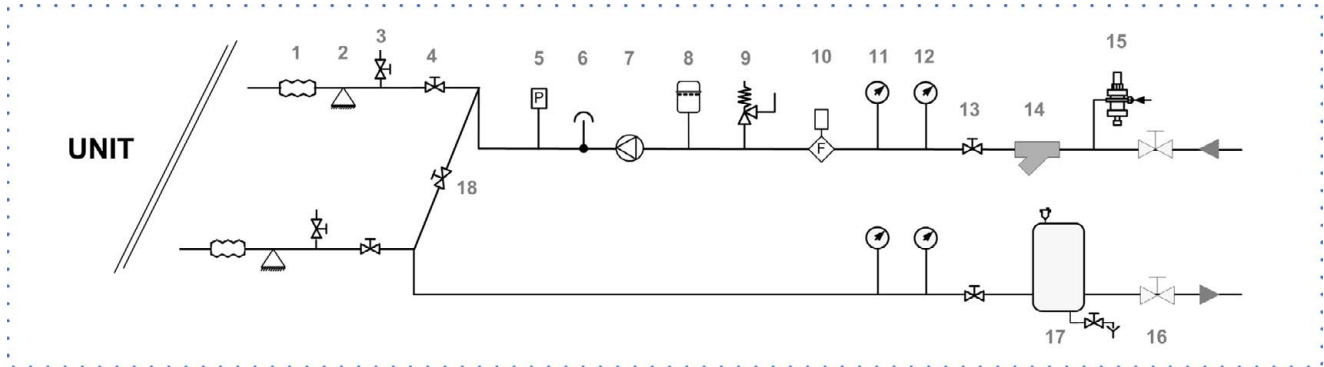
The rubber gasket might be irreparably damaged.

4.6 Water filter

- ⚠ It must be installed immediately in the water input of the unit, in a position that is easily accessible for cleaning.
- 🚫 The filter never should be removed, this operation invalidates the guaranty.

4.7 Recommended connection

- ⚠ The installer must define:
 - component type
 - position in system



- | | | | |
|---|---------------------------------------|----|------------------------|
| 1 | antivibration joints | 10 | Flow Switch |
| 2 | piping support | 11 | pressure gauge |
| 3 | exchanger chemical cleaning bypass | 12 | thermometer |
| 4 | shut-off valve | 13 | shut-off valve |
| 5 | pressure switch of the charged system | 14 | filter |
| 6 | vent | 15 | filling valve |
| 7 | Pump / circulating pump | 16 | shut-off valve |
| 8 | expansion vessel | 17 | Internal storage tank |
| 9 | safety valve | 18 | Cleaning system bypass |

4.8 Operation sequence

Close all vent valves in the high points of the unit hydraulic circuit

Close all drain valves in the low points of the unit hydraulic circuit:

- Heat exchangers
 - Pumps
 - collectors
 - storage tank
 - free-cooling coil
1. Carefully wash the system with clean water: fill and drain the system several times.
 2. Apply additives to prevent corrosion, fouling, formation of mud and algae.
 3. Fill the plant
 4. Execute leakage test.
 5. Isolate the pipes to avoid heat dispersions and formation of condensate.
 6. Leave various point of service free (wells, vent-holes etc).

- ⚠ Neglecting the washing will lead to several filter cleaning interventions and at worst cases can cause damages to the exchangers and the other parts.

5 Refrigerating connections

5.1 Pressure Equipment Directive

This unit is a subset: to operate it has to be combined to another unit.

It is an installer responsibility:

- follow the PED Directive and to the national regulations of PED Directive realization
- consider the insertion of any additional security devices
- check the safety device operation
- write on the serial label number the amount of total refrigerant
- issue the Declaration of conformity
- inform the user of the need to carry out regular checks

5.2 Vibrations / Noise



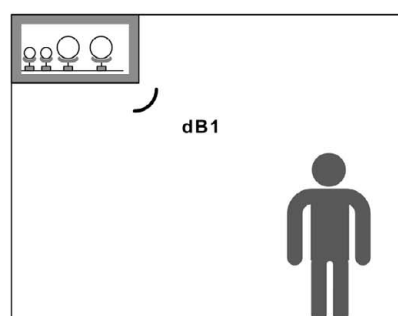
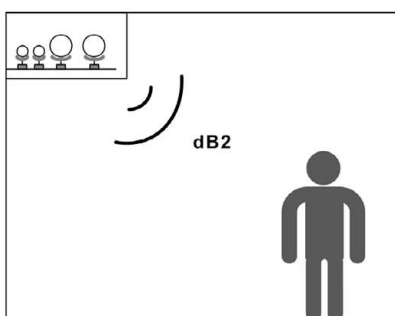
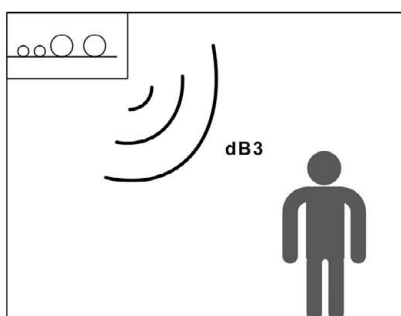
The installation of the pipes may affect the level of noise in the system:

- install flexible joints between the unit and the pipes
- install antivibration material between the brackets and the pipes so as to prevent the transmission of vibrations
- avoid the passage in particularly silent environments

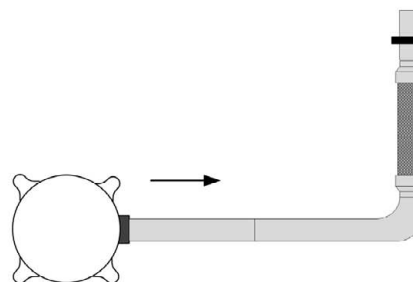
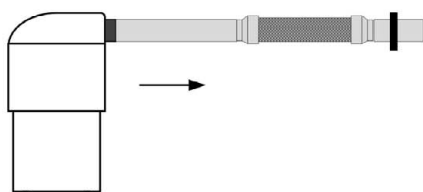
Elastomer mounts



$dB3 > dB2 > dB1 > 0$



Vibration absorber



5.3 General description

- ⚠ The sizing of the refrigerating connection lines is of extreme importance for the system operating and reliability.
- ⚠ The diameter of the connection between the two units is function of distances, differences in level and curve number; it has so to be calculated by a qualified technician.
- ⚠ Incorrect sizing may damage the compressor or affect cooling capacity.
 - the operations must be performed by an expert refrigerator technician
 - use only a copper pipe for chiller operating
 - pipes must be perfectly clean (perform a cleaning with nitrogen or dry air before connecting the pipes to the two units) and without humidity to allow a good vacuum operation
 - pipes must not to be too much long and with too much curves
 - for a good efficiency do not perform curves with a radius too much short and avoid the pipe crushing
 - to allow the vacuum and charge operations install service fittings on pipes (if the unit is not fitted with taps with service fittings)

5.4 Risk of explosion

- ⚠ When you install cut-off devices (solenoid valves, cocks, etc.), be aware that they may cause traps for refrigerant in the form of closed zones upstream and downstream where the refrigerant cannot freely expand.
- ⚠ In this situation, if there is an increase in temperature (due to exposure to the sun, proximity of pipes or sources of heat), the expansion of the trapped gas may cause the refrigeration pipes to explode.
- ⚠ Evaluate whether safety valves can be installed, especially in the liquid pipes that are most exposed to this risk.

5.5 Supply line

Insulate only if you want to prevent burns due to accidental contact.

5.6 Liquid line

The liquid line must be insulated if it is exposed to the sunlight or it crosses zones with a temperature higher than the external one, otherwise it can be free.

Avoid excessive diameters to not cause an excessive refrigerant charge.

The solenoid valve avoids dangerous gas leaks when the unit is off; the installation is always recommended, above all with pipes particularly long.

It has to be positioned near the thermostatic valve.

5.7 Liquid receiver

The liquid receiver installation is always recommended, above all when:

- the connecting pipes are longer than 10 metres
- the installation operates in variable climatic conditions (for example fresh air temperature with ranges day/night, summer/winter).

The receiver must have a capacity adequate to the installation and it must be positioned near the evaporating unit.

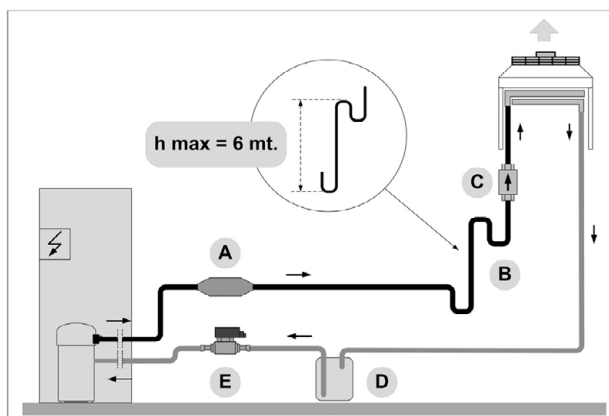
If the distance is greater than 15 metres and the compressor is located in the lower part of the system, position the receiver near the unit with the compressor.

The liquid receiver can absolve the above described functions:

- it avoids the presence of gaseous freon in the expansion device
- it compensates for the charge variations in the installation when changing the operating conditions
- it avoids an excessive condenser flooding with consequent condensing temperature/pressure raising if the installation charge is performed in anomalous climatic conditions.

Along with the previously mentioned aspects, the liquid recipient compensates for the various volumes of the exchangers as their function changes (evaporator/condenser and vice versa).

Make very sure that the return and supply points are placed at the bottom.



- A. antivibration mount
- B. siphon
- C. check valve
- D. liquid receiver
- E. solenoid valve

5.8 Checking for leaks

- 1 Check carefully that the evaporator unit taps are closed.
- 2 Connect the pressure gauges with the service fittings (on the taps or on the connection pipes).
- 3 Pressurise the system with nitrogen:
 - mode 1: up to PS (see the label) and wait few hours
 - mode 2: up to PS x 1,43 law (as according to UNI-EN 378-2)



CAUTION: EXPLOSION DANGER

- 4 Spray using a leak detector spray cocks and pipes and check if bubbles are present (gas leaks).
- 5 Discharge the nitrogen from the unit.

5.9 Vacuum operations

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

With the cocks of the motor condenser closed, drain the system.

Using a gauge group, connect the vacuum pump on both connections of the cocks, make sure that the solenoid valve or any intermediate cocks are open, proceed with the vacuum.

Stop the pump at a pressure of about 100 Pa and leave it under vacuum for a few hours; a slight initial rise of pressure is normal, followed by stabilization.

If the pressure continues to rise, it means there are either small leaks or humidity is present. In the first case, repeat the operations in the paragraph on checking for leaks in the manual for the refrigerant pipes.

In the second case, recharge the system with refrigerant gas up to 100KPa and re-create the vacuum as described above.

Once the pressure is permanently stable, move on to the next phase, which is charging.

5.10 Refrigerant charge



Check the type of refrigerant on the serial number label

The refrigerant charge must to be completed during the start-up phase, based on the type of indoor unit and on the pipe development.

With the system under vacuum, close the cocks of the gauge group and disconnect the vacuum pump.

Connect the refrigerant gas tank, venting the air out of the hose for connection to the gauge group.

Open the cock of the liquid line.

Open the cocks of the gauge group and let liquid-state refrigerant enter using an appropriate pump.

Once charging is complete, open the gas cock so that the unit is ready to be started.

5.11 Adding oil

Consider adding oil if the connection pipes are particularly long.

Check the oil level of the compressor in the indicator or in the Schrader plug.

5.12 Weight of refrigerant fluid

This table provides an estimate of that makes it possible to determine in advance how much gas will be needed.

The optimal refrigerant charge must be determined with the unit at normal operating power, in conditions that are near design conditions, measuring and adjusting excessive heating or cooling.

The table does not take into account various thicknesses of pipes, it refers to a unit in operation ($T_{ev} = 5^{\circ}\text{C}$, $T_{cond} = 45^{\circ}\text{C}$).

It is necessary to add to the indicated quantities the amounts required for the two units and for the gas pipes.

ext diameter mm	28	35	42	54	64	76	88.9
R-134a	6.0	9.5	13.6	22.3	32.1	46.3	64.4
R-407C	5.7	9.0	12.9	21.2	30.6	44.0	61.2

6 Electrical connections

The characteristics of the electrical lines must be determined by qualified electrical personnel able to design electrical installations; moreover, the lines must be in conformity with regulations in force.

The protection devices of the unit power line must be able to stop all short circuit current, the value must be determined in accordance with system features.

The power cables and the protection cable section must be defined in accordance with the characteristics of the protections adopted.

All electrical operations should be performed by trained personnel having the necessary qualifications required by the regulations in force and being informed about the risks relevant to these activities.

Operate in compliance with safety regulations in force.

6.1 Electrical data



The serial number label reports the unit specific electrical data, included any electrical accessories.

The electrical data indicated in the technical bulletin and in the manual refer to the standard unit, accessories excluded.

The matriculation plate shows the indications foreseen by the standards, in particular:

- Voltage
- F.L.A.: full load ampere, absorbed current at maximum admitted conditions
- F.L.I.: full load input, full load power input at max. admissible condition
- Electrical wiring diagram Nr.

6.2 Connections

1. Refer to the unit electrical diagram (the number of the diagram is shown on the serial number label).
2. Verify that the electrical supply has characteristics conforming to the data shown on the serial number label.
3. Before starting work, ensure the unit is isolated, unable to be turned on and a safety sign used.
4. Ensure correct earth connection.
5. Ensure cables are suitably protected.
6. Before powering up the unit, make sure that all the protections that were removed during the electrical connection work have been restored.

6.3 Signals / data lines

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

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

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

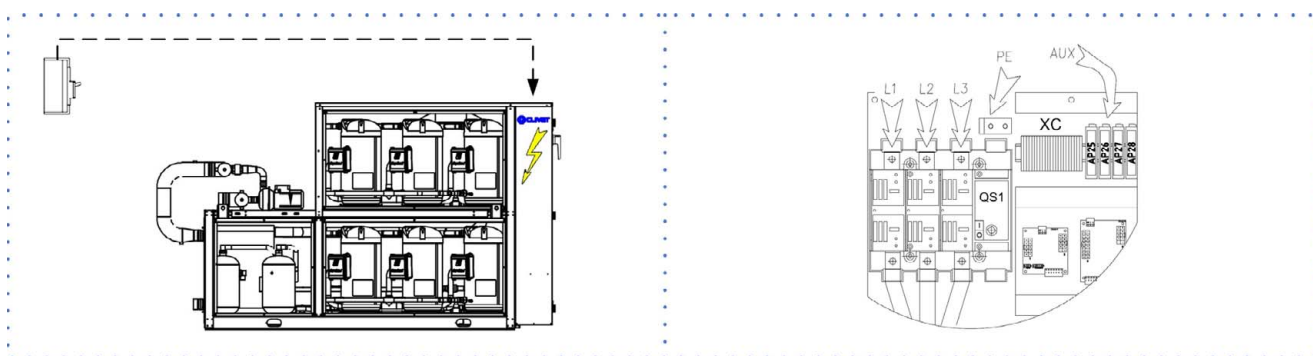
Do not lay the cables parallel to other cables, cable crossings are possible, only if laid at 90°.

Connect the screen to the ground, only if there aren't disturbances.

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

Respect impedance, capacity and attenuation indications.

6.4 Power input



Fix the cables: if vacated may be subject to tearing.



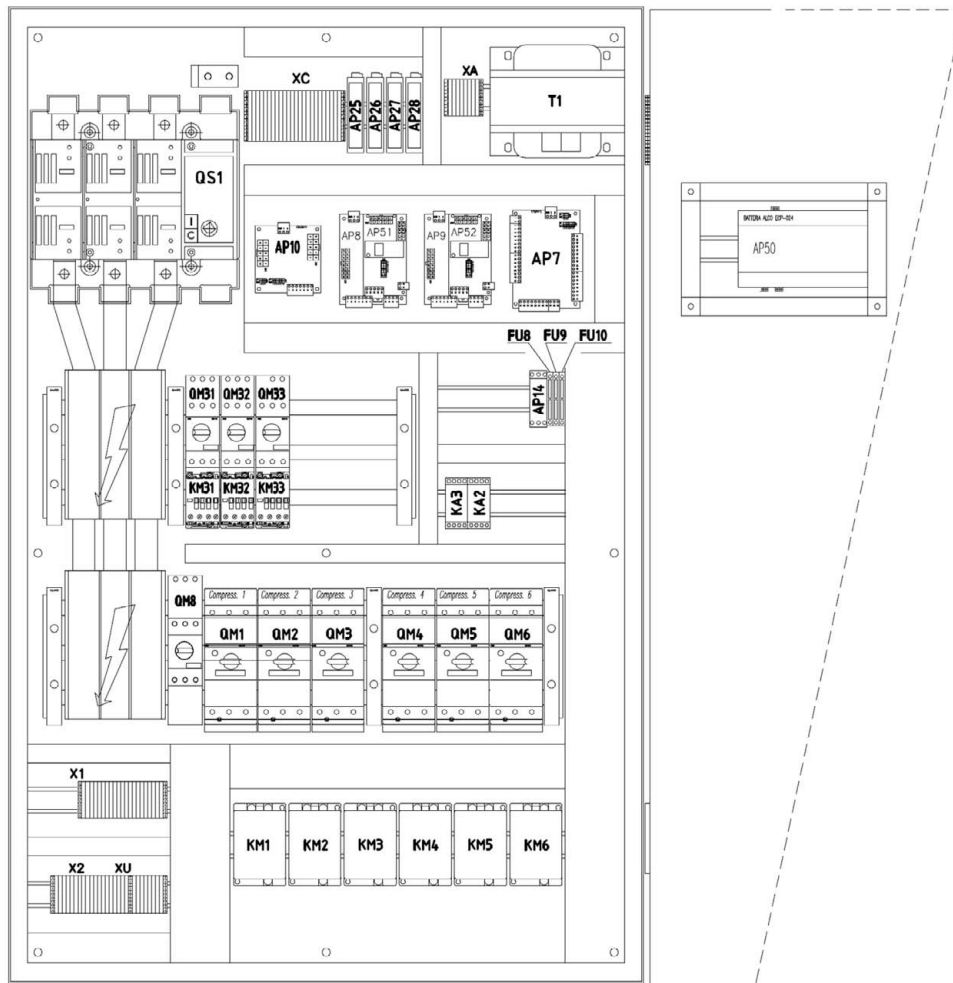
The cable must not touch the compressor and the refrigerant piping (they reach high temperatures).

XC: Customer connections

QS1: main isolator switch

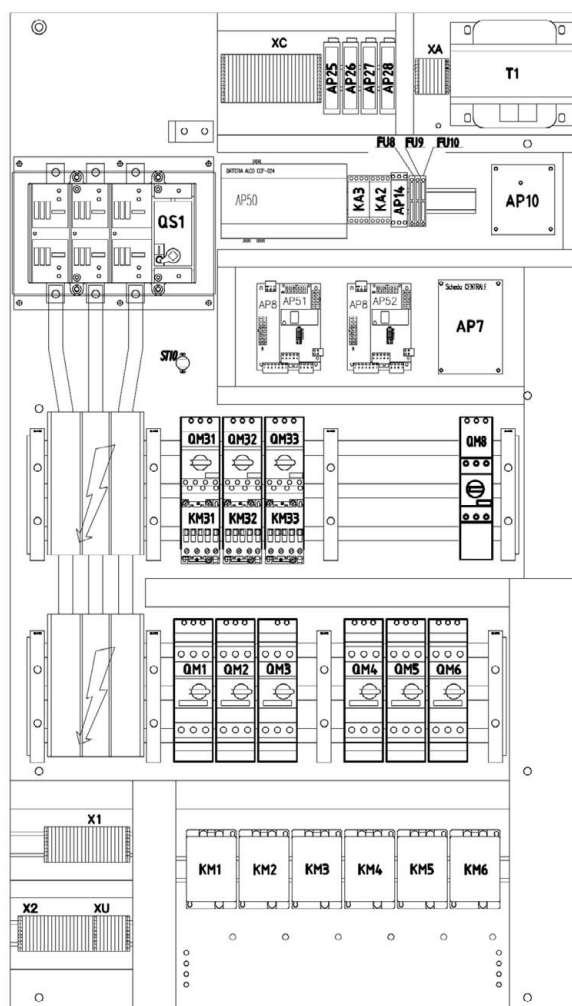
6.5 Electrical panel

External unit



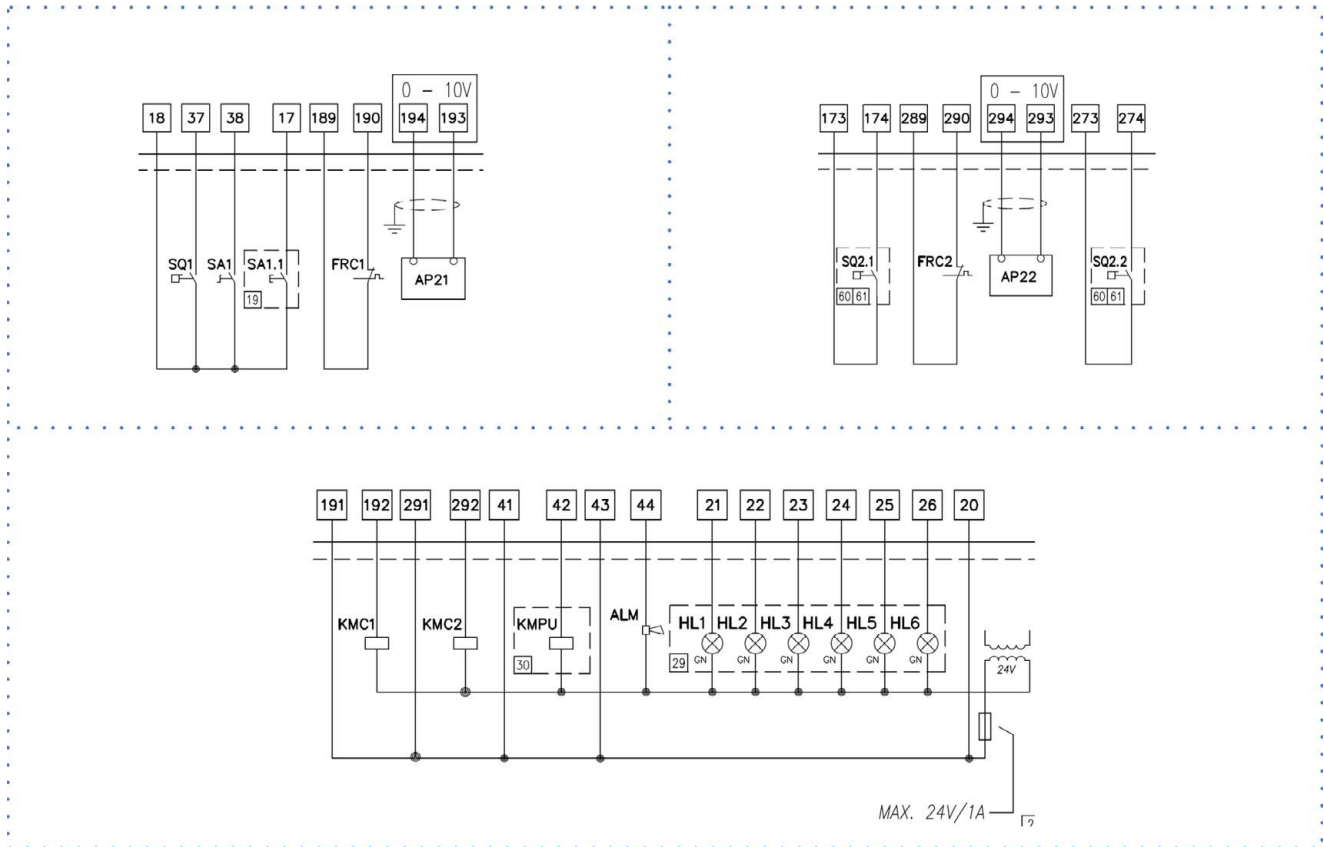
AP7	Main control module	FU10	230V aux. circuit fuse
AP8	Compressor control module	KA2	Auxiliary relays
AP9	Compressor control module	KA3	Auxiliary relays
AP10	Pumps management module utility side	KM1-2-3	Compressor contactor
		KM4-5-6	
AP14	Phase monitor	KM31...33	Utility side pump control
AP25	CAN TO CAN converter module	QM1...6	Compressor thermal magnetic circuit breaker
AP26	Gateway LonWorks	QM8	Auxiliary circuit thermal magnetic circuit breaker
AP27	CAN TO MODBUS converter module	QM31...33	Pump motor overload cutout
AP28	DATALOGGER module	QS1	Main isolator switch
AP50	Storage battery	ST10	High temperature safety thermostat
AP51 / 52	Electronic thermostatic management	T1	Auxiliary circuit transformer
FU8	12V aux. circuit fuse	XC	Terminal block of the customer connections
FU9	24V aux. circuit fuse		

Internal unit



AP7	Main control module	FU10	230V aux. circuit fuse
AP8	Compressor control module	KA2	Auxiliary relays
AP9	Compressor control module	KA3	Auxiliary relays
AP10	Pumps management module utility side	KM1-2-3	Compressor contactor
		KM4-5-6	
AP14	Phase monitor	KM31...33	Utility side pump control
AP25	CAN TO CAN converter module	QM1...6	Compressor thermal magnetic circuit breaker
AP26	Gateway LonWorks	QM8	Auxiliary circuit thermal magnetic circuit breaker
AP27	CAN TO MODBUS converter module	QM31...33	Pump motor overload cutout
AP28	DATALOGGER module	QS1	Main isolator switch
AP50	Storage battery	ST10	High temperature safety thermostat
AP51 / 52	Electronic thermostatic management	T1	Auxiliary circuit transformer
FU8	12V aux. circuit fuse	XC	Terminal block of the customer connections
FU9	24V aux. circuit fuse		

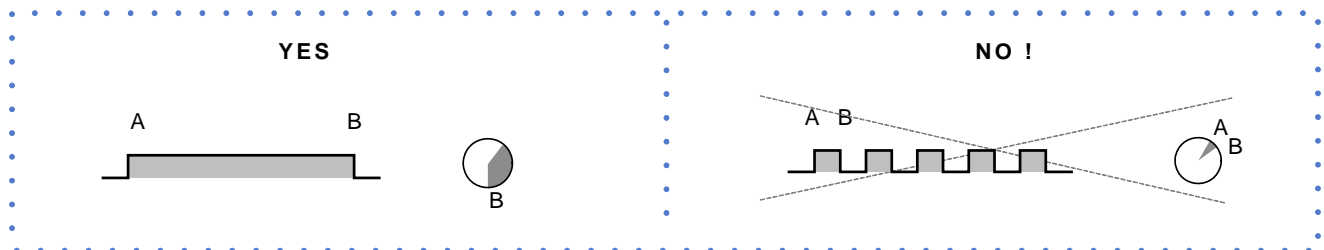
6.6 Connections performer by customer



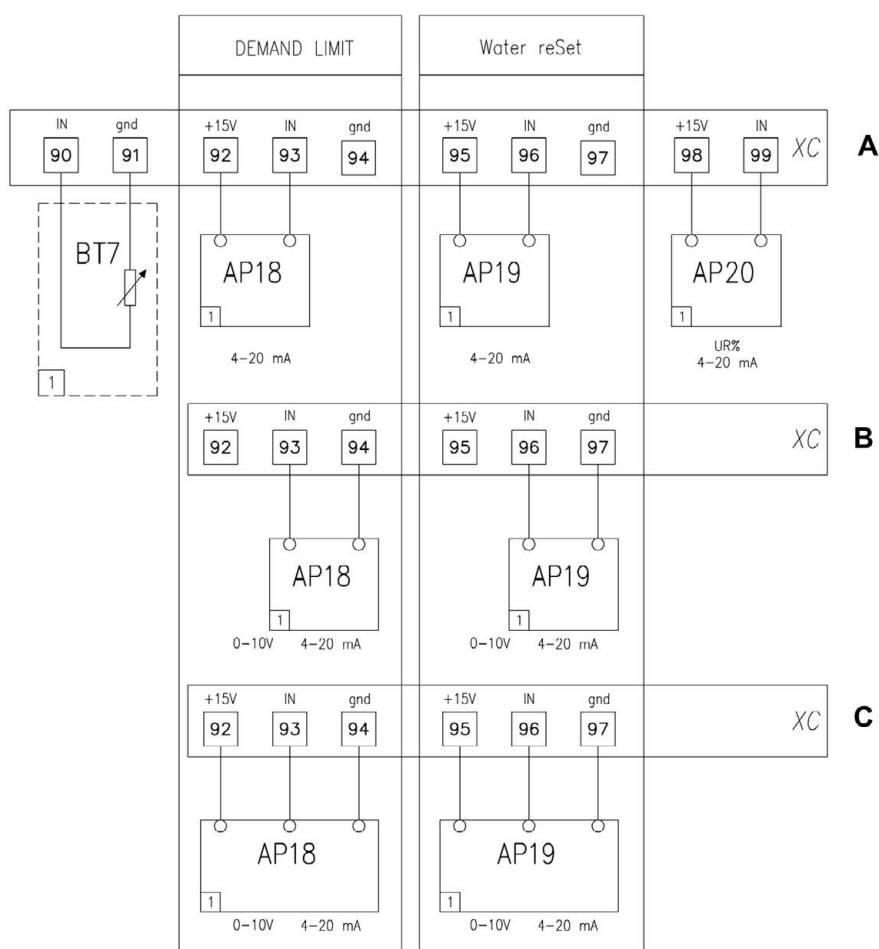
ALM	cumulative fault signal	SA1	remote on/off
AP21	remote condenser control module 0..10V	SA1.1	second setpoint
AP22	remote condenser control module 0..10V	SQ1	utility side exchanger flow switch
FRC1-2	Remote condenser fan thermal overload	SQ2.1	flowswitch remote exchanger
HL1.....6	compressor status signal	SQ2.2	flowswitch remote exchanger
KMC1-2	remote condenser on-off control module		
KMPU	Utility side pump control		

6.7 Remote ON-OFF

- ⊘ Do not perform short On Off cycles
- ⊘ Do not use the remote On Off with thermoregulation function.



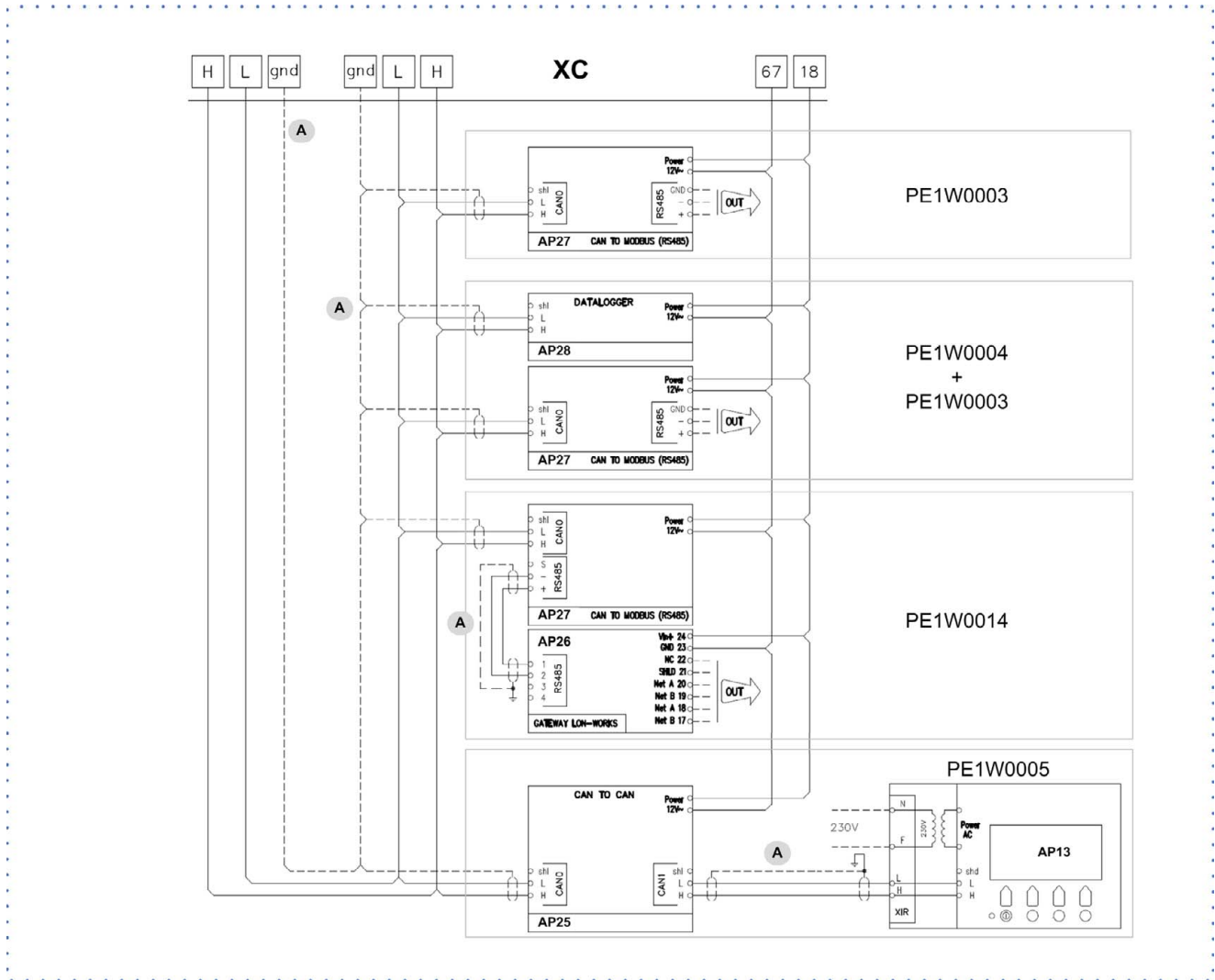
6.8 DEMAND LIMIT and WATER RESET



AP18 Demand limit
 AP19 Water reset
 AP20 ambient humidity control probe
 BT7 ambient air temperature probe

A devices powered by the signal
 B devices with own power supply
 C passive devices powered by the module (max 50mA)

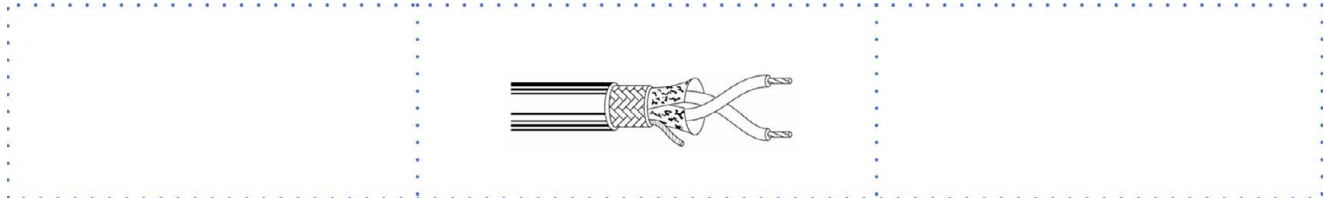
6.9 Communication



- | | | | |
|------|------------------|------|---------------------|
| AP13 | remote interface | AP27 | Can to Modbus RS485 |
| AP25 | Can to Can | AP28 | Datalogger |
| AP26 | Gateway LonWorks | | |

Cable "A" requirements

- Couple of conductors twisted and shielded
- Section of conductor 0,22mm²...0,35mm²
- Nominal capacity between conductors < 50 pF/m
- Nominal impedance 120 Ω
- Recommended cable BELDEN 3105A

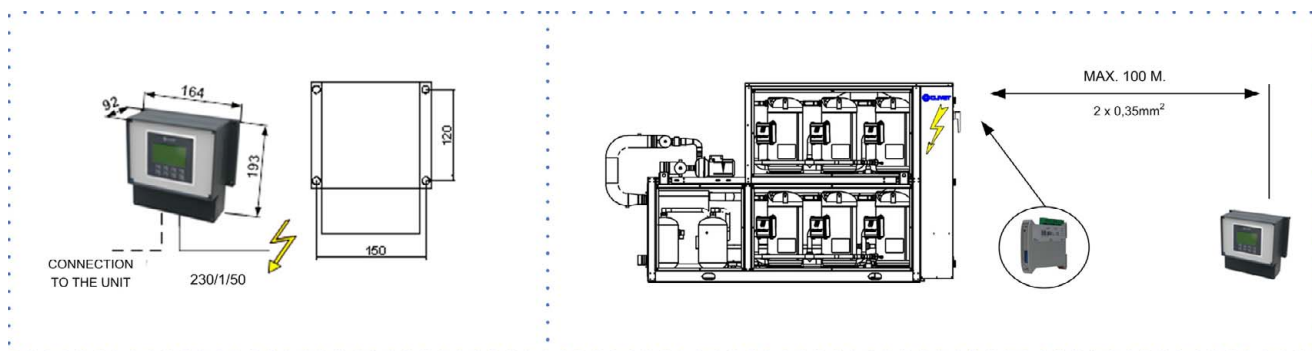


6.10 Remote control via microprocessor control

Remote terminal addressing

On the remote terminal:

- "Setup-PASSWORD....." menu
- "Setup-IDTast-Cen" setting Tast=27 menu



7 Start-up

7.1 General description

The indicated operations should be done by qualified technician with specific training on the product.

Upon request, the service centres performing the start-up.

The electrical, water connections and the other system works are by the installer.

Agree upon in advance the start-up data with the service centre.

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 isolated at the beginning
- the unit isolator is open, locked and equipped with the suitable warning
- make sure no tension is present



After turning off the power, wait at least 5 minutes before accessing to the electrical panel or any other electrical component.



Before accessing check with a multimeter that there are no residual stresses.

7.2 Preliminary checks

For details refer to the different manual sections.

Unit OFF power supply

1. safety access
2. functional spaces
3. structure integrity
4. unit on vibration isolators
5. refrigerant line section
6. length of the refrigerant lines
7. siphon on the gas line every 6 meter back up
8. vacuum and additional charge
9. unit input water filter + shut-off valves for cleaning
10. vibration isolators on water connections
11. expansion tank (indicative volume = 5% system content)
12. cleaned system
13. loaded system + possible glycol solution + corrosion inhibitor
14. system under pressure
15. vented system
16. fresh air probe
17. refrigerant circuit visual check
18. earthing connection
19. power supply features
20. electrical connections provided by the customer

7.3 Start-up sequence

For details refer to the different manual sections.

Unit ON power supply

1. compressor crankcase heaters operating at least since 8 hours
2. off-load voltage measure
3. phase sequence check
4. pump manual start-up and flow check
5. shut-off valve refrigerant circuit open
6. unit ON
7. load voltage measure and absorptions
8. liquid sight glass check (no bubbles)
9. measure return and supply water temperature
10. measure super-heating and sub-cooling
11. check no anomalous vibrations are present
12. climatic curve personalization
13. climatic curve personalization
14. scheduling personalization
15. complete and available unit documentation

7.4 Refrigeration circuit

1. Check carefully the refrigerating circuit: the presence of oil stains can mean leakage caused by transportation, movements or other).
2. Verify that the refrigerating circuit is in pressure: Using the unit manometers, if present, or service manometers.
3. Make sure that all the service outlets are closed with proper caps; if caps are not present a leak of refrigerant can be possible.
4. Open the valves of the refrigerant circuit, if there are any.

7.5 Water circuit

1. Before realizing the unit connection make sure that the hydraulic system has been cleaned up and the cleaning water has been drained.
2. Check that the water circuit has been filled and pressurized.
3. Check that the shut-off valves in the circuit are in the "OPEN" position.
4. Check that there isn't air in the circuit, if required, evacuate it using the air bleed valve placed in the system high points.
5. When using antifreeze solutions, make sure the glycol percentage is suitable for the type of use envisaged.



Neglecting the washing will lead to several filter cleaning interventions and at worst cases can cause damages to the exchangers and the other parts.

Weight of glycol (%)	10	20	30	40
Freezing temperature (°C)	-3.9	-8.9	-15.6	-23.4
Safety temperature (°C)	-1	-4	-10	-19

7.6 Electric Circuit



Verify that the unit is connected to the ground plant.

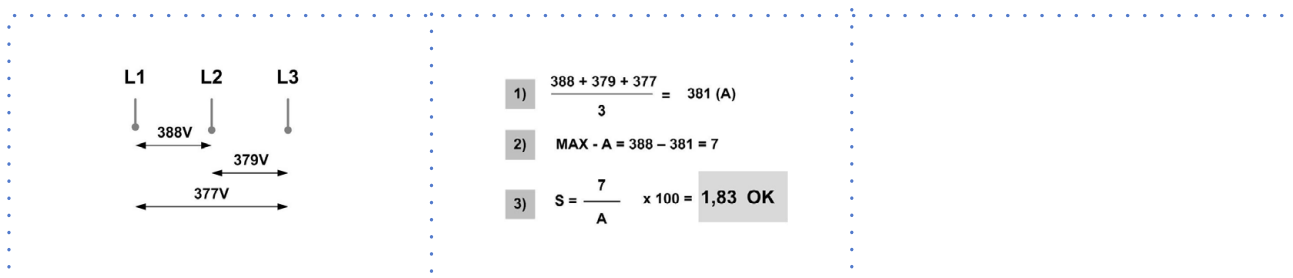
Check the conductors are tightened as: the vibrations caused by handling and transport might cause these to come loose.

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

Check the voltage and line frequency values which must be within the limits: 400/3/50 +/- 10%

Check and adjust the phase balance as necessary: it must be lower than 2%

Example



Working outside of these limits can cause irreversible damages and voids the warranty.

7.7 Compressor crankcase heaters

Connect the oil resistances on the compressor crankcase at least 8 hours before the compressor is to be started:

- at the first unit start-up
 - after each prolonged period of inactivity
1. Supply the resistances switching off the unit isolator switch.
 2. To make sure that heaters are working, check the power input.
 3. At start-up the compressor crank-case temperature on the lower side must be higher at least of 10°C than the outside temperature.



Do not start the compressor with the crankcase oil below operating temperature.

7.8 Voltages

Check that the air and water temperatures are within in the operating limits.

Start-up the unit.

With unit operating in stable conditions, check:

- Voltage
- Total absorption of the unit
- Absorption of the single electric loads

7.9 Remote controls

Check that the remote controls (ON-OFF etc) are connected and, if necessary, enabled with the respective parameters as indicated in the "electrical connections" section.

Check that probes and optional components are connected and enabled with the respective parameters ("electrical connections" section and following pages).

7.10 Evaporator water flow-rate

Check that the difference between the temperature of exchanger return and supply water corresponds to power according to this formula:

unit cooling power (kW) x 860 = Dt (°C) x flow rate (L/h)

The cooling power is shown in the table of the GENERAL TECHNICAL DATA included in this manual, referred to specific conditions, or in the tables on COOLING PERFORMANCE in the TECHNICAL BULLETIN referred to various conditions of use.

Check for water side exchanger pressure drops:

- determine the water flow rate
- measure the difference in pressure between exchanger input and output and compare it with the graph on WATER SIDE EXCHANGER PRESSURE DROPS

The measurement of pressure will be easier if pressure gauges are installed as indicated in the DIAGRAM OF SUGGESTED WATER CONNECTIONS.

7.11 Start-up report

Identifying the operating objective conditions is useful to control the unit over time.

With unit at steady state, i.e. in stable and close-to-work conditions, identify the following data:

- total voltages and absorptions with unit at full load
- absorptions of the different electric loads (compressors, fans, pumps etc)
- temperatures and flows of the different fluids (water, air) both in input and in output from the unit
- temperature and pressures on the characteristic points of the refrigerating circuit (compressor discharge, liquid, intake)

The measurements must be kept and made available during maintenance interventions.

7.12 Operating at reduced load

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

However a constant and long operation with reduced load with frequent stop and start-up of the compressor/s can cause serious damages for the lack of oil return.

The above-described operating conditions must be considered outside the operating limits.

In the event of compressor breakdown, due to operating in the above-mentioned conditions, the guarantee will not be valid and Clivet spa declines any responsibility.

Check periodically the average operating times and the frequency of the compressors starts: approximately the minimum thermal load should be such as to need the operating of a compressor for at least ten minutes.

If the average times are close to this limit, take the proper corrective actions.

7.13 97/23 CE PED directive

97/23 CE PED DIRECTIVE gives instructions for installers, users and maintenance technicians as well.

Refer to local regulations; briefly and as an example, see the following:

Compulsory verification of the first installation:

- only for units assembled on the installer's building site (for ex. Condensing circuit + direct expansion unit)

Certification of setting in service:

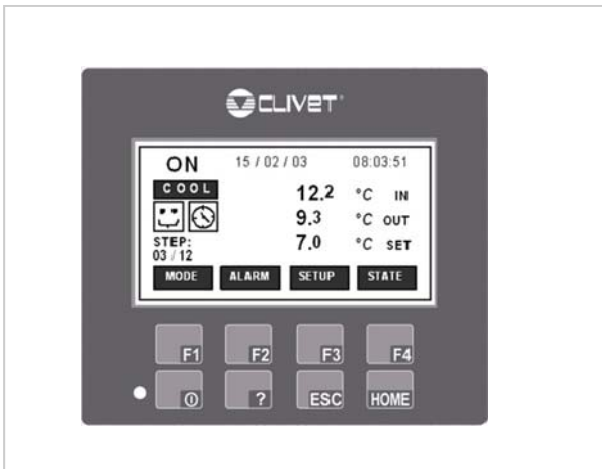
- for all the units

Periodical verifications:

- to be executed with the frequency indicated by the Manufacturer (see the "maintenance inspections" paragraph)

8 Control

8.1 Control interface



	Unit ON / OFF
	F1 = not used (HEAT / COOL change)
	F2 = ALARM menu access
	F3 = SET POINT, TIME BANDS, CLOCK access
	F4 = STATA menu access
	HELP parameter descriptions
	Back to the previous screen
	Back to the main menu

	Led = on for unit in ON Led = off for unit in OFF
ON	Unit status ON – ECO – OFF
	Enabled time bands
	Alarm signalling in progress
	No alarm in progress

COOL	cooling
HEAT	Not used (heating)
12.2	INLET temperature
9.3	OUTLET temperature
7.0	Current set point

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).

KEYPAD USE

In accordance with the unit configuration, therefore of the electronic modules and options present in the unit, some lists can not be used.

LOCAL OR REMOTE ON OFF

The control from remote by SA1 has priority on the control by keypad and supervisor.

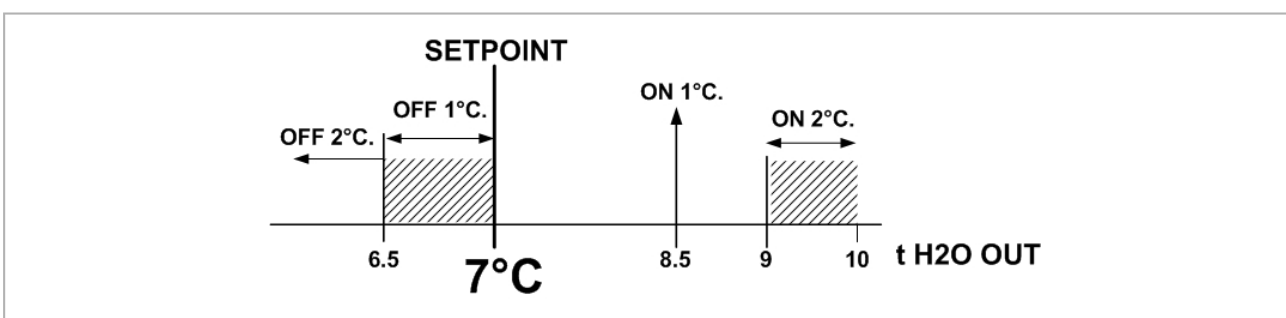
For example if the unit is in OFF by SA1, it can not be positioned in ON by keypad or supervisor.

By SA1 in ON the unit is positioned in OFF or ON in accordance to the last control by keypad or supervisor.

SETPOINT

The thermoregulation is performed on the supply temperature.

Example with setpoint = 7°C (parameter 118) and project thermal gradient = 5°C (parameter 17)



8.2 Setup menu

SET UP menu: PARAMETERS modifies set point SCHEDULING enables/dis. time periods CLOCK SETUP set the clock ID Tast-Cen (ONLY ATC) PASSWORD (ONLY ATC)	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

8.3 Demand limit

It is possible to limit the absorbed electric power with an external signal of 10 Vcc or 4-20 mA. The higher the signal is, the lower the number of compressors available to meet the thermal need .

The parameter configuration is necessary.

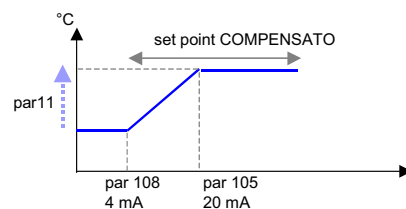
MENU	NUM	Parameter name	meaning
thermoregulation-demandlimit		DmandLimitEn	Enables the function : 0=disabled , 1=by signal, 2=by parameter
parameters-set-sensors	82	TypeDI	Type of signal : 0=0-10 V ; 1=4-20mA

8.4 Water reset

It allows the automatic correction of the set-point, according to an external signal of 4-20 mA or 0-10 vcc.

The working process is similar to the above mentioned process .

The parameter configuration is necessary .



MENU	NUM	Parameter name	Meaning
parameters thermoregulation waterreset	11	MaxCWRC	Max value of the summer WR correction
	75	WaterRes	Water Reset enabling : 0=no ; 1=COOL only ; 2=HEAT only; 3=always
	105	SWRMaxC	Summer MAX correction signal
	108	SWRMinC	Summer MIN correction signal
parameters-set-sensors	83	TypeWR	Inlet signal type: 0=0-10V ; 1=4-20mA

8.5 External air humidity probe

It allows the automatic correction of the set-point, according to external air enthalpy.

In the winter operation the correction is only on the temperature.

The operation process is similar to the above mentioned process. The parameter configuration is necessary.

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

8.6 Fresh air temperature probe

<p>It allows the automatic correction of the set-point according to the external air temperature.</p> <p>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 is necessary.</p>			
MENU	NUM	Parameter name	Meaning
parameters thermoregulation compext	1	EnCompE t	External compensation enabling 0=no ; 1=COOL only ; 2=HEAT only; 3=always
	4	MaxCExtC	Max. ext. compensation value of cooling
	106	CextMaxC	Max. ext. temp. of cooling compensation
	107	CextMinC	Min. ext. temp. of cooling compensation
parameters-set-sensors		ProbeText	It enables ext. temp. probe: 0=yes ; 1=no

8.7 Alarms

BEFORE RESETTING AN ALARM, IDENTIFY AND REMOVE ITS CAUSE.
REPEATED RESETS CAN CAUSE IRREVERSIBLE DAMAGE .

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.

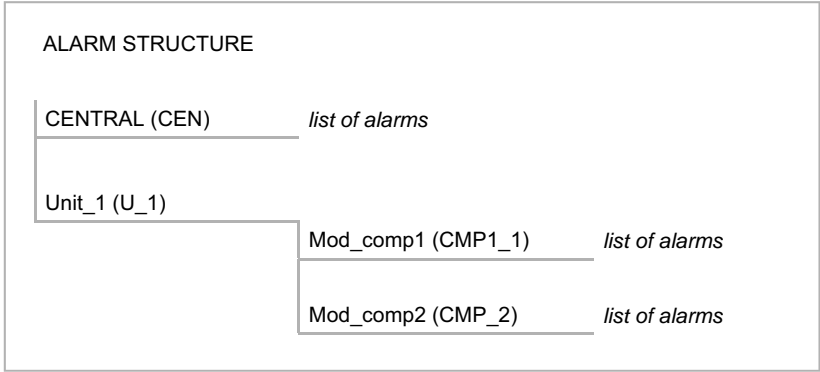
ALARMS and FAULTS show a potentially dangerous situation for the machine integrity. An immediate analysis is necessary to detect the causes of the block. A repeated reset can provoke irreversible damage. That is why reset is MANUAL .

PRE-ALARMS and SIGNALS indicate a close risk situation. Their occurrence can be accepted if occasional and/or in temporary situations (for example at the system start-up . In case of doubt contact an authorized service centre .

Alarm menu 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

An alarm list is associated with the inputs of each electronic module of the unit.
 On the display appears a code that identifies the electronic module and the alarm code.
 Example :

U_1 CMP_1 E105
 U_1 CMP_1 = compressor 1 module
 E105 = high pressure alarm



CENTRAL MODULE	
E001	H2O IN temp. probe fault on control module
E002	H2O OUT temp. probe fault on control module
E003	Outside air temp. probe fault
E004	Water Reset input fault
E005	Outside RH% probe fault
E006	Thermal cut-out alarm pump 1 on control module
E007	Thermal cut-out alarm pump 2 on control module
E008	Flow switch alarm on control module
E009	System pressure alarm
E010	Phase monitor alarm
E011	Antifreeze alarm on control module
E012	Antifreeze pre-alarm on control module
E013	Change CENTRAL pump
E014	Unit configuration alarm
E015	Demand Limit input fault
E016	Can net disconnectedness on control module
E017	Inhibits control in heating
E018	Incongruent deltaT alarm
E019	Ext low temperature alarm







COMPRESSOR MODULE	
E101	Cond./ Evap. temp. probe fault
E102	Condensing pressure probe fault
E103	Evaporation pressure probe fault
E104	Recovery temp. probe fault
E105	High pressure alarm
E106	Low pressure alarm
E107	Fan/Pump thermal cut-out alarm
E111	Cond. / Evap. H2O flow alarm
E112	High pressure pre-alarm 1
E113	High pressure pre-alarm 2
E114	Low pressure pre-alarm
E115	Force defrost alarm
E116	Max Press. diff. alarm
E117	Recovery H2O flow alarm
E118	Heat recovery HP pre-alarm
E108	Compressor 1 thermal cut-out alarm
E109	Compressor 2 thermal cut-out alarm
E110	Compressor 3 thermal cut-out alarm
E213	Module not connected
E119	Oil differential pressure alarm
E120	Condenser frost alarm
E121	BP2 prealarm
E123	TA TEE alarm
E124	TS TEE alarm
E125	max TS TEE prealarm
E126	max TS TEE prealarm
E127	power fail alarm
E128	stepper motor error alarm

8.8 Stata

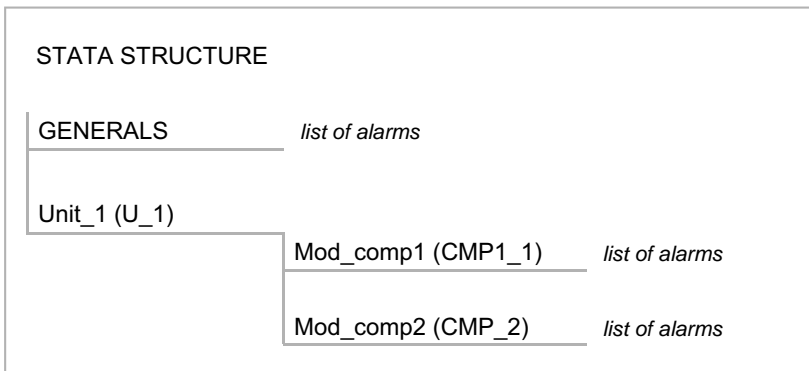
submenu:

GENERALS
UNIT 1

- mod_comp1
- mod_comp2

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

To each unit electronic module is associated a sub menu that allows the system stata to be visualized.



Index	GENERAL stata	UM
0	Unit status	1=ON / 0=OFF
1	Unit 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	CompE t	°C (tenths)
10	Co WR	°C (tenths)
11	CompCa	°C (tenths)
12	CompSpunt	°C (tenths)
13	CompDu	°C (tenths)
14	Outside temperature	°C (tenths)
15	Outside 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	ter Reset	%
22	Deman 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
45	Coil temp.	°C (tenths)
46	Recovery input water temp.	°C (tenths)
47	Condensing pressure	bar
48	aporating pressure	bar
49	Fa status	bar
50	Defrosting status	1=ON / 0=OFF
51	Defrosti counting time	sec
52	Comp. 1 hours	
53	Comp. 1 starts	
54	Comp. 2 hours	
55	Comp. 2 starts	
56	Comp. 3 hours	
57	Comp. 3 starts	
58	Recovery valve	1=ON / 0=OFF
59	Recovery PREHP delay	sec
61	Digital inputs	bit map of a byte
75	Daiki calculated capacity	%
76	P apOp	bar
77	Return	°C(tenths)
78	Disc rgeT	°C(tenths)
79	Valve opening	%
80	SuperHea	°C(tenths)
81	SuperHea POperativo	°C(tenths)
82	TempSaturaCon nsazione	°C(tenths)

9 Maintenance

9.1 General description

Maintenance must be done by authorized centres or by qualified personnel.

The maintenance allows to:

- maintain the unit efficiency
- increase the life span of the equipment
- assemble information and data to understand the state of the unit efficiency and avoid possible damages

Before checking, please verify the following:

- the electrical power supply line should be isolated at the beginning
- the unit isolator is open, locked and equipped with the suitable warning
- make sure no tension is present



After turning off the power, wait at least 5 minutes before accessing to the electrical panel or any other electrical component. Before accessing check with a multimeter that there are no residual stresses.

9.2 Inspections frequency

Perform an inspection every 6 months minimum.

The frequency, however, depends on the use.



In the event of frequent use it is recommended to plan inspections at shorter intervals:

- frequent use (continuous or very intermittent use, near the operating limits, etc)
- critical use (service necessary)

9.3 Unit booklet

It's advisable to create a unit booklet to take notes of the unit interventions.

In this way it will be easier to adequately note the various interventions and aid any troubleshooting.

Report on the booklet:

- date
- type of intervention effected
- intervention description
- carried out measures etc.

9.4 Standby mode

If a long period of inactivity is foreseen:

- turn off the power
- avoid the risk of frost (empty the system or add glycol)

Turn off the power to avoid electrical risks or damages by lightning strikes.



With lower temperatures keep heaters turned on in of the electrical panel (option).

It's recommended that the re-start after the stopping period is performed by a qualified technician, especially after seasonal stops or seasonal switching.

When restarting, refer to what is indicated in the "start-up" section.

Schedule technical assistance in advance to avoid hitches and to guarantee that the system can be used when required.

9.5 Compressor supply line shut-off valve



A. Supply line shut-off valve



CAUTION!

Do not remove the seal

Remove only if authorized by the manufacturer.

Please contact the maker for informations.

9.6 System discharge

1. evacuate the system
2. evacuate the exchanger, use all the cocks presents
3. use compressed air to blow the exchanger
4. dry completely the exchanger by an hot air jet; for greater safety fill the exchanger with glycoled solution
5. protect the exchanger from the air
6. remove the drain plugs to the pumps

- Any anti-freeze liquid contained in the system should not be discharged freely as it is a pollutant.
- It must be collected and reused.
- Before starting a washing the plant.

Example

- A. emptying pump



It's recommended that the re-start after the stopping period is performed by a qualified technician, especially after seasonal stops or seasonal switching.

When restarting, refer to what is indicated in the "start-up" section.

Schedule technical assistance in advance to avoid hitches and to guarantee that the system can be used when required.

9.7 Control check list

√		intervention frequency (months)	1	6	12
1	presence corrosion				X
2	water filter cleaning			X	
3	check the exchanger efficiency				X
4	circulating pumps			X	
5	check of the fixing and the insulation of the power lead				X
6	check of the earthing cable				X
7	electric panel cleaning				X
8	capacity contactor status				X
9	termina closing, cable insulation integrity				X
10	voltage and phase unbalancing (no load and on-load)			X	
11	absorptions of the single electrical loads			X	
12	test of the compressor crankcase heaters			X	
13	leak control*				X
14	survey of the refrigerant circuit operating parameters			X	
15	protective device test: pressure switches, thermostats, flow switches etc..			X	
16	control system test: setpoint, climatic compensations, capacity stepping, water / air flow-rate variations			X	
17	control device test: alarm signalling, thermometers, probes, pressure gauges etc..			X	

* European regulation 303/2008

Refer to the local regulations; and ensure correct adherence. Companies and technicians that effect interventions of installation, maintenance/repairs, leak control and recovery must be CERTIFIED as expected by the local regulations. The leak control must be effected with annual renewal.

9.8 Water filter

Check that no impurities prevent the correct passage of water.

9.9 Water side exchanger

It is very important for the exchanger to be able to provide the maximum thermal exchange, therefore it is essential for the inner surfaces to be clean of dirt and incrustations.

Periodically check the difference between the temperature of the supply water and the condensation temperature: if the difference is greater than 8°C–10°C it is advisable to clean the exchanger.

The clearing must be effected:

- with circulation opposite to the usual one
- with a speed at least 1,5 times higher than the nominal one
- with an appropriate product moderately acid (95% water + 5% phosphoric acid)
- after the cleaning rinse with water to inhibit the action of any residual product

9.10 Circulating pumps

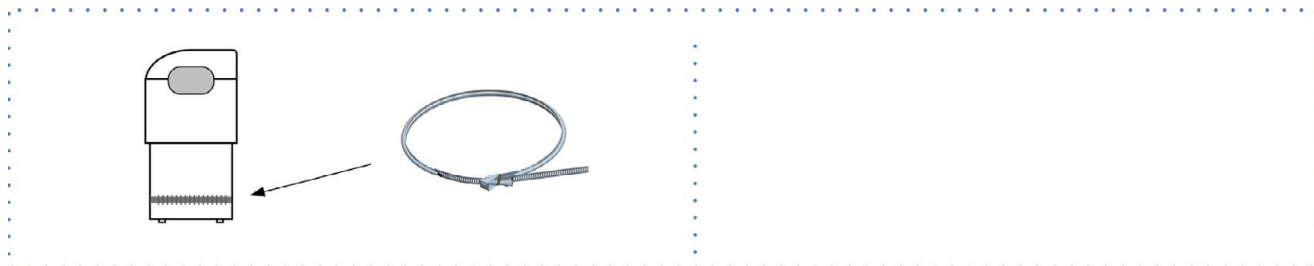
Check:

- no leaks
- bearing status (anomalies are highlighted by abnormal noise and vibration)
- the terminal protection covers are closed and the cable holders are properly positioned

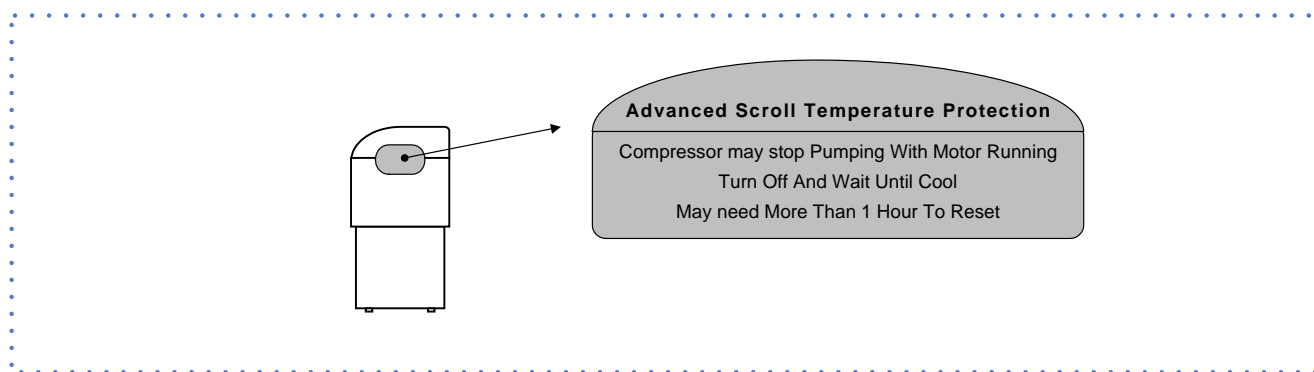
9.11 crankcase heater

Check:

- closure
- Operation



9.12 Copeland scroll compressor



10 Decommissioning

10.1 Disconnecting

Only authorised personnel must disconnect the unit.

Avoid leak or spills into the environment.

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

- refrigerant gas
- anti-freeze solutions in the water circuit

Awaiting dismantling and disposal, the unit can also be stored outdoors, if the electrical, cooling and water circuits of the unit have 100% integrity and are isolated, bad weather and rapid change in temperature will not result in any environmental impact.

10.2 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.

10.3 Directive EC RAEE

The units covered by the legislation in question are marked with the symbol on the side.

With the aim of protecting the environment, all of our units are produced in compliance with Directive EC on waste electrical and electronic equipment (RAEE).

The potential effects on the environment and on human health due to the presence of hazardous substances are shown in the use and maintenance manual in the section on residual risks.

Information in addition to that indicated below, if required, can be obtained from the manufacturer/distributor/importer, who are responsible for the collection/handling of waste originating from equipment covered by EC-RAEE. This information is also available from the retailer who sold this appliance or from the local authorities who handle waste.

Directive EC-RAEE requires disposal and recycling of electrical and electronic equipment as described therein to be handled through appropriate collection, in suitable centres, separate from collection for the disposal of mixed urban waste.

The user must not dispose of the unit at the end of its life cycle as urban waste, it must instead be handed over to appropriate collection centres as set forth by current standards or as instructed by the distributor.



11 Residual risks

General description

In this section the most common situations are indicated, as these cannot be controlled by the manufacturer and could be a source of risk situations for people or things.

Danger zone

This is an area in which only an authorised operator may work. The danger zone is the area inside the unit which is accessible only with the deliberate removal of protections or parts thereof.

Handling

The handling operations, if implemented without all of the protection necessary and without due caution, may cause the drop or the tipping of the unit with the consequent damage, even serious, to persons, things or the unit itself.

Handle the unit following the instructions provided in the present manual regarding the packaging and in compliance with the local regulations in force.

Should the refrigerant leak please refer to the refrigerant "Safety sheet".

Installation

The incorrect installation of the unit could cause water leaks, condensate accumulation, leaking of the refrigerant, electric shock, poor operation or damage to the unit itself.

Check that the installation has been implemented by qualified technical personnel only and that the instructions contained in the present manual and the local regulations in force have been adhered to.

The installation of the unit in a place where even infrequent leaks of inflammable gas and the accumulation of this gas in the area surrounding the area occur could cause explosions or fires.

Carefully check the positioning of the unit.

The installation of the unit in a place unsuited to support its weight and/or guarantee adequate anchorage may result in consequent damage to things, people or the unit itself.

Carefully check the positioning and the anchoring of the unit.

Easy access to the unit by children, unauthorised persons or animals may be the source of accidents, some serious.

Install the unit in areas which are only accessible to authorised person and/or provide protection against intrusion into the danger zone.

General risks

Smell of burning, smoke or other signals of serious anomalies may indicate a situation which could cause damage to people, things or the unit itself.

Electrically isolate the unit (yellow-red isolator).

Contact the authorised service centre to identify and resolve the problem at the source of the anomaly.

Accidental contact with exchange batteries, compressors, air delivery tubes or other components may cause injuries and/or burns.

Always wear suitable clothing including protective gloves to work inside the danger zone.

Maintenance and repair operations carried out by non-qualified personnel may cause damage to persons, things or the unit itself. Always contact the qualified assistance centre.

Failing to close the unit panels or failure to check the correct tightening of all of the panelling fixing screws may cause damage to persons, things or the unit itself.

Periodically check that all of the panels are correctly closed and fixed.

If there is a fire the temperature of the refrigerant could reach values that increase the pressure to beyond the safety valve with the consequent possible projection of the refrigerant itself or explosion of the circuit parts that remain isolated by the closure of the tap.

Do not remain in the vicinity of the safety valve and never leave the refrigerating system taps closed.

Electric parts

An incomplete attachment line to the electric network or with incorrectly sized cables and/or unsuitable protective devices can cause electric shocks, intoxication, damage to the unit or fires.

Carry out all of the work on the electric system referring to the electric layout and the present manual ensuring the use of a system thereto dedicated.

An incorrect fixing of the electric components cover may lead to the entry of dust, water etc inside and may consequently electric shocks, damage to the unit or fires.

Always fix the unit cover properly.

When the metallic mass of the unit is under voltage and is not correctly connected to the earthing system it may be as source of electric shock and electrocution.

Always pay particular attention to the implementation of the earthing system connections.

Contact with parts under voltage accessible inside the unit after the removal of the guards can cause electric shocks, burns and electrocution.

Open and padlock the general isolator prior to removing the guards and signal work in progress with the appropriate sign.

Contact with parts that could be under voltage due to the start up of the unit may cause electric shocks, burns and electrocution.

When voltage is necessary for the circuit open the isolator on the attachment line of the unit itself, padlock it and display the appropriate warning sign.

Moving parts

Contact with the transmissions or with the fan aspiration can cause injuries.

Prior to entering the inside of the unit open the isolator situated on the connection line of the unit itself, padlock and display the appropriate warning sign.

Contact with the fans can cause injury.

Prior to removing the protective grill or the fans, open the isolator on the attachment line of the unit itself, padlock it and display the appropriate warning sign.

Refrigerant

The intervention of the safety valve and the consequent expulsion of the gas refrigerant may cause injuries and intoxication.

Always wear suitable clothing including protective gloves and eyeglasses for operations inside the danger zone.

Should the refrigerant leak please refer to the refrigerant "Safety sheet".

Contact between open flames or heat sources with the refrigerant or the heating of the gas circuit under pressure (e.g. during welding operations) may cause explosions or fires.

Do not place any heat source inside the danger zone.

The maintenance or repair interventions which include welding must be carried out with the system off.

Hydraulic parts

Defects in tubing, the attachments or the removal parts may cause a leak or water projection with the consequent damages to people, things or shortcircuit the unit.

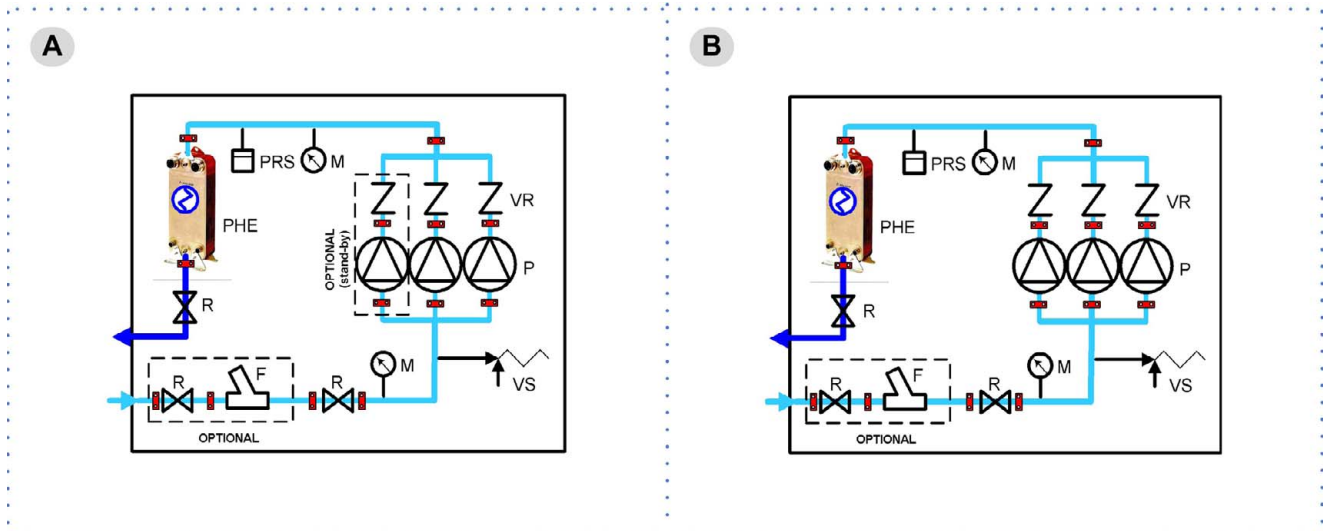
12 Accessories

12.1 HydroPack

Pumping unit made up of two or three electropumps laid out in parallel, with auto-adaptive modular logic activation.

It enables the automatic reduction of the liquid flow rate in critical conditions, avoiding blocks due to overloading and consequential intervention work by specialised technical personnel.

- A. VERSION WITH TWO PUMPS
- B. VERSION WITH THREE PUMPS



Multi-pump hydraulics group composed of:

- R Shut-off valves
- F Steel mesh strainer (OPTIONAL)
- S 250-litre storage tank with antifreeze electric heater
- M Pressure gauges
- VS Safety valve (6 Bar)
- P monobloc electric pumps with high-performance single rotor
- VR non-return valve
- PRS system charge safety pressure switch (keeps pumps from operating if there is no water)
- PHE Evaporator

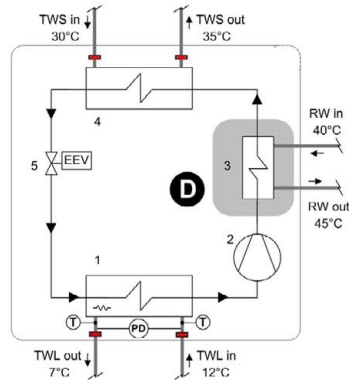
Kit composed of two solid rapid connections for pump removal in case of malfunction.

12.2 Partial energy recovery

A configuration which enables the production of hot water free-of-charge while operating in the cooling mode, thanks to the partial recovery of condensation heat that would otherwise be rejected to the external heat source.



When the temperature of the water to be heated is particularly low, it is wise to insert a flow-rate control valve into the system water circuit, in order to maintain the temperature at the recovery output at above 35°C and thus avoid the condensation of the refrigerant into the partial energy recovery device.



D - Partial recovery device

1. Internal exchanger (evaporator)
2. Compressor
3. Recovery exchanger
4. External exchanger (condenser)
5. Electronic expansion valve

TWS in - Water inlet source side

TWS out - Water outlet source side

TWL in - Water inlet user side

TWL out - Water output user side

RW in - Recovery water inlet

RW out - Recovery water outlet

T - Temperature probe

PD - Differential pressure switch

EXCHANGER OPERATING LIMITS

	INTERNAL EXCHANGER		
	DPr (S - B)		DPw
	kPa		kPa
CLIVET (C)	3200	3200	2500
PED (CE)	3200	3200	2500
SQL	3200	3200	2500

DPr = Maximum operating pressure on refrigerant side

DPw = Maximum operating pressure on water side

OVERLOAD AND CONTROL DEVICE CALIBRATION

		OPEN	CLOSED	VALUE
High pressure switch	kPa	2700	1940	-
Low pressure switch	kPa	230	360	-
Low pressure switch (Brine)	bar	110	240	-
Antifreeze protection	°C	4.0	6.5	-
High pressure safety valve	kPa	-	-	3000
Low pressure safety valve	kPa	-	-	1900
Max no. of compressor starts per hour	Nr	-	-	10
High compressor discharge temperature safety thermostat	°C	-	-	120

WEIGHT DISTRIBUTION

ACOUSTIC CONFIGURATION: STANDARD (ST)

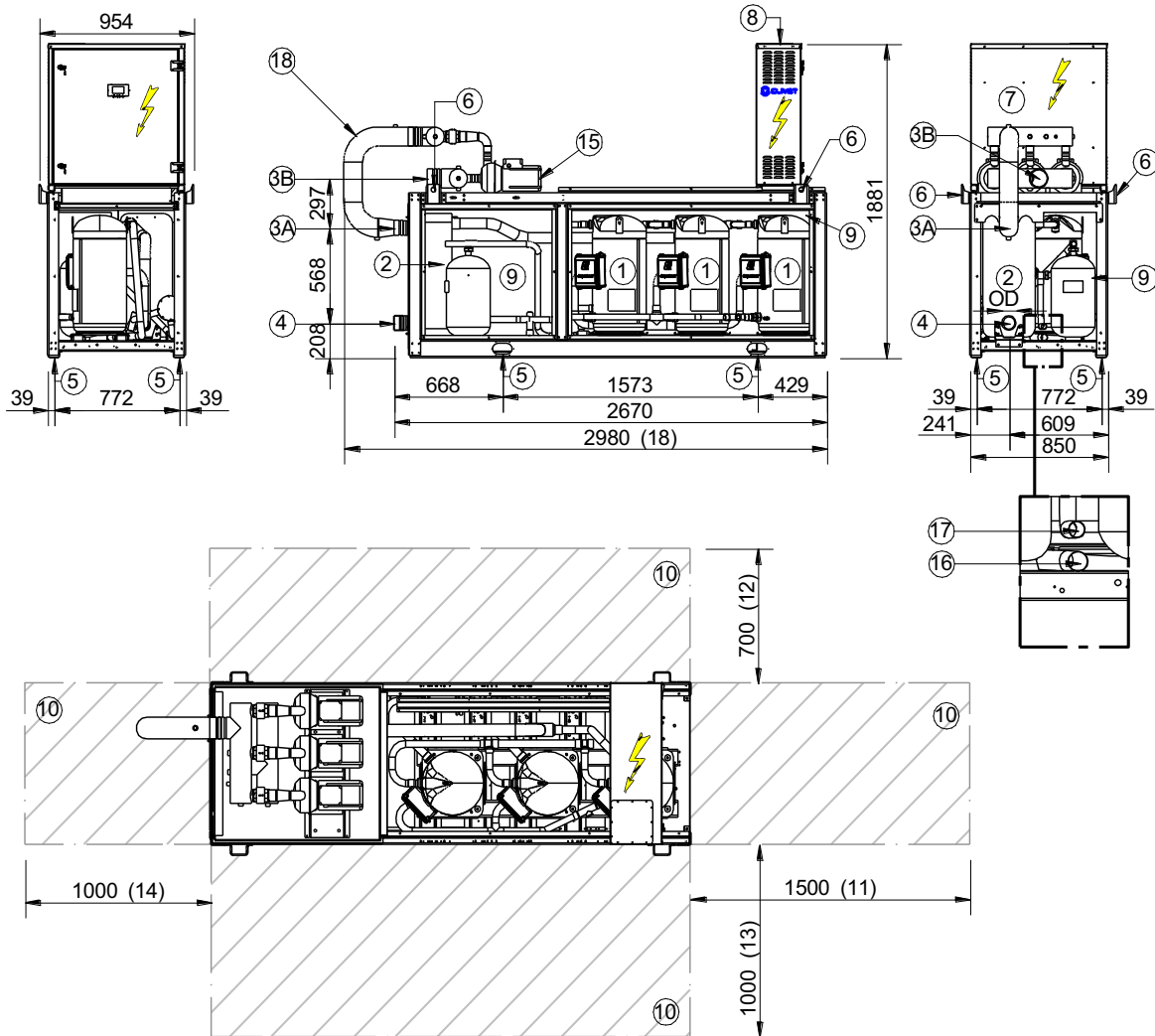
Size		75C	65D	70D	75D	80D	90C	90D	100D	110D	120D	135F	150F	165F	180F
Dimensional dwg. no.		1	2	2	2	2	1	2	2	2	2	3	3	3	3
W1 Supporting Point	kg	244	162	166	187	196	244	218	227	227	227	404	433	433	433
W2 Supporting Point	kg	268	373	399	405	421	268	454	478	478	478	541	610	610	610
W3 Supporting Point	kg	314	194	198	229	239	314	264	283	283	283	482	499	499	499
W4 Supporting Point	kg	343	443	472	490	508	343	542	588	588	588	643	700	700	700
Shipping weight	kg	1144	1148	1211	1281	1334	1144	1445	1538	1538	1538	2018	2189	2189	2189
Operating weight	kg	1169	1172	1235	1310	1363	1169	1478	1576	1576	1576	2070	2241	2241	2241

ACOUSTIC CONFIGURATION: SUPER-SILENCED (EN)

Size		75C	65D	70D	75D	80D	90C	90D	100D	110D	120D	135F	150F	165F	180F
Dimensional dwg. no.		1	2	2	2	2	1	2	2	2	2	3	3	3	3
W1 Supporting Point	kg	270	182	187	207	216	270	236	248	248	248	451	472	472	472
W2 Supporting Point	kg	290	393	419	425	442	290	469	499	499	499	584	642	642	642
W3 Supporting Point	kg	340	216	221	250	260	340	289	305	305	305	514	538	538	538
W4 Supporting Point	kg	364	461	490	508	526	364	567	606	606	606	664	729	729	729
Shipping weight	kg	1239	1229	1292	1362	1416	1239	1527	1620	1620	1620	2160	2330	2330	2330
Operating weight	kg	1264	1253	1316	1391	1445	1264	1560	1658	1658	1658	2212	2382	2382	2382

Weight referred to standard unit; according to the considered accessories unit weight can noticeably change

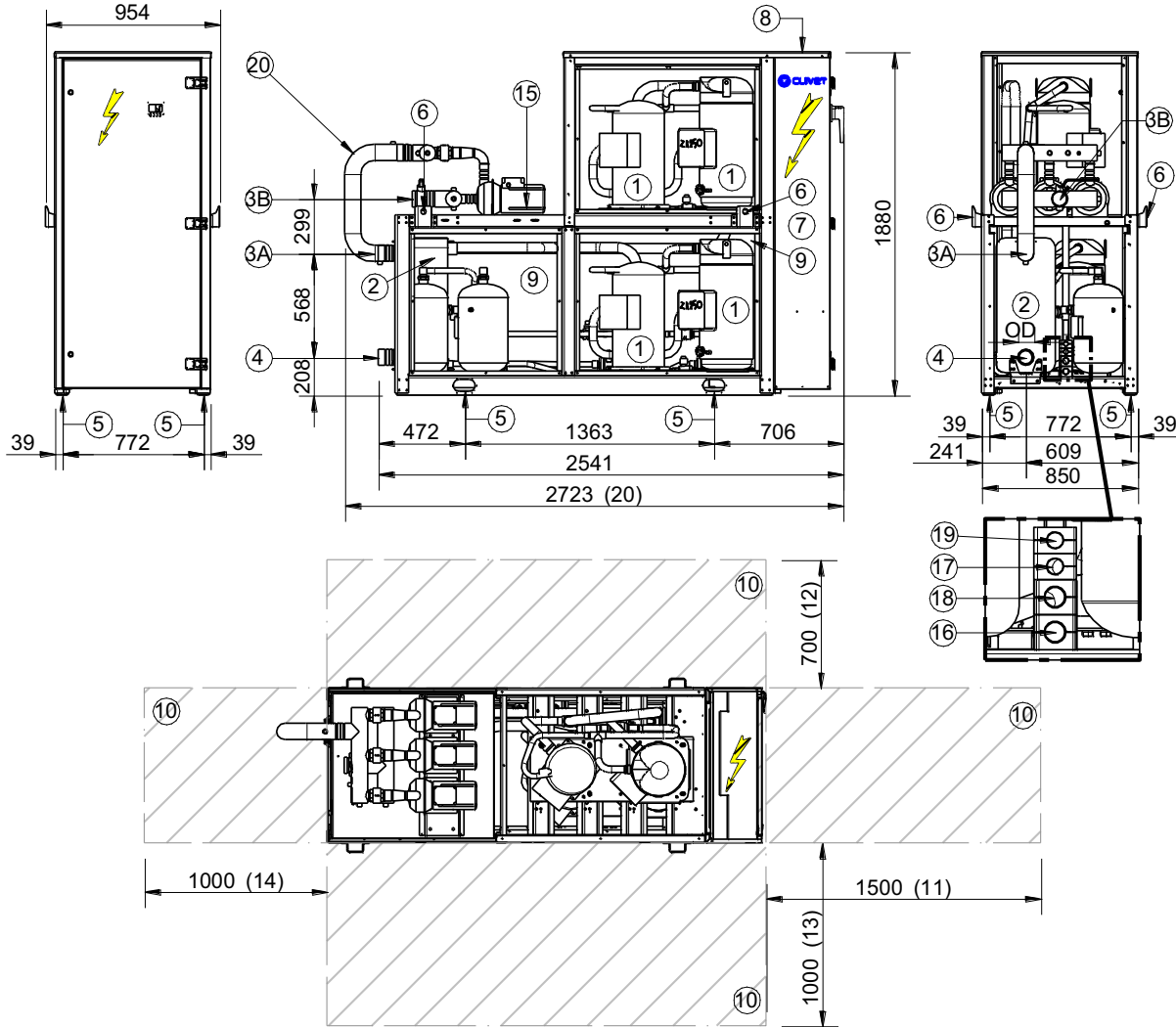
DIMENSIONS: MSE-SC 75C-90C



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3A) WATER INLET (STANDARD UNIT)
- (3B) WATER INLET (UNIT WITHOUT HYDRONIC KIT)
- (4) INTERNAL EXCHANGER WATER OUTLET
- (5) HOLE TO HANG UNIT
- (6) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT)
- (7) ELECTRICAL PANEL
- (8) POWER INPUT
- (9) SOUNDPROOFED CABIN
- (10) CLEARANCE ACCESS RECOMMENDED
- (11) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (13) MINIMUM DIMENSION FOR MAINTENANCE.
- (14) MINIMUM DIMENSION FOR WATER CONNECTIONS.
- (15) INTERNAL EXCHANGER HYDRONIC GROUP (OPTIONAL)
- (16) GAS OUTLET
- (17) LIQUID RETURN
- (G) BARYCENTRE

Size		ST/EN	
		75C	90C
M	mm	1379	1379
P	mm	471	471
OD	mm	88,9	88,9
A - Length	mm	2670	2670
B - Depth	mm	850	850
C - Height	mm	1881	1881

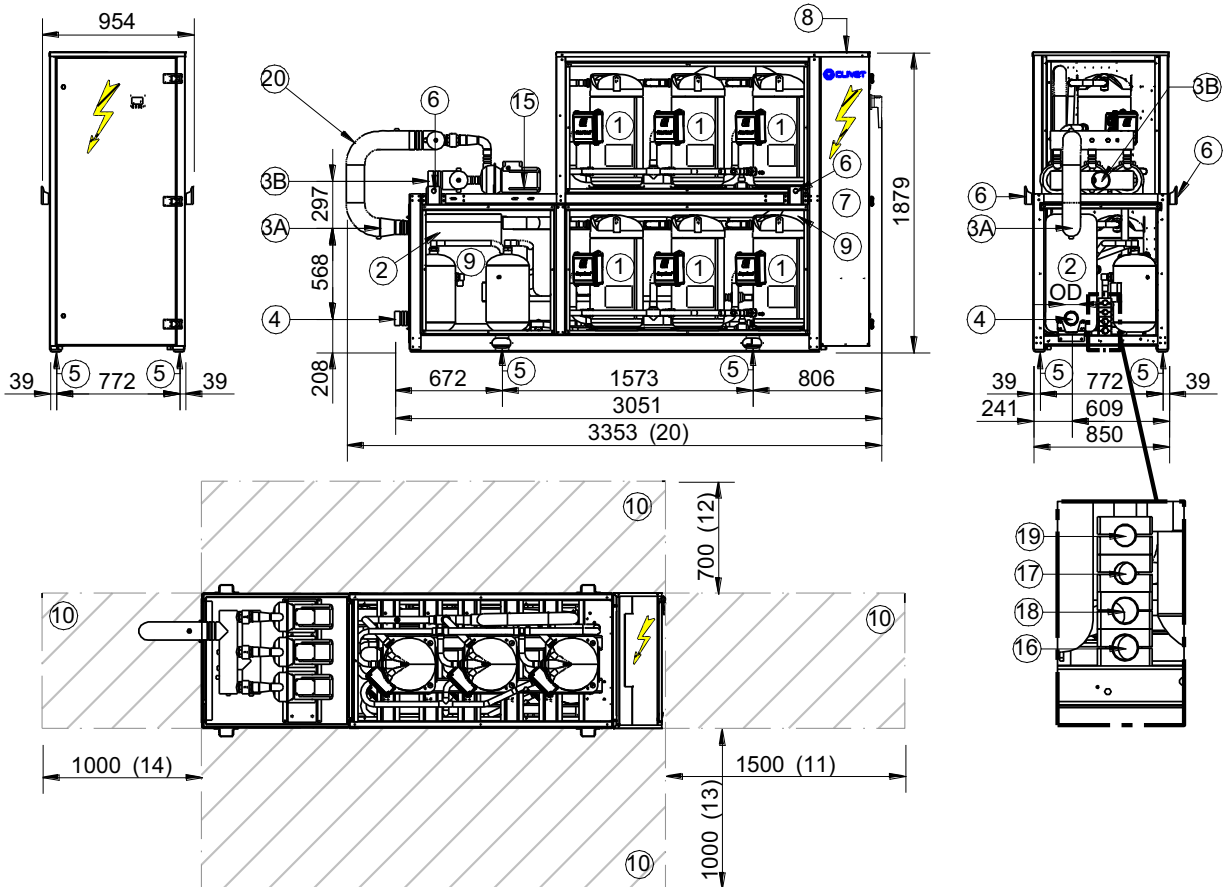
DIMENSIONS: MSE-SC 65D - 120D



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3A) WATER INLET (STANDARD UNIT)
- (3B) WATER INLET (UNIT WITHOUT HYDRONIC KIT)
- (4) INTERNAL EXCHANGER WATER OUTLET
- (5) HOLE TO HANG UNIT
- (6) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT)
- (7) ELECTRICAL PANEL
- (8) POWER INPUT
- (9) SOUNDPROOFED CABIN
- (10) CLEARANCE ACCESS RECOMMENDED
- (11) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (13) MINIMUM DIMENSION FOR MAINTENANCE.
- (14) MINIMUM DIMENSION FOR WATER CONNECTIONS.
- (15) INTERNAL EXCHANGER HYDRONIC GROUP (OPTIONAL)
- (16) GAS OUTLET CIRCUIT 1
- (17) LIQUID RETURN CIRCUIT 1
- (18) GAS OUTLET CIRCUIT 2
- (19) LIQUID RETURN CIRCUIT 2
- (G) BARYCENTRE

Size		ST/EN							
		65D	70D	75D	80D	90D	100D	110D	120D
M	mm	1082	1108	955	960	988	982	982	982
P	mm	474	474	469	471	474	475	475	475
OD	mm	88,9	88,9	88,9	88,9	88,9	88,9	88,9	88,9
A - Length	mm	2541	2541	2541	2541	2541	2541	2541	2541
B - Width	mm	850	850	850	850	850	850	850	850
C - Height	mm	1880	1880	1880	1880	1880	1880	1880	1880

DIMENSIONS: MSE-SC 135F - 180F



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3A) WATER INLET (STANDARD UNIT)
- (3B) WATER INLET (UNIT WITHOUT HYDRONIC KIT)
- (4) INTERNAL EXCHANGER WATER OUTLET
- (5) HOLE TO HANG UNIT
- (6) LIFTING BRACKETS (REMOVABLE, IF REQUIRED, AFTER POSITIONING THE UNIT)
- (7) ELECTRICAL PANEL
- (8) POWER INPUT
- (9) SOUNDPROOFED CABIN
- (10) CLEARANCE ACCESS RECOMMENDED
- (11) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (12) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (13) MINIMUM DIMENSION FOR MAINTENANCE.
- (14) MINIMUM DIMENSION FOR WATER CONNECTIONS.
- (15) INTERNAL EXCHANGER HYDRONIC GROUP (OPTIONAL)
- (16) GAS OUTLET CIRCUIT 1
- (17) LIQUID RETURN CIRCUIT 1
- (18) GAS OUTLET CIRCUIT 2
- (19) LIQUID RETURN CIRCUIT 2
- (G) BARYCENTRE

Size		ST/EN			
		135F	150F	165F	180F
M	mm	1389	1393	1393	1393
P	mm	473	467	467	467
OD	mm	88,9	88,9	88,9	88,9
A - Length	mm	3051	3051	3051	3051
B - Width	mm	850	850	850	850
C - Height	mm	1879	1879	1879	1879

Acoustic configuration: Standard (ST)/Extremely low noise(EN)

Max. equivalent length [in meters] for the ducts at the remote condenser

Outlet line - Liquid line

SIZE		65D	70D	75C	75D	80D	90C	90D	100D	110D	120D	135F	150F	135F	180F
Difference in Level		Maximum Length Discharge and Liquid Piping													
0.0 [m]	m	11	11	20	23	23	13	23	18	18	30	20	20	14	14
2.5 [m]	m	11	11	19	22	22	13	22	17	17	28	19	19	13	13
5.0 [m]	m	10	10	18	21	21	12	21	16	16	27	18	18	12	12
7.5 [m]	m	10	10	17	20	20	12	20	15	15	26	17	17	12	12
10.0 [m]	m	-	-	16	19	19	-	19	15	15	25	16	16	-	-

These values refer to Max. Allowed Equivalent Length, in meters, by using pipes with the same diameters of the connections reported on General Technical Data section and on Dimension section.

Data referred to the following conditions :

- internal exchanger water = 12/7°C
- condensing temperature = 50°C

The reported values assure an equivalent pressure drop contained among the following max. values:

- 1.0K (1.0°C) on the outlet line to the remote condenser;
- 0.5K (0.5°C) on the liquid line from the remote condenser;

The inclination is such that the remote condenser is in an higher position than the moto-evaporating unit

The indicated values are not binding and are rather indicative: anyway, they are the max. allowed ones in ideal conditions of correct installation and operation of the lines and of their welding, without any leak.

The correct values for each specific installation can also be very different from those reported above according to operation and installation conditions.

To take all countermeasures to avoid liquid hammers to the compressor and to ensure a correct oil return to the compressor, etc., such as sloping lines, installing traps, insulation, etc., refer to the standard and correct design rules for refrigerating lines; the manufacturer CLIVET declines all responsibilities for these.

For a dimensioning more personalized and specific or with different diameters, see Software "CLIVET DLF - Cooling Line Dimensioning".

Please contact Our Sales Office for the issue of the above-mentioned Software.



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