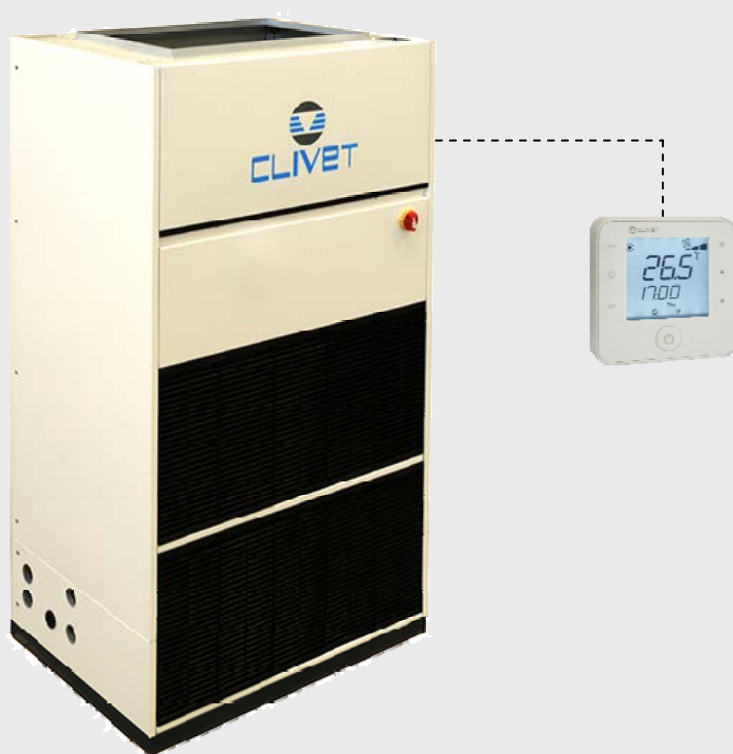


# CHV-X

# 31-222

High efficiency direct expansion Ductable vertical water source heat pump  
For indoor installation - Water-air heat pump

## Installation use and maintenance manual



M04V40LA-05

28-04-14

---

*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.

On the unit can operate only qualified personal , as determined by the regulations 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 :

#### CIVIL AIR-CONDITIONING


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 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 constructor certified assistance service.
- 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 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,
  - Series → **CHV-X**
  - Size → **31 ..... etc.**
- serial number  
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.

Typology
Size
Serial number
Year of manufacture
Wiring diagram

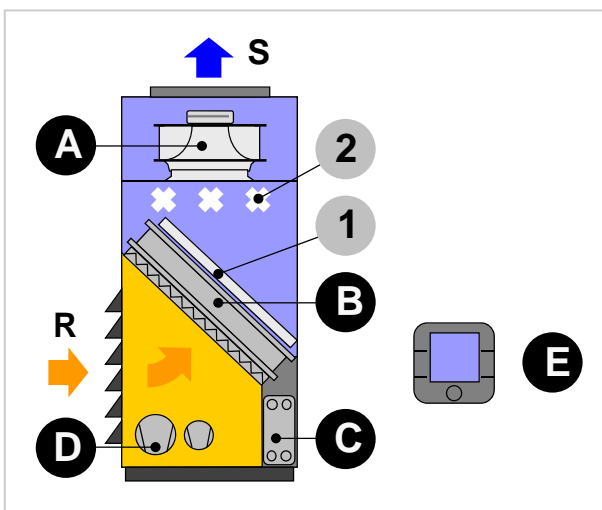
# 1 - GENERAL

## 1.5 UNIT DESCRIPTION

- R Air intake  
Optional: front, bottom or rear.
- S Treated air supply  
Optiona: upwards or rear.
- A Supply fan and air filter  
Electronic control, which returns the air to the setting after having taken it in, strained it with G4 efficiency and treated it
- B Internal exchanger  
It transfers energy (heat/cool)to the fresh supply air
- C Source side exchanger  
It exchanges energy (heat or cool) with the outdoor air
- D Direct expansion circuit  
Produces cool or heat energy through Scroll compressors and an electronic expansion valve
- E User interface  
Easy to use, with automatic control sensors built-in.

### MAIN OPTIONS

- 1 Hot gas post-heating /Hot water heating  
Gas post-heating recovers condensation energy in summer humidity control. The hot water heating (available as an alternative), when necessary, integrates or substitutes the workings of the direct expansion circuit
- 2 Electric heating  
Integrates or substitutes the workings of the direct expansion circuit when necessary



## 1.6 ACCESSORIES

- Differential pressure switch for dirty air filters
- Front air discharge plenum H=500mm (separately supplied accessories)
- Plumbing assembly for loop with constant flow rate with manual valves
- Plumbing assembly for loop with variable flow rate with 2 way ON- OFF valve
- Plumbing assembly for loop with disposable water system with 2-way modulating valve
- Antifreeze heater protection on the water side exchanger
- Steel mesh filter on the water side (separately supplied accessories)
- External humidifier control with 0-10V command
- Constant outlet air flow-rate
- Electronic room control with display, for wall installation in built-in box
- Temperature control with on-board probe
- Temperature and humidity ambient control by on board probes
- Serial port RS485 with MODBUS protocol built in
- LON WORKS serial communication module (separately supplied accessories)
- BACNET serial communication module (separately supplied accessories )
- Electric heaters
- Rubber antivibration mounts (separately supplied accessories )
- High and low pressure gauges
- Phase monitor
- Power factor correction capacitors
- 2 rows hot water coil
- Modulating three-way valve
- Hot gas re-heat coil

## 2 - RECEPTION

### 2.1 PRELIMINARY INFORMATION



#### General

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.

#### Stocking

Observe external packing instructions .



#### Handling

Verify unit weight and handling equipment lifting capacity .

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

Verify the position of the barycentre in the Technical information - DIMENSIONS section.

Before handling verify that the unit keeps its balance.

#### Packing removing

Be careful not to damage the unit.

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

### 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:

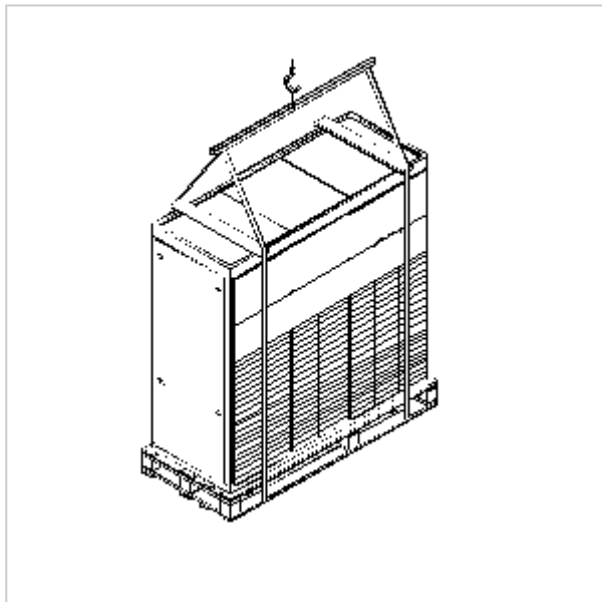
- Write down on the transport document the damage you found and quote this sentence:  
"Conditional acceptance — clear evidence of deficiencies/damages during transport".
- Contact supplier and the carrier by fax and registered mail with advice of receipt.

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

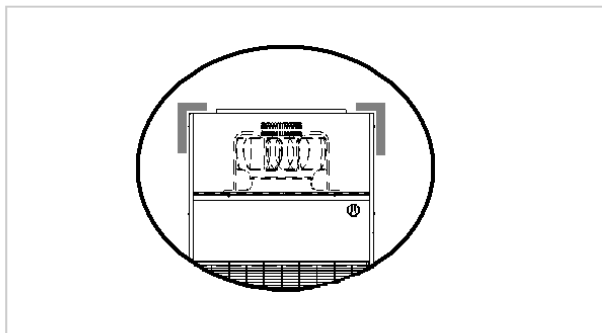
### 2.3 HANDLING



Considerer that the barycentre could out of centre



Use protection to avoid the unit damaging



## 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 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 consider 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:

- INTERNAL
- in fixed positions.

Limit vibration transmission:

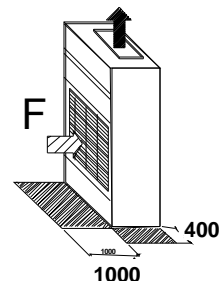
- use antivibration devices on unit bearing/supporting points;
- install flexible joints on the hydraulic.

Installation standards:

- Safe accessible position;
- avoid flood-prone places;
- verify unit weight and bearing point capacity;
- verify that all bearing points are aligned and leveled;

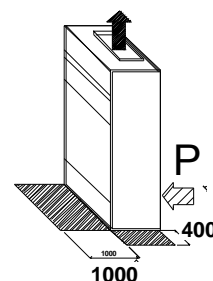
The supply is vertical as standard ; it can be rear as option.  
The FRONTAL SUPPLY PLENUM accessory allows to frontally introduce the treated air.

F : Frontal return air inlet  
with intake grille



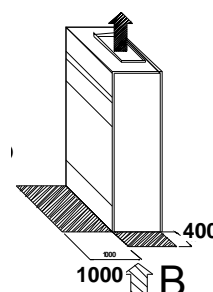
P : Rear intake

blind panel replacing the  
front grille

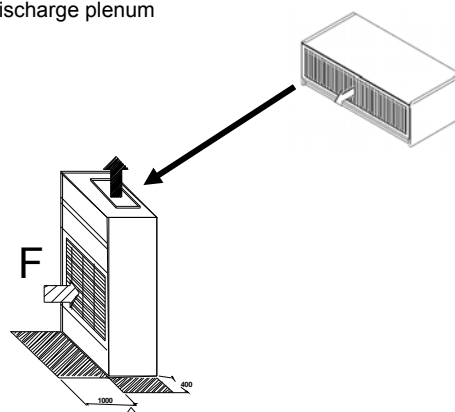


B : Bottom intake

blind panel replacing the  
front grille



Front air discharge plenum



## 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 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. Could be necessary install in addition on the unit one or more of it .

WATER FILTER :



- must be installed immediately in the water input of the unit, in a position that is easily accessible for cleaning.



- The filter should never be re-moved, this operation invalidates the guaranty .
- filter features:

Size	31-81	82-102	122-222
Ø	1"	1"¼	1" ½
filtration mesh (micron)	500µm	600µm	600µm

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

Before connecting the unit, carefully wash the system by filling it and emptying it several times with clean water.

In the units equipped with hydraulic pipeworks use the bypass.

Ignoring this operation will lead to several filter cleaning interventions and at worst cases can cause damages to the exchangers and the other parts.

Execute leakage test before 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).

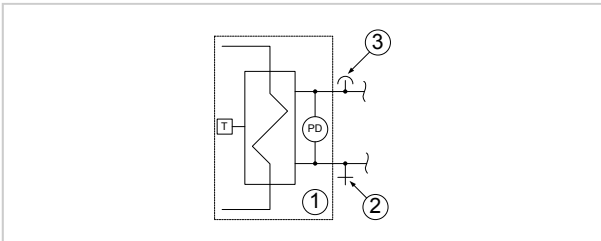
## 4 - WATER CONNECTIONS

### CONNECTION SOURCE SIDE

#### 4.7 STANDARD UNIT

The standard unit is equipped with the following components:

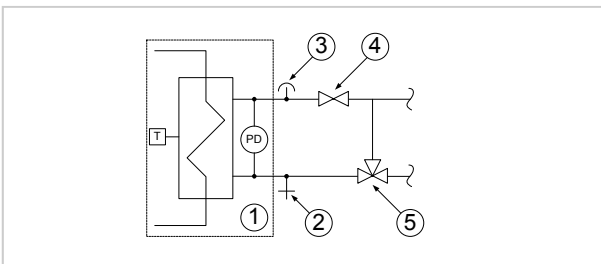
1. plate heat exchanger complete with water side differential pressure switch and a water temperature control probe
2. drain bibcock
3. bleed bibcock



#### 4.8 PLUMBING ASSEMBLY FOR LOOP WITH CONSTANT

The plumbing assembly for the constant flow rate loop includes, in addition to 1, 2 and 3 standard components :

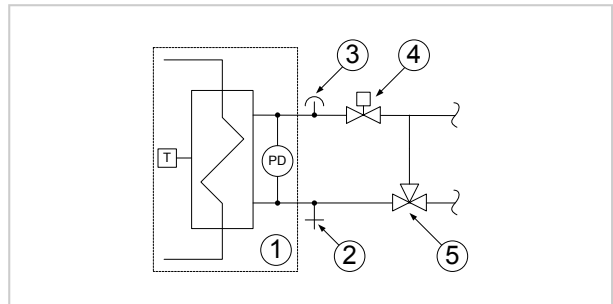
- 4 two-way manually activated valves to make it possible to disconnect the unit from the plumbing system for maintenance.
- 5 manually activated three-way valve for loop wash by-pass (to allow washing of the pipes of the system and protect the heat exchanger against fouling);



#### 4.9 PLUMBING ASSEMBLY FOR LOOP WITH VARIABLE

The plumbing assembly for the constant flow rate loop includes, in addition to 1, 2 and 3 standard components :

- 4 two-way motorize ON/OFF valve, operation is linked to that of the refrigeration circuit: with the compressor off the valve stays closed and as a result less water is used
- 5 manually activated three-way valve for loop wash by-pass (to allow washing of the pipes of the system and protect the heat exchanger against fouling);

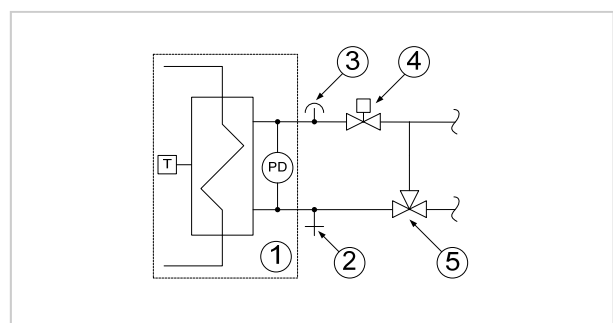


#### 4.10 PLUMBING ASSEMBLY FOR LOOP WITH DISPOSABLE WATER

The plumbing assembly for systems with disposable water (from well or groundwater) includes in addition to 1, 2 and 3 standard components :

- 1 2-way motorised modulating valve at the exchanger outlet (the operation is linked to that of the refrigeration circuit: modulating the valve opening by 0-10V signal the water content is reduced and the unit operation values are maintained within the limits allowed)
- 2 manually activated three-way valve for loop wash by-pass (to allow washing of the pipes of the system and protect the heat exchanger against fouling);

In summer operation, the device, complete with modulating valve, makes it possible to maximize the thermal differential of the water and hence to reduce the water flow rate. In winter operation, modulation of the water flow rate allows the unit to function with the water loop at high temperature. An additional advantage of using this device is the extension of the operating limits of the unit in summer and winter.



## 4 - WATER CONNECTIONS

### 4.11 CONDENSATE DISCHARGE

The condensate must be dispersed to avoid damages to persons and property .

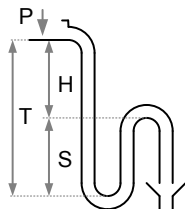
- Unit discharge fitting : the connection must avoid the transmission of mechanical stresses and must be performed paying attention to avoid the damaging of the unit discharge fitting .
- Make a trap that, eliminating the depression caused by the fan, stops the return of gas from the discharge pipe
- The ducting must have an appropriate slope to allow the downflow
- Anchor the ducting with an appropriate number of supports. Otherwise are generated ducting failures and air pockets that prevent the downflow.
- Insulate the ducting and the siphon to avoid condensate drippings
- Connect the condensate discharge to a rainwater drain.
- Do NOT use sewerage drains, so as to avoid the return of odours if the water contained in the trap evaporates
- Finally, check that the condensate will drain correctly by pouring water into the tray stud

#### Calculation of the siphon height

$$T = 2P$$

$$S = T/2$$

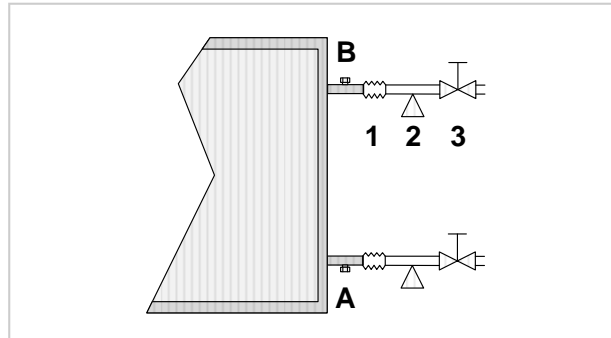
P is the pressure determinate by the fan in correspondence of the drain pain (1mm c.a = 9.81 Pa)



Example :

$$\begin{aligned} P &= 300 \text{ Pa} = 30 \text{ mm} \\ T &= 2P = 60 \text{ mm} \\ S &= T/2 = 30 \text{ mm} \end{aligned}$$

### 4.12 HEATING COIL - OPTION



A drain cock

B air vent

Supplied by the customer :

- 1 vibration isolators
- 2 ducting supports
- 3 shutoff valves

#### MAX. WORKING PRESSURE

- Standard unit = **700 kPa**
- With ON/OFF valves = **700 kPa**
- With manual valves = **700 kPa**
- With modulating valve = **300 kPa**

Aries effects and air bubbles can produce the overcoming and cause water drops.

## 5 - AERAILIC CONNECTIONS

### 5.1 GENERAL

Proper execution and sizing of air connections are essential for ensuring correct operation of the unit and an acceptable level of silence in the room.

When designing and creating ducts, consider PRESSURE DROPS, FLOW RATE and AIR SPEED which need to be compatible with the characteristics of the unit.



Special consideration needs to be made for pressure drops that are greater than the unit's static pressure, which would lead to a reduction in flow rate resulting in unit shutdown.

- the weight of the ducts must not be supported by the connection flanges
- place anti-vibration joints between the ducts and the unit
- the connection to the flanges and between the various sections of the ducts must ensure an airtight seal, preventing leakage in delivery and return which would compromise overall system efficiency.
- limit pressure drops by optimizing the path, the type and number of curves and the branches
- use curves with a wide radius. Consider whether it might be useful to equip them with deflectors (especially if the air speed is high or if curves are tight )

### 5.2 FEATURES FOR DUCTS FOR TREATED AIR

- The inner surface of the duct must be smooth and washable. It must not contaminate the air.
- Thermally insulate the ducts and the flanges so as to prevent loss of energy and condensation build-up.

#### GRILLES OUTLETS DIFFUSERS

Proper distribution of air in the room is essential for ensuring comfort levels.



In the selection and positioning of grilles, outlets and diffusers, the following are to be avoided:

- excessive air speed
- formation of stagnant zones and layering
- entry of cold air into the room
- formation of localized currents (due to uneven air distribution)
- excessive variations in ambient temperature in the vertical and horizontal planes
- short circuiting of delivery air towards return air

For purposes of comfort, the following things need to be considered:

- air diffusers must be selected by checking the sound power generated at nominal flow rate conditions
- the disconnections to the diffusers are to be made using flexible elements
- the return grilles must be amply sized

#### APPLICATIONS AT HIGH DEGREE OF SILENCE

For applications that require a high degree of silence in the system:

- In delivery and return, provide septum silencers, preferably inserted in sections of ducts located outside the building. The septums must ensure the required dampening with minimum pressure drops (ONLY OUTDOOR UNITS – do not print note).
- Equip all curves with deflectors.

## 6 - ELECTRICAL CONNECTIONS

### 6.1 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 .

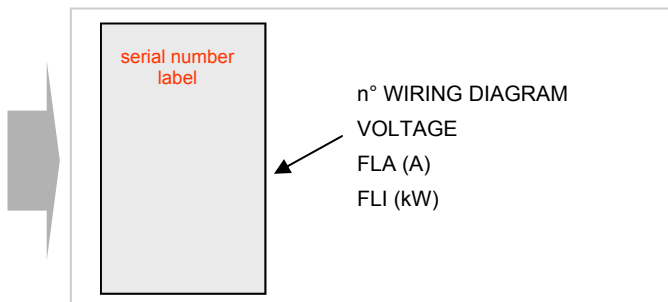
### 6.2 ELECTRICAL DATA



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 )

### 6.3 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.

### 6.4 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°.

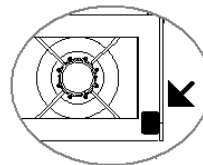
Connect the screen to the ground, only if there aren't disturbances

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

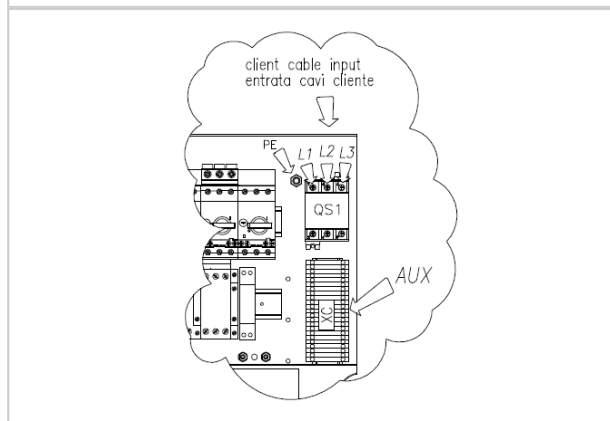
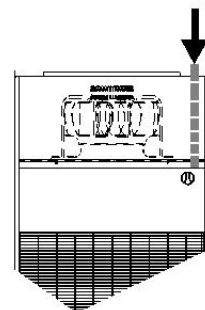
Respect impedance, capacity and attenuation indications.

### 6.5 ELECTRIC LINES INLET

Unit top view



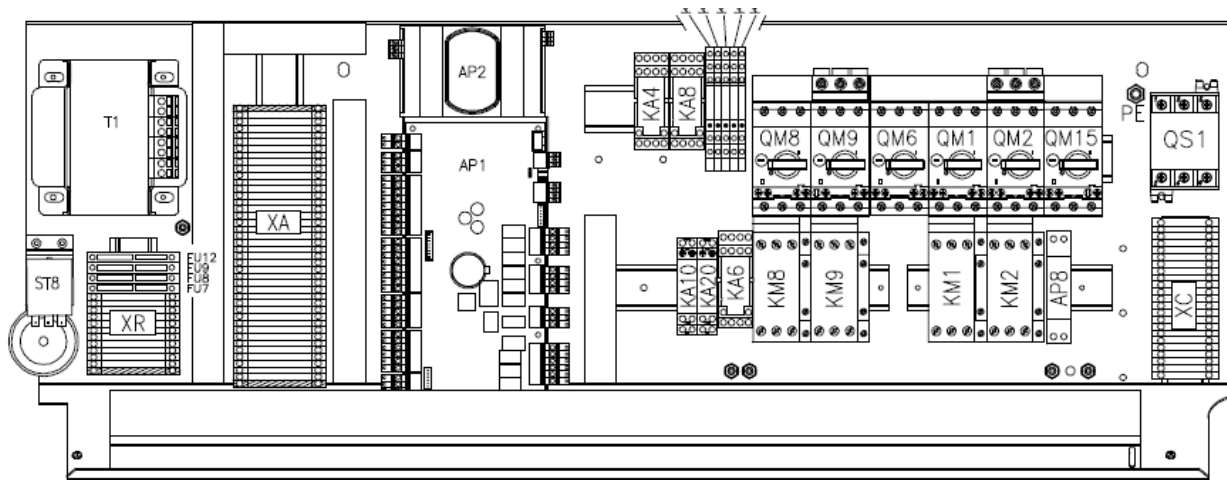
Unit front view



QS1 main isolator switch  
PE protection conductor

## 6 - ELECTRICAL CONNECTIONS

### 6.6 ELECTRICAL PANEL



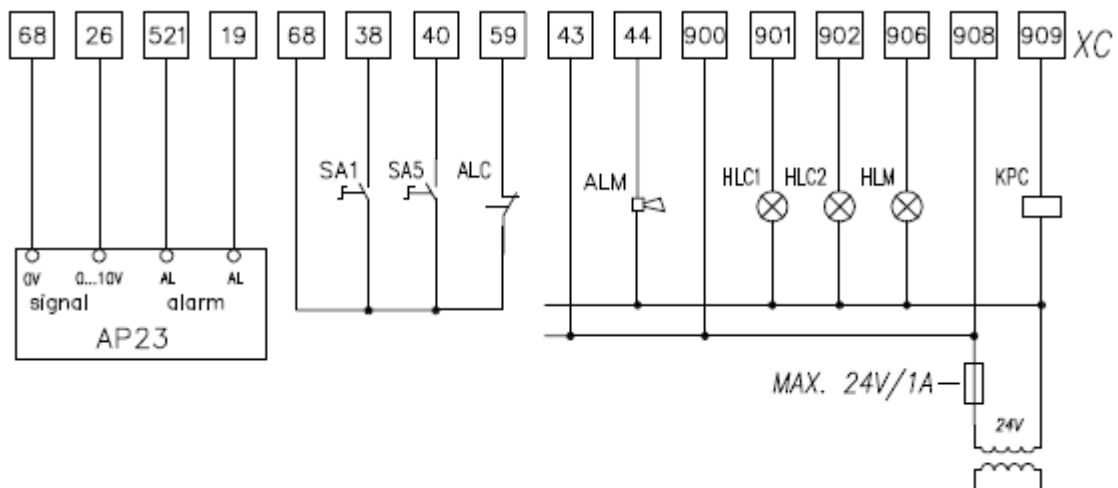
<b>AP1</b>	Master module
<b>AP2</b>	Electronic thermostatic module
<b>XC</b>	Customer connection
<b>QS1</b>	Main isolator switch
<b>QM1 - QM2</b>	Compressor magnetothermic switch
<b>KM1 - 2</b>	Compressor contactor

<b>QM8 - QM9</b>	Electric heat thermal magnetic circuit breakers
<b>KM8 - KM9</b>	Heater contactor
<b>QM6</b>	Outlet fan motor overload switch
<b>QM15</b>	Auxiliary circuit thermal magnetic circuit breaker
<b>ST8</b>	High temperature safety thermostat
<b>T1</b>	Auxiliary circuit transformer

Layout of the standard unit electrical panel.

With special configurations the layout can be modified: refer to the layout indicated on the unit specific electrical panel.

### 6.7 CONNECTIONS

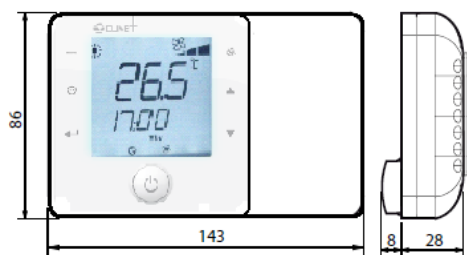


SA1 remote on/off selector  
 SA5 remote winter/summer selector  
 ALC free contact from signalling system of fire alarm  
 ALM cumulative fault signal

KPC heating coil pump control  
 HLC1 compressor 1 status  
 HLC2 compressor 2 status  
 HLM indicating light of the supply fan status  
 AP23 remote umidification group

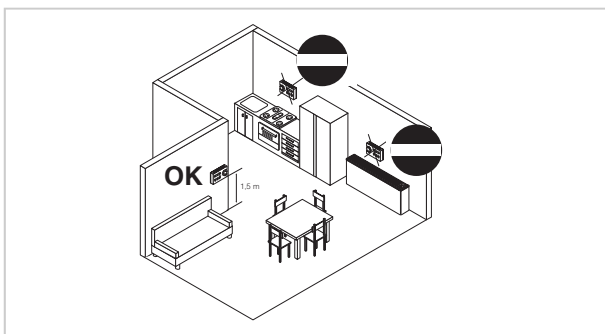
## 6 - ELECTRICAL CONNECTIONS

### 6.8 WALL AMBIENT THERMOSTAT



Install the room thermostat far from heat sources (radiators, sunbeam, kitchens), from doors, windows etc.

Provide 230 VAC power supply

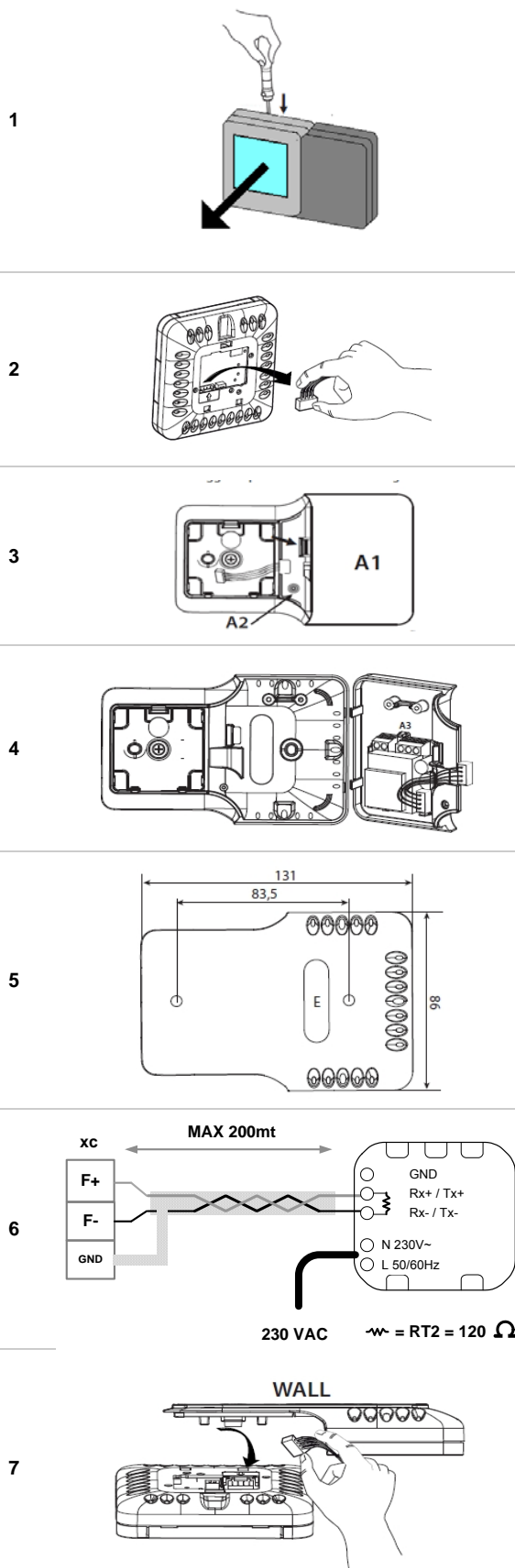


#### ASSEMBLY

- separate the front from the rear of the terminal using a screwdriver (**Fig. 1**);
- disconnect the 4-pin connector from the front part (**Fig. 2**);
- to remove cover A1, unscrew screw A2 and press the point of attachment (**Fig. 3**); access terminal block A3 (**Fig. 4**);
- drill the holes in the wall (dia. 5 mm); then insert the plugs and screws supplied, making sure that the electrical wires pass through hole E (**Fig. 5**);
- perform the electrical connections between thermostat ambient and XC terminal block in the unit electric panel (**Fig. 6**)  
Connect RT2 (provided with room thermostat)
- close cover A1, completing the same operations as describe above in reverse;
- plug the 4-pin connector back in (**Fig. 8**);
- finally replace the terminal, starting with the bottom tabs and applying a hinge movement. Make sure that the electrical wires are inside to ensure correct fastening (click on).

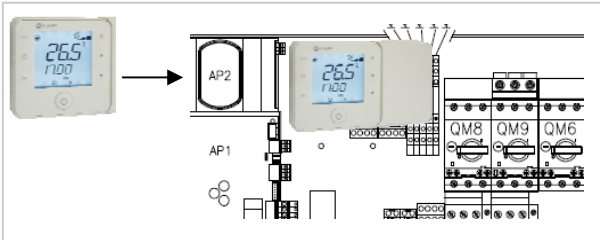
#### DISMANTLING

Insert a screwdriver into the clot at the top (**Fig. 1**) and press downwards to detach the display.



## 6 - ELECTRICAL CONNECTIONS

For maintenance operations it is possible to remove the thermostat from its base, wall installed, and connect it to the base inside the unit electrical panel.

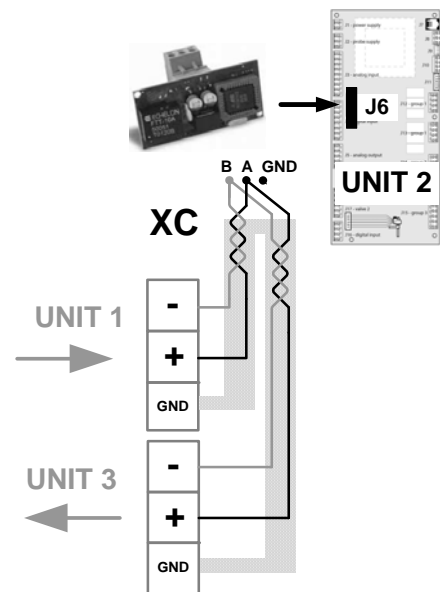


### 6.9 CHARACTERISTICS CABLE

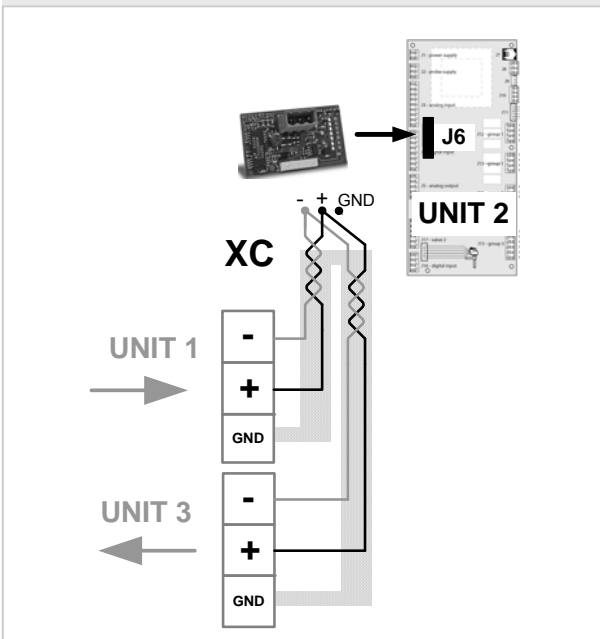
Couple of conductors twisted and shielded  
Section of conductor  $0.22\text{mm}^2 \dots 0.35\text{mm}^2$   
Nominal capacity between conductors  $< 50 \text{ pF/m}$   
nominal impedance  $120 \Omega$   
Recommended cable BELDEN 3105 A



### 6.11 SERIAL WITH LONWORKS PROTOCOL



### 6.10 RS 485 WITH MODBUS PROTOCOL



## 7 - START-UP

### Preliminary checks

#### Checks with machine in OFF, before start-up .

For details refer to the various chapters in the manual.

✓	<b>Preliminary checks - unit OFF power supply</b>
<input type="checkbox"/>	safe access
<input type="checkbox"/>	functional spaces
<input type="checkbox"/>	air flow: free return and supply (no bypass, no stratification)
<input type="checkbox"/>	integrity of structure
<input type="checkbox"/>	fans turn freely
<input type="checkbox"/>	unit on anti-vibration devices
<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 + possibile glicole solution + corrosion inhibitor
<input type="checkbox"/>	Under pressure system
<input type="checkbox"/>	Vented system
<input type="checkbox"/>	cooling circuit visual control
<input type="checkbox"/>	earth connection
<input type="checkbox"/>	unit powered by fixed network or by electrogen group
<input type="checkbox"/>	electric connections by customer

## 7 - START-UP

### Start-up sequence

Machine start-up operations.

For details refer to the various chapters in the manual.

<input checked="" type="checkbox"/> <b>Start-up sequence - unit ON power supply</b>
<input type="checkbox"/> compressor carter heaters ON from at least 8 hours
<input type="checkbox"/> vacuum voltage measurement
<input type="checkbox"/> phases sequence control
<input type="checkbox"/> pump manual start-up and flow check
<input type="checkbox"/> Powered unit
<input type="checkbox"/> load voltage measurement and absorptions
<input type="checkbox"/> liquid sight glass check (no bubbles)
<input type="checkbox"/> fans operation check
<input type="checkbox"/> treated air flow rate measurement
<input type="checkbox"/> supply, return and outdoor air temperature measurement
<input type="checkbox"/> measure return and supply water temperature
<input type="checkbox"/> subcooling and overheating measurement
<input type="checkbox"/> no anomalous vibrations check
<input type="checkbox"/> set date and time
<input type="checkbox"/> set-point customisation
<input type="checkbox"/> available machine documentation

## 7 - START-UP

### 7.1 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 start-up data with the service centre.

### 7.2 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

### 7.3 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.

### 7.4 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)	-2	-7	-13	-21

### 7.5 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 +/- 10%

Control the unbalancing of the phases:

it must be lower than 2%

Example:

L1 - L2 = 388 V, L2 - L3 = 379 V, L3 - L1 = 377 V

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

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

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

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

### 7.6 COMPRESSOR CRANKCASE RESISTANCES

Feed the oil resistances on the compressor crankcase at least 8 hours before the start compressor :

- at the first unit start-up
  - after each prolonged periods of inactivity
1. Feed the resistances closing the unit isolator (sorter??).
  2. Control the resistances electrical absorption to be sure that they're function .
  3. Carry out start-up only if the compressor crankcase temperature on the lower side must be higher at least of 10° C than the outside temperature.

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

### 7.7 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

## 7 - START-UP

### 7.8 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 connected and enabled with the relative parameters (ELECTRICAL CONNECTION section)

### 7.9 APPLICATIONS WITH TEXTILE DUCTING

It is possible to modify the fan start-up ramp to personalize it in case of applications with textile ducting.

Set the parameter

**P62** EnRampaEsp :

**0** = disable ramp

**1** = slow ramp

**10** = rapid ramp

It is also possible to set intermediate values.

### 7.10 AIR FLOW SETTING

The real unit flow is according to the aerodynamic system features.

It is therefore necessary to check the air flow and in case to set the parameter:

**P57** FanSpeedOut

Before checking, make sure that the system has been completed

In all its parts (shunts, dampers, grilles, diffusers etc.)

### 7.11 FIRE ALARM : CONFIGURATION

It is possible to set the unit operating in case of an alarm signal from the fire signalling controller.

**Par 151** TypeFireMode = complete unit shutdown

### 7.12 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 .

### 7.13 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)



The unit cannot be used as smoke extractors.

## 8 - CONTROL



### SETPOINT

the display visualizes the **ambient temperature**

1. Press once ▲ or ▼ to display the setpoint ( it appears on the display <sup>set</sup> )
2. press ▲▼ to modify the working setpoint
3. Wait that the ambient temperature appears again on the display ( disappears <sup>set</sup> )

KEY FUNCTION		
	<b>ON-OFF</b>	Press 5 seconds to access or switch off the unit.
mode	<b>MODE</b>	Change the operating mode : summer, winter, automatic
	<b>CLOCK</b>	Date and hour control
<b>OK</b>	<b>OK</b>	Confirm, display setpoint, display the outside temperature ( tE )
	<b>UP-DOWN</b>	Shift in the menu, increase-decrease the value
+	5 sec	Access to the password menu ( Code )
mode +	5 sec	Access to the alarm menu ; only if the icon is present

### ON / OFF

	Press for 5 seconds	
OFF		

### BUTTON LOCK / UNLOCK

	Press together for 5 seconds	
<b>OK</b>		
	Symbol appears	

### DISPLAY MEANING

	Operating mode : summer
	Operating mode : winter
	Operating mode : automatic
	supply fan speed
	alarm
	Keyboard locked
	Time band activated
	Time band scheduling
	Active compressor
	Defrosting in progress
	electric heaters , hot water coil - option

### MODE CHANGE

Press to set the operating mode:

mode	Cooling	
	Heating	
<b>AUTO</b>	Automatic	

Operating in:

Cooling



## 8 - CONTROL

### 8.1 OPERATING MODES

#### SUMMER :

With ambient temperature higher than the set, the unit cools;

With a temperature lower than the set, it is in stand-by (ambient fan On, compressor OFF) .

#### WINTER :

With ambient temperature lower than the set, the unit heats

With a temperature higher than the set, the unit is in stand-by (ambient fan ON, water coil compressor, electric heaters, humidifier in OFF)

### 8.2 CHANGE OF THE OPERATING MODE

#### AUTO

The change of the SUMMER-WINTER mode is automatic.

The unit is in :

- SUMMER if the ambient temperature is higher than the set
- WINTER if the ambient temperature is lower than the set .

The set changes automatically according to the outside temperature. The variation is defined by the **climatic curve**, which can be personalized by the parameters.....

It is anyway possible to modify any time the working set by the ▲ ▼ buttons.

#### MANUAL

The operating mode (SUMMER-WINTER) is chosen by the **MODE** button.

It possible to modify any time the working set by the ▲ ▼ buttons.

### 8.3 ECONOMIC SETPOINT

The ECO setpoint is optimized to reduce the Energy consumption :

- in summer the ECO setpoint is higher than the standard set
- in winter it is lower.

To activate the setECO , modify the P04 parameter (instructions at the following page)

In ECO mode if the setECO is satisfied, the unit stops the ambient fan and the compressor.

When the setECO is active :

- If the set **is satisfied**  
the fan, the compressor and the other thermoregulation resources are stopped
- If the set is **not** satisfied  
the fan, the compressor and the other thermoregulation resources are activated.

If the thermoregulation is based on the return probe(option) instead on the ambient thermostat, the behaviour with active

setECO is different.

The fan is started at time intervals defined by P19 TimeECO parameter, and remains active for a time defined by the P20 TimeTestECO parameter :

- If the set is **satisfied**  
the fan is stopped and will start again after the time defined by P19
- If the set is **not** satisfied  
the fan, the compressor and the other thermoregulation resources are activated.

Once the set is satisfied, the cycle is repeated :

- Fan shutdown
- After P19 TimeECO time → fan ON
- The fan remains on for P20 TimeTestECO time
- Temperature check, etc.

### 8.4 -DAY MODIFICATION

- Press the **CLOCK** button for 5 sec.
- By the ▲ ▼ buttons, select the **clock** menu
- Confirm with **OK**
- The hour is flashing : set with the ▲ ▼ buttons
- Confirm with **OK**
- Repeat the procedure for the minutes and week's day
- To go back to the main screen, select the **Esc** menu and confirm with **OK**




## 8 - CONTROL

### 8.5 TIME BAND SCHEDULING




It is possible to set 4 types of scheduling:

- 7 days (from monday to sunday)
- 5 days (from monday to friday)
- 2 days (from saturday to sunday)
- Day by day

#### Day scheduling


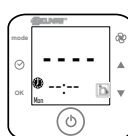





-  At home
-  Outside
-  Return to home

#### Night scheduling





-  At home
-  Outside the home
-  Return to the home

#### Day by day scheduling

 Press for 5 seconds	
▲ Select Time bands ▼ Press OK	
▲ Select the scheduling: ▼ - Day by day Press OK	
Press OK	
▲ Set the hour ▼ Press OK	
▲ Set the minutes ▼ Press OK	

▲ Set the temperature ▼ Press OK	
▲ Select the next time band Press OK and repeat from <b>point 05</b>	
▲ As all the programming is finished, select ESC ▼ Press OK	
Press OK to program the next day	
▲ Select the next day ▼ Press OK Repeat from <b>point 04</b>	
▲ To exit from the scheduling select ESC ▼ Press OK	
▲ Select Esc to exit ▼ Press OK	

### ON / OFF SCHEDULING

 Press for deactive or enable the scheduling.	
The deactivated scheduling, the symbol  doesn't appear	

## 8 - CONTROL

### 8.6 ALARMS



Malfunctions are displayed with the ALARM icon.

Before resetting an alarm, identify and remove the cause that generated it.

Repeated reset may cause irreversible damages as a system malfunction.

To reset the alarm in progress :

1. Press the Mode + Clock button for 5 sec.
2. The alarm code is displayed
3. If more alarms are active at the same time, scroll the list  
▲ ▼
4. With buttons ▲ ▼ select the alarm reset menu  
( resALM )
5. press **OK**
6. The main screen reappears without the alarm icon

The alarm can be signalled by the thermostat also by a buzzer.

To disable the buzzer, modify the P200 parameter.

LIST OF ALARMS		
CODE	Description	
AE01	Alarm of faulty return temp. probe µPC	A
AE02	Alarm of faulty supply temp. probe µPC	A
AE03	Alarm of faulty outside temp. probe µPC	A
AE04	Alarm of faulty coil probe temp. probe µPC	A
AE05	Alarm of faulty differential pressure probe of the supply fan µPC	A
AE06	Alarm of faulty condensing pressure probe µPC	A
AE07	Alarm of faulty evaporating pressure probe µPC	A
AE08	Alarm of faulty return temp. probe µPC	A
AE09	Alarm of faulty antifreeze probe temp. probe of the additional coil µPC	A
AE10	Alarm of faulty air quality probe µPC	A
AE11	Alarm of faulty ext. RH probe µPC	A
AE12	Alarm of faulty return RH probe µPC	A
AE13	Alarm of faulty diff. Detector of the fresh/ ambient air	A
AE14	Alarm of faulty ambient thermostat temp. probe	A
AE15	Alarm of faulty ambient thermostat RH%	A
AE20	pCOE communication alarm	A
AE21	Alarm of the humidifier communication	A
AE22	Alarm of ambient thermostat communication	A
AE23	Alarm of supply fan overload (cond. fan/pump) or compartment opening or supply flow alarm	M
AE26	Compressor 1 overload alarm	M
AE27	Compressor 2 overload alarm	M
AE28	Phase monitor alarm	M
AF01	HP alarm of the refrigerant circuit	M
AF02	LP alarm of the refrigerant circuit	A / M
AF03	HP1 high pressure prealarm	A
AF04	LP1 low pressure prealarm	A
AF05	HP2 high pressure prealarm	A
AF06	LP2 low pressure prealarm	A
AA01	Fire alarm	M
AA02	Dirty filter warning	A
AA03	Resistance high temperature alarm	M
AI01	Source water flow-rate alarm	A
AI02	Antifreeze alarm of the source exchanger	M
AI10	Humidifier alarm group 1	A
AI11	Humidifier alarm group 2	A
Cn	communication failure thermostat-main board	










A = alarm at AUTOMATIC reset

M = alarm at MANUAL reset

A/M = alarm at AUTOMATIC reset, after 3 alarms in 1 hour, it becomes at MANUAL reset

## 8 - CONTROL

### STORED ALARM (installer use only)

 	Press buttons for 5 sec	
▲ ▼	Enter password Confirm with OK	
▲ ▼	Select <b>S ALM</b> Confirm with OK	
▲ ▼	Scroll alarm list (AL1, AL2...) and display alarm detail	
1° alarm - 1° display		
AL1	new alarm	
XX	alarm code	
1° alarm - 2° display		
dA1	alarm day 1	
YY	day number after alarm	
1° alarm - 3° display		
HA1	alarm hour 1	
hhmm		

### 8.7 PARAMETERS

The setting parameters are protected by password to avoid inadvertent changes that can affect the unit operating.

To access to the parameters

1. press **On/Off + Fan** button for 5 sec.
2. enter password : with the ▲ ▼ button set **Code = 2**
3. Confirm with **OK**
4. Select the **PAr** menu and confirm with **OK**
5. Scroll the list ▲ ▼
6. Select the parameter with **OK**
7. Modify the value ▲ ▼ and confirm with **OK**
8. To esc, scroll the lost, select **ESC** and confirm with **OK**

P02	Economic SetPoint in heat mode
P03	Economic SetPoint in cool mode
P04	Enable the set and the economical functions
P05	Enables the automatic setpoint
P06	Set CO2
P200	Enables buzzer in case of alarm : 0=disabled, 1=enabled

## 8 - CONTROL

### 8.8 STATA

To access to the stata:

1. Press the On/Off + Fan button for 5 sec.
2. Enter the password: with ▲ ▼ buttons, set **Code = 1**
3. Confirm with **OK**
4. The **Sta** menu appears, confirm with **OK**
5. Scroll the list of stata with ▲ ▼ buttons
6. To esc scroll the list, select **ESC** and confirm with **OK**

S01	ManSet	°C
S02	SetUR	%
S03	Request of total Vc capacity	%
S04	Capacity request to compressors	%
S05	Capacity delivered from free cooling/heating	%
S06	Capacity requested to the aux. element	%
S07	N. of active compressors	-
S08	Ext. damper opening	%
S09	Exhaust fan modulation	%
S10	Return air differential pressure	Pa
S11	Additional element modulation (electric resistances / hot water coil)	%
S12	Operative return temperature	°C
S13	Supply temperature	°C
S14	Operative ambient RH%	%
S15	CO2 probe	Ppm
S16	Fresh air temperature	°C
S17	Fresh air RH%	%
S18	Temperature of the coil probe/source exchanger	°C
S19	Temperature of the aux. element antifreeze probe	°C
S20	Condensing pressure	Bar
S21	Evaporating pressure	Bar
S22	Condensing fan signal	%
S23	Return temperature	°C
S24	Current overheating	°C
S25	Thermostatic valve opening	%
S26	Supply air flow	m3/ h*10
S27	Signal of modulating supply fan	%
S28	Supply differential pressure	Pa
S29	Modulating humidifier signal	%
S30	Post heating request	%
S31	Functionning compressor 1 hours	
S32	Functionning compressor 2 hours	
S33	Compressor 1 starts	
S34	Compressor 2 starts	
S35	Software type	
S36	Software version number	
S37	Software release day	
S38	Software release month	
S39	Software release year	

## 9 - MAINTENANCE

### 9.1 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

### 9.2 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) .

### 9.3 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 ..

### 9.4 PUT A REST

- If a long period of inactivity is foreseen :
- put the unit in OFF
- wait for 1 minute, so that the water valves are in rest position
- 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.

### 9.5 STRUCTURE

Check the condition of the parts making up the structure.

Paint so as to eliminate or reduce oxidation at the points in the unit where this problem may occur.

Check that the paneling is fastened correctly. Poor fastening may give rise to malfunctions and abnormal noise and vibration .

### 9.6 PLEATED FILTERS

It is very important for the air treatment coil to be able to offer maximum thermal exchange. Therefore, the unit must always operate with the filters installed and clean.

Cleaning and replacement of filters are very important in terms of health and hygiene.

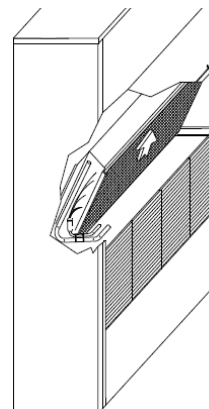
Operation with clogged filters leads to a reduction in the air flow rate, resulting in malfunctions and unit shutdowns. It may even cause the unit to break down.

How often the filters need to be checked depends on the quality of outdoor air, unit operating hours, dust and number of persons in the rooms.

As a guideline, cleaning should ideally take place between WEEKLY and MONTHLY. It is advisable to start with frequent checks, and to adjust the frequency based on how much dirt is discovered .

- Remove the closing doors
- Carefully extract the filter so that no dust reaches the parts below
- Wash the filtering mattress in warm water with a common detergent.
- Carefully rinse it under water while preventing to pour water in the room
- Dry the filter
- Reinsert it to its seat
- Reassemble the closing doors

Old filters, washing residuals and residual parts must be disposed of, according to the law in force .



## 9 - MAINTENANCE

### 9.7 INTERNAL AIR COIL



Accidental contact with the fins of the exchanger may cause small cuts. When performing the following steps, use protective gloves.

The finned surfaces of the cooling coils and especially the condensation collection trays are the places where microorganisms and moulds most easily flourish. It is therefore very important to clean regularly with suitable detergents and disinfect with appropriate products as necessary.

### 9.8 CONDENSATE DISCHARGE

Dust and deposits could cause obstructions .

In the tank can also proliferate microorganisms and mold. Very important to provide for a periodic cleaning with appropriate detergents and in case to a disinfection with sanitizing products.

Clean the tank, pour some water into the tank and check water flows normally.

### 9.9 DUCTING

Check the fixing screws and the operation of the anti-vibration devices in order to prevent the transmission of vibrations in the room .

### 9.10 ELECTRICAL HEATING ELEMENTS

Regularly check the cleaning and the fixing status .

### 9.11 ELECTRIC FANS

Check :

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

### 9.12 TENSIONS

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

Check with a multimeter that there are no residual tensions

### 9.13 OIL COMPRESSOR ELECTRIC HEATERS

Regularly check the fixing status .

## 9 - MAINTENANCE

### 9.13 CONTROL BOARD

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

#### STRUCTURE

1. Presence of corrosions
2. Panel fixing
3. Fan fixing
4. Coil cleaning

#### CONDENSATE DISCHARGE

1. Drain pain cleaning + sanification
2. down flow test

#### AERAULIC CIRCUIT

1. Air filter cleaning
2. Air flow test
3. Ducting : test of fixing and vibration isolators

#### WATER CIRCUIT

1. Water filter cleaning
2. Check the exchanger efficiency
3. Circulating pumps, valve, pressure and flow switches

#### 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 check ( tapping connections, fittings, saftey valves, etc...)
2. Survey of the refrigerant circuit operating parameters (see TECHNICAL INFORMATION section)

#### 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

#### OPTIONAL COMPONENTS

1. Check of the electrical resistances
2. Check of the water coil

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.

## 9 - MAINTENANCE

### 9.16 MALFUNCTIONINGS

NUL AIR FLOW	No power supply	
	unit in alarm	Check the alarm code Contact the authorized service centre
	HP alarm (in summer)	Dirty exchanger
		Water temperature out of operating limits
INSUFFICIENT AIR FLOW	Dirty filters	Clean the filters
WATER DRAGGING	siphon or clogged tray discharge	Clean the siphon / tray
	No siphon / not well produced	See WATER CONNECTIONS section
NOISINESS	Ducting or loosened panels	Check closings
	Fan bearings	Replace fans
	Wrong compressor phase sequence	See START-UP section
	To much flow	Calibrate the flow
THE AMBIENT DOESN'T REACH THE DESIRED TEMPERATURE	Dirty exchanger	Clean the exchanger see previous pages

## 10 - DECOMMISSIONING

### 10.1 DISCONNECTING

Only authorised personnel must disconnect the unit.

- Avoid leak or spills into the environment .
- Before disconnecting the unit, the following must be recovered, if present:
  - refrigerant gas
  - Anti-freeze solutions in the 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.

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 place 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.



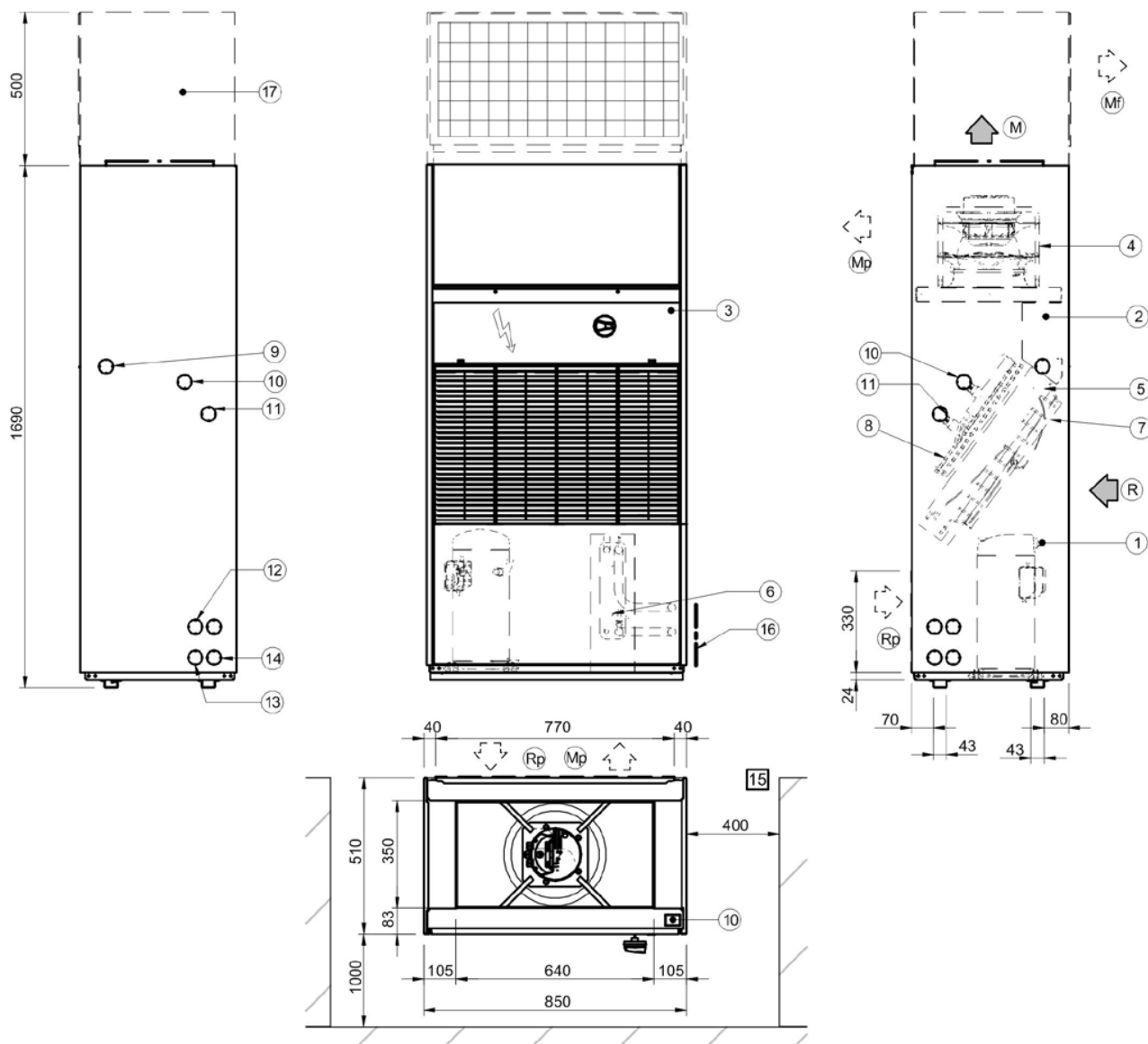
### 10.3 CE RAEE CE DIRECTIVE

- 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

## 11 - TECHNICAL INFORMATION

### 11.1 DIMENSIONS 31 - 51

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Date: 05/09/2013



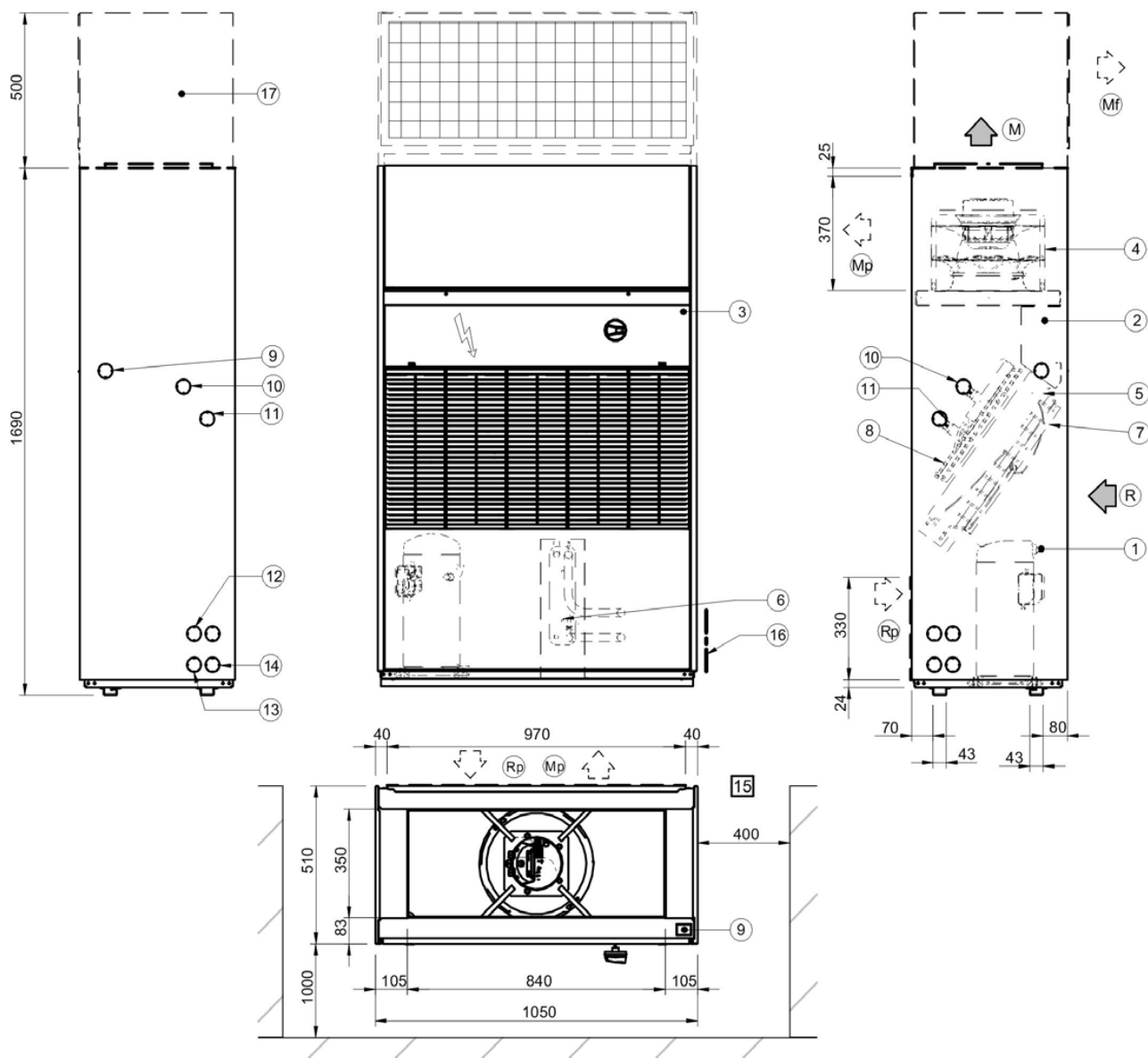
- |   |                                    |
|---|------------------------------------|
| 1. COMPRESSOR   | 14. CONDENSATE DISCHARGE           |
| 2. ELECTRICAL PANEL                                     | 15. ONAL CLEARANCES                |
| 3. ACCESS TO THE ELECTRICAL PANEL                       | 16. WATER CONNECTION SIDE          |
| 4. SUPPLY FAN   | 17. FRONT OUTLET PLENUM (OPTIONAL) |
| 5. DIRECT EXPANSION COIL                                | (R) AMBIENT AIR INTAKE STANDARD    |
| 6. PLATE EXCHANGER                                      | (M) AIR SUPPLY STANDARD            |
| 7. G4 AIR FILTERS                                       | (MP) REAR AIR OUTLET (OPTIONAL)    |
| 8. WATER COIL (OPTIONAL) OR ELECTRIC HEATERS (OPTIONAL) | (MF) FRONT AIR OUTLET (OPTIONAL)   |
| 9. POWER INPUT  | (RP) REAR AIR INLET (OPTIONAL)     |
| 10. WATER LINE OUTPUT OF THE HEATING COIL Ø1" GAS       |                                    |
| 11. WATER LINE INPUT OF THE HEATING COIL Ø1" GAS        |                                    |
| 12. PLATE EXCHANGER WATER OUTPUT Ø 1"                   |                                    |
| 13. PATE EXCHANGER WATER INLET Ø 1"                     |                                    |

SIZE		31	41	51
Weigt	kg	178	179	188

# 11 - TECHNICAL INFORMATION

## 11.2 DIMENSIONS 61 - 81

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Date: 05/09/2013

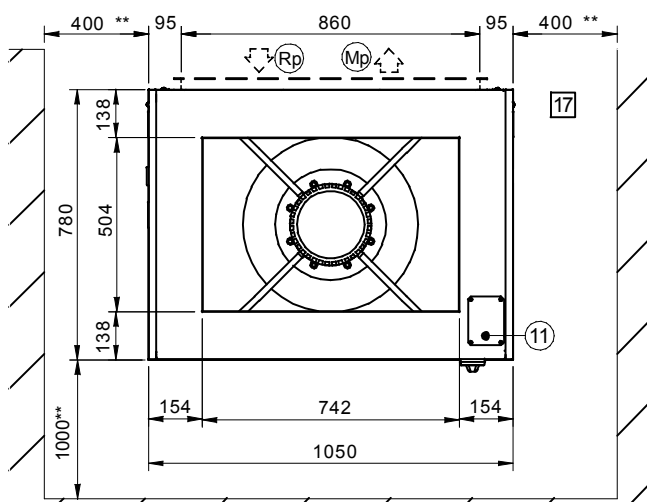
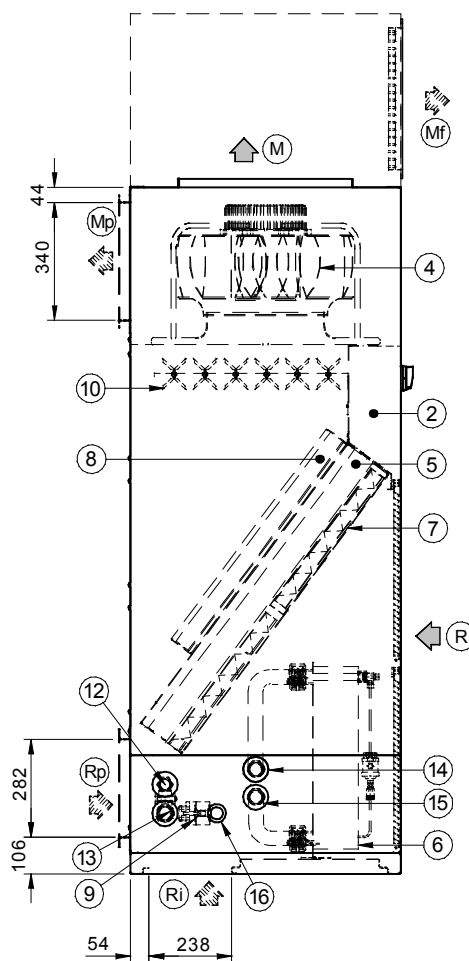
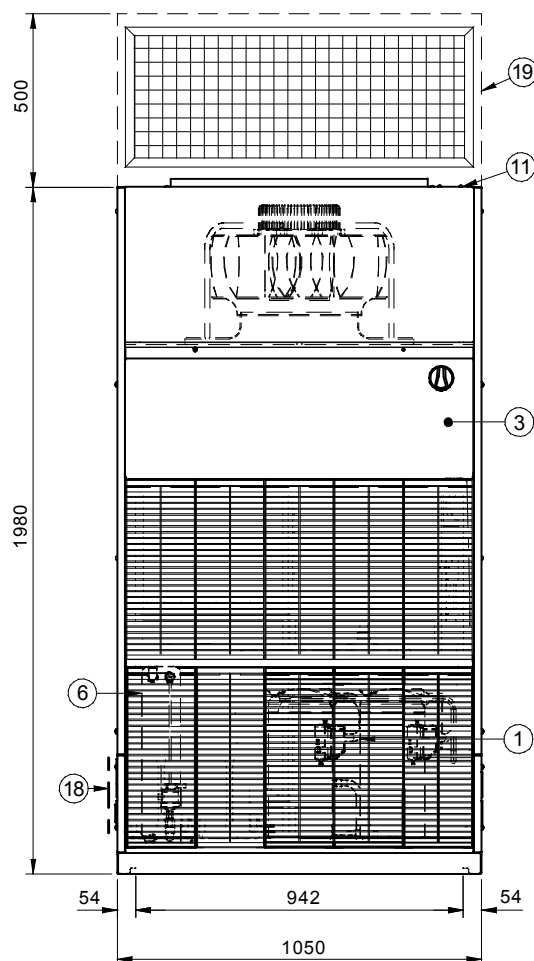


- |   |                                    |
|---|------------------------------------|
| 1. COMPRESSOR   | 14. CONDENSATE DISCHARGE           |
| 2. ELECTRICAL PANEL                                     | 15. ONAL CLEARANCES                |
| 3. ACCESS TO THE ELECTRICAL PANEL                       | 16. WATER CONNECTION SIDE          |
| 4. SUPPLY FAN   | 17. FRONT OUTLET PLENUM (OPTIONAL) |
| 5. DIRECT EXPANSION COIL                                | (R ) AMBIENT AIR INTAKE STANDARD   |
| 6. PLATE EXCHANGER                                      | (M ) AIR SUPPLY STANDARD           |
| 7. G4 AIR FILTERS                                       | (MP ) REAR AIR OUTLET (OPTIONAL)   |
| 8. WATER COIL (OPTIONAL) OR ELECTRIC HEATERS (OPTIONAL) | (MF) FRONT AIR OUTLET (OPTIONAL)   |
| 9. POWER INPUT  | (RP ) REAR AIR INLET (OPTIONAL)    |
| 10. WATER LINE OUTPUT OF THE HEATING COIL Ø1" GAS       |                                    |
| 11. WATER LINE INPUT OF THE HEATING COIL Ø1" GAS        |                                    |
| 12. PLATE EXCHANGER WATER OUTPUT Ø 1"                   |                                    |
| 13. PATE EXCHANGER WATER INLET Ø 1"                     |                                    |

SIZE		61	71	81
Weigt	kg	207	208	210

## 11 - TECHNICAL INFORMATION

### 11.3 DIMENSIONS 82 - 102

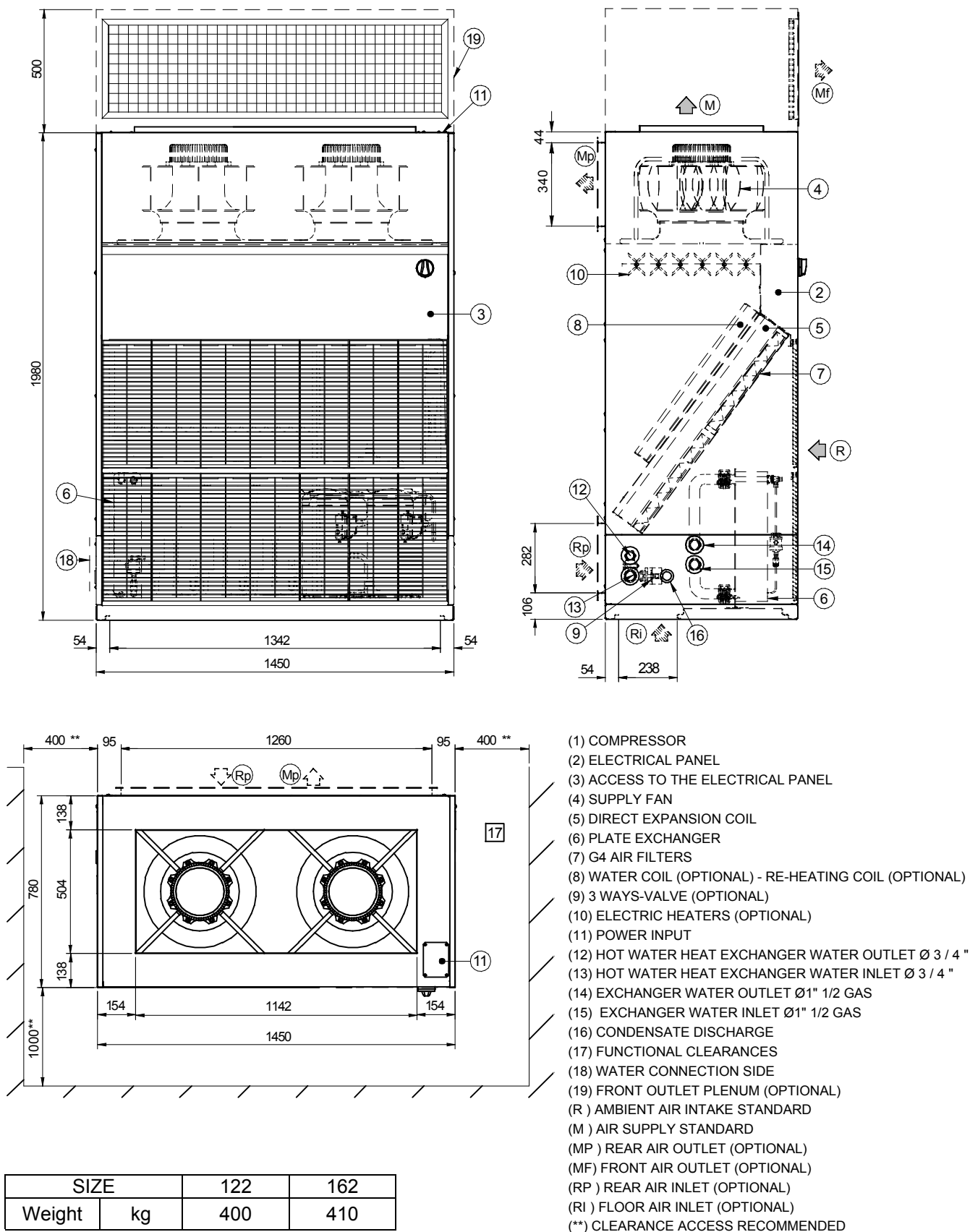


- (1) COMPRESSOR
- (2) ELECTRICAL PANEL
- (3) ACCESS TO THE ELECTRICAL PANEL
- (4) SUPPLY FAN
- (5) DIRECT EXPANSION COIL
- (6) PLATE EXCHANGER
- (7) G4 AIR FILTERS
- (8) WATER COIL (OPTIONAL) - RE-HEATING COIL (OPTIONAL)
- (9) 3 WAYS-VALVE (OPTIONAL)
- (10) ELECTRIC HEATERS (OPTIONAL)
- (11) POWER INPUT
- (12) HOT WATER HEAT EXCHANGER WATER OUTLET Ø 3 / 4 "
- (13) HOT WATER HEAT EXCHANGER WATER INLET Ø 3 / 4 "
- (14) EXCHANGER WATER OUTLET Ø1" 1/2 GAS
- (15) EXCHANGER WATER INLET Ø1" 1/2 GAS
- (16) CONDENSATE DISCHARGE
- (17) FUNCTIONAL CLEARANCES
- (18) WATER CONNECTION SIDE
- (19) FRONT OUTLET PLENUM (OPTIONAL)
- (R ) AMBIENT AIR INTAKE STANDARD
- (M ) AIR SUPPLY STANDARD
- (MP ) REAR AIR OUTLET (OPTIONAL)
- (MF) FRONT AIR OUTLET (OPTIONAL)
- (RP ) REAR AIR INLET (OPTIONAL)
- (RI ) FLOOR AIR INLET (OPTIONAL)
- (\*\*) CLEARANCE ACCESS RECOMMENDED

SIZE		82	102
Weight	kg	310	315

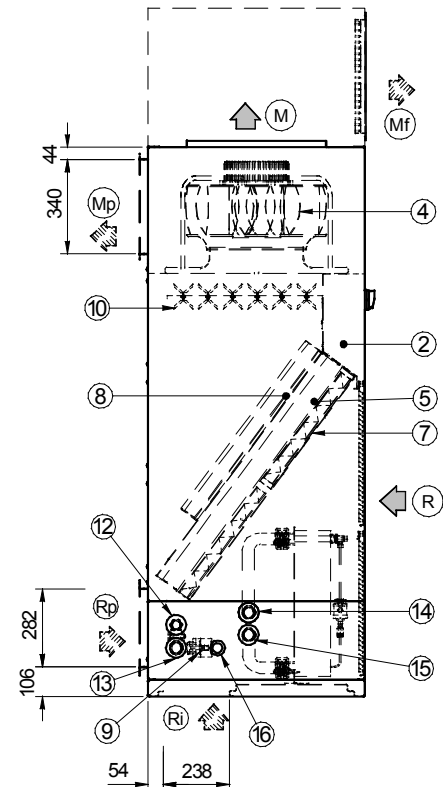
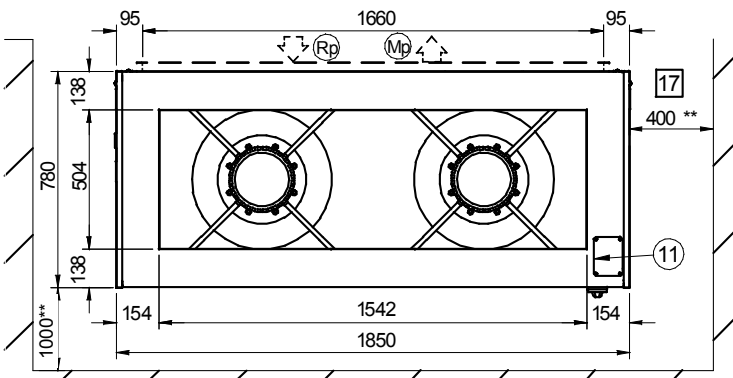
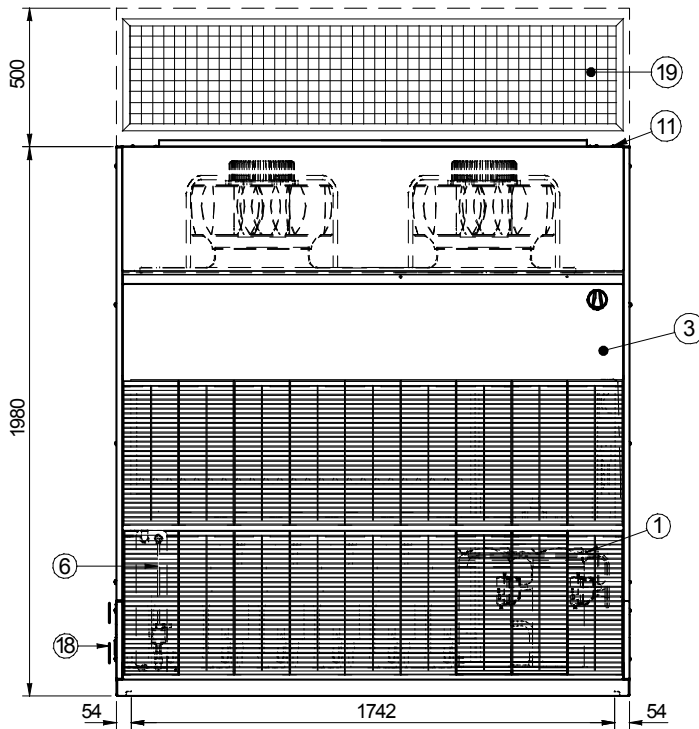
## 11 - TECHNICAL INFORMATION

### 11.4 DIMENSIONS 122 - 162



## 11 - TECHNICAL INFORMATION

### 11.5 DIMENSIONS 182 - 222



- (1) COMPRESSOR
- (2) ELECTRICAL PANEL
- (3) ACCESS TO THE ELECTRICAL PANEL
- (4) SUPPLY FAN
- (5) DIRECT EXPANSION COIL
- (6) PLATE EXCHANGER
- (7) G4 AIR FILTERS
- (8) WATER COIL (OPTIONAL) - RE-HEATING COIL (OPTIONAL)
- (9) 3 WAYS-VALVE (OPTIONAL)
- (10) ELECTRIC HEATERS (OPTIONAL)
- (11) POWER INPUT
- (12) HOT WATER HEAT EXCHANGER WATER OUTLET Ø 3 / 4 "
- (13) HOT WATER HEAT EXCHANGER WATER INLET Ø 3 / 4 "
- (14) EXCHANGER WATER OUTLET Ø 1" 1/2 GAS
- (15) EXCHANGER WATER INLET Ø 1" 1/2 GAS
- (16) CONDENSATE DISCHARGE
- (17) FUNCTIONAL CLEARANCES
- (18) WATER CONNECTION SIDE
- (19) FRONT OUTLET PLENUM (OPTIONAL)
- (R ) AMBIENT AIR INTAKE STANDARD
- (M ) AIR SUPPLY STANDARD
- (MP ) REAR AIR OUTLET (OPTIONAL)
- (MF) FRONT AIR OUTLET (OPTIONAL)
- (RP ) REAR AIR INLET (OPTIONAL)
- (RI ) FLOOR AIR INLET (OPTIONAL)
- (\*\*) CLEARANCE ACCESS RECOMMENDED

SIZE		182	222
Weight	kg	490	500

# 11 - TECHNICAL INFORMATION

## 11.6 GENERAL TECHNICAL SPECIFICATIONS

### AIR FLOW: STANDARD

Size			31	41	51	61	71	81	82	102	122	162	182	222
<b>Cooling</b>														
Cooling capacity	1	kW	10.8	12.4	16.0	17.5	20.0	24.8	34.3	39.3	48.1	56.3	66.2	75.7
Sensible capacity	1	kW	8.3	9.8	12.6	13.8	15.0	18.4	27.7	30.8	38.5	45.8	53.3	58.8
Compressor power input	1	kW	2.0	2.3	3.1	3.7	3.8	4.7	6.4	7.4	9.2	10.2	12.2	14.6
EER	1		5.5	5.4	5.2	4.8	5.2	5.0	5.8	5.3	5.2	5.5	5.4	5.2
<b>Heating</b>														
Heating capacity	2	kW	12.2	14.0	18.6	20.6	23.1	28.6	37.7	43.4	52.0	62.0	72.2	83.9
Compressor power input	2	kW	2.7	2.7	3.6	4.5	5.9	6.3	7.1	8.3	9.4	11.3	13.2	15.9
COP	2		5.1	5.2	5.9	4.6	4.5	4.6	5.3	5.2	5.5	5.5	5.8	5.3
<b>Compressor</b>														
Type of compressors	3		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
No. of compressors		No	1	1	1	1	1	1	2	2	2	2	2	2
Std Capacity control steps		No	1	1	1	1	1	1	3	3	2	3	3	3
Refrigeration circuits		No	1	1	1	1	1	1	1	1	1	1	1	1
<b>Air Handling Section Fans (Supply)</b>														
Type of supply fan	4		RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD	RAD
Number of supply fans		No	1	1	1	1	1	1	1	1	2	2	2	2
Fan diameter		mm	310	310	310	355	355	355	500	500	450	500	500	500
Supply airflow		l/s	569	778	889	1056	1167	1250	1944	2222	2778	3194	3611	4167
Installed unit power		kW	0.80	0.80	0.80	0.90	0.90	0.90	2.70	2.70	1.00	2.70	2.70	2.70
Max. static pressure supply fan	5	Pa	700	460	275	365	240	120	450	340	240	540	510	400
<b>External exchanger</b>														
Type of external exchanger	6		PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE	PHE
Water flow rate (Source Side)		l/s	0.60	0.70	0.90	1.00	1.10	1.40	1.90	2.20	2.70	3.20	3.70	4.30
<b>Power supply</b>														
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

Performance refers to operation at full re-circulation

DB = dry bulb

WB = wet bulb

1. Ambient air 27°C D.B./19°C W.B. Exchanger water temperature 30°C / 35°C

2. Ambient air at 20°C D.B./15°C W.B. Water temperature at plate exchanger input 15°C

The water temperature at the exchanger output is read in relation to the flow of water being chilled.

3. SCROLL = scroll compressor

4. RAD = radial fan

5. Net outside static pressure to win the outlet and intake onboard pressure drops

6. PHE = plate exchanger

## 11 - TECHNICAL INFORMATION

### 11.7 SOUND LEVELS

Sizes	Sound power level (dB)								Sound pres- sure level	Sound power level
	Octave band (Hz)									
	63	125	250	500	1000	2000	4000	8000	dB(A)	dB(A)
31	68	68	70	64	63	62	51	48	53	68
41	71	71	73	66	64	64	53	50	55	70
51	72	72	75	68	66	66	56	51	57	72
61	74	74	77	70	68	68	58	53	59	74
71	76	75	80	72	70	69	60	54	61	76
81	78	77	82	74	72	71	62	55	63	78
82	67	72	79	74	71	67	59	54	60	76
102	70	75	82	77	74	70	62	56	63	79
122	67	74	78	75	71	66	54	54	59	76
162	68	73	80	75	72	69	59	56	61	78
182	70	75	82	77	74	71	62	57	63	80
222	73	77	85	80	77	73	66	60	65	82

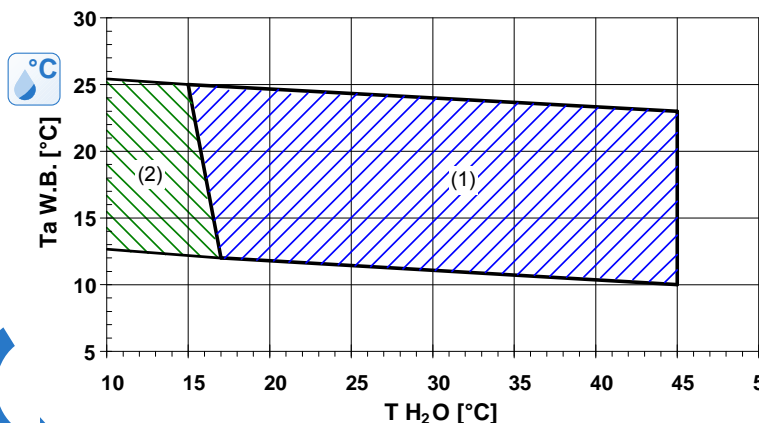
The sound levels are referred to units working at full load in nominal conditions. The sound pressure level is referred at a distance of 1 m. from the ducted unit surface working in free field conditions.

External static pressure 50 Pa.

Measurements are made in compliance with UNI EN ISO 9614-2.

Please note that when the unit is installed in conditions different from nominal test conditions (e.g. near walls or obstacles in general), the sound levels may undergo substantial variations.

### 11.8 OPERATING LIMITS - COOLING



THE LIMITS ARE INDICATIVE AND HAVE BEEN CALCULATED CONSIDERING:

- VALUES GENERAL AND NOT SPECIFICATIONS,
- STANDARD AIR FLOW-RATE,
- NON-CRITICAL POSITIONING AND CORRECT USE OF THE UNIT,
- OPERATION AT FULL LOAD
- DIFFERENCE BETWEEN INLET / OUTLET WATER TEMPERATURE = 5°C

TA = AIR TEMPERATURE ENTERING THE AIR HANDLING COIL (°C)

**CAUTION! TEMPERATURE MEASURED WITH WET BULB** (W.B.=WET BULB)

TH20 = WATER TEMPERATURE AT PLATE EXCHANGER INPUT (°C)

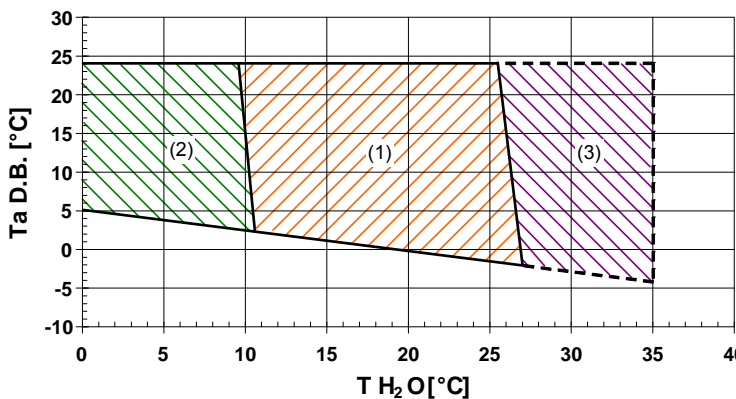
1 = STANDARD OPERATING RANGE  
2 = FIELD OF USE FOR UNIT EQUIPPED WITH PLUMBING ASSEMBLY FOR WASTE WATER SYSTEM (OPTIONAL)

WET TEMPERATURE - EXAMPLE

19°C W.B. { 24°C D.B. / 63% R.H.  
26°C D.B. / 52% R.H.  
27°C D.B. / 48% R.H.



### 11.9 OPERATING LIMITS - HEATING



THE LIMITS ARE INDICATIVE AND HAVE BEEN CALCULATED CONSIDERING:

- VALUES GENERAL AND NOT SPECIFICATIONS,
- STANDARD AIR FLOW-RATE,
- NON-CRITICAL POSITIONING AND CORRECT USE OF THE UNIT,
- OPERATION AT FULL LOAD
- DIFFERENCE BETWEEN INLET / OUTLET WATER TEMPERATURE = 5°C

TA = AIR TEMPERATURE ENTERING THE AIR HANDLING COIL (°C)

**CAUTION! DRY BULB MEASURED TEMPERATURE** (D.B.=DRY BULB)

TH20 = WATER TEMPERATURE AT PLATE EXCHANGER INPUT (°C)

1 = STANDARD OPERATING RANGE  
2 = FIELD OF USE FOR SYSTEM WITH GLYCOLATED WATER (ANTI-FREEZE)  
3 = FIELD OF USE FOR UNIT EQUIPPED WITH PLUMBING ASSEMBLY FOR WASTE WATER SYSTEM (OPTIONAL)

## 12 - RESIDUAL RISKS

### 12.1 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

### 12.2 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

### 12.3 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".

### 12.4 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 .

### 12.5 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 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.

### 12.6 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.

### 12.7 Moving parts

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

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

### 12.8 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.

### 12.9 Hydraulic parts

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

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