

WSH-XSC

65D - 180F

WATER COOLED CHILLERS OF 195 TO 560 kW

Installation use and maintenance manual



Dear Customer,

We congratulate you on choosing these product.

Clivet is being working for years to offer systems able to assure the maximum comfort for long time with high reliability, efficiency , quality and safety. The target of the company is to offer advanced systems, that assure the best comfort, reduce the energy con-sumption, the installation and maintenance costs for all the life-cycle of the system.

With this manual, we want to give you information that are useful in all the phases: from the reception, to the installation and use until the disposal so that a system so advanced offers the best procedure of installation and use.

Best regards and have a nice reading !

CLIVET Spa

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1 - GENERAL

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 equipment 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. The preliminary information must be read prior to carrying out any of the following operations.

1.2 GENERAL INSTRUCTIONS

Preliminaries

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

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

Using the unit in case of breakdown or malfunction :


- voids the warranty
- may compromise the safety of the machine
- may increase time and repair costs.

Follow local safety regulations. .

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

Recycle and dispose of packing material in conformity with local regulations. .

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.

Intended use


 Use the unit for cooling/heating water or a water and glycol mix for air-conditioning only, within limits defined in the technical bulletin and on this manual..

Any use other than intended does not involve the manufacturer in any commitment or obligation. .

Installation


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

Maintenance

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

Turn the machine off before any operation.

Modification

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


Breakdown/Malfuction

Disable the unit immediately in case of breakdown or malfunction. .

Contact a constructor certified assistance service.

Use original spares parts only.

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.

Data update

Continual product improvements may imply manual data changes .

Visit manufacturer web site for updated data.

1.3 INDICATIONS FOR THE USER

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

Note the unit table data so you can provide them at the assistance centre in case of intervention (see "Unit identification" section).

Provide a machine notebook that allows any interventions carried out on the machine 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 assistance service centre authorized by the manufacturer.

 use original spares parts only

Ask the installer to format on:

- start-up / shutdown;
- set points change;
- standby mode;
- maintenance;
- what to do / what not to do in case of breakdown.

1 - GENERAL

1.4 UNIT IDENTIFICATION

Serial number label

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

It has not to be removed for any reason.

It reports the regulations indications such as:

- machine type, exmple:
 - Series → **WSH-XSC**
 - Size → **65D...**
- serial number
 - 12 characters → **Axxxxxxxxxx**
- year of manufacture
- wiring diagram number
- electrical data
- manufacturer logo and address .

Serial number

It identifies uniquely each machine.

It identifies specific spare parts for the machine.

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.

In case of intervention you have to provide data.

Serie
Size
Serial number
Year of manufacture
Wiring diagram

ANTIVIBRATION DEVICES

It is recommended to put the unit on specific antivibration devices .

Each support point of the unit sustains a different weight.

Therefore, each anti-vibration device is sized for a specific support point, and can only be placed there.

The anti-vibration devices must therefore be placed in accordance with the instructions provided with them and with the dimensional drawings in which the support points are indicated by W1 , W2 , W3 etc .

On each anti-vibration device (if provided by CLIVET), its identifying code is stamped, for example C6100100

Flexible joints are necessary on all the hydraulic/ aeraulic connections (the joints are not supplied by Clivet)

Size	PE code	W1	W2	W3	W4
65D	PE960003	C6100024	C6100024	C6100024	C6100024
70D	PE960003	C6100024	C6100024	C6100024	C6100024
75D	PE960003	C6100024	C6100024	C6100024	C6100024
80D	PE980002	C6100024	C6100026	C6100024	C6100026
85D	PE980002	C6100024	C6100026	C6100024	C6100026
90D	PE980002	C6100024	C6100026	C6100024	C6100026
100D	PE980002	C6100024	C6100026	C6100024	C6100026
110D	PE980002	C6100024	C6100026	C6100024	C6100026
115D	PE980002	C6100024	C6100026	C6100024	C6100026
120D	PE980002	C6100024	C6100026	C6100024	C6100026
135E	PE960004	C6100026	C6100026	C6100026	C6100026
150F	PE960004	C6100026	C6100026	C6100026	C6100026
165F	PE980005	C6100026	C6100026	C6100028	C6100028
180F	PE980005	C6100026	C6100026	C6100028	C6100028

2 - RECEPTION

2.1 PRELIMINARY INFORMATION



Operate in compliance with safety regulations in force .

For detailed information (dimensions, weight, technical characteristics etc.) please refer to the TECHNICAL INFORMATION section.

Use single protection devices : gloves, glasses etc

2.2 DELIVERY CONTROL



Before accepting the delivery you have to check:

- 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".
- Contest by fax and registered mail with advice of receipt to supplier and the carrier.

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

2.3 STORING

Observe external packaging instructions .

2.4 HANDLING



Verify unit weight and handling equipment lifting capacity .

Identify critical points during handling (disconnected routes, flights, steps, doors).

Check the position of the centre of gravity in the TECHNICAL INFORMATION—DIMENSIONS section.

Before starting the handling, make sure that the unit is stable.



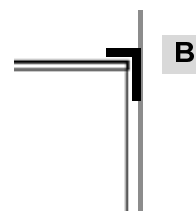
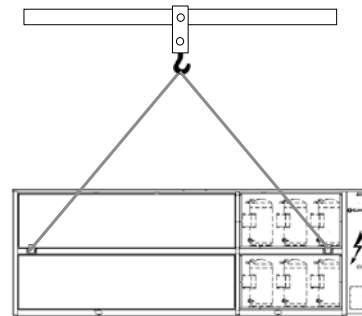
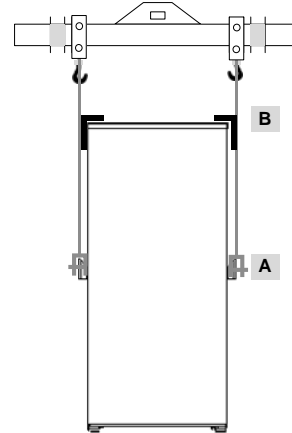
Check the position of the centre of gravity in the TECHNICAL INFORMATION—DIMENSIONS section.

2.5 PACKAGING REMOVING

Be careful not to damage the unit.

Recycling and disposing the packaging material in conformity with local regulations.

Lifting beam with spacers



Use protections not to damage the unit.

3 - POSITIONING

3.1 PRELIMINARY INFORMATION

Operate in compliance with safety regulations in force.

For detailed information (dimensions, weight, technical characteristics etc.) please refer to the TECHNICAL INFORMATION section.



Use single protection devices : gloves, glasses etc.

During positioning consider these elements :

- technical spaces requested by the unit and the system
- choice of the unit installation place
- electrical connections
- water connections

3.2 FUNCTIONAL CLEARANCES

The functional clearances have to :

- guarantee the unit good operating
- allow the maintenance operations
- safeguard the authorized operators and the exposed person



Respect the functional clearances indicated in the TECHNICAL INFORMATION - DIMENSIONS section.

Double the functional clearances if more units are aligned.

3.3 POSITIONING



The unit has been designed to be installed :

- INDOOR
- in fixed position
- in premises with **Max ambient temperature= 40 °C** (49 °C with "electrical panel ventilation" option)
- in premises with **Max ambient RH = 50% at 40 °C**

Limit the vibration transmission:

- use vibration isolators on the unit support points
- install the flexible joints on the water connections.

Installation criteria:

- safe accessible position
- avoid flood-prone places;
- verify the unit weight and bearing point capacity;
- verify that all bearing points are aligned and levelled
- install the unit raised from the ground

SAFETY 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.

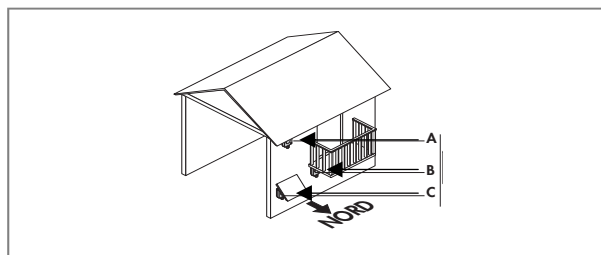
POSITIONING



The sensor should not be influenced by factors that can distort the reading (eg direct sunlight, air exhausted from the fan or other sources, contact with the unit structure or other heat sources, accumulations of snow / ice).

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 PRELIMINARY INFORMATION

Selection and installation of system components must be carry out by installer.

Following you will find some indications to integrate with what is provided by the local regulations in force and by the good technical laws.

4.2 COMPONENTS

CUT-OFF VALVES :

- installed at inlet and outlet (both on the water technique circuit as well as that of the hot domestic water) allow maintenance operations without having to empty the system .

THERMOMETERS AND MANOMETERS :

- installed at entry and exit of the main elements facilitate inspection and maintenance.

AN AIR BLEED VALVE :

- installed in all of the highest points of the system allowing the venting of the circuits air..

DRAINAGE TAPS :

- installed in the lowest points of the system to allow bleeding.

EXPANSION TANK :

- It keeps a correct system pressure when the water temperature changes.
It must be dimensioned as a function of water content.

WATER FILTER :

- if not present on-board the machine, must be installed immediately in the water input of the unit, in a position that is easily accessible for cleaning.
- Mesh dimension: 1,0 mm² unit with 1 compressor
- Mesh dimension: 1,5 mm² multicompressor unit
- The filter never should be removed, this operation invalidates the guaranty

SUPPORTS :

- The hydraulic pipes weight mustn't burden on the unit connections ..

FLOW SWITCH

- The flow switch must be present as a component of the system

4.3 OPERATION SEQUENCE

1. Execute leakage test
2. Carefully wash the system by filling it and emptying it several times with clean water.
Ignoring this operation will lead to several filter cleaning interventions and at worst cases can cause damages to the exchangers and the other parts.
3. Prepare anti-freeze solution if required
4. Fill the plant
5. vent the plant
6. Isolate the pipes to avoid heat dispersions and formation of condensate isolate all the pipes.
Leave various point of service free (wells, vent-holes etc).

4.4 WATER QUALITY

The water quality is determined by the following factors, avoid therefore:

- Inorganic salts
- pH
- Biological load (seaweeds etc)
- Suspended solids
- Dissolved oxygen

Water with inadequate characteristics can cause:

- pressure drop increase
- energy efficiency decrease
- corrosive symptom increase

4.5 RISK OF FREEZE

If the unit or the relative water connections can be subject to temperatures close to 0°C adopt measures for prevent risk of freeze.

For example:

- Mix water with ethylene glycol
- Safeguard the pipes with heating cables placed under the insulation
- Empty the system in cases of long non-use and check that:
 - there are no closed taps present that could trap water even after emptying
 - there are no low points in which water can stagnate even after emptying; carry out any blowing required .

4.6 ANTI-FREEZE SOLUTION

Consider that the use of anti-freeze solution determines an increase in a pressure drop.

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

Do not use different glicol mixture (i.e. ethylic with propylene)

4.7 VICTAULIC CONNECTIONS

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

Do not weld the system pipe with the Victaulic connection joint attached.

The rubber gasket might be irreparably damaged.

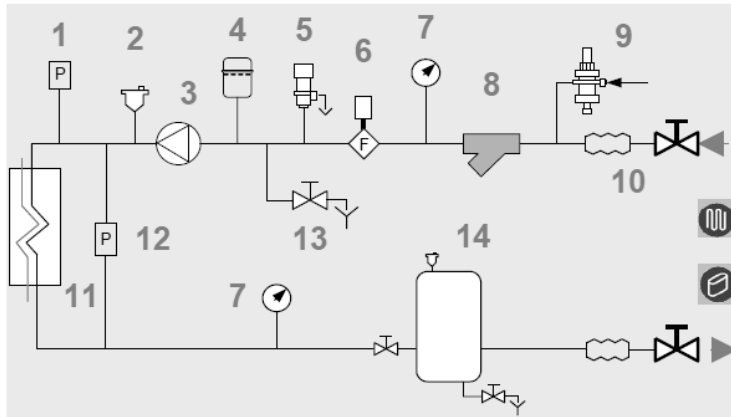


4 - WATER CONNECTIONS

DIAGRAM OF RECOMMENDED USE SIDE CONNECTION

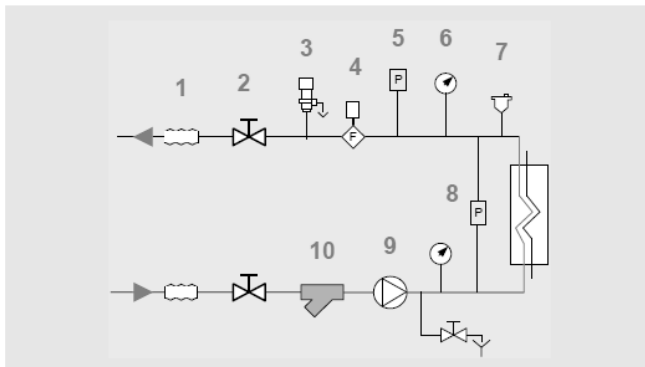
Depending on the type of machine and the selected setup, some components may be integrated into the unit.
The accumulation tank is necessary in the event of the following:

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



1. Charged system pressure switch
2. vent
3. circulating pump / pump
4. expansion tank
5. safety valve
6. flow switch
7. pressure switch / thermometer
8. filter
9. filling valve
10. antivibration joints
11. user side exchanger
12. Differential pressure switch
13. Discharge cock
14. inertial storage tank

RECOMMENDED SOURCE SIDE CONNECTION SCHEMA



1. Antivibration joints
2. Shut-off valve
3. Safety valve
4. Flow switch
5. System min. pressure manostat
6. Pressure switch / thermometer
7. vent
8. Differential pressure switch
9. Pump
10. Filter

RECOVERY EXCHANGER (OPTIONAL)

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

- with 20% recovery
- The customer is responsible for the management of the circulation pump, valves, thermostats, etc.

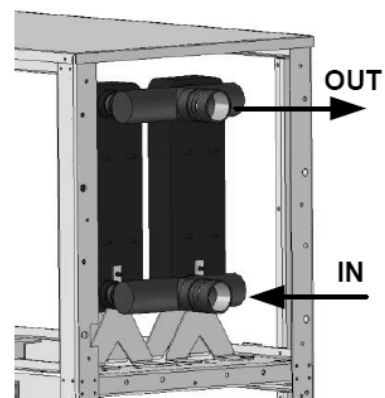
The recovery input water must not be below 25°C, in the event that, wrongful operations and breakages of the unit can occur.

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

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

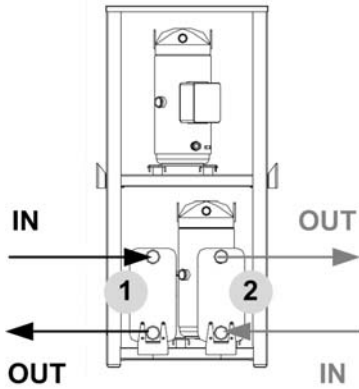
Water temperature can reach high temperatures (up to 100°C), therefore:

- 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.



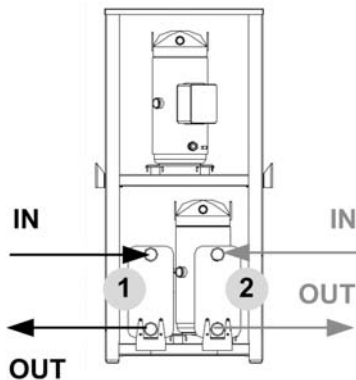
WATER CONNECTIONS

ONLY COOLING Standard: OCO



1. EVAPORATOR - cool side
use side connections
2. CONDENSER - heat side
source side connections

HEAT PUMP Option: OHP



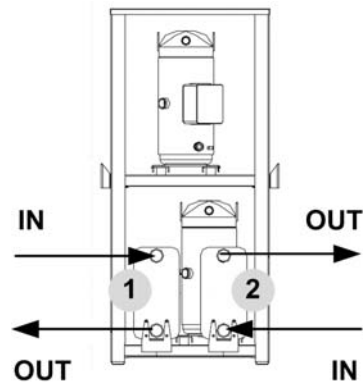
SUMMER

1. EVAPORATOR - cool side
use side connections
2. CONDENSER - heat side
source side connections

WINTER

1. CONDENSER - heat side
use side connections
2. EVAPORATOR - cool side
source side connections

REVERSAL ON WATER CIRCUIT Option: OHI



SUMMER

1. EVAPORATOR - cool side
 2. CONDENSER - heat side
- EVAPORATOR water temperature control

WINTER

1. EVAPORATOR - cool side
 2. CONDENSER - heat side
- CONDENSER water temperature control

WATER CONNECTIONS

HYDROPACK - OPTIONAL

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

HYDROPACK with 1 pump

for low-power units you can choose the basic solution with 1 pump.

HYDROPACK with 1 pump + 1 standby

also for low-power units you can include a second pump for complete reliability. If one pump shuts down, the other one automatically starts up and the unit control signals the shutdown of the pump that is out of order. The micro-processor automatically balances the hours of operation of both pumps

HYDROPACK with 2 pumps

Per less power units, the standard solution with 2 pumps can be chosen. If a pump gets blocked, the unit will go on working till about 80% of the charge. This solution is more reliable than the traditional ones with a single great power pump.

HYDROPACK with 2 pumps + 1 stand-by,

2 reserve pump can be foreseen for assuring a total reliability.

So the design water rate is assured (in fact, in the event of a failure, the reserve pump is automatically activated and the unit control signals if the broken pump is blocked).

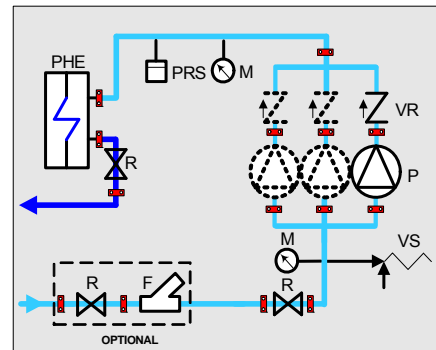
HYDROPACK with 3 pumps

for units of greater power; with the solution of 3 pumps which are always activated, the possible blocking of a pump always assures the regular working up to 80% of the charge (always with the signalization of the blocking). In this case, it is possible, upon request, to supply a reserve pump (not connected). The replacement is performed in few minutes time, thanks to the simple foreseen connections.

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

This device is very useful during starts-up, weekend pauses, and after a long period of inactivity.

When the water temperature of the hydronic circuit is very high, possible blocks for overcharging are avoided, as well as the consequent interventions of specialized personnel for the assisted start-up.



Multi pump hydronic group including:

R = shut-off valves

F = steel mesh filter(optional)

M = manometers

VS = safety valve (6 Bar)

P = high efficiency single-structure and single-rotor electric pumps

VR = check valves

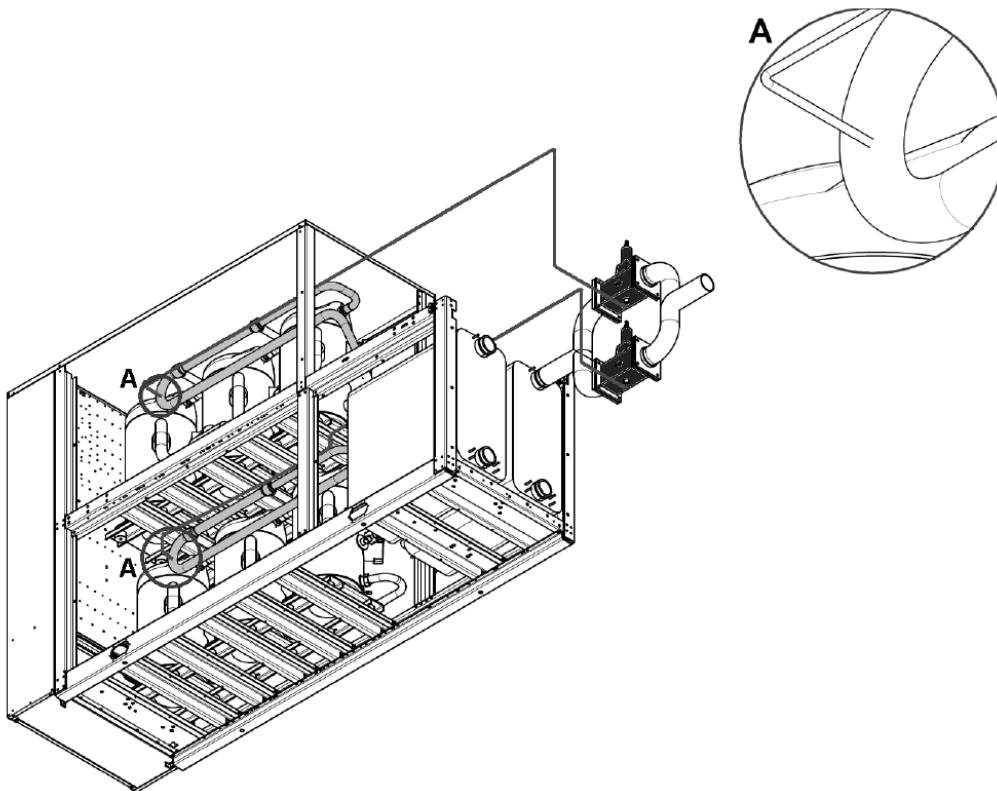
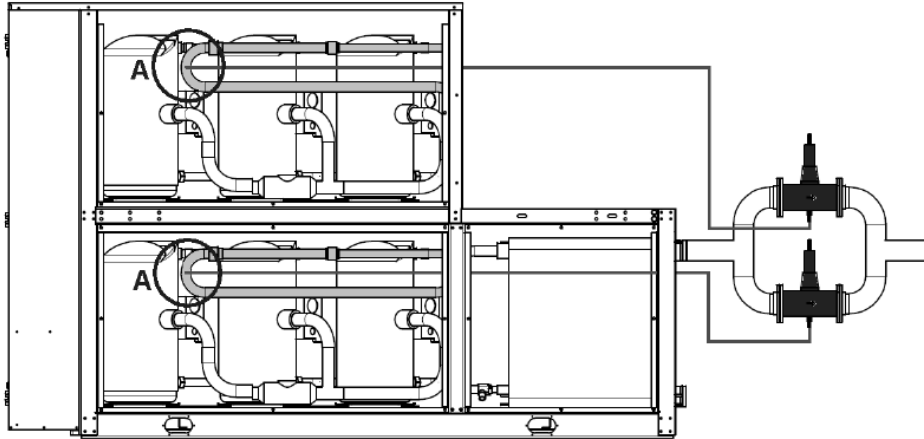
PRS = safety pressure switch (avoids pumps operation in case of water absence)

PHE = evaporator-kit including two blind plugs needed in case of pump removal for maintenance operations

WATER CONNECTIONS

PRESSOSTATIC VALVES - OPTION

Assembling and connection performed by customer.



5 - ELECTRICAL CONNECTIONS

5.1 PRELIMINARY INFORMATION

The characteristics of the electrical lines must be determined by specialized 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 the presumed short circuit current, whose value must be determined in function of 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 requirements by the regulations in force and being informed about the risks relevant to these activities.

Operate in compliance with safety regulations in force .

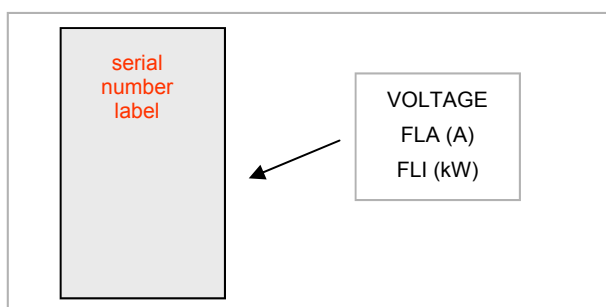
5.2 ELECTRICAL DATA



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.

Refer to the electrical data report on the serial number label.



F.L.A. full load ampere
Full load current at max admissible conditions

F.L.I. Full load input
Full load power input
(at max. admissible condition)

5.3 CONNECTIONS

1. refer to the unit electrical diagram (the number of the diagram is shown on the serial number label)
2. verify that the network has characteristics conforming to the data shown on the serial number label
3. Before starting work, verify that the sectioning device at the start of the unit power line is open, blocked and equipped with cartel warning
4. Primarily you have to realize the earthing connection
5. Shelter the cables using adequate measure fairleads
6. Before power the unit, make sure that all the protections that were removed during the electrical connection work have been restored.

5.4 SIGNALS / DATA LINES

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

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

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

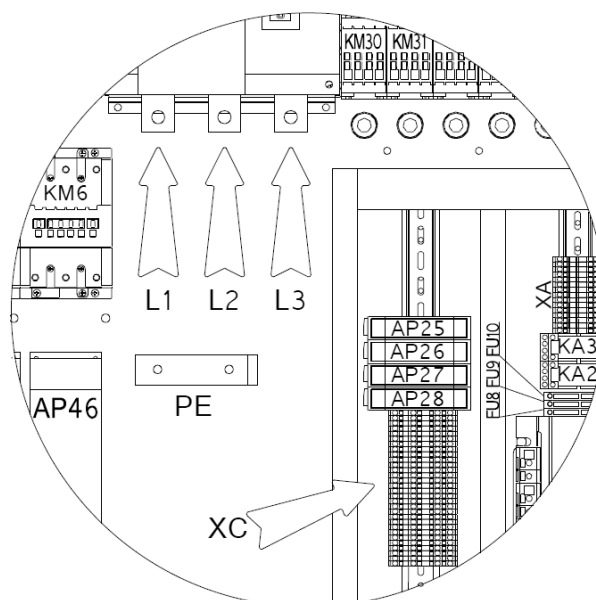
Do not lay the cables parallel to other cables; cable crossings are possible, only if laid at 90°.

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

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

Respect impedance, capacity and attenuation indications.

5.5 ELECTRIC LINES INLET



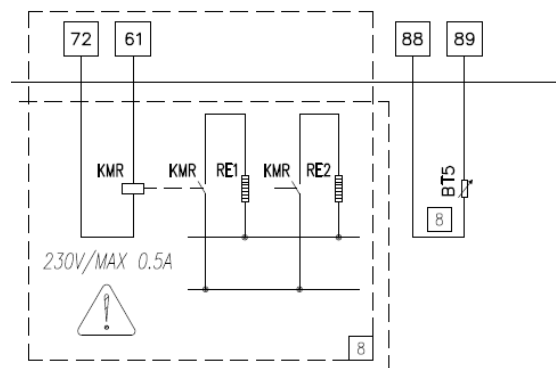
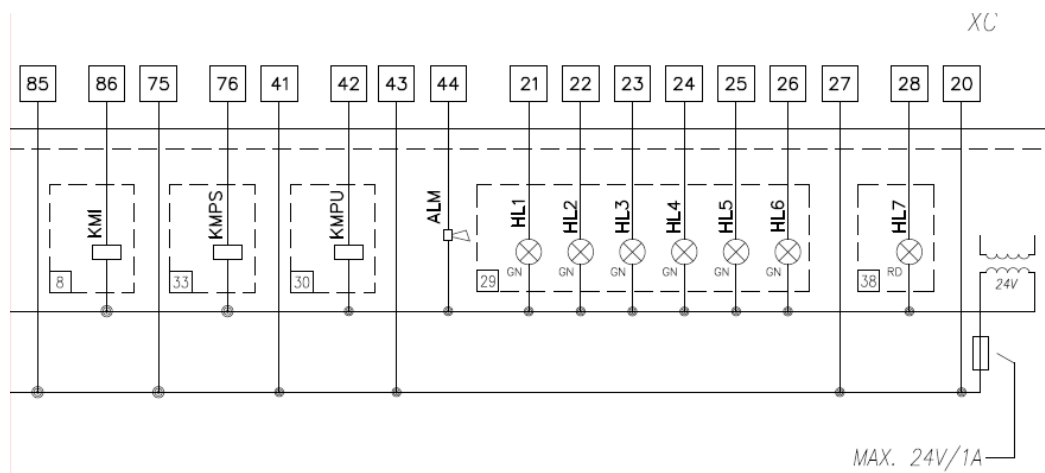
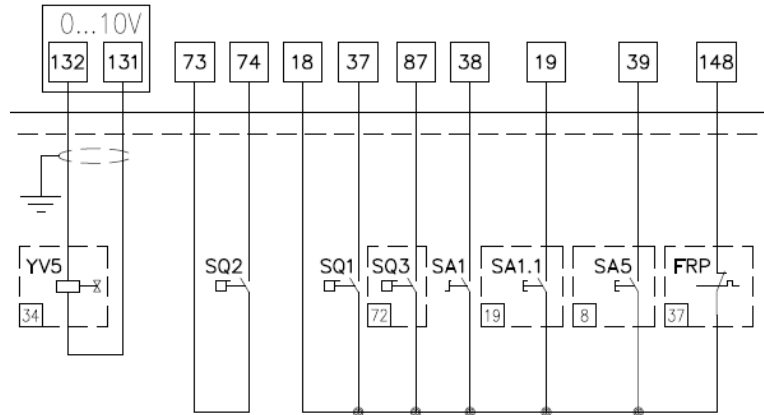
Fix the cables: if vacated may be subject to tearing.



The cable don't have to touch the compressor and the refrigerant piping (they reach high temperatures).

5 - ELECTRICAL CONNECTIONS

5.6 CONNECTIONS PERFORMER BY CUSTOMER



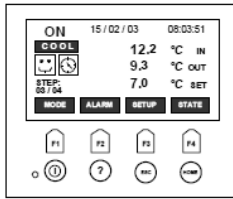
5 - ELECTRICAL CONNECTIONS

SQ1	Flussostato scambiatore lato utilizzo utility side exchanger flow switch contrôleur de débit échangeur côté utilisateur Strömungswächter Wärmetauscher auf Verbraucherseite Flujostato intercambiador lado equipo
SQ2	Flussostato scambiatore lato sorgente Source side exchanger flow switch Contrôleur de débit de l'échangeur côté source Strömungswächter des Wärmetauschers Quelleseite Flujostato cambiador lado fuente
SQ3	Flussostato per scambiatore recupero di calore Flow switch for heat recovery exchanger Strömungswächter Rückgewinnung Contrôleur de débit pour échangeur récupération de chaleur Flujostato por intercambiador a recuperación de calor
SA1	selettore remoto di ON/OFF macchina remote machine on/off selector sélecteur déporté de ON/OFF machine Ein/Aus Fernwahlschalter selector remoto de ON/OFF máquina
SA1.1	selettore remoto per cambio set-point remote set-point variation selector sélecteur déporté pour changement de consigne Fernwahlschalter Sollwertwechsel selector remoto para cambio set-point
SA5	selettore remoto "estate/inverno" remote winter/summer selector sélecteur déporté "été/hiver" Fernwahlschalter "Winter/Sommer" selector remoto "verano/invierno"
FRP	protezione termica pompa lato sorgente pump thermal overload protection source side protection thermique de la pompe côté source Überhitzungsschutz der Pump Versorgungsseite protección térmica de la bomba lado alimentación

RE1 RE2	resistenze di riscaldamento esterne lato sorgente external heater source side résistances de chauffage externes côté source externe Heizung im Kühlwasserkreislauf resistencias de calefacción externas lado alimentación
ALM	segnalazione blocco cumulativo cumulative fault signal signalisation alarmé Sammelstörmeldung señalización bloqueo cumulativo
HL1 HL4 HL2 HL5 HL3 HL6	lampada di segnalazione stato compressore compressor status signal lamp lampe de signalisation état compresseur Signallampe Verdichtierzustand lámpara de señalización estado compresor
HL7	Segnalazione luminosa stato pompa Pump status luminous signal Signalisation lumineuse état pompe Leuchtende Meldung des Pumpezustand Señalización luminosa estado bomba
KMR	contattore gestione resistenze di riscaldamento esterne contactor for external heater control contacteur gestion résistances externes de chauffage Relais für die Ansteuerung einer externen Heizung contador de control resistencias de calefacción externas

KMPU	contattore di comando pompa lato utilizzo utility side pump control contactor contacteur commande pompe côté utilisateur Schaltgeber Pumpensteuerung auf Verbraucherseite contactor de accionamiento bomba lado equipo
KMPS	contattore di comando pompa lato sorgente source side pump control contactor contacteur commande pompe côté source Schaltgeber Pumpensteuerung auf Quelleseite contactor de accionamiento bomba lado fuente
KMI <i>de chaleur</i> <i>valor</i>	contattore di inversione esterna circ. idr. contactor for the ext. water circuit reversal contacteur d'inversion extérieure circ. hydraulique Schütz für externe Umkehr des Wasserkreislaufs contactor de inversión externa circ. hidr.
BT5	sonda di temperatura acqua uscita condensatore water temp. probe at condenser outlet sonde de température eau à la sortie du condenseur Temperaturfühler Wasseraustritt Verflüssiger sonda de temperatura agua salida condensador
YV5	valvola modulante lato sorgente modulating valve source side vanne modulante côté source Regelventil Erzeugerseite válvula modulante lado alimentación
SA5	⁷² selettore remoto di abilitazione al recupero ⁷² remote heat recovery enabling selector sélecteur déporté de validation récupération Fernwahlschalter Rückgewinnung selector remoto de habilitación para la recuperación

5 - ELECTRICAL CONNECTIONS



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

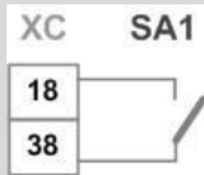
few functionalities and inputs must be activated by configuration parameters whose access is reserved to authorized assistance centres (in order to avoid unauthorized modifications)

HEATING function is active only in units with options:

- reversal on water circuit
 - operation in heat pump
- (see **WATER CONNECTIONS** section)

ON / OFF FROM REMOTE CONTROL

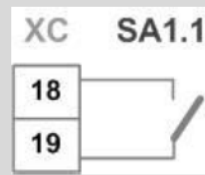
It allows the remote start and stop, not by keypad. It can be used to disable the unit during the night, the weekend etc., so with ON or OFF periods relatively long (some hours). It has not to be used with ON or OFF cycles too much shorts: they compromise the operating logic and they can cause malfunctions or faults. In summer operating, for example, ON –OFF cycles lower than one hour can compromise the thermoregulation logic, that implements an integral check. If this function is not used, jump the respective terminals.



SECOND SET-POINT

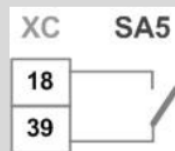
It allows the use of a secondary set-point, such as, for example, for a night operation, which can be activated by a remote contact.

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

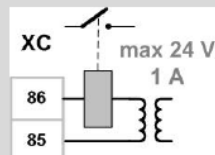


CHANGING FROM SUMMER TO WINTER USING THE REMOTE CONTROL

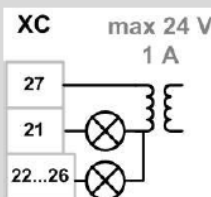
It allows the remote changing COOLING/HEATING, rather than by keypad. Generally the unit is delivered with disabled input and the changing can be activated from keypad. If this function is used, it is necessary to set the parameter 12 accessible only to the service centre; in this way the changing by keypad is no more possible. With selection switch open, the unit operates in heating, with selection switch closed it operates in cooling.



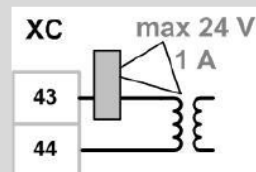
INVERSION CONTROL ON HYDRAULIC CIRCUIT



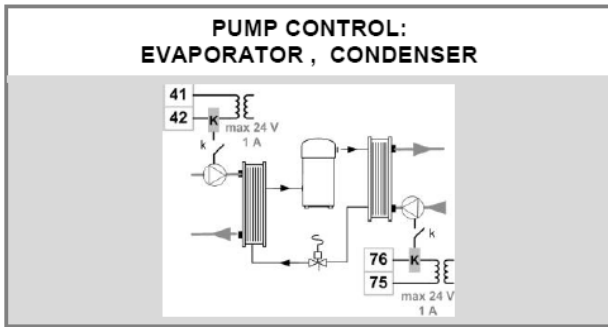
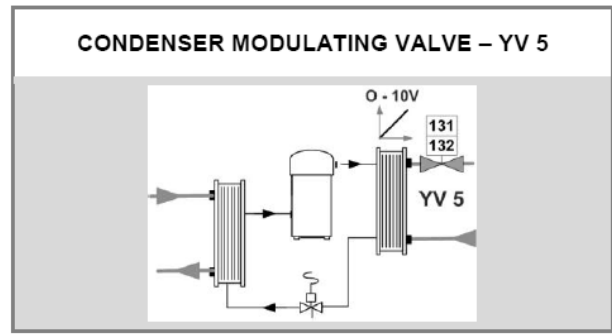
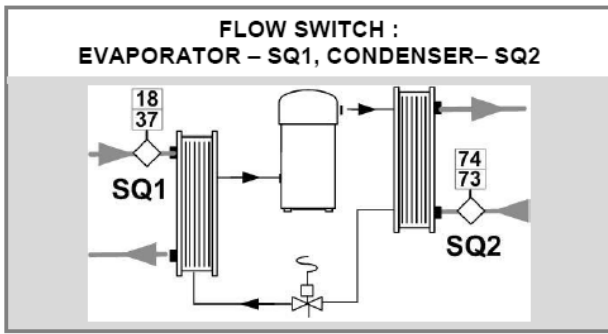
COMPRESSOR OPERATION SIGNAL



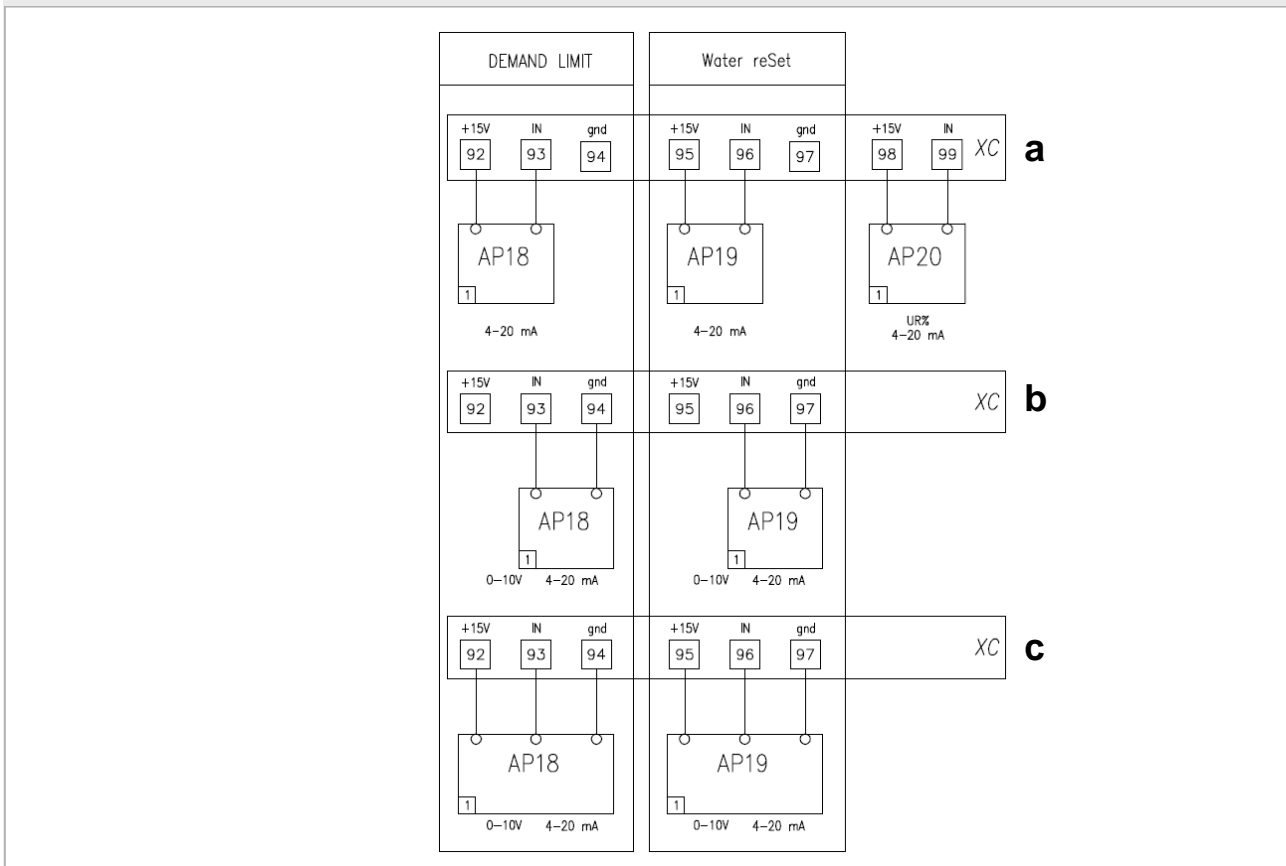
SIGNAL CUMULATIVE SHUTDOWN



5 - ELECTRICAL CONNECTIONS



5.7 DEMAND LIMIT and WATER RESET

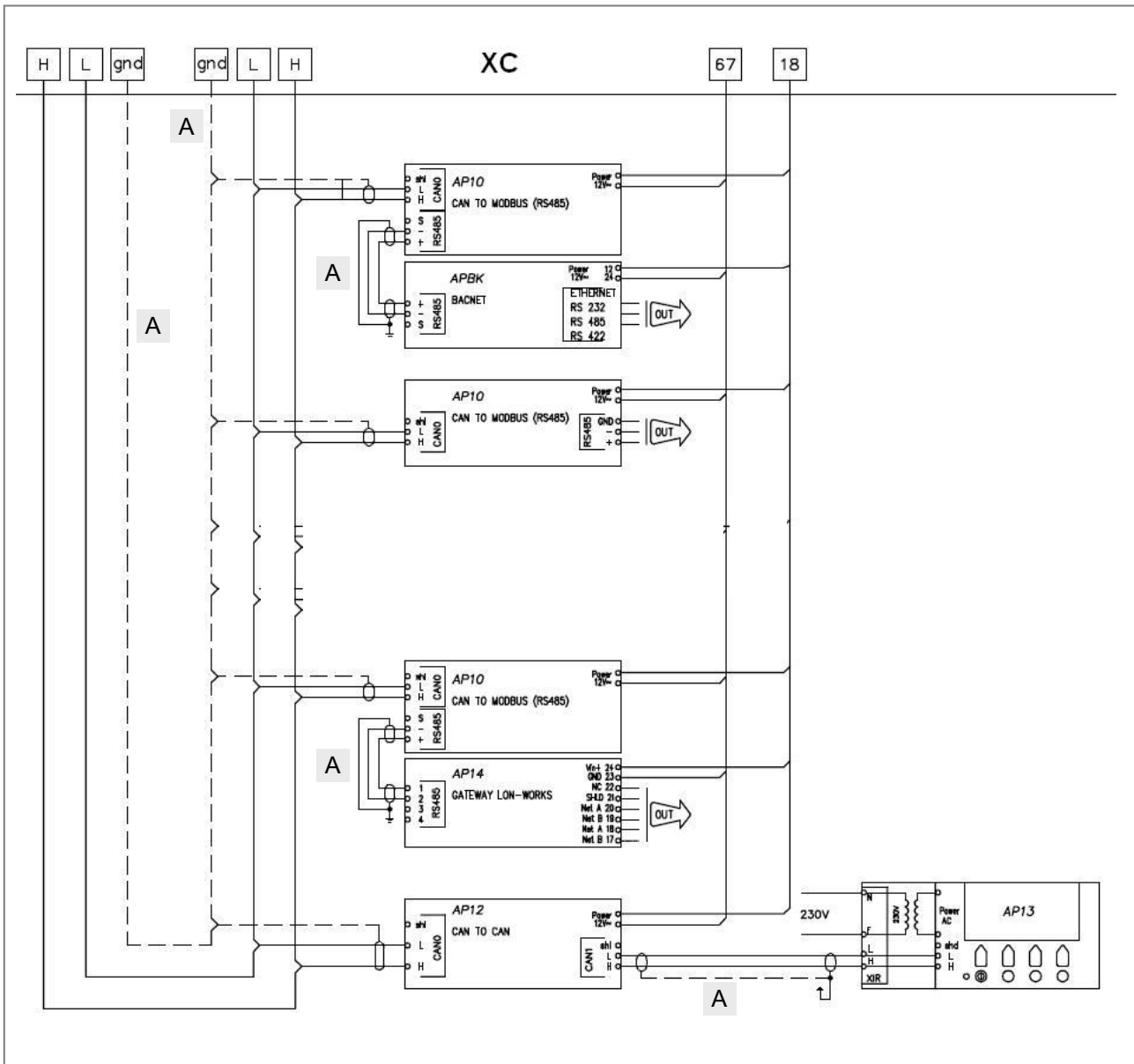


XC	Terminal block of Customer connections
AP18	demand-limit
AP19	water reset
AP20	Ambient humidity control probe

a	Devices powered by the signal
b	Devices with own power supply
c	Passive devices powered by the module (max 50mA)

5 - ELECTRICAL CONNECTIONS

5.8 COMMUNICATION



XC	Terminal block of Customer connections
AP10	Gateway Modbus RS485
AP12	Remote interface terminal
AP13	Remote interface
AP14	Gateway LonWorks
APBK	Gateway Bacnet

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 - START-UP

PRELIMINARY CHECKS



To check **before** starting-up the unit .

For details refer to the different manual sections.

<input checked="" type="checkbox"/> Preliminary checks - Unit OFF power supply
<input type="checkbox"/> Access in safety
<input type="checkbox"/> Functional clearances
<input type="checkbox"/> Structure integrity
<input type="checkbox"/> Unit on vibration isolators
<input type="checkbox"/> Unit input water filter + shut-off valves for cleaning
<input type="checkbox"/> Vibration isolators on water connections
<input type="checkbox"/> Expansion tank (indicative volume = 5% system content)
<input type="checkbox"/> Cleaned system
<input type="checkbox"/> Loaded system + possible glicole solution + corrosion inhibitor
<input type="checkbox"/> Under pressure system
<input type="checkbox"/> Vented system
<input type="checkbox"/> Refrigerant circuit visual check
<input type="checkbox"/> Earthing connection
<input type="checkbox"/> Power supply features
<input type="checkbox"/> Electrical connections provided by the customer
<input type="checkbox"/> Outside air temperature probe

6 - START-UP

START-UP SEQUENCE



Operations to perform to start-up the unit.

For details refer to the different manual sections.

<input checked="" type="checkbox"/> Start-up sequence - Unit ON power supply
<input type="checkbox"/> Compressor carter resistances operating at least since 8 hours
<input type="checkbox"/> Off-load voltage measure
<input type="checkbox"/> Phase sequence check
<input type="checkbox"/> Pump manual start-up and flow check
<input type="checkbox"/> Unit ON
<input type="checkbox"/> Load voltage measure and absorptions
<input type="checkbox"/> Liquid light check (no bubbles)
<input type="checkbox"/> Measure of return and supply water temperature
<input type="checkbox"/> Super-heating and sub-cooling measure
<input type="checkbox"/> Check no anomalous vibrations are present
<input type="checkbox"/> Set-point personalization
<input type="checkbox"/> Climatic curve personalization
<input type="checkbox"/> Complete and available unit documentation

6 - START-UP

6.1 PRELIMINARY INFORMATION

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 star-up data with the service centre.

6.2 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 line sectionalizing device is open, locked and equipped with the suitable warning
- make sure no tension is present

6.3 REFRIGERANT 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.

6.4 HYDRAULIC CIRCUIT

1. Before realizing the unit connection make sure that the hydraulic system has been cleaned up and the clearing 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.

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

6.5 ELECTRICAL CIRCUIT

Verify that the unit is connected to the ground plant

Check the conductors tightening: the vibrations caused by handling and transport might cause loosening

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

Check the tension and line frequency values which must be within the limits :

$$400/3/50 \pm 6\%$$

Control the unbalancing of the phases:

it must be lower than 2%

Example:

1)
$$\frac{388 + 379 + 377}{3} = 381 \text{ (A)}$$

2)
$$\text{MAX} - A = 388 - 381 = 7$$

3)
$$S = \frac{7}{A} \times 100 = 1,83 \text{ OK}$$



The working out of the limits can cause irreversible damages and voids the warranty.

Check with amperometric pliers the operating of the compressor carter heating. Before proceeding with the start-up, leave the unit powered with stopped compressors for some hours.

6 - START-UP

6.6 COMPRESSOR CRANKCASE RESISTANCES

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 the resistances 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.

6.7 VOLTAGES

Check that the air and water temperatures are included in the operating limits. Refer to "Control" section for the indications on the control system.

Start-up the unit.

With operating unit, i.e. in stable conditions and next to the operating ones, check:

- supply voltage
- total absorption of the unit
- absorption of the single electric loads

6.8 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)

6.9 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 **OUT** of standards.

In the event of compressor break, due to the 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.

6.10 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.

6.11 CE 97/23 PED DIRECTIVE

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

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)

6 - START-UP

6.12 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.

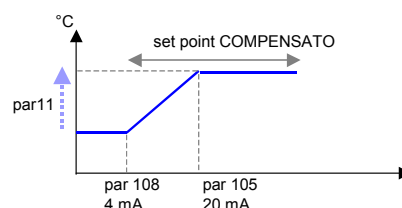
MENU	NUM	Parameter name	meaning
thermoregulation-demandlimit	7	DmandLimitEn	Enables the function : 0=disabled , 1=by signal, 2=by parameter
parameters-set-sensors	82	TypeDI	Type of signal : 0=0-10 V ; 1=4-20mA

6.13 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 .

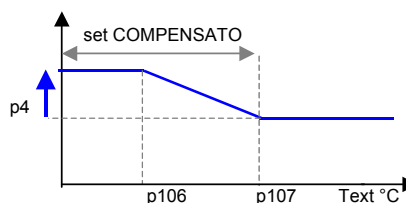


MENU	NUM	Parameter name	Meaning
parameters thermoregulation waterreset	11	MaxCWRC	Max value of the summer WR correction
	75	WaterReset	Water Reset enabling : 0=no ; 1=COOL only ; 2=HEAT only; 3=always
	105	SWRMaxC	Summer MAX correction signal
	108	SWRMinC	Summer MIN correction signal
parameters-set-sensors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

6.14 FRESH AIR TEMPERATURE PROBE

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 is necessary.



MENU	NUM	Parameter name	Meaning
parameters thermoregulation compext	1	EnCompExt	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	9	ProbeText	It enables ext. temp. probe: 0=yes ; 1=no

6.15 EXTERNAL AIR HUMIDITY PROBE

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

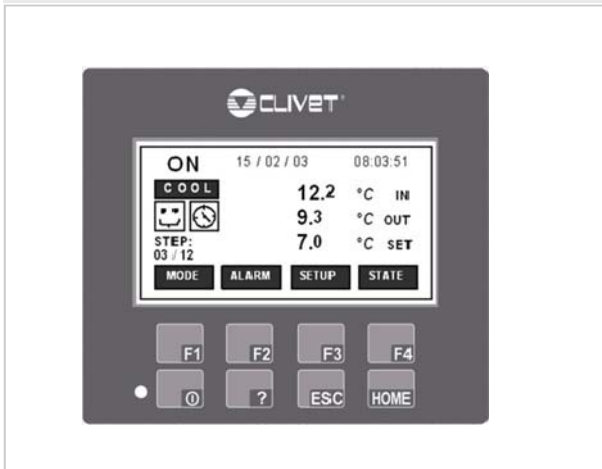
In the winter operation the correction is only on the temperature.

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	23	ProbeURExt	Enables external humidity probe: 1=YES / 0=NO

7 - CONTROL

7.1 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

HEATING function is active only in units with options: reversal on water circuit , operation in heat pump

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.

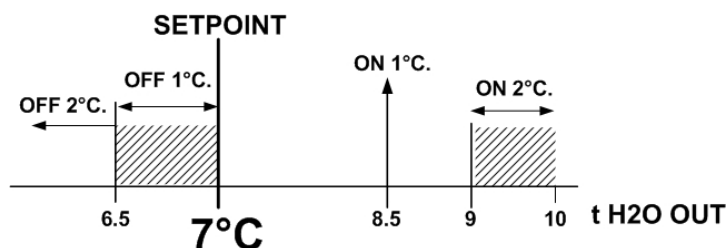
For example if the unit is in OFF by SA1, it can not be positioned in ON by keypad or supervisor.

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

SETPOINT







La termoregolazione viene effettuata sulla temperatura di mandata .

Esempio con setpoint = 7°C (parametro 118) e salto termico di progetto = 5°C (parametro 17)



7 - REGOLAZIONE

7.2 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

7.3 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

7 - CONTROL

An alarm list is associated with the inputs of each electronic module of the unit.

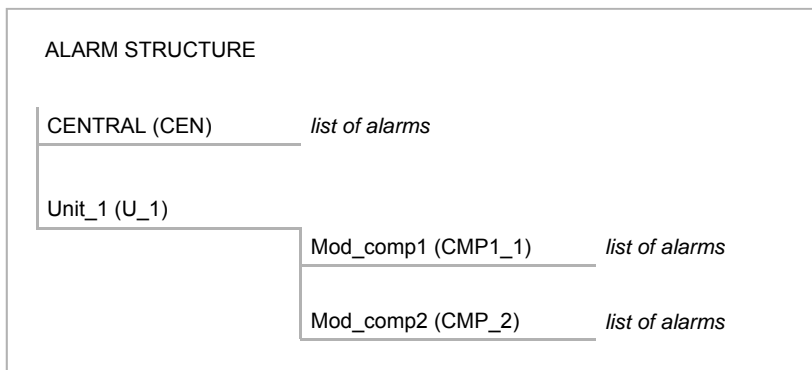
On the display appears a code that identifies the electronic module and the alarm code.

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

7 - CONTROL

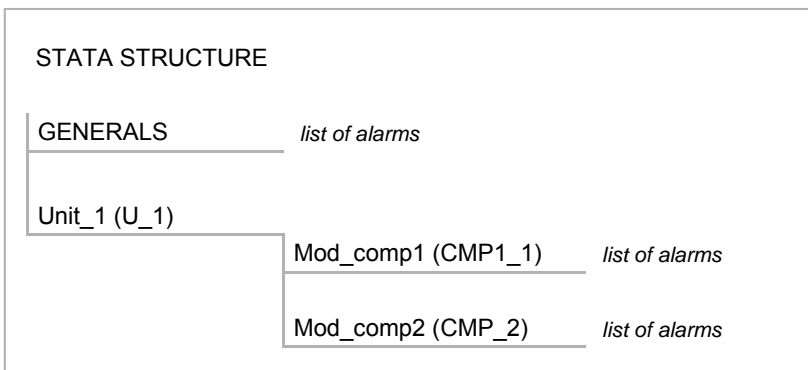
7.4 STATA

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.



7 - CONTROL

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	CompExt	°C (tenths)
10	CompWR	°C (tenths)
11	CompCar	°C (tenths)
12	CompSpunti	°C (tenths)
13	CompDuty	°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	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	Stato Valvola 2 c3	1=ON / 0=OFF
43	Stato Valvola 3 c3	1=ON / 0=OFF
44	Solenoide Liquido	1=ON / 0=OFF
45	Temp. batteria	°C (decimi)
46	Temp. IN recupero	°C (decimi)
47	Pressione condensazione	bar
48	Pressione evaporazione	bar
49	Stato Fan	bar
50	Stato Sbrinamento	1=ON / 0=OFF
51	Tempo conteggio Sbrinamento	sec
52	Ore comp. 1	
53	Spunti comp. 1	
54	Ore comp. 2	
55	Spunti comp. 2	
56	Ore comp. 3	
57	Spunti comp. 3	
58	Valvola recupero	1=ON / 0=OFF
59	Ritardo PREHP recupero	sec
61	Ingressi digitali	bit map di un byte
75	Potenza calcolata Daikin	%
76	PEvapOp	bar
77	Taspirazione	°C(decimi)
78	Tscarico	°C(decimi)
79	Apertura Valvola	%
80	SuperHeat	°C(decimi)
81	SuperHeatSPOperativo	°C(decimi)
82	TempSaturaCondensazione	°C(decimi)

8 - MAINTENANCE

8.1 GENERAL

Maintenance must be done by authorized centres or by qualified personnel

The maintenance allows to:

- maintain the unit efficiency
- reduce the deterioration speed to whom every equipment is subject over time
- assemble information and data to understand the state of the unit efficiency and avoid possible damages

8.2 INSPECTIONS FREQUENCY

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 it is recommended to plan inspections at close intervals:

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

8.3 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:

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

8.4 PUT AT REST

If a long period of inactivity is foreseen:

- Turn off the power in order to avoid electrical risks or damages by lightning strikes
- avoid the risk of frost (empty or add glycol to the parts of the system exposed to temperatures below zero, maintain powered any anti-freeze resistances)

It's recommended that the starting-up after the stopping period is performed by a qualified technician, especially after seasonal stops or seasonal switch.

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.

8.5 WATER FILTER

Check that no impurities prevent the correct passage of water.

8.6 WATER 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 inhibe the detergent rests.

8.7 CIRCULATION PUMPS

Verify :

- no leaks
- Bearing status (anomalies are highlighted by abnormal noise and vibration)
- The closing of the terminals cover and the correct positioning of the cable glands.

8 - MAINTENANCE

8.10 CONTROL BOARD

Controls effected onBy Of the Company.....

STRUCTURE

1. Presence of corrosions
2. Panel fixing

WATER CIRCUIT

1. Water filter cleaning
2. Check the exchanger efficiency
3. Circulating pumps

ELECTRICAL CIRCUIT

1. Check of the fixing and the insulation of the power lead
2. Electric panel cleaning
3. Capacity contactor status, terminal closing, cable insulation integrity
4. Voltage and phase unbalancing (no load and on-load)
5. Absorptions of the single electrical loads
6. Test of the compressor carter resistances

REFRIGERANT CIRCUIT

1. Leak control
2. Survey of the refrigerant circuit operating parameters

CONTROL & CONTROL

1. Protective device test : safety valves, pressure switches, thermostats, flow switches etc
2. Control system test: setpoint, climatic compensations, capacity stepping, water / air flow-rate variations etc
3. Control device test : alarm signalling, thermometers, probes, pressure gauges etc

Notes / interventions recommended to the owner

*European regulation 303/2008

Refer to the local actuation regulations; in short and just as an indication the regulation order as follow.

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.

TROUBLESHOOTING

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

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

BEFORE RESETTING AN ALARM, IDENTIFY AND ELIMINATE ITS CAUSE. REPEATED RESETS MAY CAUSE SERIOUS DAMAGES.

In certain machine configurations, some safeties may be placed in series and lead back to a single input on the electronic module.

Therefore, check on the electrical diagram whether the device to which the alarm corresponds has other devices or safeties connected in series.

Below is a list of the possible causes of alarms.

HIGH PRESSURE

1. high water temperature (see operating limits)
2. insufficient water flow to the exchanger (high thermal difference between input and output)
3. not CONSTANT flow (for example, if the pumps are turned off, certain areas of the plant are excluded or included, other uses are isolated, etc)
4. Water filter clean / valves open /air bubbles in the plant
5. dirty exchanger
6. Manostat/transducer: loose electric contacts/terminals, wiring cables interrupted
7. condensation gas in the cooling circuit
8. Too much refrigerant
9. Check the trigger point for the manostat and transducer
10. Check the manostat or transducer pressure control point (deposits of oil, dirt, pin blocked mechanically)

LOW PRESSURE

1. low water temperature (see operating limits)
2. insufficient water flow to the exchanger (high thermal difference between input and output)
3. not CONSTANT flow (for example, if the pumps are turned off, certain areas of the plant are excluded or included, other uses are isolated, etc)
4. Water filter clean / valves open /air bubbles in the plant
5. dirty exchanger
6. Manostat/transducer: loose electric contacts/terminals, wiring cables interrupted
7. refrigerant circuit empty, visible leaks of refrigerant/oil, insufficient charge
8. Blocked dehydrator filter
9. thermostatic device not operating correctly
10. Check the trigger point for the manostat and transducer
11. Check the manostat or transducer pressure control point (deposits of oil, dirt, pin blocked mechanically)

FAULTY PROBE

1. Identify the part on the wiring diagram.
2. Loose electric contacts/terminals, leads broken
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

FAULTY PRESSURE TRANSDUCER

1. Identify the part on the wiring diagram
2. Loose electric contacts/terminals, leads broken
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

COMPRESSOR PROTECTION

1. Identify the part on the wiring diagram
2. Loose electric contacts/terminals, leads broken
3. electrical windings interrupted
4. Vacuum power voltage below the limits
5. power contactors / contacts defective
6. start-up power voltage lower than the limits
7. electrical absorption high / unbalanced
8. High compressor discharge temperature > thermostatic device needs calibrating, insufficient refrigerant charge

9 - 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 hydraulic circuit
- 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.

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 CE RAEE CE DIRECTIVE

- 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 (WEEE).
- 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 - WEEE. This information is also available from the retailer who sold this appliance or from the local authorities who handle waste.
-
- Directive EC - WEEE 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.



10 - RESIDUAL RISKS

General

In this section the most common situations are signalled. As these cannot be controlled by the manufacturer these 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 fall 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 gas refrigerant leak please refer to the refrigerant "Safety sheet".

Installation

An incorrect installation of the unit could cause water leaks, condensate accumulation, leaking of the refrigerant, electric shock, bad functioning 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 cause the fall or the tipping of the unit with the 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 favour the entry of dust, water etc inside and may consequently can 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 shield.

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 shield.

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 suitable sign.

Contact with the fans can cause incurie.

Prior to removing the protective grill or the fans, open the

10 - RESIDUAL RISKS

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 gas 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.

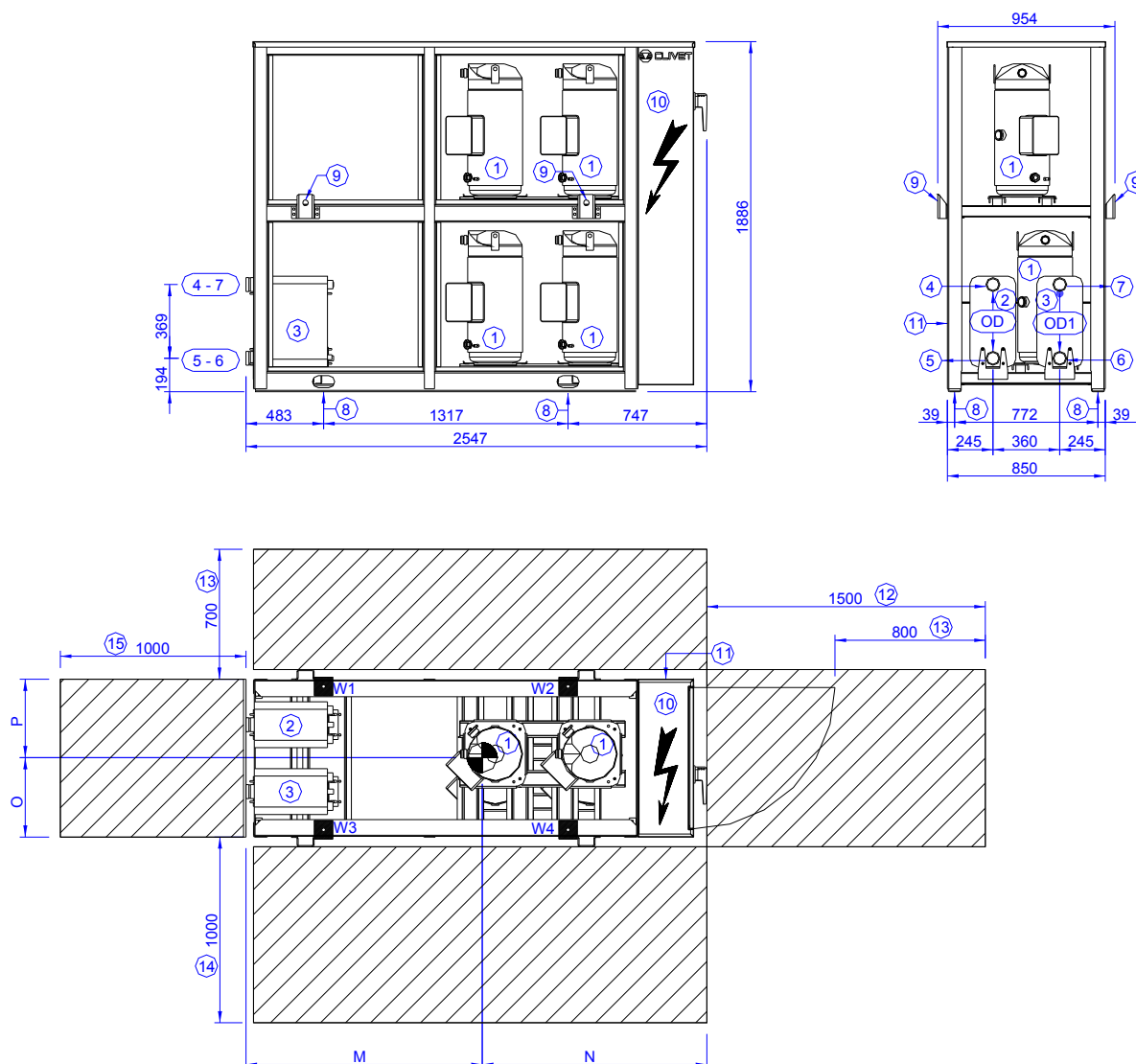
The maintenance or repair interventions which include welding must be carried out with the system off.

Hydraulic parts

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

9 - TECHNICAL INFORMATION

DIMENSIONS: WSH-XSC 65D-70D-75D-80D



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3) EXTERNAL EXCHANGER (CONDENSER)
- (4) INTERNAL EXCHANGER WATER INLET
- (5) INTERNAL EXCHANGER WATER OUTLET
- (6) EXTERNAL EXCHANGER WATER INLET
- (7) EXTERNAL EXCHANGER WATER OUTLET
- (8) HOLE TO HANG UNIT
- (9) LIFTING BRACKETS

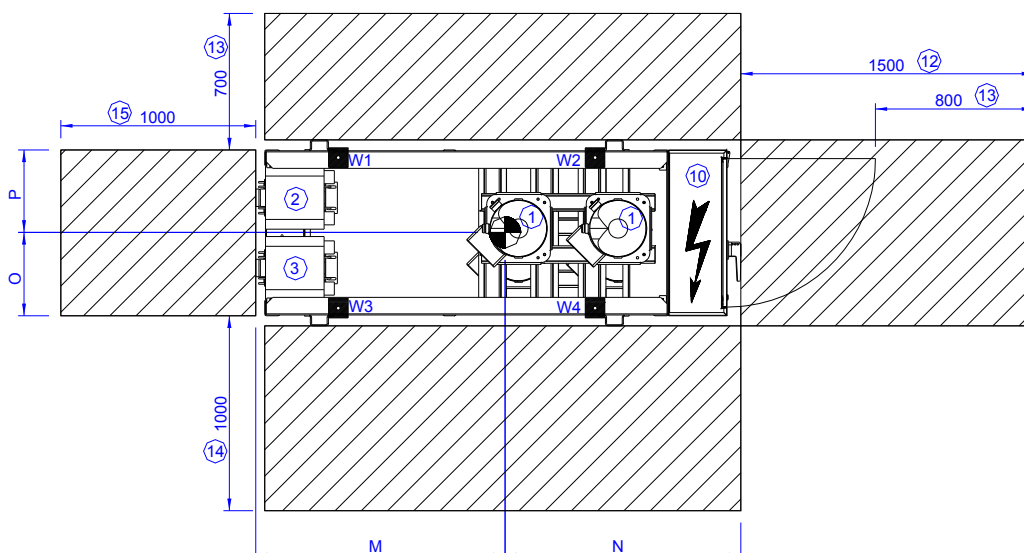
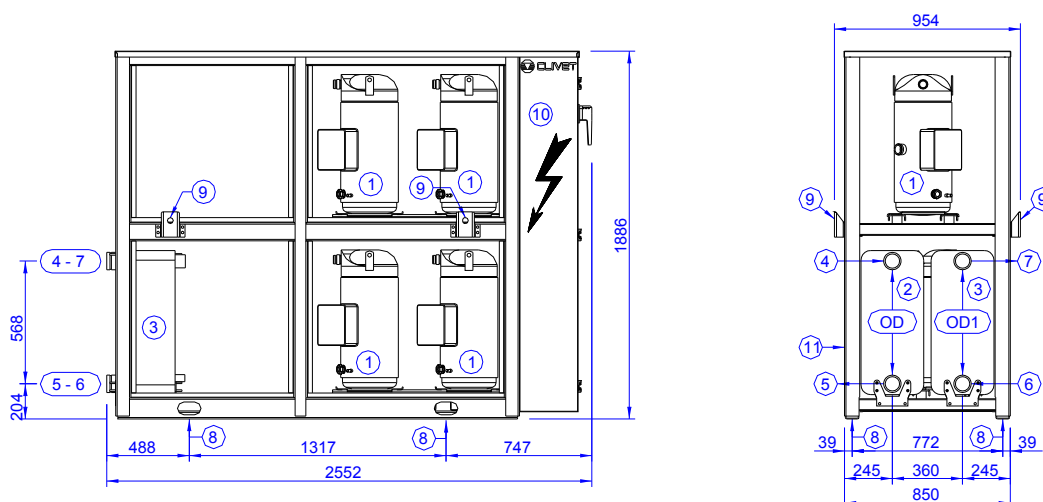
- (10) ELECTRICAL PANEL
- (11) POWER INPUT
- (12) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) MINIMUM DIMENSION FOR MAINTENANCE.
- (15) MINIMUM DIMENSION FOR WATER CONNECTIONS.

Size		ST				EN			
		65D	70D	75D	80D	65D	70D	75D	80D
M	mm	1314	1323	1289	1272	1271	1293	1264	1246
N	mm	1233	1224	1258	1275	1276	1254	1283	1301
O	mm	404	398	402	399	404	399	402	400
P	mm	446	452	448	451	446	451	448	450
OD	mm	76	76	76	76	76	76	76	76
OD1	mm	76	76	76	76	76	76	76	76
Length	mm	2547	2547	2547	2547	2547	2547	2547	2547
Depth	mm	850	850	850	850	850	850	850	850
Height	mm	1886	1886	1886	1886	1886	1886	1886	1886
W1	kg	187	192	216	229	223	222	246	260
W2	kg	398	422	423	423	410	440	442	440
W3	kg	208	221	244	262	248	254	277	296
W4	kg	444	485	477	484	457	504	498	501
Operating weight	kg	1238	1320	1360	1397	1337	1420	1464	1496
Shipping weight	kg	1212	1292	1329	1364	1311	1392	1433	1463

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

9 - TECHNICAL INFORMATION

DIMENSIONS: WSH-XSC 85D-90D-100D-110D-115D-120D



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3) EXTERNAL EXCHANGER (CONDENSER)
- (4) INTERNAL EXCHANGER WATER INLET
- (5) INTERNAL EXCHANGER WATER OUTLET
- (6) EXTERNAL EXCHANGER WATER INLET
- (7) EXTERNAL EXCHANGER WATER OUTLET
- (8) HOLE TO HANG UNIT

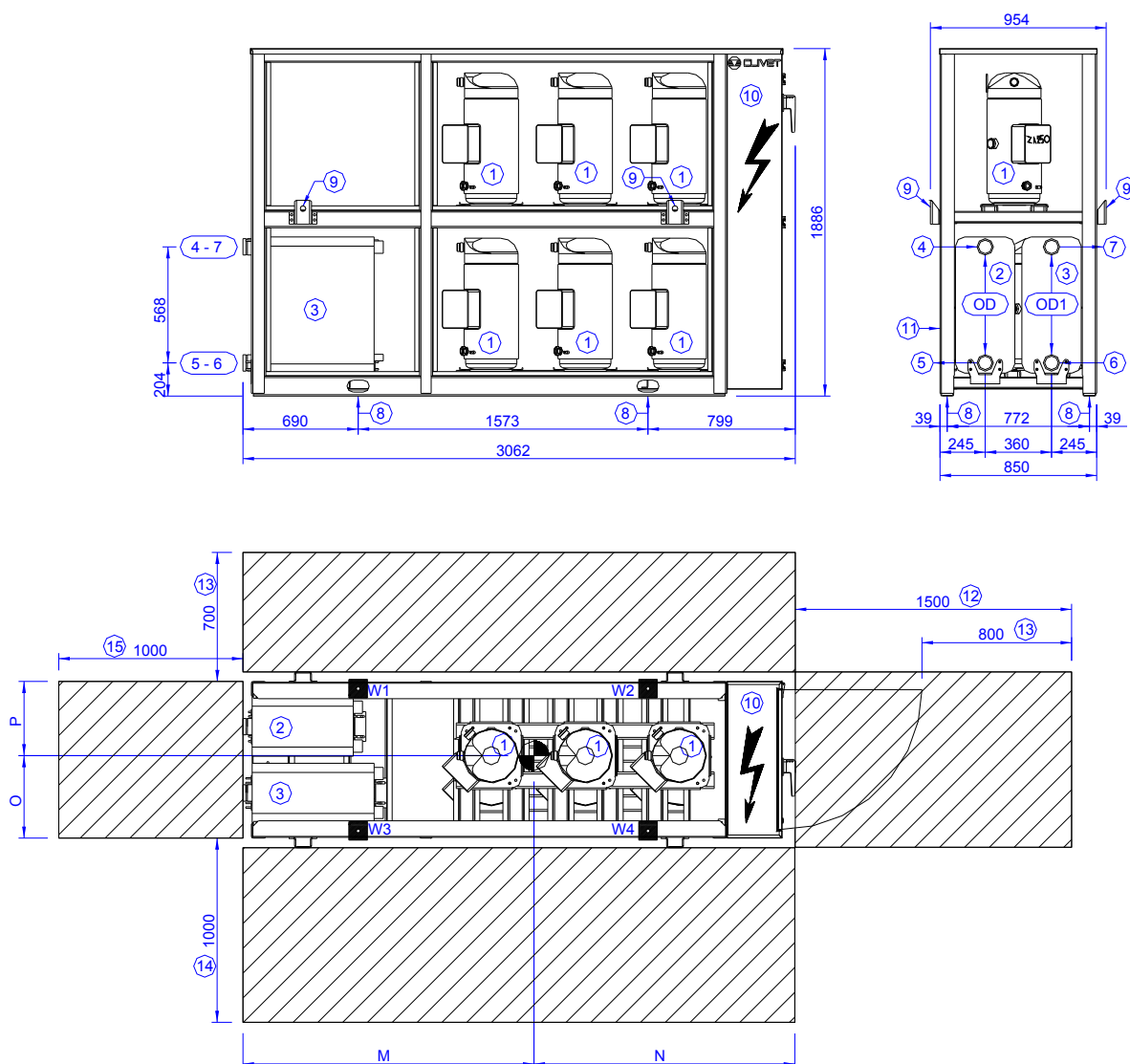
- (9) LIFTING BRACKETS
- (10) ELECTRICAL PANEL
- (11) POWER INPUT
- (12) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) MINIMUM DIMENSION FOR MAINTENANCE.
- (15) MINIMUM DIMENSION FOR WATER CONNECTIONS.

Size	ST						EN					
	85D	90D	100D	110D	115D	120D	85D	90D	100D	110D	115D	120D
M	mm	1233	1248	1217	1228	1221	1211	1224	1197	1207	1202	1202
N	mm	1319	1304	1335	1324	1331	1341	1328	1355	1345	1350	1350
O	mm	398	400	399	396	394	398	400	399	396	394	394
P	mm	452	450	451	454	456	452	450	451	454	456	456
OD	mm	89	89	89	89	89	89	89	89	89	89	89
OD1	mm	89	89	89	89	89	89	89	89	89	89	89
Length	mm	2552	2552	2552	2552	2552	2552	2552	2552	2552	2552	2552
Depth	mm	850	850	850	850	850	850	850	850	850	850	850
Height	mm	1886	1886	1886	1886	1886	1886	1886	1886	1886	1886	1886
W1	kg	266	260	297	304	312	297	291	327	335	342	344
W2	kg	426	437	451	479	480	442	452	467	494	496	498
W3	kg	306	296	340	354	367	341	331	375	390	402	404
W4	kg	490	497	516	557	564	509	515	534	574	583	585
Operating weight	kg	1489	1490	1604	1694	1723	1589	1589	1703	1793	1823	1830
Shipping weight	kg	1435	1436	1537	1627	1651	1535	1535	1636	1726	1751	1758

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9 - TECHNICAL INFORMATION

DIMENSIONS: WSH-XSC 135E-150F-165F-180F



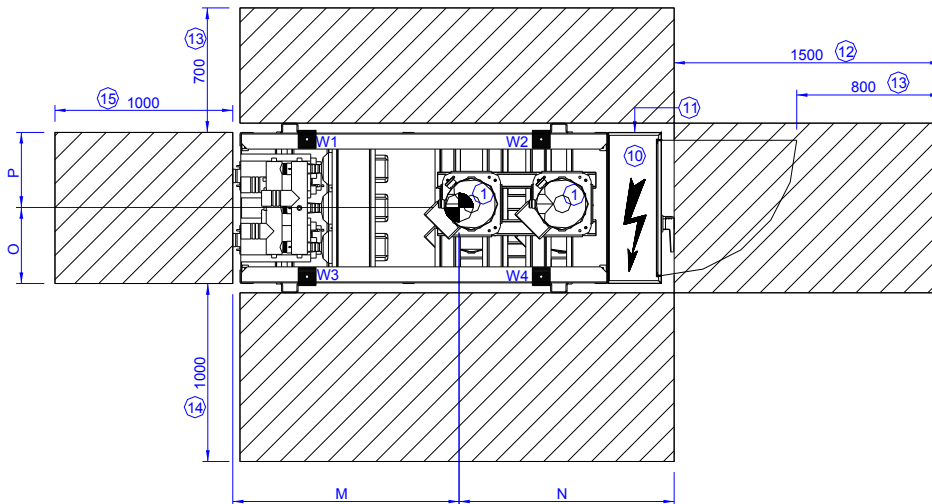
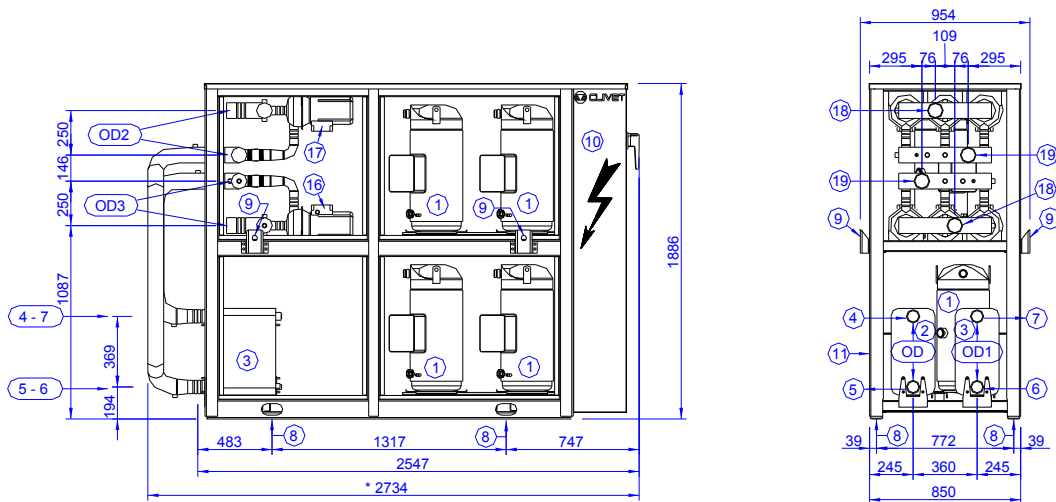
- | | |
|--|---|
| <ul style="list-style-type: none"> (1) COMPRESSOR (2) INTERNAL EXCHANGER (EVAPORATOR) (3) EXTERNAL EXCHANGER (CONDENSER) (4) INTERNAL EXCHANGER WATER INLET (5) INTERNAL EXCHANGER WATER OUTLET (6) EXTERNAL EXCHANGER WATER INLET (7) EXTERNAL EXCHANGER WATER OUTLET (8) HOLE TO HANG UNIT | <ul style="list-style-type: none"> (9) LIFTING BRACKETS (10) ELECTRICAL PANEL (11) POWER INPUT (12) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE. (13) MINIMUM DIMENSION FOR A SAFE PASSAGE. (14) MINIMUM DIMENSION FOR MAINTENANCE. (15) MINIMUM DIMENSION FOR WATER CONNECTIONS. |
|--|---|

Size		ST				EN			
		135E	150F	165F	180F	135E	150F	165F	180F
M	mm	1509	1464	1470	1461	1493	1459	1459	1457
N	mm	1553	1598	1592	1601	1569	1603	1603	1605
O	mm	388	400	401	400	390	403	403	403
P	mm	462	450	449	450	460	447	447	447
OD	mm	89	89	89	89	89	89	89	89
OD1	mm	89	89	89	89	89	89	89	89
Length	mm	3062	3062	3062	3062	3062	3062	3062	3062
Depth	mm	850	850	850	850	850	850	850	850
Height	mm	1886	1886	1886	1886	1886	1886	1886	1886
W1	kg	398	496	523	527	434	536	560	567
W2	kg	511	567	607	598	534	605	632	636
W3	kg	483	564	592	600	520	601	628	635
W4	kg	620	645	687	681	640	678	708	713
Operating weight	kg	2012	2272	2409	2406	2128	2419	2528	2552
Shipping weight	kg	1935	2190	2325	2318	2051	2337	2444	2464

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9 - TECHNICAL INFORMATION

DIMENSIONS: WSH-XSC 65D-70D-75D-80D



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3) EXTERNAL EXCHANGER (CONDENSER)
- (4) INTERNAL EXCHANGER WATER INLET
- (5) INTERNAL EXCHANGER WATER OUTLET
- (6) EXTERNAL EXCHANGER WATER INLET
- (7) EXTERNAL EXCHANGER WATER OUTLET
- (8) HOLE TO HANG UNIT
- (9) LIFTING BRACKETS
- (10) ELECTRICAL PANEL
- (11) POWER INPUT

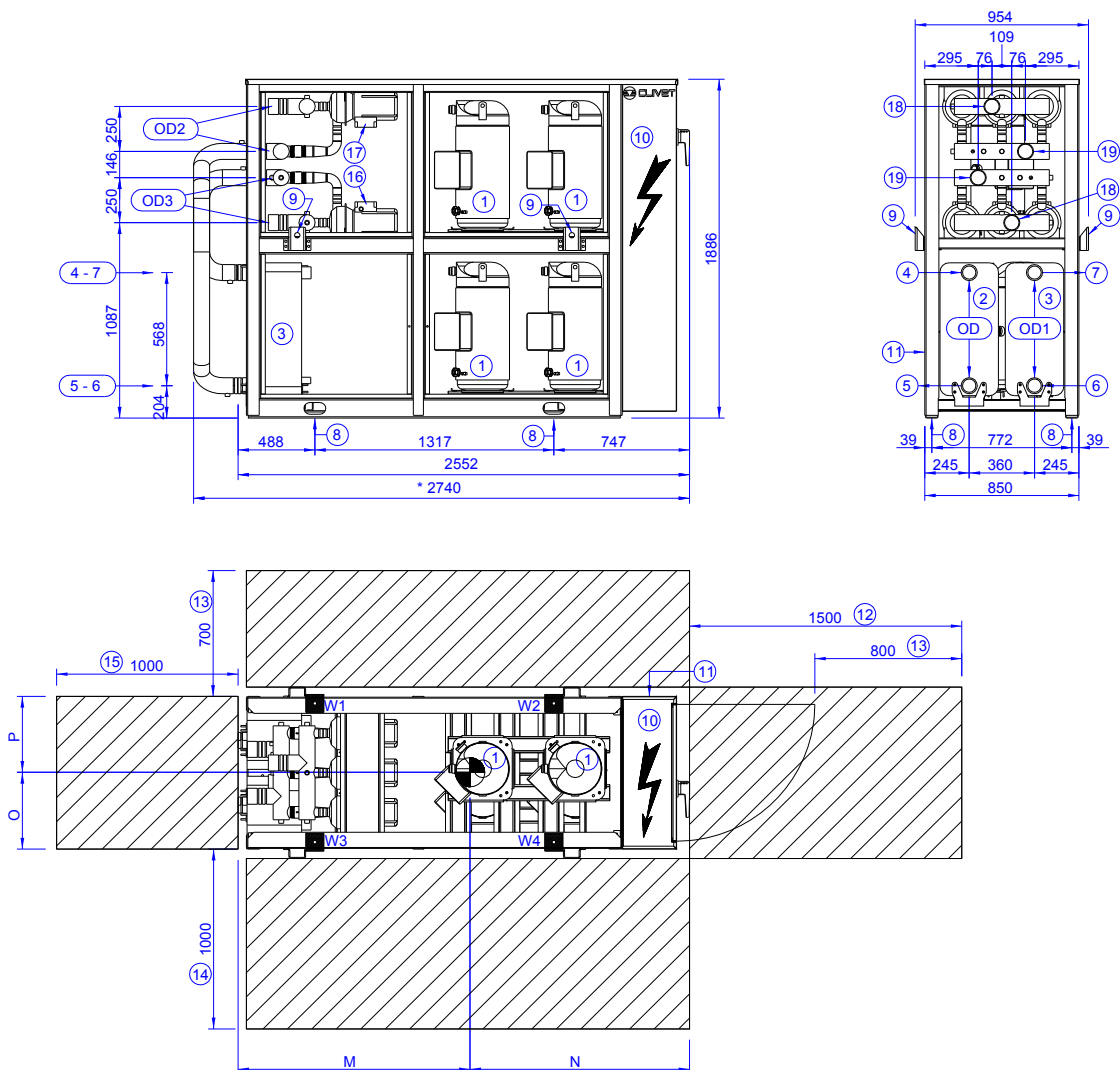
- (12) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) MINIMUM DIMENSION FOR MAINTENANCE.
- (15) MINIMUM DIMENSION FOR WATER CONNECTIONS.
- (16) HYDROPACK UTILITY SIDE
- (17) HYDROPACK SOURCE SIDE
- (18) PUMPS SUCTION
- (19) PUMPS SUPPLY
- (*) UNIT LENGTH WITH ACCESSORIES CEHU / CEHS "EXCHANGER - HYDRONIC UNIT CONNECTION SET"

Size		ST				EN			
		65D	70D	75D	80D	65D	70D	75D	80D
M	mm	1314	1323	1289	1272	1271	1293	1264	1246
N	mm	1233	1224	1258	1275	1276	1254	1283	1301
O	mm	404	398	402	399	404	399	402	400
P	mm	446	452	448	451	446	451	448	450
OD	mm	76	76	76	76	76	76	76	76
OD1	mm	76	76	76	76	76	76	76	76
OD2	mm	89	89	89	89	89	89	89	89
OD3	mm	89	89	89	89	89	89	89	89
Length	mm	2547	2547	2547	2547	2547	2547	2547	2547
Depth	mm	850	850	850	850	850	850	850	850
Height	mm	1886	1886	1886	1886	1886	1886	1886	1886
W1	kg	285	289	314	325	330	329	353	366
W2	kg	409	433	434	434	422	454	456	454
W3	kg	316	329	351	369	360	367	389	407
W4	kg	453	493	486	492	460	506	502	504
Operating weight	kg	1462	1544	1584	1621	1572	1655	1699	1731
Shipping weight	kg	1436	1516	1553	1588	1546	1627	1668	1698

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

9 - TECHNICAL INFORMATION

DIMENSIONS: WSH-XSC 85D-90D-100D-110D-115D-120D



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3) EXTERNAL EXCHANGER (CONDENSER)
- (4) INTERNAL EXCHANGER WATER INLET
- (5) INTERNAL EXCHANGER WATER OUTLET
- (6) EXTERNAL EXCHANGER WATER INLET
- (7) EXTERNAL EXCHANGER WATER OUTLET
- (8) HOLE TO HANG UNIT
- (9) LIFTING BRACKETS
- (10) ELECTRICAL PANEL
- (11) POWER INPUT

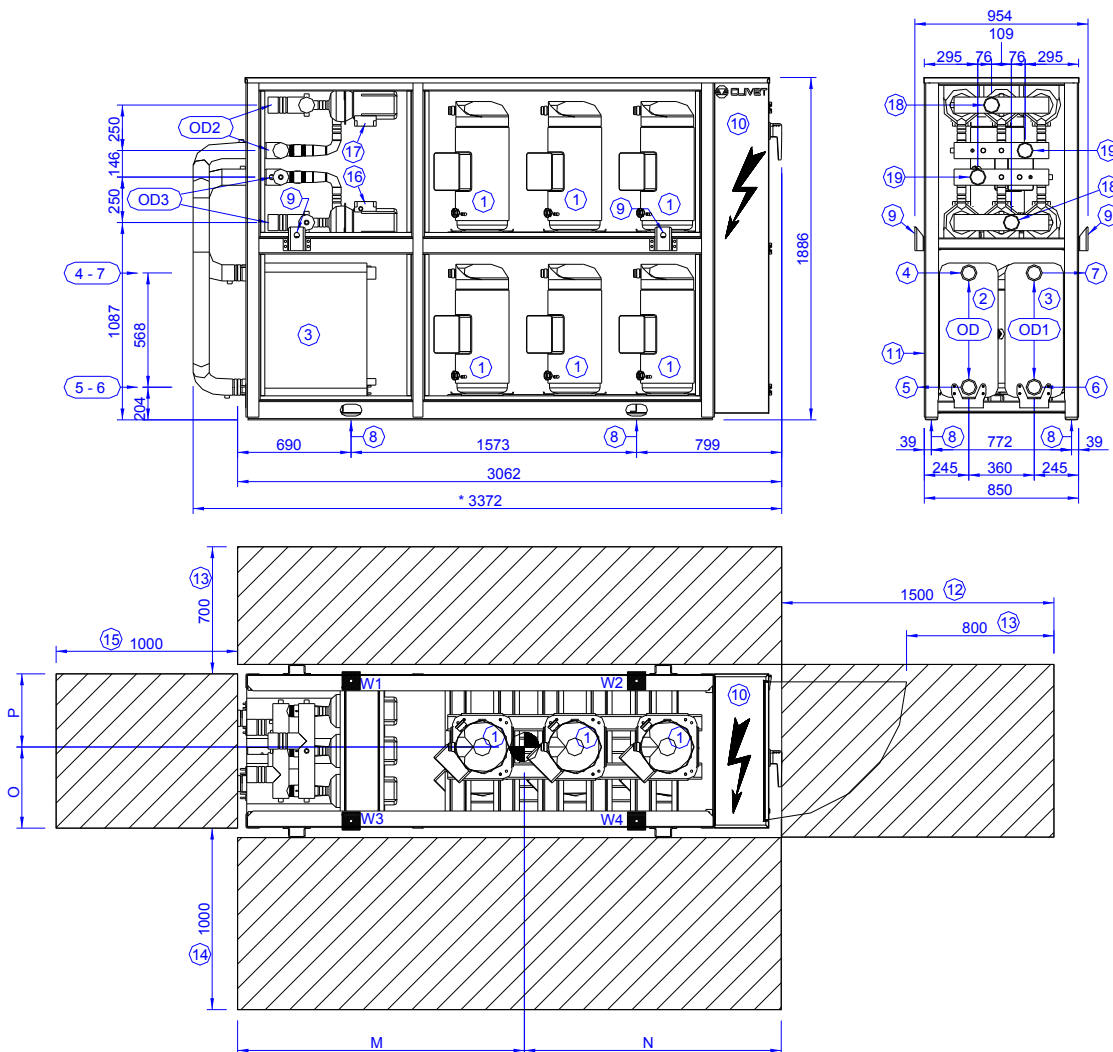
- (12) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) MINIMUM DIMENSION FOR MAINTENANCE.
- (15) MINIMUM DIMENSION FOR WATER CONNECTIONS.
- (16) HYDROPACK UTILITY SIDE
- (17) HYDROPACK SOURCE SIDE
- (18) PUMPS SUCTION
- (19) PUMPS SUPPLY
- (*) UNIT LENGTH WITH ACCESSORIES CEHU / CEHS "EXCHANGER - HYDRONIC UNIT CONNECTION SET"

Size	ST						EN					
	85D	90D	100D	110D	115D	120D	85D	90D	100D	110D	115D	120D
M	mm	1233	1248	1217	1228	1221	1211	1224	1197	1207	1202	1202
N	mm	1319	1304	1335	1324	1331	1341	1328	1355	1345	1350	1350
O	mm	398	400	399	396	394	398	400	399	396	394	394
P	mm	452	450	451	454	456	452	450	451	454	456	456
OD	mm	89	89	89	89	89	89	89	89	89	89	89
OD1	mm	89	89	89	89	89	89	89	89	89	89	89
OD2	mm	89	114	114	114	114	89	114	114	114	114	114
OD3	mm	89	114	114	114	114	89	114	114	114	114	114
Length	mm	2552	2552	2552	2552	2552	2552	2552	2552	2552	2552	2552
Depth	mm	850	850	850	850	850	850	850	850	850	850	850
Height	mm	1886	1886	1886	1886	1886	1886	1886	1886	1886	1886	1886
W1	kg	363	357	393	401	409	403	397	433	442	449	450
W2	kg	438	448	463	490	492	456	466	481	507	510	512
W3	kg	413	403	446	462	475	452	442	485	503	515	516
W4	kg	499	507	526	564	572	513	519	539	576	585	587
Operating weight	kg	1713	1714	1828	1918	1947	1824	1824	1938	2028	2058	2065
Shipping weight	kg	1659	1660	1761	1851	1875	1770	1770	1871	1961	1986	2001

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

9 - TECHNICAL INFORMATION

DIMENSIONS: WSH-XSC 135E-150F-165F-180F



- (1) COMPRESSOR
- (2) INTERNAL EXCHANGER (EVAPORATOR)
- (3) EXTERNAL EXCHANGER (CONDENSER)
- (4) INTERNAL EXCHANGER WATER INLET
- (5) INTERNAL EXCHANGER WATER OUTLET
- (6) EXTERNAL EXCHANGER WATER INLET
- (7) EXTERNAL EXCHANGER WATER OUTLET
- (8) HOLE TO HANG UNIT
- (9) LIFTING BRACKETS
- (10) ELECTRICAL PANEL
- (11) POWER INPUT

- (12) MINIMUM DIMENSION ON THE ELECTRICAL SWITCHBOARD SIDE.
- (13) MINIMUM DIMENSION FOR A SAFE PASSAGE.
- (14) MINIMUM DIMENSION FOR MAINTENANCE.
- (15) MINIMUM DIMENSION FOR WATER CONNECTIONS.
- (16) HYDROPACK UTILITY SIDE
- (17) HYDROPACK SOURCE SIDE
- (18) PUMPS SUCTION
- (19) PUMPS SUPPLY
- (*) UNIT LENGTH WITH ACCESSORIES CEHU / CEHS "EXCHANGER - HYDRONIC UNIT CONNECTION SET"

Size		ST				EN			
		135E	150F	165F	180F	135E	150F	165F	180F
M	mm	1509	1464	1470	1461	1493	1459	1459	1457
N	mm	1553	1598	1592	1601	1569	1603	1603	1605
O	mm	388	400	401	400	390	403	403	403
P	mm	462	450	449	450	460	447	447	447
OD	mm	89	89	89	89	89	89	89	89
OD1	mm	89	89	89	89	89	89	89	89
OD2	mm	114	114	114	114	114	114	114	114
OD3	mm	114	114	114	114	114	114	114	114
Length	mm	3062	3062	3062	3062	3062	3062	3062	3062
Depth	mm	850	850	850	850	850	850	850	850
Height	mm	1886	1886	1886	1886	1886	1886	1886	1886
W1	kg	523	621	637	641	558	661	685	692
W2	kg	508	562	601	592	530	600	627	632
W3	kg	617	695	718	726	654	731	758	765
W4	kg	600	629	678	671	621	663	693	698
Operating weight	kg	2247	2507	2633	2630	2363	2654	2763	2787
Shipping weight	kg	2170	2425	2549	2542	2286	2572	2679	2699

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

9 - TECHNICAL INFORMATION

GENERAL TECHNICAL SPECIFICATIONS

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

Size		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F	
COOLING																
Cooling capacity	1	kW	195	207	223	234	251	286	312	334	353	371	406	440	497	560
Compressor power input	1	kW	41,2	44,2	47,3	50	53,4	59,5	65,1	70,2	75,4	79,3	86,1	93,7	106	119
Total power input	1	kW	41,5	44,5	47,6	50,3	53,7	59,8	65,4	70,5	75,7	79,6	86,6	94,2	106	120
Heating capacity total recovery	3	kW	224	237	257	269	289	327	356	383	407	428	466	506	574	646
Heating capacity partial recovery	3	kW	47	50	54	57	61	69	75	81	86	90	98	107	121	136
Cooling capacity (EN14511:2011)	2	kW	194	206	222	233	250	285	311	333	352	370	404	438	495	558
Total power input (EN14511:2011)	2	kW	43,3	46,5	49,8	52,5	55,5	62,1	67,5	72,8	78,3	82,5	89,9	97,8	110	126
EER (EN 14511:2011)	2		4,48	4,43	4,46	4,44	4,51	4,59	4,61	4,57	4,49	4,48	4,5	4,48	4,5	4,44
ESEER	2		6,11	6,15	5,87	6,03	5,88	6,02	5,99	6,15	6,09	6,07	6,1	6,28	6,21	6,24

HEATING																
Heating capacity	4	kW	224	237	257	269	289	327	356	383	407	428	466	506	574	646
Compressor power input	4	kW	50,9	54,7	57,9	61,3	64,6	72,9	79,6	86,3	92,8	97,9	106	115	130	147
Total power input	4	kW	51,2	55	58,2	61,6	64,9	73,2	79,9	86,6	93,1	98,2	107	115	130	147
Heating capacity (EN14511:2011)	5	kW	224	237	257	269	289	327	356	383	407	428	466	506	574	646
Total power input (EN14511:2011)	5	kW	51,2	55	58,2	61,6	64,9	73,2	79,9	86,6	93,1	98,2	107	115	130	147
COP (EN 14511:2011)	5		4,38	4,31	4,42	4,37	4,45	4,47	4,46	4,42	4,37	4,36	4,4	4,42	4,39	

COMPRESSOR																
Type of compressors			SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL
No. of compressors		Nr	4	4	4	4	4	4	4	4	4	4	5	6	6	6
Rated power (C1)		HP	30	35	35	40	40	45	50	55	55	60	60	75	75	90
Nominal Power (C2)		HP	35	35	40	40	45	45	50	55	60	60	75	75	90	90
Std Capacity control steps		Nr	4	4	4	4	4	4	4	4	4	4	5	6	6	6
Oil charge (C1)		l	7	8	8	10	10	9	10	10	12	11	11	20	20	17
Oil charge (C2)		l	8	8	10	10	9	9	10	12	11	11	20	20	17	17
Refrigerant circuits		Nr	2	2	2	2	2	2	2	2	2	2	2	2	2	2

INTERNAL EXCHANGER																
Type of internal exchanger	6		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water flow rate (Utility Side)		l/s	9,3	9,9	10,7	11,2	12	13,7	14,9	16	16,9	17,7	19,4	21	23,7	26,8
internal exchanger pressure drop		kPa	47	43	43	47	31	40	36	40	45	49	47	46	45	56
Water content		l	11	13	14	14	25	25	29	29	29	29	34	38	47	47

EXTERNAL EXCHANGER																
Type of external exchanger	6		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water flow rate (Source Side)		l/s	11,3	12	12,9	13,6	14,5	16,5	18	19,3	20,5	21,5	23,5	25,5	28,8	32,4
External exchanger pressure drop		kPa	46	51	52	51	32	40	33	37	36	39	46	49	52	65
Water content		l	14	14	16	18	29	29	38	38	43	43	43	47	56	56

CONNECTIONS																
Water fittings	7		2" 1/2	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"
Water fittings	7		2" 1/2	2" 1/2	2" 1/2	2" 1/2	3"	3"	3"	3"	3"	3"	3"	3"	3"	3"

POWER SUPPLY																
Standard power supply		V	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50

(1) data referred to the following conditions : - internal exchanger water (evaporator) = 12/7 °C - external exchanger water (condenser) = 30/35°C
 (3) external exchanger water = 40/45°C
 internal exchanger water = 12/7°C
 (2) Data calculated according to EN 14511:2011 regulations referred to the following conditions :
 (4) Data referred to unit in 'OHI - Operation with reversal on the water circuit' configuration
 data referred to the following conditions : - internal exchanger water (evaporator) = 12/7 °C - external exchanger water (condenser) = 40/45°C
 The data do not consider the pump share, required to overcome the pressure drop for the solution circulation inside the exchangers

(5) Data referred to unit in 'OHI - Operation with reversal on the water circuit' configuration
 Data calculated according to EN 14511:2011 regulations referred to the following conditions :
 - internal exchanger water (evaporator) = 12/7 °C
 - external exchanger water (condenser) = 40/45°C
 (6) PHE = plates
 (7) internal exchanger inlet / outlet

ELECTRICAL DATA

Size		65D	70D	75D	80D	85D	90D	100D	110D	115D	120D	135E	150F	165F	180F	
F.L.A. - FULL LOAD CURRENT AT MAX ADMISSIBLE CONDITIONS																
F.L.A. - Total		A	132,4	141,7	153	164,3	170,9	177,5	196,3	218,9	225,5	232,1	270,2	308,3	328,1	347,9
F.L.I. FULL LOAD POWER INPUT AT MAX ADMISSIBLE CONDITION																
F.L.I. - Total		kW	79,3	85,7	90,8	95,9	102,2	108,5	121,3	131,5	137,9	144,2	167,5	178,2	197,2	216,2
M.I.C. MAXIMUM INRUSH CURRENT																
M.I.C. - Value		A	309,5	318	365	373,4	448	454,6	473,4	496	502,6	509,2	547,3	517	605,2	625

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

The F.L.A. data is to be considered in order to correctly size the supply line, whereas the M.I.C. data is used for the sizing of the protection device up the line.
 Certain accessories and operations may entail a significant variation in the absorptions illustrated here. Contact our technical department.

9 - TECHNICAL INFORMATION

OPERATING LIMITS (COOLING)

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

EXTERNAL EXCHANGER

Max water inlet temperature	1	°C	51	50	51	51	52	52	52	51	51	51	50	50	51	51
Max water inlet temperature	2	°C	52,5	51,5	52,5	52,5	53,5	53,5	53,5	52,5	52,5	52,5	51,5	52	53	53
Max water inlet temperature	3	°C	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Min. water outlet temperature		°C	23	23	23	23	23	23	23	23	23	23	23	23	23	23

INTERNAL EXCHANGER

Max water inlet temperature		°C	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Min. water outlet temperature	4	°C	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Min. water outlet temperature	5	°C	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8

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

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

(3) unit not operating

(4) Standard Version

(5) Low temperature version

Fluid with ethylene glycol of 40%

SOUND LEVELS

Acoustic configuration: Standard (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)
65D	81	62	75	90	84	86	80	74	73	91
70D	84	63	75	89	84	87	80	74	74	92
75D	87	62	74	91	85	86	80	74	74	92
80D	88	62	74	92	85	84	79	73	74	92
85D	90	63	74	93	86	85	79	73	74	93
90D	90	63	75	93	87	85	80	74	74	93
100D	89	67	78	91	87	92	84	78	76	95
110D	94	66	75	96	89	88	82	76	76	96
115D	94	66	75	96	89	88	82	76	76	96
120D	94	66	75	96	89	88	82	76	76	96
135E	94	65	75	95	89	87	81	75	76	95
150F	94	65	75	95	89	87	81	75	76	95
165F	95	66	76	96	90	88	82	76	77	96
180F	95	67	77	97	91	89	83	77	77	97

Measures according to UNI EN ISO 9614-2 regulations, with respect to the EUROVENT 8/1 certification.

The sound levels refer to the unit at full load, in the rated test conditions. The sound pressure level refers to a distance of 1m from the external surface of the units operating in an open field.

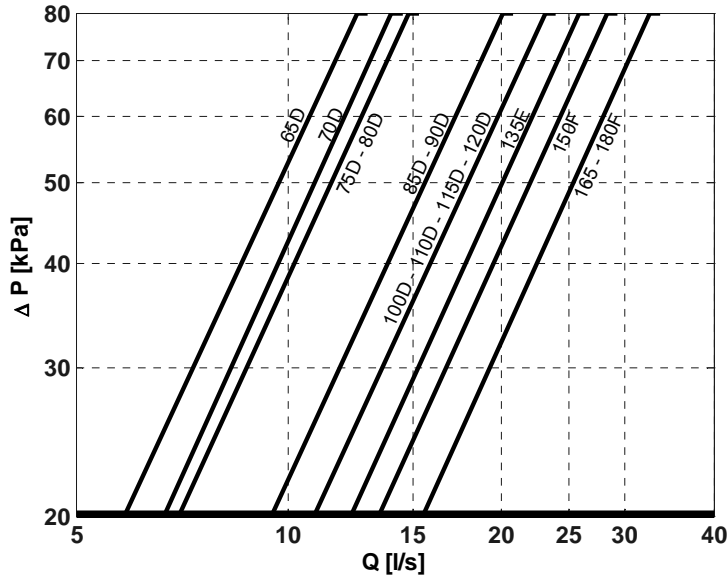
Data referred to the following conditions :

- internal exchanger water = 12/7°C
- external exchanger water = 30/35°C

Acoustic configuration: Extremely low noise (EN)

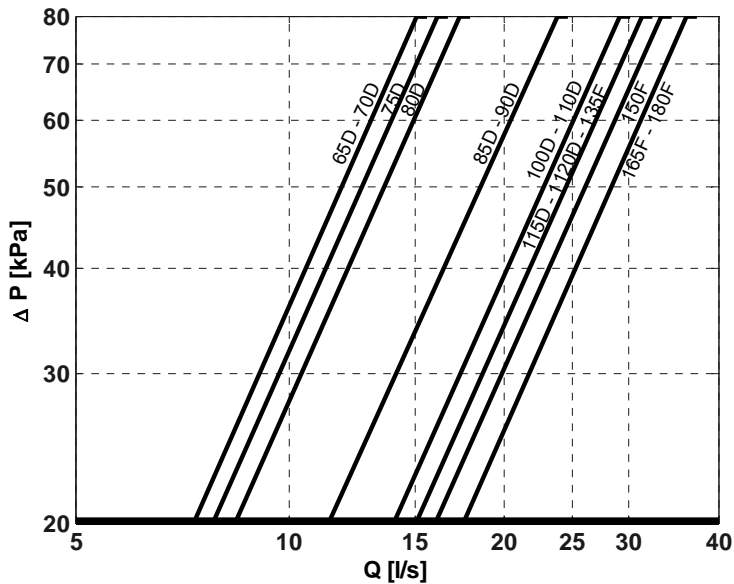
Size	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
65D	71	53	70	83	73	74	69	64	64	82
70D	74	54	71	83	73	76	70	65	64	83
75D	77	54	70	84	74	75	69	65	65	83
80D	78	53	69	85	74	73	68	64	65	84
85D	80	54	70	86	75	74	69	64	66	85
90D	80	54	70	87	76	74	69	65	66	85
100D	79	58	74	84	76	80	73	69	67	85
110D	84	57	71	89	78	76	71	67	68	88
115D	84	57	71	89	78	76	71	67	68	88
120D	84	57	71	89	78	76	71	67	68	88
135E	84	57	71	89	78	76	71	66	68	87
150F	84	57	71	89	78	76	71	66	68	87
165F	84	57	72	90	79	77	71	67	68	88
180F	85	58	73	91	80	78	72	68	69	89

EVAPORATOR PRESSURE LOAD: ST STANDARD - SC - EN



	Qmin [l/s]	Qmax [l/s]
65D	5.9	12.4
70D	6.6	13.9
75D	7.0	14.9
80D	7.0	14.9
85D	9.4	20.0
90D	9.4	20.0
100D	10.9	23.1
110D	10.9	23.1
115D	10.9	23.1
120D	10.9	23.1
135E	12.2	25.8
150F	13.4	28.3
165F	15.5	32.4
180F	15.5	32.4

EXTERNAL EXCHANGER PRESSURE DROP (CONDENSER): ST (STANDARD)- EN

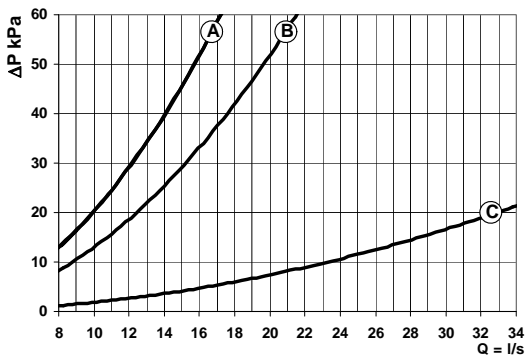


	Qmin [l/s]	Qmax [l/s]
65D	7.3	15.3
70D	7.3	15.3
75D	7.8	16.1
80D	8.4	17.2
85D	11.4	23.8
90D	11.4	23.8
100D	13.9	29.2
110D	13.9	29.2
115D	15.0	31.4
120D	15.0	31.4
135E	15.0	31.4
150F	15.9	33.2
165F	17.4	36.1
180F	17.4	36.1

ACCESSORIES

WATER FILTER

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

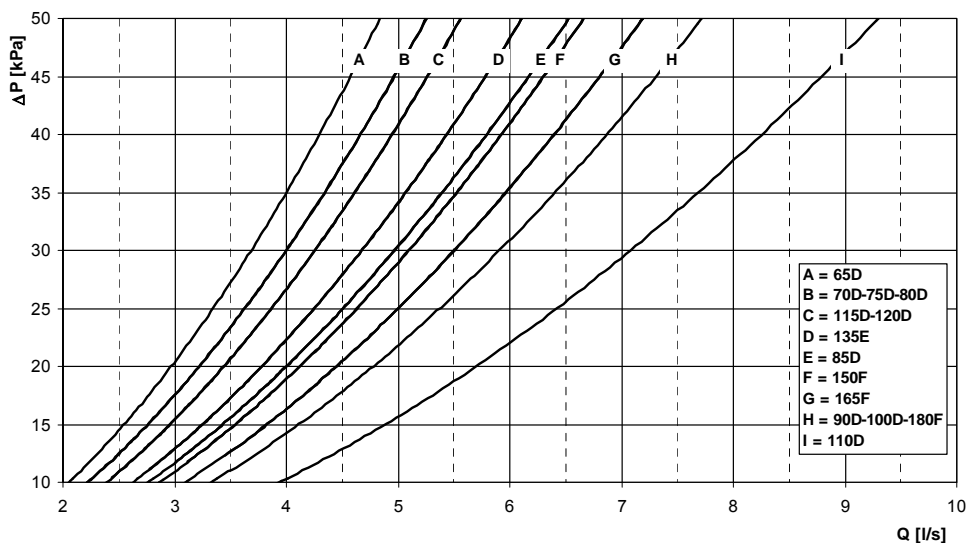


- Internal exchanger (evaporator)**
- (A) 65D-70D-75D-80D-85D
 - (B) 90D-100D-110D-115D-120D-135E-150F
 - (C) 165F-180F
- External exchanger (condenser)**
- (A) 65D-70D-75D-80D-85D
 - (B) 90D-100D-110D-115D-120D
 - (C) 135E-150F-165F-180F

Q = water flow
dP = pressure drop

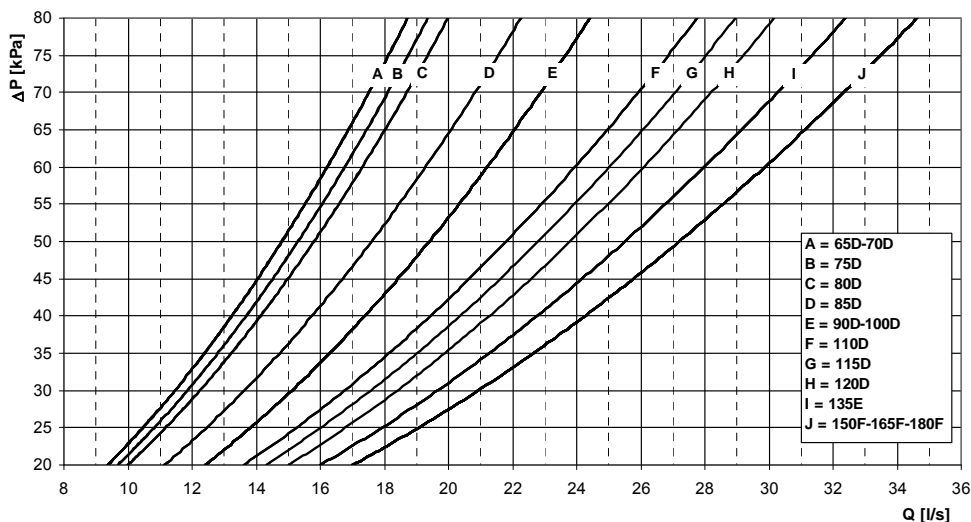
9 - TECHNICAL INFORMATION

EXCHANGER PRESSURE DROP PARTIAL ENERGY RECOVERY



Q = water flow
dP = pressure drop

EXCHANGER PRESSURE DROP TOTAL ENERGY RECOVERY



Q = water flow
dP = pressure drop

CORRECTION FACTOR FOR ANTIFREEZE SOLUTIONS

Internal exchanger (evaporator)

% 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.

External exchanger (condenser)

% 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.

* MAX. REDUCTION EXTERNAL EXCHANGER INLET WATER TEMPERATURE

9 - TECHNICAL INFORMATION

FOULING CORRECTION FACTOR

m ² °C/W	INTERNAL EXCHANGER		EXTERNAL EXCHANGER	
	F1	FK1	F2	FK2
0.44 x 10 ^{^(-4)}	1,00	1,00	1,00	1,00
0.88 x 10 ^{^(-4)}	0,97	0,99	0,97	1,08
1.76 x 10 ^{^(-4)}	0,94	0,98	0,92	1,05

F1 = Cooling capacity correction factors
 FK1 = Compressor power input correction factor
 F2 = Cooling capacity correction factors
 FK2 = Compressors input power correction factors

EXCHANGER OPERATING LIMITS

	INTERNAL EXCHANGER		EXTERNAL EXCHANGER	
	DPr		DPw	
	kPa		kPa	
CLIVET (C)	4500	4500	1000	1000
PED (CE)	4500	4500	1000	1000

DPr = Maximum operating pressure on refrigerant side
 DPw = Maximum operating pressure on water side
 for different approvals contact our sales office

OVERLOAD AND CONTROL DEVICE CALIBRATION

		OPEN	CLOSED	VALUE
High pressure switch	kPa	4050	3300	-
Low pressure switch	kPa	450	600	-
Low pressure switch (Brine)	bar	200	350	-
Antifreeze protection	°C	3,00	5,50	-
High pressure safety valve	kPa	-	-	4500
Low pressure safety valve	kPa	-	-	3000
Max no. of compressor starts per hour	Nr	-	-	10,00
High compressor discharge temperature safety thermostat	°C	-	-	120



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