WSAN-XEE

82 - 302

Air cooled heat pump for outdoor installation

Installation use and maintenance manual

CLIVET

A
Eurovent Energy Efficiency Class

R-410A

M6G240F7-05

17-12-2013

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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Reference technical bulletin : BT07F009GB-10

1.1 MANUAL

The manual provides correct unit installation, use and maintenance.

Pay particolar 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 injures 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.

Maitenance

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 lable 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 manifacturer.
- 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.

1.4 UNIT INDENTIFICATION

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

It has not to be removed for any reason.

It reports the regulations indications such as:

- machine type, exmple:
  Series → **WSAN-XEE**
  Size → **82**
- serial number
  12 characters → **Axxxxxxxxxxx**
- 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.

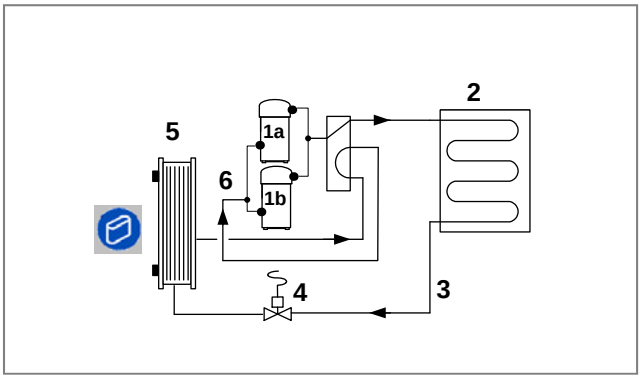
Assistance request
Note data from the serial number label and write them in the chart on side, so you will find them easily when needed.
In case of intervention you have to provide data.

Serie
Size
Serial number
Year of manufacture
Wiring diagram

1.5 PRINCIPLE OF OPERATION

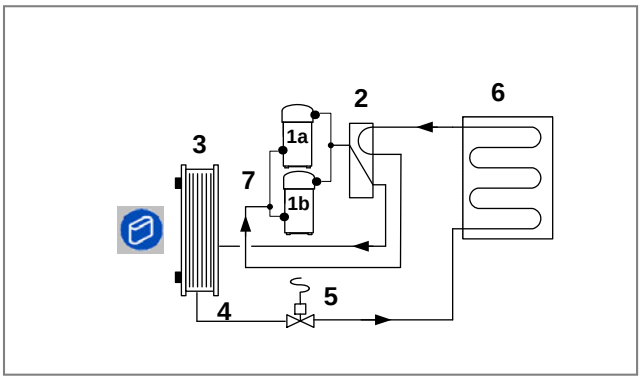
SUMMER: the cooling cycle allows the transfer of excess indoor heat to the external environment.

1. The compressor compresses the refrigerant gas, placing it at high pressure and high temperature.
2. In the external coil, the refrigerant is cooled, and the heat is released into the environment by means of the fan. This is why the coil needs to be kept clean and free of obstacles.
3. When it cools, the refrigerant becomes liquid.
4. The expansion valve causes a sudden drop in the pressure of the refrigerant, which becomes very cold as its volume increases.
5. In the exchanger, the refrigerant evaporates and absorbs the heat from the water that returns to the system, cooling it.



WINTER : the cooling cycle makes it possible to absorb energy (heat at low temperature) from the external environment and to transfer it to the area to be heated.

1. The compressor compresses the refrigerant fluid, placing it at high pressure and high temperature.
2. The 4-way valve reverses the flow with respect to respect to SUMMER operation.
3. In the plate exchanger, the water that returns to the system absorbs heat from the refrigerant.
4. As it cools, the refrigerant condenses and becomes liquid.
5. The expansion valve causes a sudden drop in the pressure of the refrigerant, which becomes very cold as its volume increases.
6. In the external coil, the cold refrigerant evaporates and absorbs heat from the external air. In this phase, as the coil cools, it may freeze. This is why the cycle is automatically reversed periodically for a short time so as to defrost it



1.6 ACCESSORIES

VERSIONS OPTIONS

D Partial energy recovery

B Water low temperature

CONFIGURATIONS

DSPB Double set point for water low temperature

REFRIGERANT CIRCUIT

CCCA Copper / aluminium condenser coil with acrylic lining

CCCA1 Copper / aluminium condenser coil with Fin Guard treatment (Silver)

MHP High and low pressure gauges

MHPX High and low pressure gauges

OHP Operation in heat pump

OHO Heat-only function

HYDRAULIC CIRCUIT

- Hydronic group utility side: not required

1PUS Standard pump

1PUR Single-pump with reduced available head

1PUM Single-pump with larger available head

2PUS Standard double pump

2PUR Double pump with reduced available head

2PUM Double pump with larger available head

IFWX Water steel mesh strainer

ACC1 Teflon steel storage device

SYSTEM ADMINISTRATORS

CMMBX Serial communication module to supervisor (MODBUS)

CMSC9 Serial communication module to Modbus supervisor

CMSC7 Modbus/LON WORKS serial converter kit

ELECTRIC CIRCUIT

RCMRX Remote control via microprocessor control

PCDWX Daily and weekly programming clock

PM Phase monitor

PMX Phase monitor

SFSTR4N Disposal for inrush current reduction, for unit 400/3/50+N

PFCP Power factor correction capacitors (cosfi > 0.9)

CLSE Free contacts for alarm

SCP3X Set point compensation according to the outside en thalpy

INSTALLATION

AMRX Rubber antivibration mounts

PGCEX Coil protection grilles external air side

X= Accessory separately supplied

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 ecc. .

2.2 DELIVERY CONTROL

Before accepting the delivery you have to check:

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

In case of damage or anomaly:

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

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

2.3 STORING

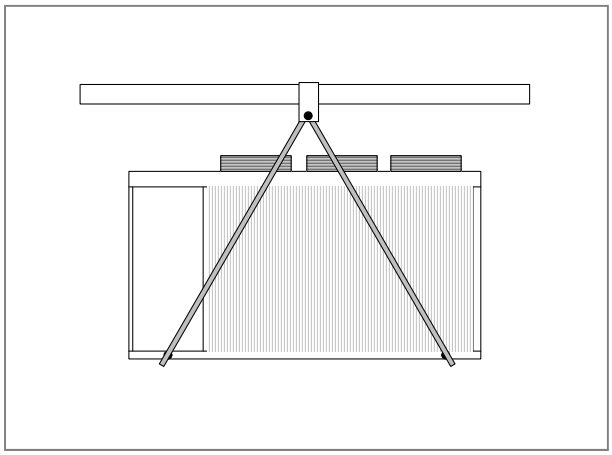
Observe external packing instructions .

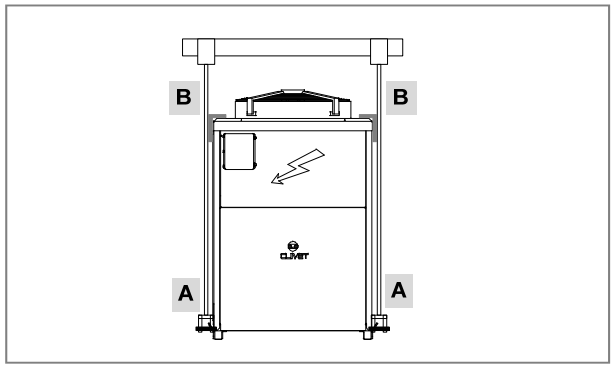
2.4 HANDLING

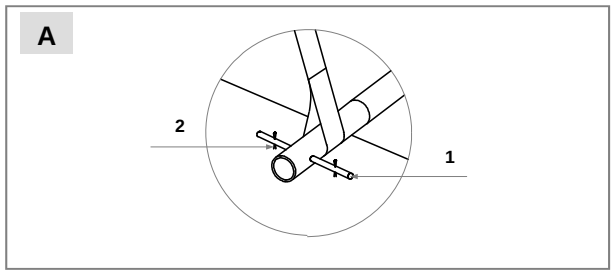
Verify unit weight and handling equipment lifting capacity .

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

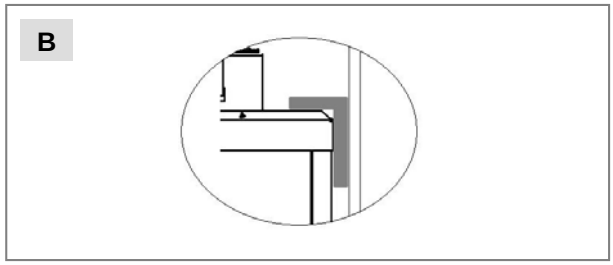
Before handling verify that the unit keeps its balance.







1 safety rods
2 pins



Use protection to avoid the unit damaging .

2.5 PACKING REMOVING

Be careful not to damage the unit.

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

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 ecc.

During positioning consider these elements :

- technical spaces required for the machine and system
- place where the machine will be installed
- electrical connections
- water connections
- air / aeraulic ducts

Do not considerer these elements could decrease performances and operational life of the unit.

3.2 FUNCTIONAL SPACES

Functional spaces are designed to:

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

Respect all functional spaces indicated in the TECHNICAL INFORMATION section.

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

3.3 POSITIONING

Units are designed to be installed:

- EXTERNAL
- in fixed positions

Limit vibration transmission:

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

Choose the installation place according to the following criteria:

- Customer approval
- safe accessible position
- technical spaces requested by the unit
- spaces for the air intake/exhaust
- avoid flood-prone places
- verify unit weight and bearing point capacity
- verify that all bearing points are aligned and leveled
- install the unit raised from the ground
- max. distance allowed by the electrical connections

Prefer places where the unit doesn't disturb the neighbours.

Avoid installations next to bedrooms or windows.

Avoid snow accumulations on batteries.

Protect the unit with an appropriate fencing to avoid the access to a not authorized personnel (babies, vandals etc.)

A correct circulation of the air is indispensible to guarantee the good working order of the machine.

Avoid therefore:

- obstacles to the airflow;
- exchange difficulties;
- leaves or other foreign bodies that can obstruct the exchange batteries;
- winds that hinder or favour the airflow;
- heat or pollution sources close to the unit (chimneys, extractors etc);
- stratification (cold air that stagnates at the bottom);
- recirculation (expelled air that is sucked in again);
- positioning below the level of the threshold, close to very high walls, attics or in angles that could give rise to stratification or recirculation phenomenons.

Ignoring the previous indications could:

- energy efficiency decrease;
- blocks due to HIGH PRESSURE (in summer) or LOW PRESSURE (in winter).

3.4 CONDENSATE WATER

When a heat pump is running it produces a considerable amount of water due to the defrosting cycles of the external coil.

The condensation must be eliminated in a manner to avoid wetting pedestrian areas.

With extensive very cold outdoor temperatures, condensation could freeze and block the flow, causing a slow build-up of ice; therefore special attention must be paid to eliminating condensation, raising the unit off the ground and evaluating whether antifreeze elements should be installed

3.5 FRESH AIR PROBE - OPTIONAL

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

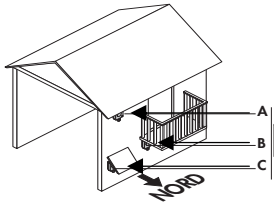
It is then possible to optimize the unit energy efficiency.

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.

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 plant volume and temperature.

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

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

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. ethylene with propylene)

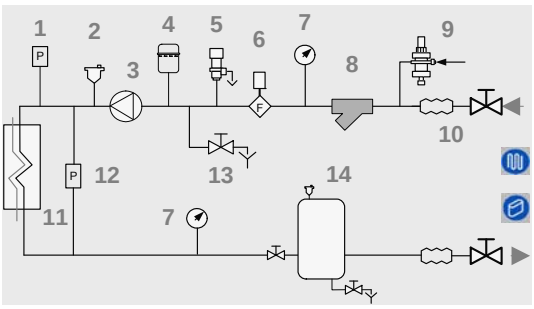
4.7 WATER CONNECTIONS

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

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

The rubber gasket might be irreparably damaged.

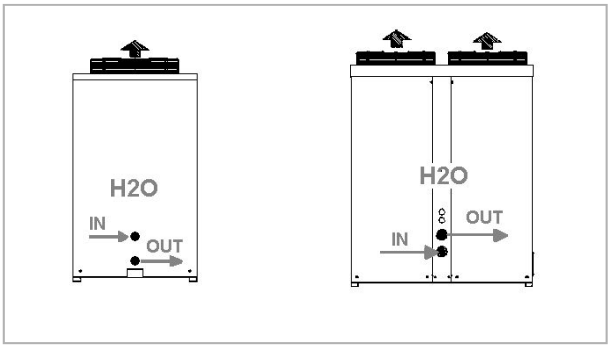
4.7 RECOMMENDED CONNECTION



1. Charged system pressure switch
2. vent
3. 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

STANDARD HYDRAULIC CIRCUIT

- water side safety valve
- impurity trap with filter
- centrifugal pump
- antifreeze heater protection to pumping station
- drain valve



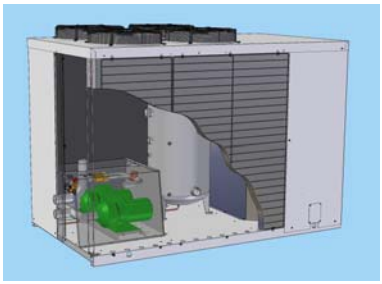
4.8 WATER CIRCUIT EMPTYING

The unit is equipped with outlets for the pump emptying and storage.

Outlets are accessible from the rear side (left side in the figure).

Storage content :

size 82¸122	**80 litres**
size 162¸302	**130litres** (optional)



4.9 RECOVERY EXCHANGER

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

The customer is responsible for the management of the circulation pump, valves, thermostats, etc

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

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

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

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.

5.1 PRELIMINARY INFORMATION

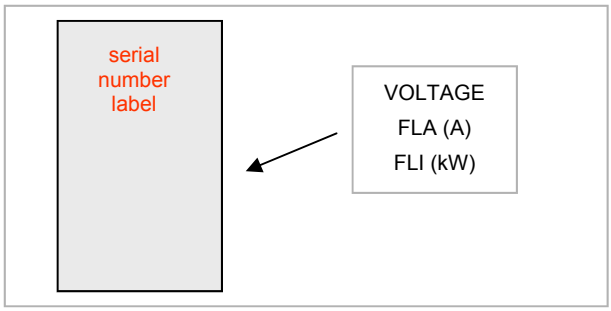
The characteristics of the electrical lines must be determined by specialized personnel able to design electrical installations; moreover, the lines must be in conformity with regulations in force.
The protection devices of the unit power line must be able to stop the presumed short circuit current, 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.

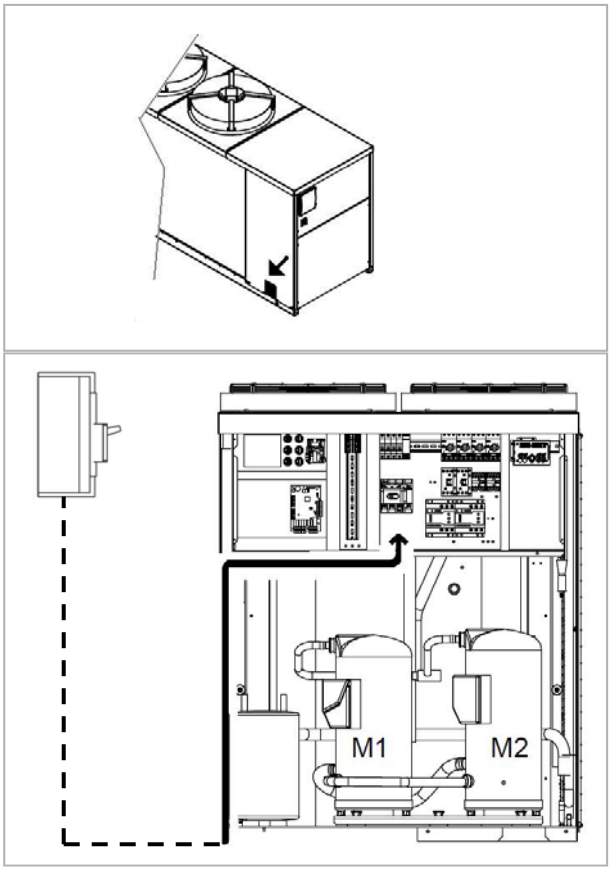
Do not lay the cables parallel to other cables; cable crossings are possible, only if laid at 90°.

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 impendency, 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 temparatures).

5.6 ELECTRICAL PANEL

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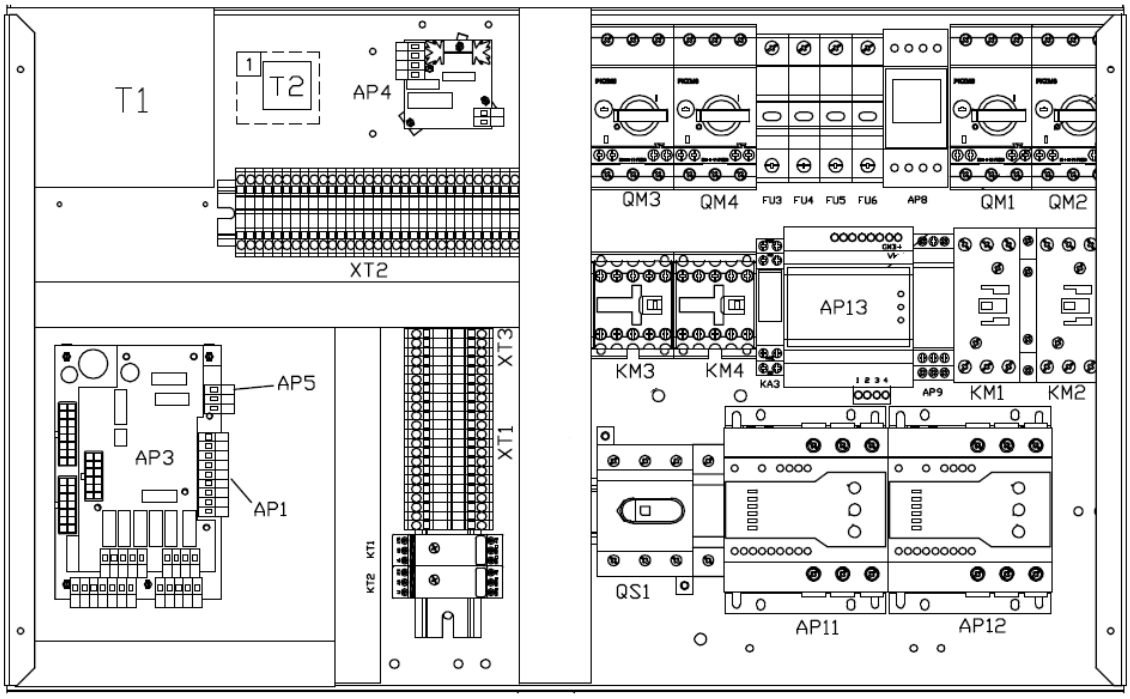

AP1	Main control module
AP2	Local keyboard
AP3	Expansion module
AP5	RS 485 module
AP11-12	Soft starter

QM1-2	Compressor motor overload cutout
QM3-4	Overload cutout switch pump
KM1-2	Compressor contactor
KM3-4	Pump contactor
QS1	main isolator switch

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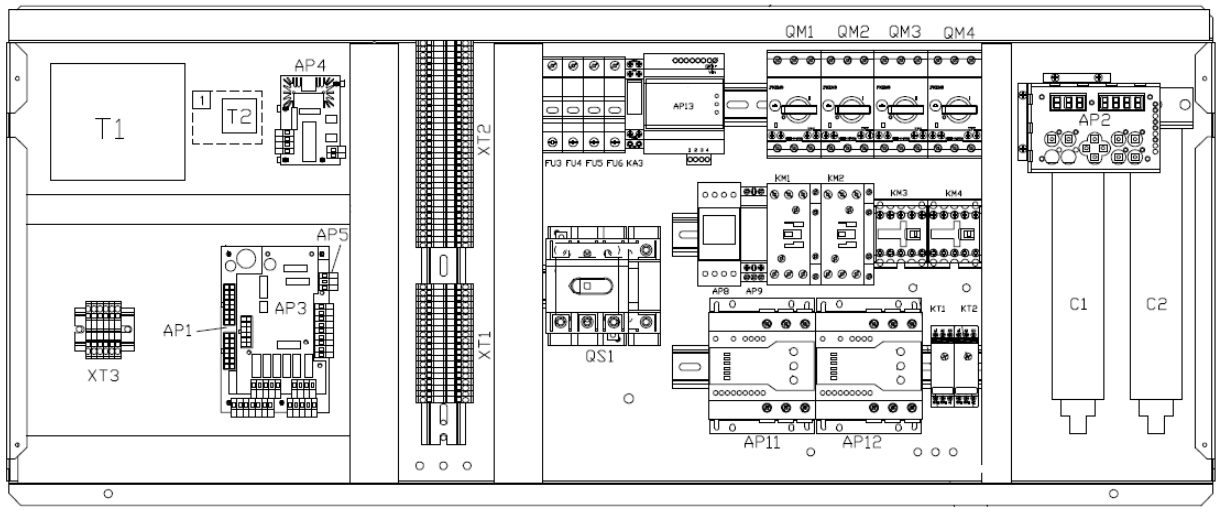
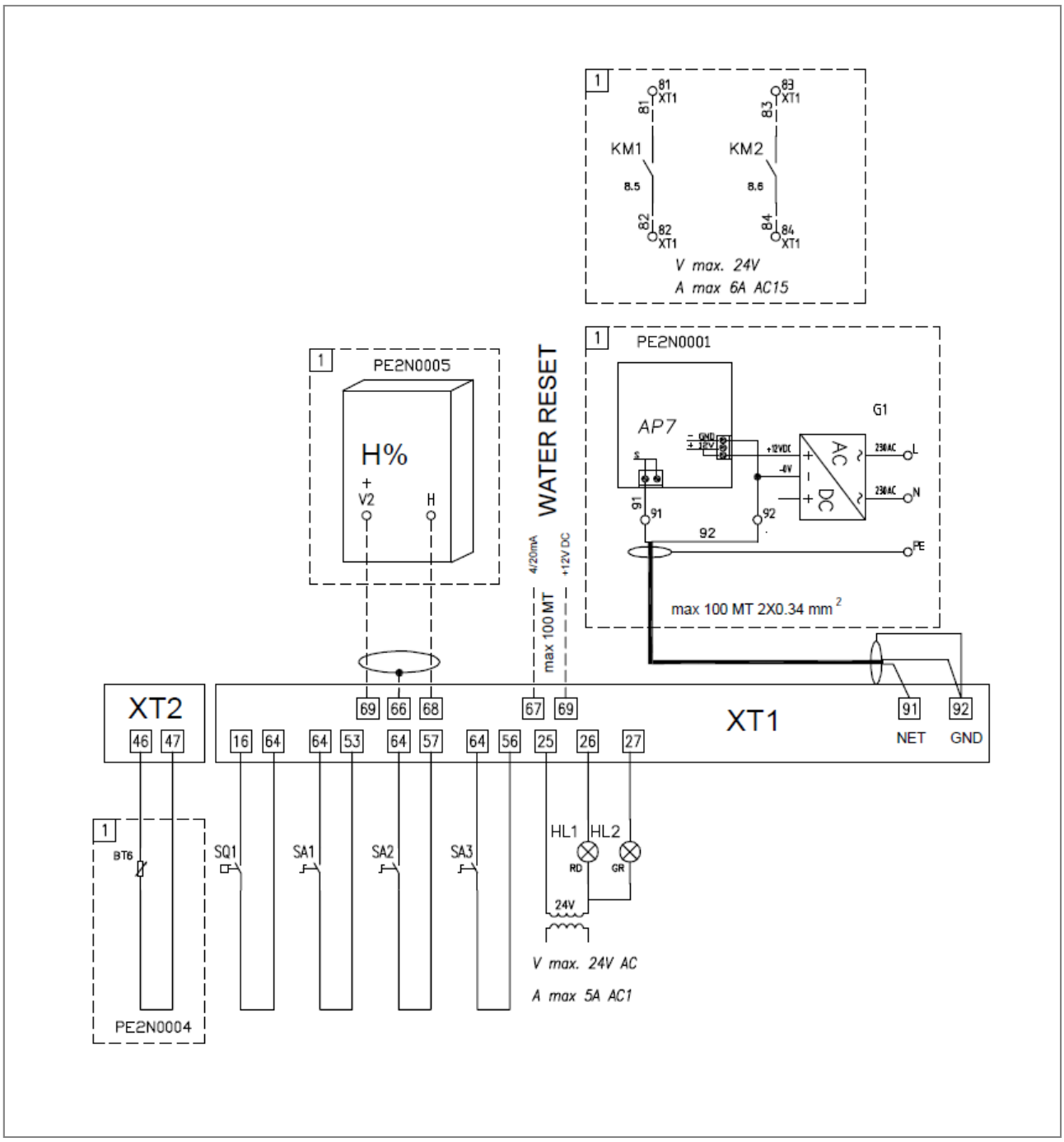


5.7 CUSTOMER CONNECTIONS



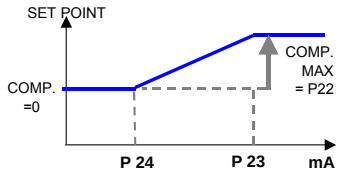
BT6	outside air temperature probe
SQ1	flow switch
SA1	remote ON-OFF selector
SA2	remote summer-winter selector
SA3	remote 2nd setpoint selector
HL1	shut-down unit signal
HL2	operating unit signal
H%	humodity control probe
AP7	remote keyboard

5.8 SET POINT COMPENSATION WITH 4-20 MA SIGNAL (WATER RESET)

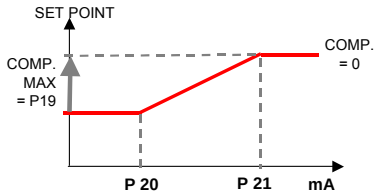
It optimizes the energetic efficiency of the unit by automatically changing the set-point according to an external signal of 4-20 ma type. It requests the **expansion plug-in module** option that must be fitted by the client (refer to the kit instructions) and enabled by parameter 140 = 1. This function must be enabled with parameter18 (=0 not enabled, =1 only summer, = 2 only winter, = 3 summer and winter)

par	description	meaning	value
18	WaterReset	Water Reset enabling 0=No 1=Cool 2=Heat 3=Always	0
19	MaxCWRH	Max. value of the Winter WR correction	10
20	SWRMAXH	Corresponding signal of the winter MAX. correction	4
21	SWRMinH	Corresponding signal of the winter MIN. correction	20
22	MaxCWRC	Summer correction max. value	8
23	SWRMaxC	Corresponding signal of the summer MAX. correction	20
24	SWRMinC	Corresponding signal of the summer MIN. correction	4
140	PlugInEn	Enables PLUG-IN presence . 1=YES / 0=NO	

SET POINT CURVE IN COOLING



SET POINT CURVE IN HEATING

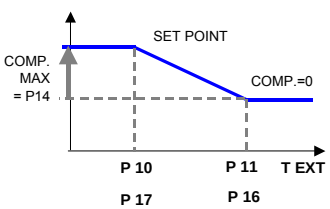


5.9 SET POINT COMPENSATION ON THE TEMPERATURE OR EXTERNAL ENTHALPY

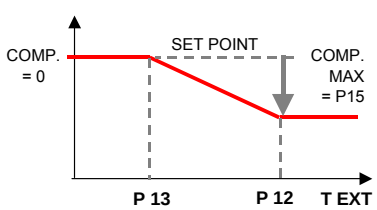
Optimises unit energy efficiency by automatically adjusting the set-point according to enthalpy or the external temperature. Requires the **external humidity probe** or the **external temperature probe,** which are optional for certain types of units and must be installed by the customer and enabled by parameters 152=1 and 156=1.

par	description	meaning	value
9	CompExt	External temp. comp. enabling 0=No 1=Cool 2=Heat 3=Always	0
10	CextMaxC	Ext. Temp. max. summer correction	15
11	CextMinC	Ext. Temp. min. summer correction	30
12	CextMaxH	Ext. Temp. max. winter correction	15
13	CextMinH	Ext. Temp. min. winter correction	0
14	MaxCExtC	Summer correction max. value	8
15	MaxCExtH	Winter correction max. value	10
16	HExtMinC	Ext. enthalpy min. correction	10,5
17	HExtMaxC	Ext. enthalpy max. correction	13,5
152	TextEn	EXT. Air probe presence 1=YES, 0=NO	
156	URProbeExt	Enables external UR% probe. 1=YES, 0=NO	

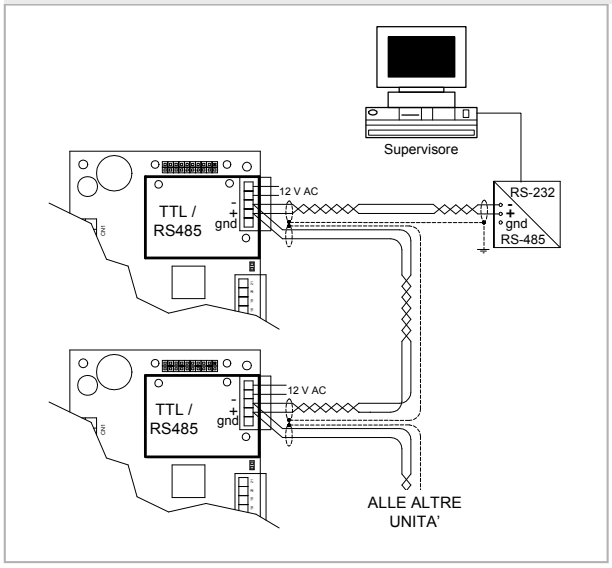
SET POINT CURVE IN COOLING



SET POINT CURVE IN HEATING

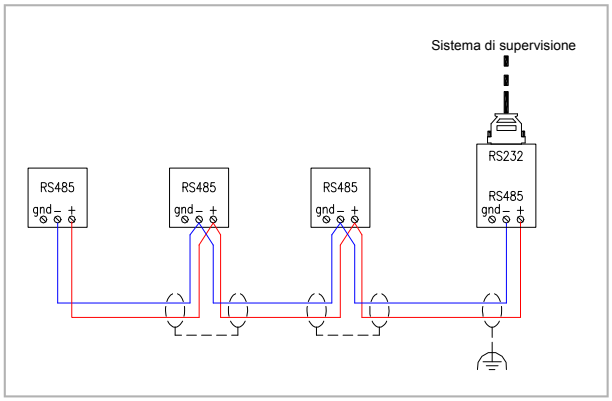


5.10 RS485



SHIELD

- It must be connected to a ground without disturbances
- Connected to round in only one point
- Provide to the shield continuity during all the serial cable extension.



NETWORK CABLE FEATURES

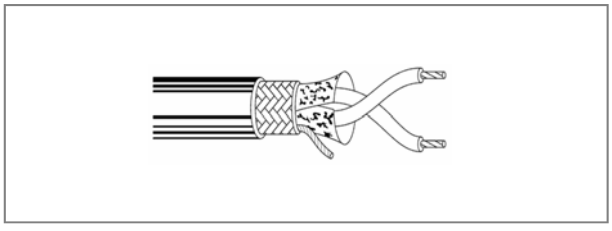
Couple of conductors twisted and shielded

Section of conductor 0.22mm^2…0,35mm^2

Nominal capacity between conductors < 50 pF/m

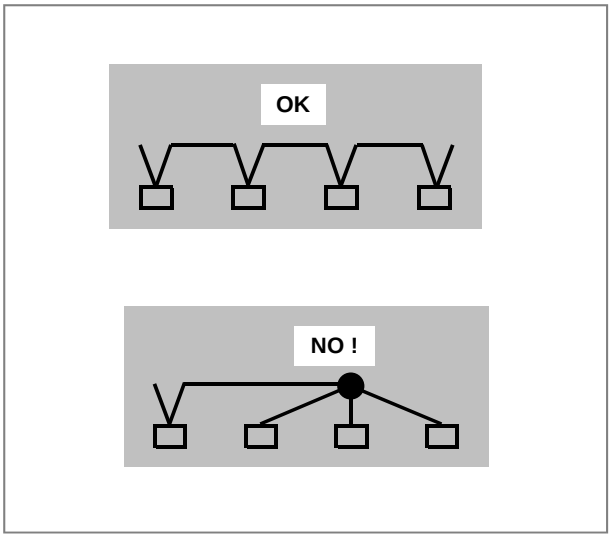
nominal impedance 120 Ω

Recommended cable BELDEN 3105A



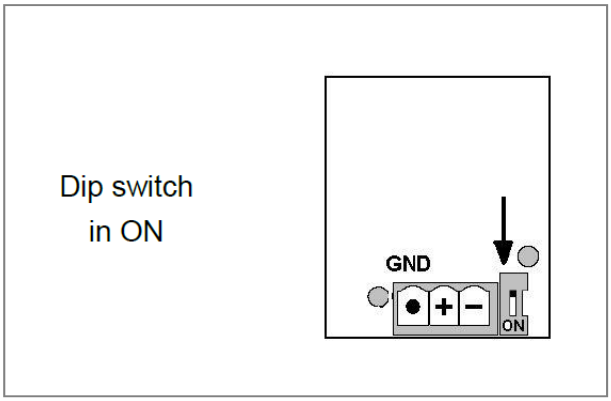
TYPE OF NETWORK

The serial lines must be connected in bus typology, i.e. nodes to more points are not admitted



Make the termination if the unit is the last of the network .

termination yes = dip ON



PRELIMINARY CHECKS

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

For details refer to the different manual sections.

√	**Preliminary checks - Unit OFF power supply**
☐	Access in safety
☐	Functional clearances
☐	Air flow : free return and supply (no bypass, no stratification)
☐	Structure integrity
☐	Fans run freely
☐	Unit on vibration isolators
☐	Unit input water filter + shut-off valves for cleaning
☐	Vibration isolators on water connections
☐	Expansion tank (indicative volume = 5% system content)
☐	Cleaned system
☐	Loaded system + possibile glicole solution + corrosion inhibitor
☐	Under pressure system
☐	Vented system
☐	Refrigerant circuit visual check
☐	Earthing connection
☐	Power supply features
☐	Electrical connections provided by the customer
☐	Outside air temperature probe

START-UP SEQUENCE

Operations to perform to start-up the unit.

For details refer to the different manual sections.

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

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)	-4	-9	-15	-23
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 loosing

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

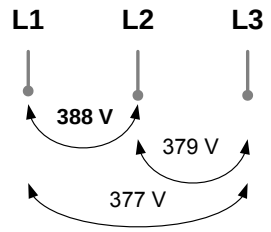
Check the tension and line frequency values which must be within the limits :

400/3/50 +/- 10%

Control the unbalancing of the phases:

it must be lower than 2%

Example:



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

2) **388** (max) – **381** = **7**

3) $\frac{7}{381} \times 100 =$ **1,83 OK**

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

6.6 COMPRESSOR CRANKCASE RESISTANCES

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

- 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 hte 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.

6.6 TENSIONS

Check that the air and water temperatures are included in the working limits

For information on the control system, refer to the paragraph CONTROL.

Start the unit

With unit of full load, namely in stable conditions and close to those of work, check :

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

6.7 REMOTE CONSENT

- Check that the remote commands (ON-OFF, etc.) are connected and if necessary enabled with the relevant parameters as described in ELECTRICAL CONNECTIONS section
- Check that probes or optional components are connect and enable with the relative parameters(ELECTRICAL CONNECTION section)

6.8 STARTING REPORT

Realize the operating objective conditions is useful for check the unit over time.

With unit of full load, namely in stable conditions and close to those of work, take the following data:

- Tension and general absorptions with unit at full load
- Absorption of varied electrical loads (compressors, fans, pumps etc)
- Temperatures and capacities of different liquid (water, air) in the inlet and outlet of the unit
- Temperatures and pressures on the refrigerant circuit characteristic points (compressor discharge, liquid, intake)

The remarks should be preserved and available during maintenance .

6.9 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 :

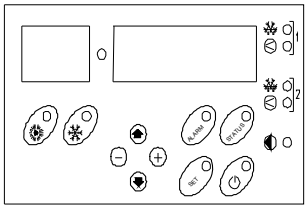
  for all the units

- Periodical verifications:

  to be executed with the frequency indicated by the manufacturer (see the maintenance section)

7.1 MULTI-FUNCTION KEYPAD

The HEATING mode functions are active only on HEAT PUMP unit version .
In ONLY COOL units, the relative parameters are VISIBLE but NOT ACTIVE , for example the winter setpoint.



OPERING MODES

ON – OFF	Unit can be switched on and off by: • remote or service keypad • remote switch (see ELECTRICAL CONNECTIONS paragraph) • Supervisor
COOLING	The compressor is activated with outlet temperature higher than set point
	To switch from **cooling** to **heating** and vice versa, proceed as follows: • Turn the unit OFF • Wait until the plant water temperature (and external air) fall within the operating limits. They can be switched over from the remote controls (refer to the ELECTRIC WIRING paragraph).
HEATING	The compressor is activated with outlet temperature lower than set point
ECO	A secondary set-point can be used, with respect to the comfort setting. In heating the ECO-set is lower than the standard set , in cooling the ECO-set is higher than the standard set.
MAINTENANCE	the plant can be kept within the operating limits even when the unit is OFF or on STANDBY
DEFROSTING	The external coil is free from ice stopping the fans and forcing for a short period the unit in cooling

THERMOREGULATION

The thermoregulation is based on the OUTLET temperature.

The unit is dimensioned for a determined TOTAL HEAD between input and output water temperature.

Usually the project step is 5°C; if the value is different, it is necessary reset parameters 37 and 38 (accessible to the service centre).

In function of the total head, the installation determines the head quote that every resource (compressor, heating elements) is able to provide: the STEP HEAD.

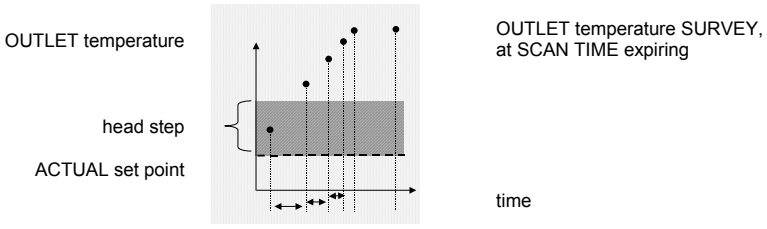
The control logic insert gradually the resources when the outlet temperature is higher than the set point + the head step.

The resources are activated one at a time and only at the SCAN TIME expiring.

The scan time is not fixed but it changes in function of the margin between the water outlet temperature and the Set point value. Higher is the margin value (both in positive and in negative) shorter will be the space among the scan points.

The scan time value is visualized at status 4; when the status 3 has reached the status 4 value, the compressor operating request is activated.

What above described, refer to the COOLING operating; in HEATING le logic is the same but “overturned” (insertion of the compressor for outlet temperature< set-point –step jump)

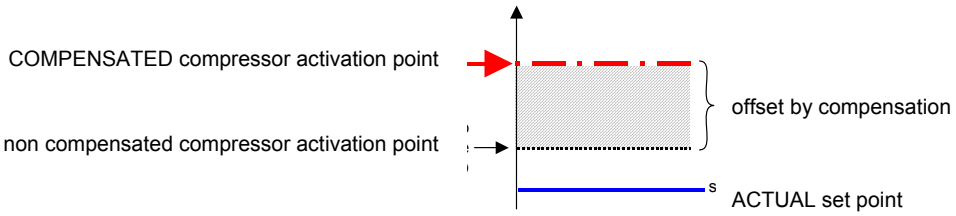


VARIABLE scan time

SET-POINT COMPENSATIONS

The compensations are evolved functions to protect the compressors and to adapt, as far as possible, the unit operating to the installation and use characteristics.

The compensations prolong the compressor operating time and limit the start number; to do this they delay the compressor insertion point adding an offset.



- The compensation on the DURATION is useful when the installation water content is limited.
- The compensation on the CHARGE is useful if the variable charge is present.

For the enabling and the configuration is necessary the parameter modification with reserved access to the service centres.

In industrial applications where is requested a temperature check is possible to disable the COMPENSATIONS.

SET-POINT CORRECTIONS

The correction aim is to optimize the unit energetic efficiency.

To do this the corrections modify the set point in a dynamic way in function of determined variables: for example in summer operating with low external temperatures, so with a reduced charge, is possible to obtain the internal comfort also with set point higher than standard, obtaining an higher energetic efficiency.

The static set point can so be modified in a dynamic way by two CORRECTIONS based on as many unit external factors:

- correction based on the ext. temp. / enthalpy
- correction based on the Water reset (4-20 mA signal provided by the Client)

The correct set point, to whom have been summed or removed the corrections, is named ACTUAL set-point and it is visible at status n°1.

The STATA menu visualizes the compensation value on the ext. temperature (status 5) and WR (status 6)

For further details see the ELECTRICAL CONNECTIONS section

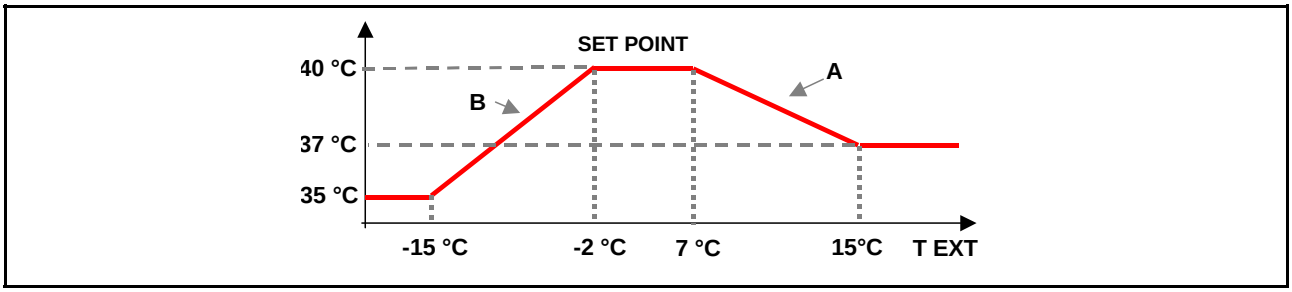
SET POINT CORRECTION FOR COMPRESSOR OPERATING LIMIT

The function is active only in HEATING; it allows extending the operating limits decreasing gradually the set point when the external temperature descends more than determined limits.

In the graph, the correction action is indicated by the curve left side (B).

The curve right side (A) represents the correction state on the external temperature (optional, see the ELECTRICAL CONNECTIONS section).

The following data are indicatives .



DEFROSTING

The defrosting aim is to maintain the external coil free from ice during the winter mode : to do that the unit is periodically commuted in “summer” mode for few minutes and the fans are stopped.
The defrosting phase is started when the evaporating pressure falls below a fixed value . A count starts and at its end, if the temperature on the coil is lower than the threshold, the defrosting starts .
The count changes according to the external temperature and to the ice quantity on the coil (by some indirect variables) .
When defrosting is complete, the unit returns automatically to the Winter mode.
Defrosting is managed according to the external temperature and humidity in the air:

- more humidity = frequent defrosting
- external temperature next to 0°C = frequent defrosting

By the EXTERNAL HUIDITY PROBE option the defrosting is optimised according to the external temperature and humidity .

CIRCULATION PUMP

The pump is always activated with the units ON.
The delivery capacity is variable to soften the thermal shock to the compressors when the plant temperature is close to the threshold limits.
Delivery capacity depends on the intake temperature:

- SUMMER: high water temperature reduces delivery
- WINTER: low water temperature reduces delivery

VENTILATION

Fans are controlled with a variable speed:

- in SUMMER, the speed increases according to the increase of external air temperature
- in WINTER the speed increases according to the decrease of the external tempe

SET POINT

SUMMER - WINTER

The thermoregulator manages two set points:

- SUMMER set-point for cooling (parameter 32)
- WINTER set-point for heating (parameter 33)

The control is performed on the OUTLET TEMPERATURE, comparing it with the actual set-point value (visible at status 1).

SET-POINT CALCULATION:

- desired medium outlet water temperature = 7°C
- Project temperature differential = 5°C (that is inlet water = 12°C)
- ¼ of the project temperature differential = 5 / 4 = 1.25°C
- set-point to be set = 7 – 1.25 = 5.7°C

SECONDARY SET POINT – ECO

A secondary set point can be used with different levels to the “normal” set point.
It is normally set to give lower energy consumption with respect to the comfort setting:

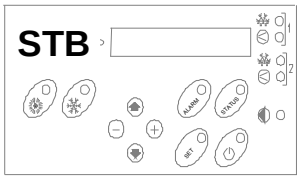
- The SECONDARY SUMMER set point is higher than the SUMMER setting.
- The SECONDARY WINTER set point is lower than the WINTER setting.

It can be set according to individual requirements.

- Secondary summer set-point parameter 29
- Secondary winter set-point parameter 30

It can be activated from the keyboard, supervisor unit or the remote control.
To change it using the remote control refer to the ELECTRIC WIRING paragraph.

MAINTENANCE



This way, the plant can be kept within the operating limits even when the unit is OFF or on STANDBY, for example during the weekend or the nighttime.
Periodically the system activates the circulation pump, measures the water temperature and activates the compressor, if required, to take the water temperature to the set-point level.

- Summer maintenance set-point par 42
- Winter maintenance set-point par 43

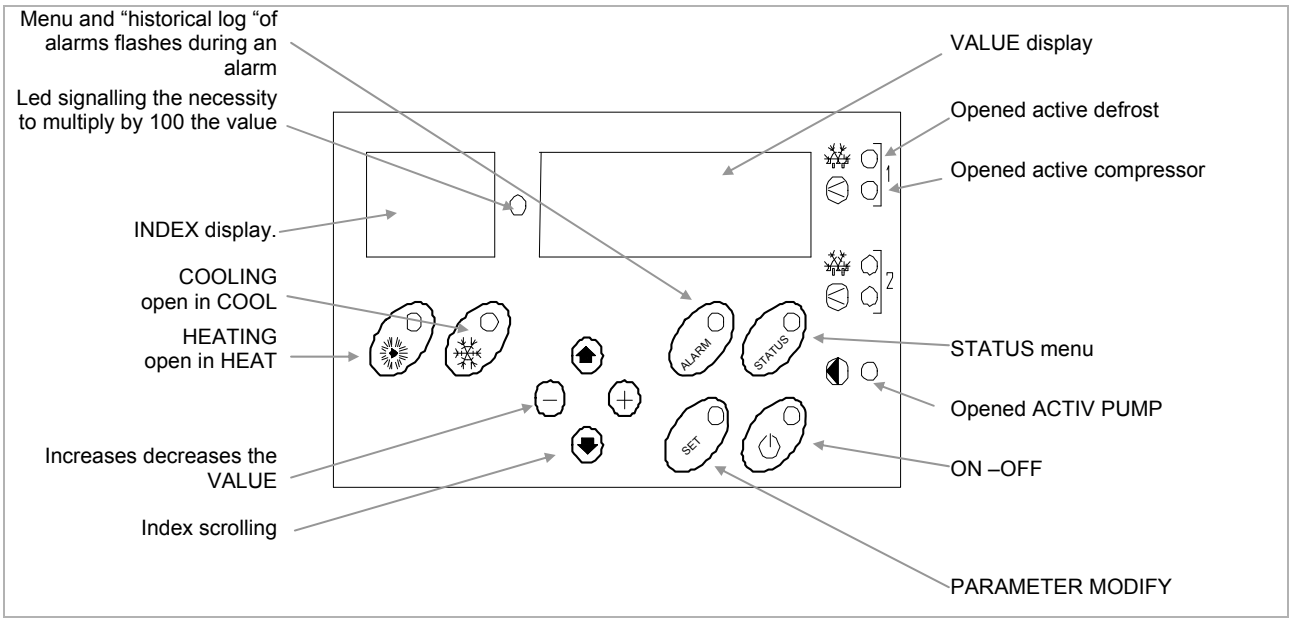
This function is activated by parameters 44 (activate summer maintenance level) and 45 (activate winter maintenance level).
With unit in maintenance mode, the display visualizes **STB** .

FUNCTIONING WITH ETHYLENE GLYCOL

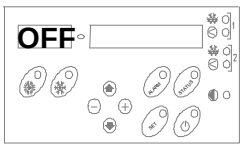
The units foreseen to function with glycoled water come out from the premise with standard parameters.
After having added glycol ethylene to water, the technician will properly set the plant.

Parameter to modify:	32	Summer set point
	77	Antifreeze heater set
	80	Antifreeze alarm
	84	Antifreeze pre-alarm threshold

KEYPAD

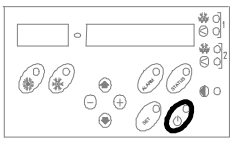


1



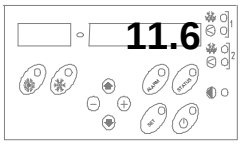
unit in OFF.
by keypad
by supervisor

2



switching: long ON - OFF pressure

3

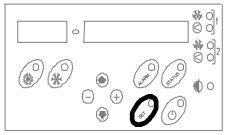


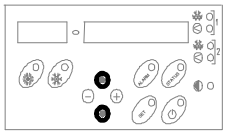
OUTLET temperature visualization

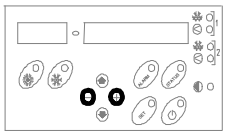
ACCESSIBLE PARAMETERS FROM REMOTE OR SERVICE KEYBOARD

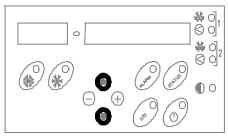
num. Par.	description	Value	UM
29	Summer secondary Set Point	10	°C
30	Winter secondary Set Point	35	°C
32	Summer Set Point	5.7	°C
33	Winter Set Point	41.2	°C
42	Summer Set Point Maintenance	20	°C
43	Winter Set Point Maintenance	30	°C
44	Enables Summer Maintenance	0	num
45	Enables Winter Maintenance	0	num
77	Antifreeze heater set point	4	°C
80	Antifreeze alarm	4	°C
84	Limit of deactivation before reaching the antifreeze steps	4.5	°C
163	Configures remote inputs: 1 = H/C by keypad or supervisor		
192	Keypad address		

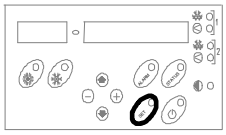
PARAMETER MODIFICATION

1  Push SET button

2  Select the parameter

3  Modify the value

4  Select another parameter

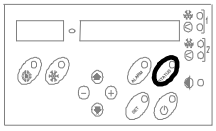
5  SET to esc

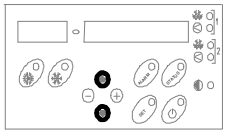
VISIBLE STATUS FROM REMOTE KEYBOARD OR SERVICE KEYBOARD

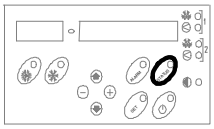
Visible status from remote keyboard or service keyboard		
INDEX	**DESCRIPTION**	**VALUE**
1	Current Set Point	°C
2	Temperature drop in degrees centigrade given by the compressor including compensations, if any	°C
3	Resource activation timer When this value reaches the value fixed at the 4 status, the thermal regulator will compare the input temperature with the set point and will activate the resources, if necessary	Seconds
4	Dynamic TimeScan relating to source activation	Seconds
5	Value in degrees of the external air compensation	°C
6	Value in degrees of the water reset signal compensation	°C
7	Value in degrees of the charge compensation	°C
9	Inlet temperature	°C
10	Outlet temperature 1	°C
11	Outlet temperature 2	°C
12	Coil temperature 1	°C
13	Condensing pressure 1	Bar
14	Fan/Coil percentage 1	0-100%
15	Coil temperature 2	°C
16	Condensing pressure 2	Bar
17	Condensing pressure 2	Bar
18	Water Reset signal value	4-20 mA

INDEX	DESCRIPTION	VALUE
19	Outdoor temperature	°C
20	Outdoor Humidity	0-100%
21	Machine Clock - fed unit hours	Num
22	Working hours C1	Num
23	Pickups C1	Num
24	Working hours C2	Num
25	Pickups C2	Num
30	Keypad software	AS – t
31	Year of certification of the keyboard SW	2007
32	Month of certification of the keyboard SW	03
33	Day of certification of the keyboard SW	04
34	Base Software	AS – b
35	Year of certification of the keyboard SW	2007
36	Month of certification of the keyboard SW	1
37	Day of certification of the keyboard SW	11

STATUS DISPLAY

1  push STATUS button

2  Select status

3  STATUS to esc

ALARMS

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

The **ALARMS** show a potentially dangerous situation for machine safety.
Before resetting the alarm, discover and remove the cause: repeated resetting could cause irreversible damage. To avoid this, the unit can only be reset MANUALLY from the keyboard (only when the cause for the alarm has been removed).

PRE-ALARMS and SIGNALS warn of a risky situation. These could be acceptable only if they happen occasionally or in transitory situations (for example when the plant is being started up).
They are reset AUTOMATICALLY, as soon as the cause has been removed, without any input from the keyboard.
The pre-alarms are signalled by the fixed C code (not flashing) and on the right the control temperature.

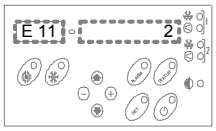
The **FAULTS** warn of problems with the probes and transducers, and are reset AUTOMATICALLY to allow the unit to continue running, perhaps with fewer functions.

In case of doubt, always contact an authorised service centre.

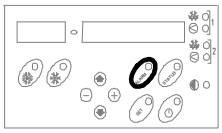
The presence of an alarm is signalled by the ALARM CODE flashing and the time at which the alarm/alarms occurred.

The cumulative block relay activates simultaneously to the alarm code visualization.
Certain alarms, in particular PRE-ALARMS, do not activate the relays.

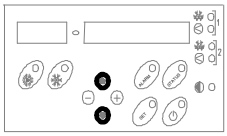
ALARM VISUALIZATION

1 

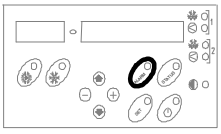
flashing
Alarm code
Alarm unit hours

2 

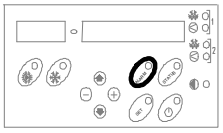
opened alarm log
short pressure
ALARM

3 

The most recent alarm is visualized
Use the arrow keys to visualize other alarms

4 

To esc
Short pressure
ALARM

5 

To RESET
LONG pressure
ALARM

According to the unit configuration and to the current options, some status can not be used.			
INDEX		**ALARM**	**RESET**
E	**1**	Faulty or disconnected water inlet probe	Auto.
E	**2**	Faulty or disconnected water outlet probe 1	Auto.
E	**3**	Faulty or disconnected water outlet probe 2	Auto.
E	**4**	Faulty or disconnected coil probe 1	Auto.
E	**5**	Faulty or disconnected coil probe 2	Auto.
E	**6**	Faulty or disconnected external probe	Auto.
E	**7**	Faulty or disconnected pressure transducer 1	Auto.
E	**8**	Faulty or disconnected pressure transducer 2	Auto.
C	**9**	Water Reset inlet in short circuit or out of range	Auto.
E	**10**	Faulty or disconnected external RH% probe	Auto.
E	**11**	High pressure 1	MANUAL
E	**12**	Low pressure 1	Auto.
E	**13**	Condensing fan and/or compressor thermal 1 switch	MANUAL
E	**14**	High pressure 2	MANUAL
E	**15**	Low pressure 2	Auto.
E	**16**	Condensing fan and/or compressor thermal 2 switch	MANUAL
E	**17**	Pump flow	Auto.
E	**18**	System charged with water	MANUAL
E	**19**	Phase monitor	Auto.
E	**20**	Antifreeze alarm	MANUAL
C	**21**	Antifreeze PREAlarm	Auto.
C	**22**	High pressure PreAlarm 1	Auto.
C	**23**	High pressure PreAlarm 2	Auto.
C	**24**	Pump change	Auto.
E	**25**	C1 flow alarm	Auto.
E	**26**	C2 flow alarm	Auto.
C	**27**	C1 low temperarue alarm	Auto.
C	**28**	C2 low temperarue alarm	Auto.
E	**33**	Condenser frost alarm	MANUAL
E	**34**	Evaporator input temp. alarm	Auto.
E	**35**	Incongruent DeltaT alarm	MANUAL
C/E	**36**	BP1 Low pressure pre-alarm C1	Auto.
C/E	**37**	BP1 Low pressure pre-alarm C2	Auto.

S = anomalous situation signalisation that doesn't compromise the unit functionality

E = ALARM, situation that compromises the unit functionality

8.1 GENERAL

Maintenance must be done by authorized centres or by qualified personnel
The maintenance enables:

- 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 six months

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 MACHINE BOOKLET

It's advisable to create a machine booklet to take notes of the unit interventions.
In this way will be easier marker the various interventions and will be e facilitate any troubleshooting.
Report on the booklet :

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

8.4 PUT A REST

If a long period of inactivity is foreseen

- Turn of the power in order to avoid electrical risks or damages by lightning strike
- avoid the risk of frosts (empty or add glycol in the plant sections subjected to temperatures below zero , power antifreeze resistances if are present)

It's recommended that the starter after the period of detention is made by a qualified technician, especially after seasonal stops or seasonal switch.
When restarting, refer to the START-UP section .

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

8.5 WATER FILTER

Verify that there are no impurities which hinder the smooth passage of water.

8.6 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.

8.7 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 rince with water to inhibe the detergent rests.

8.8 ELECTRIC FANS

Check :

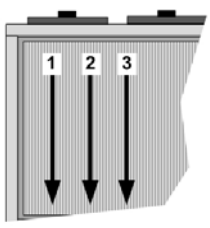
- the fans and the relative protection gridsare well fixed
- The fan bearings (evident by noise and anomalous vibrations)
- the terminal protection covers are closed and the cable holders are properly positioned

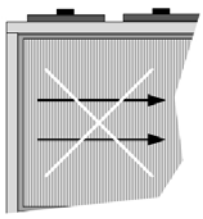
8.9 AIR COIL

⚠ Contact with the exchanger fins can cause cuts. Wear protective gloves to perform the above described operations.
It is extremely important that the battery gives the maximum thermal exchange; therefore, its surface must be cleaned from dust and deposits. Remove all impurities from the surface.
It is extremely important that the battery gives the maximum thermal exchange; therefore, its surface must be cleaned from dust and deposits. Remove all impurities from the surface.
Using an air pressure gun, clean the aluminum surface of the battery. Be careful to direct the air in the opposite direction of the fan air movement.

⚠ Hold the gun parallel to the fins to avoid damages. As an alternative, an aspirator can be used to suck impurities from the air input side.

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





CONTROL CHECK LIST

Controls effected on ……..By …… Of the Company……..……

√		1	6	12
□	Presence of corrosions			●
□	Panel fixing			●
□	Fan fixing		●	
□	Coil cleaning		●	
□	Water filter cleaning		●	
□	Check the exchanger efficiency			●
□	Circulating pumps		●	
□	Check of the fixing and the insulation of the power lead		●	
□	Check of the earthing cable		●	
□	Electric panel cleaning			●
□	Capacity contactor status		●	
□	Termina closing, cable insulation integrity			●
□	Voltage and phase unbalancing (no load and on-load)		●	
□	Absorptions of the single electrical loads		●	
□	Test of the compressor carter resistances		●	
□	Leak control *			●
□	Survey of the refrigerant circuit operating parameters		●	
□	Protective device test : safety valves, pressure switches, thermostats, flow switches etc		●	
□	Control system test: setpoint, climatic compensations, capacity stepping, water / air flow-rate variations etc		●	
□	Control device test : alarm signalling, thermometers, probes, pressure gauges etc		●	

Notes / interventions recommended to the owner

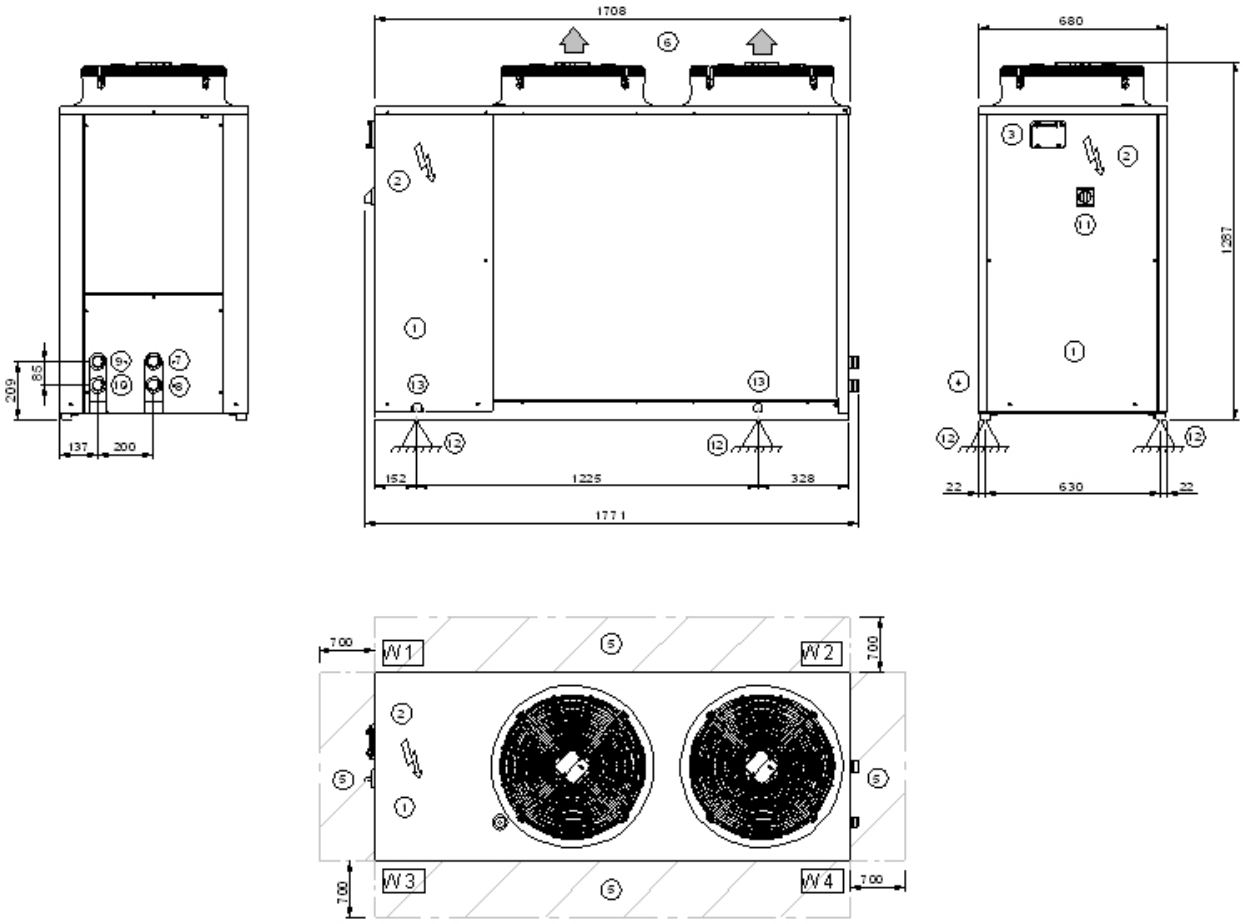
* European regulation 303/2008

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.

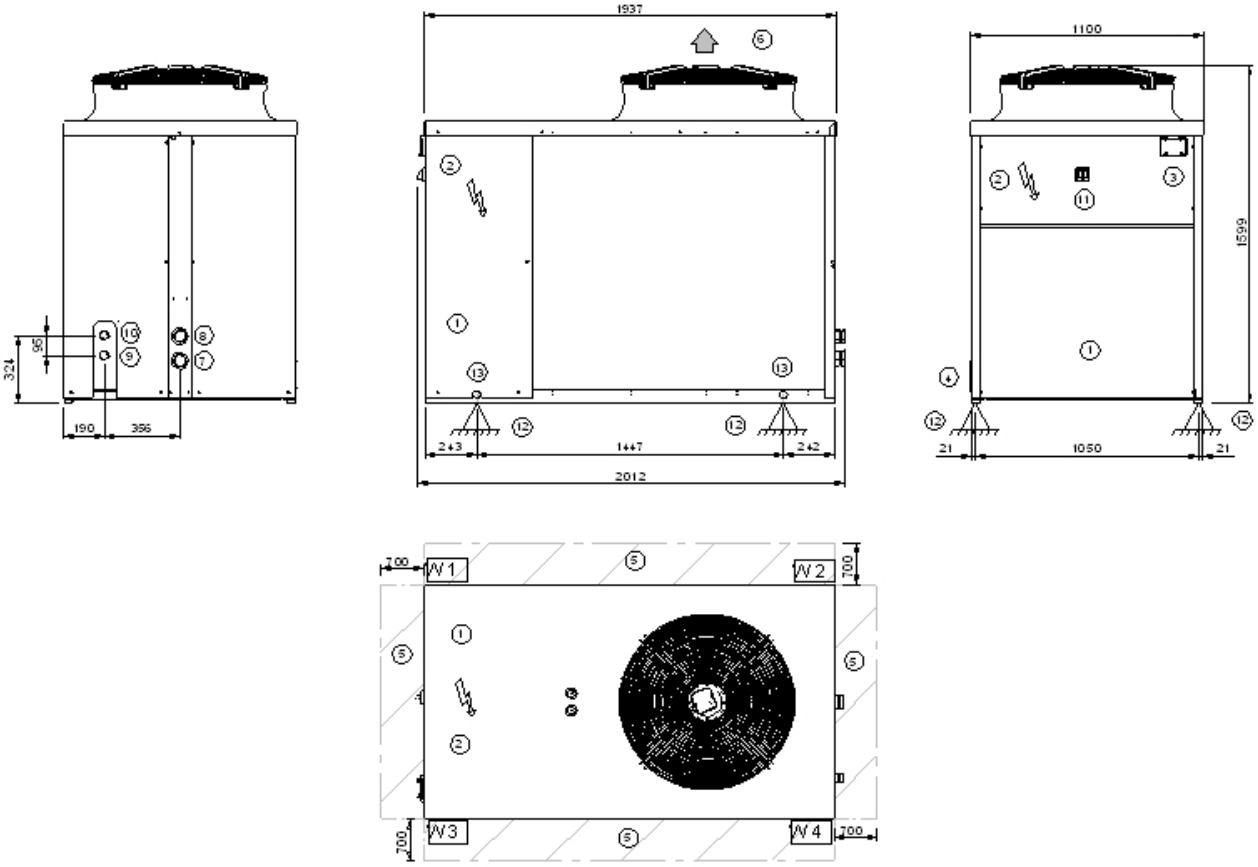
DIMENSIONALES AND WEIGHT DISTRIBUTION WSAN-XEE 82-102-122



Size			82	102	122
M		mm	705	700	699
N		mm	998	1003	1004
O		mm	345	345	345
P		mm	330	330	330
Length		mm	1771	1771	1771
Depth		mm	680	680	680
Height		mm	1287	1287	1287
W1		kg	101	102	118
W2		kg	60	61	70
W3		kg	88	90	104
W4		kg	66	67	78
Operating weight		kg	315	320	370
Shipping weight		kg	325	330	380

(1) COMPRESSOR COMPARTMENT
(2) ELECTRICAL PANEL
(3) KEYBOARD CONTROL UNIT
(4) POWER INPUT
(5) FUNCTIONAL SPACE
(6) AIR SUPPLY
(7) WATER INLET 1 1/4" VICTAULIC
(8) WATER OUTLET 1 1/4" VICTAULIC
(9) DESUPERHEATER WATER INLET 1" 1/4 VICTAULIC (OPTIONAL)
(10) DESUPERHEATER WATER OUTLET 1" 1/4 VICTAULIC (OPTIONAL)
(11) MAIN ISOLATOR SWITCH
(12) VIBRATION MOUNTS POSITION
(13) LIFTING HOLES POSITION

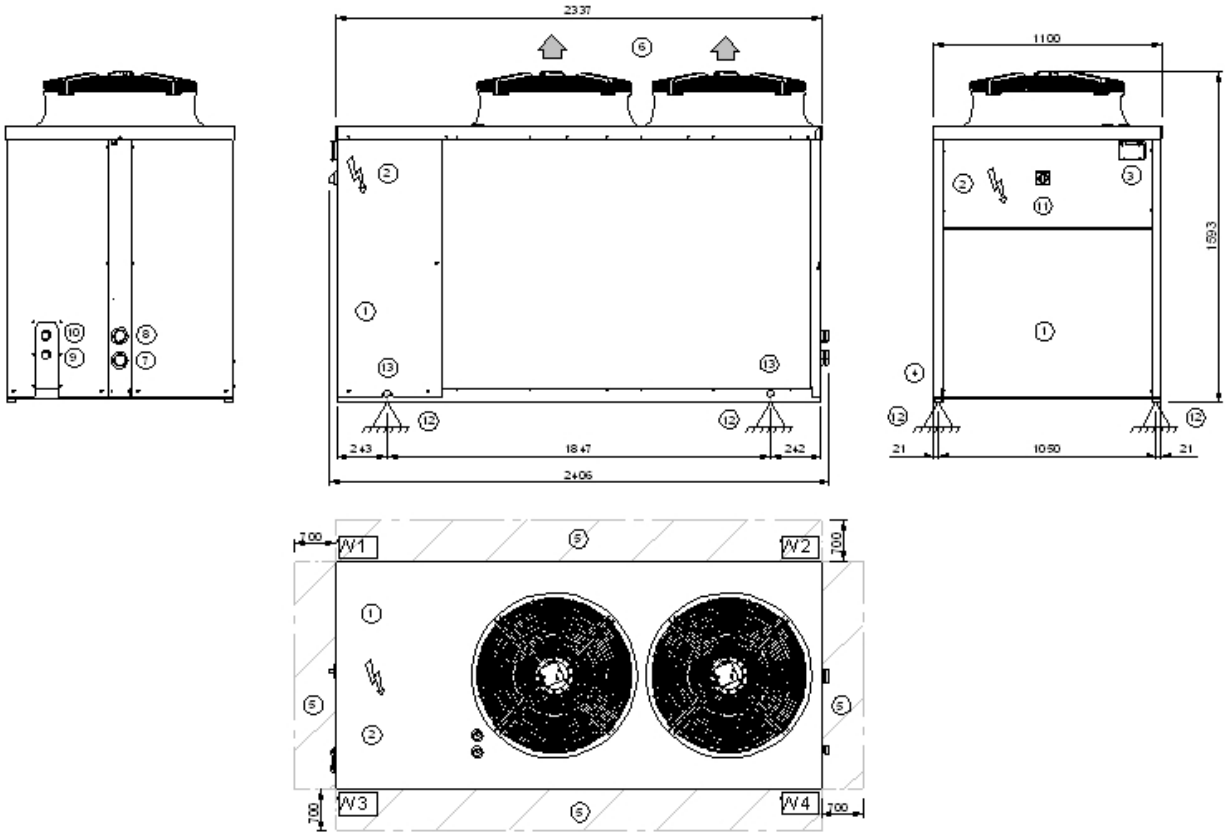
DIMENSIONALS AND WEIGHT DISTRIBUTION WSAN-XEE 162-182-222



Size			162	182	222
M		mm	892	888	889
N		mm	1040	1044	1043
O		mm	520	515	517
P		mm	580	585	583
Length		mm	2012	2012	2012
Depth		mm	1100	1100	1100
Height		mm	1599	1599	1599
W1		kg	148	154	162
W2		kg	101	105	110
W3		kg	170	176	186
W4		kg	111	116	122
Operating weight		kg	530	550	580
Shipping weight		kg	545	565	595

(1) COMPRESSOR COMPARTMENT
(2) ELECTRICAL PANEL
(3) KEYBOARD CONTROL UNIT
(4) POWER INPUT
(5) FUNCTIONAL SPACE
(6) AIR SUPPLY
(7) WATER INLET 2" VICTAULIC
(8) WATER OUTLET 2" VICTAULIC
(9) DESUPERHEATER WATER INLET 1" 1/4 VICTAULIC (OPTIONAL)
(10) DESUPERHEATER WATER OUTLET 1" 1/4 VICTAULIC (OPTIONAL)
(11) MAIN ISOLATOR SWITCH
(12) VIBRATION MOUNTS POSITION
(13) LIFTING HOLES POSITION

DIMENSIONALS AND WEIGHT DISTRIBUTION WSAN-XEE 262-302



Size			262	302
M		mm	1105	1100
N		mm	1227	1232
O		mm	515	513
P		mm	585	587
Length		mm	2406	2406
Depth		mm	1100	1100
Height		mm	1593	1593
W1		kg	189	193
W2		kg	128	131
W3		kg	216	221
W4		kg	142	145
Operating weight		kg	675	690
Shipping weight		kg	690	705

(1) COMPRESSOR COMPARTMENT
(2) ELECTRICAL PANEL
(3) KEYBOARD CONTROL UNIT
(4) POWER INPUT
(5) FUNCTIONAL SPACE
(6) AIR SUPPLY
(7) WATER INLET 2" VICTAULIC
(8) WATER OUTLET 2" VICTAULIC
(9) DESUPERHEATER WATER INLET 1" 1/4 VICTAULIC (OPTIONAL)
(10) DESUPERHEATER WATER OUTLET 1" 1/4 VICTAULIC (OPTIONAL)
(11) MAIN ISOLATOR SWITCH
(12) VIBRATION MOUNTS POSITION
(13) LIFTING HOLES POSITION

Application: Terminal units

GENERAL TECHNICAL SPECIFICATIONS

Size			82	102	122	162	182	222	262	302
COOLING										
Cooling capacity	1	kW	23.6	27.5	32.7	39.4	45.6	52.9	63.0	71.9
Compressor power input	1	kW	9.00	10.5	12.7	14.6	17.1	20.3	23.9	27.3
Total power input	2	kW	9.52	11.0	13.2	16.4	18.8	22.0	25.7	29.1
EER	3		2.48	2.49	2.48	2.41	2.42	2.40	2.45	2.47
HEATING										
Heat output	4	kW	28.8	32.9	37.5	45.6	53.0	61.9	72.4	83.7
Compressor power input	4	kW	8.66	9.93	11.4	13.4	15.8	18.3	21.1	24.5
Total power input	2	kW	9.16	10.4	11.9	15.1	17.5	20.0	22.9	26.3
COP	4		3.14	3.15	3.16	3.02	3.03	3.09	3.16	3.18
COMPRESSOR										
Type of compressors			SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL
No. of Compressors		Nr	2	2	2	2	2	2	2	2
Std Capacity control steps		Nr	3	3	2	3	3	3	3	2
Oil charge (C1)		l	3.61	3.72	3.54	5.76	5.76	6.65	7.39	8.28
Refrigerant charge (C1)		kg	12,5	11,8	14,0	18,0	18,5	23,5	21,5	27,0
Refrigerant circuits		Nr	1	1	1	1	1	1	1	1
INTERNAL EXCHANGER										
Type of internal exchanger	5		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
No. of internal exchangers		Nr	1	1	1	1	1	1	1	1
Water flow rate (Internal Exchanger)	1	l/s	1.1	1.3	1.6	1.9	2.2	2.5	3	3.4
Max water flow-rate		l/s	1.5	1.8	2.3	2.7	3.1	4	4.6	5.4
internal exchanger pressure drop		kPa	48.1	47.6	41.6	42.7	43.1	37.5	39.4	41.9
Useful pump discharge head	1	kPa	136	129	125	107	89	150	141	131
EXTERNAL SECTION FANS										
Type of fans	6		AX	AX	AX	AX	AX	AX	AX	AX
Number of fans		Nr	2	2	2	1	1	1	2	2
Standard air flow		l/s	2553	2545	2514	4965	4902	4778	7196	6971
Installed unit power		kW	0.25	0.25	0.25	1.72	1.72	1.72	0.90	0.90
CONNECTIONS										
Water fittings			1" 1/4	1" 1/4	1" 1/4	2"	2"	2"	2"	2"
HYDRAULIC CIRCUIT										
Max water side pressure		kPa	550	550	550	550	550	550	550	550
Safety valve calibration		kPa	600	600	600	600	600	600	600	600
POWER SUPPLY										
Standard power supply		V	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N
NOISE LEVELS										
Sound pressure level (1 m)		dB(A)	60	60	60	64	64	65	65	65
DIMENSIONS										
Length		mm	1771	1771	1771	2012	2012	2012	2406	2406
Depth		mm	680	680	680	1100	1100	1100	1100	1100
Height		mm	1287	1287	1287	1599	1599	1599	1593	1593
Packing volume		m3	1.8	1.8	1.8	4	4	4	4.5	4.5
STANDARD UNIT WEIGHTS										
Shipping weight		kg	325	330	380	545	565	595	690	705
Operating weight		kg	315	320	370	530	550	580	675	690

(1) data referred to the following conditions :
internal exchanger water = 12/7°C
external exchanger air intake 35°C
(2) Total absorbed power is given by the compressor absorbed power + fan absorbed power + auxiliary circuit absorbed power.
(3) 100% EER
internal exchanger water outlet temperature = 7°C
outdoor air temperature = 35°C

(4) data referred to the following conditions :
outlet water internal exchanger 45°C
outdoor air temperature = 7°C (RH = 85%)
(5) PHE = plates
(6) AX = axial-flow fan

Application: Unit for underfloor heating

GENERAL TECHNICAL SPECIFICATIONS

Size			82	102	122	162	182	222	262	302
COOLING										
Cooling capacity	1	kW	31,5	36,7	43,8	52,6	60,2	72,3	83,1	97,2
Compressor power input	1	kW	9,59	11,5	14.0	16,1	18,2	22.0	25,5	29,4
Total power input	2	kW	10.11	12.0	14,5	17.8	19.9	23.7	27.3	31.2
EER			3,12	3,05	3,02	2.95	3,02	3,05	3,04	3,11
HEATING										
Heat output	3	kW	29.2	33.6	38.0	46.9	54.1	63.3	74.0	85.4
Compressor power input	3	kW	6.73	7.63	8.8	10.5	12.6	14.9	17.1	20.0
Total power input		kW	7.23	8.1	9.3	12.2	14.3	16.6	18.9	21.8
COP			4.04	4.13	4.09	3.84	3.78	3.81	3.92	3.92
COMPRESSOR										
Type of compressors			SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL	SCROLL
No. of Compressors		Nr	2	2	2	2	2	2	2	2
Std Capacity control steps		Nr	3	3	2	3	3	3	3	2
Oil charge (C1)		l	3,61	3,72	3,54	5,76	5,76	6,65	7,39	8,28
Refrigerant charge (C1)		kg	12,5	11,8	14,0	18,0	18,5	23,5	21,5	27,0
Refrigerant circuits		Nr	1	1	1	1	1	1	1	1
INTERNAL EXCHANGER										
Type of internal exchanger	4		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
No. of internal exchangers		Nr	1	1	1	1	1	1	1	1
Water flow rate (Internal Exchanger)		l/s	1.5	1.8	2.1	2.5	2.9	3.5	4	4.6
Max water flow-rate		l/s	1.5	1.8	2.3	2.7	3.1	4	4.6	5.4
internal exchanger pressure drop	1	kPa	48.1	47.6	41.6	42.7	43.1	37.5	39.4	41.9
Useful pump discharge head	1	kPa	91.8	80.4	72.7	42.9	17.2	111.2	102.3	82.9
EXTERNAL SECTION FANS										
Type of fans	5		AX	AX	AX	AX	AX	AX	AX	AX
Number of fans		Nr	2	2	2	1	1	1	2	2
Standard air flow		l/s	2553	2545	2514	4965	4902	4778	7196	6971
Installed unit power		kW	0,25	0,25	0,25	1.72	1.72	1.72	0.90	0.90
CONNECTIONS										
Water fittings			1" 1/4	1" 1/4	1" 1/4	2"	2"	2"	2"	2"
HYDRAULIC CIRCUIT										
Max water side pressure		kPa	550	550	550	550	550	550	550	550
Safety valve calibration		kPa	600	600	600	600	600	600	600	600
POWER SUPPLY										
Standard power supply		V	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N
NOISE LEVELS										
Sound pressure level (1 m)		dB(A)	60	60	60	64	64	65	65	65
DIMENSIONS										
Length		mm	1771	1771	1771	2012	2012	2012	2406	2406
Depth		mm	680	680	680	1100	1100	1100	1100	1100
Height		mm	1287	1287	1287	1599	1599	1599	1593	1593
Packing volume		m3	1.8	1.8	1.8	4	4	4	4.5	4.5
STANDARD UNIT WEIGHTS										
Shipping weight		kg	325	330	380	545	565	595	690	705
Operating weight		kg	315	320	370	530	550	580	675	690

(1) data referred to the following conditions :
internal exchanger water = 23/18°C
external exchanger air intake 35°C
(2) Total absorbed power is given by the compressor absorbed power + fan absorbed power + auxiliary circuit absorbed power.
(3) data referred to the following conditions :
water to internal exchanger 30/35°C
outdoor air temperature 7°C DB - 6°C WB
(4) PHE = plates
(5) AX = axial-flow fan

Application: Terminal units

OPERATING LIMITS (COOLING)

Size			82	102	122	162	182	222	262	302
EXTERNAL EXCHANGER										
Max air intake temperature	1	°C	47	47	46	47	48	47	47	47
Max air intake temperature	2	°C	49	49	48	49	48	49	49	49
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10
INTERNAL EXCHANGER										
Max water inlet temperature	4	°C	22	22	22	22	22	22	22	22
Min. water outlet temperature	5	°C	5	5	5	5	5	5	5	5
Min. water outlet temperature	6	°C	-8	-8	-8	-8	-8	-8	-8	-8

OPERATING LIMITS (HEATING)

EXTERNAL EXCHANGER

Max air temperature inlet (WB)	7	°C	22	22	24	24	24	22	24	22
Min air inlet temperature (W.B.)	8	°C	-7	-7	-7	-7	-7	-7	-7	-7

INTERNAL EXCHANGER

Min. water outlet temperature		°C	28	28	28	28	28	28	28	28
Max water outlet temperature	9	°C	55	55	53	55	55	55	55	55

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

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

Water thermal head (min / max) are indicated in the section INTERNAL EXCHANGER PRESSURE DROP

(1) unit at full load: internal exchanger water 12/7°C
(2) internal exchanger water = 12/7°C
capacity-controlled unit (automatic capacity control)
(3) external exchanger air in quiet
(4) this limit can be exceeded for brief and transitory periods with automatic capacity control of the unit: the maximum limit is 30°C.
(5) standard unit
outdoor air temperature 35°C
(6) B = Low Temperature
outdoor air temperature 35°C
Fluid with ethylene glycol of 40%
(7) unit at full load
outlet water internal exchanger 45°C
(8) outlet water internal exchanger 45°C
(9) outdoor air temperature = 7°C (RH = 85%)

Application: Unit for underfloor heating

OPERATING LIMITS (COOLING)

Size			82	102	122	162	182	222	262	302
EXTERNAL EXCHANGER										
Max air intake temperature	1	°C	44	44	42	43	43	42	41.5	43
Max air intake temperature	2	°C	46	46	45	45	45	45	44	45
Min. air intake temperature	3	°C	-10	-10	-10	-10	-10	-10	-10	-10
INTERNAL EXCHANGER										
Max water inlet temperature	4	°C	22	22	22	22	22	22	22	22
Min. water outlet temperature	5	°C	5	5	5	5	5	5	5	5
Min. water outlet temperature	6	°C	-8	-8	-8	-8	-8	-8	-8	-8

OPERATING LIMITS (HEATING)

EXTERNAL EXCHANGER

Max air temperature inlet (WB)	7	°C	22	22	24	24	24	22	24	22
Min air inlet temperature (W.B.)	8	°C	-10	-10	-10	-10	-10	-10	-10	-10

INTERNAL EXCHANGER

Min. water outlet temperature		°C	28	28	28	28	28	28	28	28
Max water outlet temperature		°C	55	55	53	55	55	55	55	55

(1) unit at full load
internal exchanger water = 23/18°C
(2) internal exchanger water = 23/18°C
capacity-controlled unit (automatic capacity control)
(3) external exchanger air in quiet
(4) this limit can be exceeded for brief and transitory periods with automatic capacity control of the unit: the maximum limit is 30°C.
(5) standard unit
outdoor air temperature 35°C
(6) B = Low Temperature
outdoor air temperature 35°C
Fluid with ethylene glycol of 40%
(7) unit at full load
exchanger water outlet 35°C
(8) exchanger water outlet 35°C

SOUND LEVELS

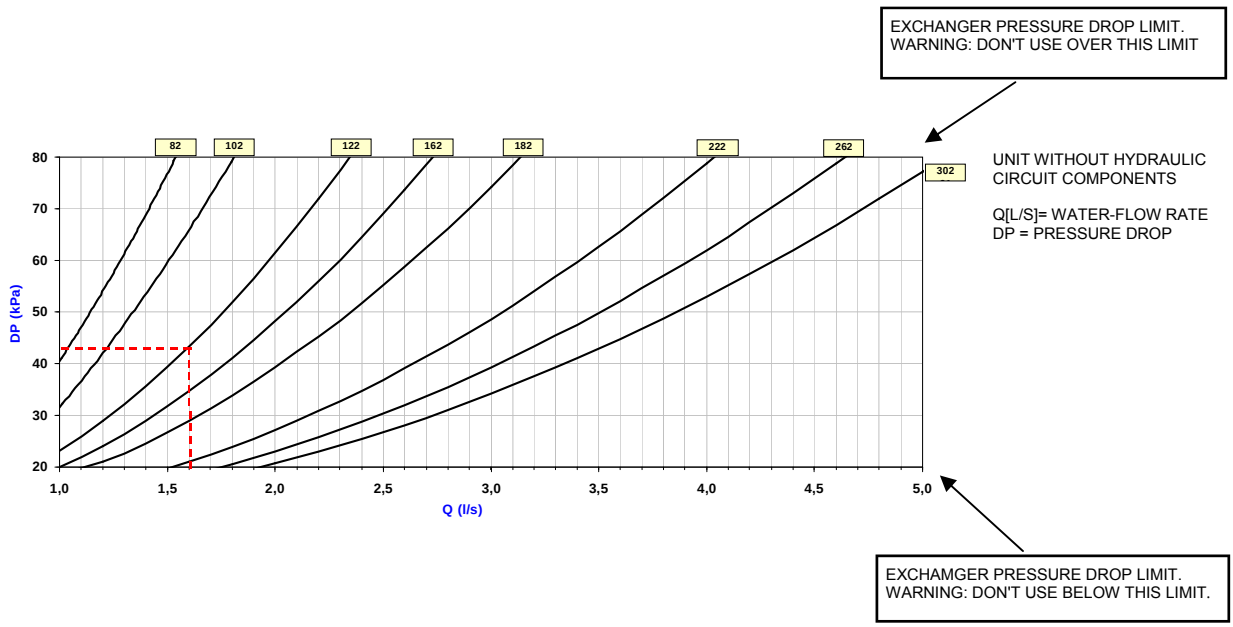
Size	Sound Power Level (dB)								Sound pressure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
82	80	75	78	73	70	66	58	52	60	75
102	79	74	77	73	70	66	60	51	60	75
122	79	74	77	72	70	67	61	52	60	75
162	89	82	78	80	77	69	64	59	64	81
182	89	82	77	79	77	71	66	60	64	81
222	89	82	80	81	77	72	64	59	65	82
262	89	82	79	80	78	73	67	59	65	82
302	89	82	80	81	78	73	64	57	65	82

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

INTERNAL EXCHANGER PRESSURE DROP



Size		82	102	122	162	182	222	262	302
Minimum flow	[l/s]	0.70	0.80	0.85	1.00	1.11	1.51	1.74	1.95
Maximum flow	[l/s]	1.52	1.80	2.85	2.71	3.05	4.05	4.65	5.00

CORRECTION FACTOR FOR ANTIFREEZE SOLUTIONS

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

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

9.1 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.

9.2 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.

9.3 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.
If disposal takes places at the same time as delivery of a new electrical or electronic equipment for the same family, the product may be collected directly by the distributor.

11.1 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

11.2 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

11.3 HANDLING

The handling operations, if implemented without all of the protection necesssary 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".

11.4 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 .

11.5 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 damge 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.

11.6 ELECTRICS 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.

11.7 MOVING PARTS

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

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

11.8 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.

11.9 HYDRAULIC PARTS

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

NOTE

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