

Modular air-handling units

Installation use and maintenance manual



Dear Customer,

Congratulations for having chosen this product.

Clivet has been working for years to offer the market systems able to assure maximum and long-lasting wellbeing with high reliability, efficiency, quality and safety. The company aim is that to offer its customers developed systems that assure the best comfort, reduce energy consumptions and installation and maintenance costs for the entire life-span of the system.

With this manual, we intend giving information useful throughout all phases: from reception, to installation, to use and even disposal, so that such a developed system meets the best installation and use methods.

With kind regards and... good reading!

CLIVET Spa

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The data contained in this manual are not binding and can be changed by the manufacturer without prior notice.

1.1 General warnings

Purpose of the manual

This manual has been realised to enable a correct installation, adjustment and maintenance of the unit.

Manual instructions

It is of fundamental importance that the manual is carefully read.

Pay particular attention to:



PROHIBITIONS

indicate operations that cannot be carried out as they jeopardise the machine operation or can cause personal injuries or damage things.



WARNINGS

indicate potentially dangerous or damaging situations.



INFORMATION

indicate particularly useful information.

The manufacturing company declines every liability for any damages, directly or indirectly, to persons or things, following the non-compliance with these instructions.

Preserving the manual

This manual and the wiring diagram of the unit must be carefully kept and be available to the operator for future consultation.

Systems designing

Installation, electric, hydraulic system, etc., must be defined by enabled designers in accordance with the current standards.

Qualified personnel

The unit must be installed, tested and assisted by qualified personnel having the legal requisites.

Installation

The installation must be carried out in accordance with the local safety standards.

Electric network

Check that the features of the electrical network are conform with the data on the unit matriculation plate, found on the inside of the main electric control board.

Packaging

The packaging material (plastic bags, expanded polystyrene, nails, etc.) must be kept out of the reach of children as it is a potential source of danger and must be correctly recycled in accordance with the local standards in force.

Maintenance

Disconnect the electric power supply to the unit before carrying out any maintenance. The operations must be carried out in accordance with the local safety standards.

Periodical checks

Carry out periodical checks to identify any loose, damaged or broken parts. The lack in repair entails the risk of damages to things and personal injuries.

Fault – Malfunctioning

Disconnect the equipment in case of fault or malfunctioning.

Repair

For any repairs, only contact an after-sales technical assistance centre authorised by the manufacturer and request the use of original spare parts. The non-compliance with the above can jeopardise the safety of the equipment.

Modifications

Every liability is declined by the manufacturer with voiding of the warranty in the event of electrical and/or mechanical modifications. Tampering in general, not expressly authorised and not respecting that reported in this manual, void the warranty.

Destination of use

The unit is designed for the treatment of air with the functions shown on the technical sheet enclosed with the machine (in general, air handling, mixing, filtration, heating, cooling, humidification, dehumidification, sound-proofing).

Keep to the limits foreseen in the technical schedule and in this manual.

Any use different to that specified does not entail any kind of commitment or obligation by the manufacturer.

Safety integration principles

The unit is designed and manufactured so as not to expose the personal health and safety to risk.

In this regard, project solutions have been adopted act at eliminating, where possible, the possible causes of risk or significantly reduce the probability of the event-risk. Should it not have been possible to intervene during designing to prevent and/or eliminate the risk, refer to the behavioural prescriptions reported in the residue risks section.

Data update

The continuous improvements made to the product can determine variations to data, even without prior notice by the manufacturer.

User training

The installer must train the user, particularly on:

- Switch-on/off
- Setpoint modification
- Stand-by
- Maintenance
- What to do/not to do in case of fault.

1.2 Unit identification

Serial number label

The serial number label is found on the unit and indicates all machine features.



The serial number label must never be removed.

The serial number label shows the indications foreseen by the standards, in particular:

- the type of machine
range → **AQX**
size → **1.....32**
- the serial number
12 characters → **Axxxxxxxxxx**
- the year of manufacture
- the wiring diagram number
- electrical data
- manufacturer logo and address

Serial number

Unambiguously identifies each machine.

Enables identifying the specific spare parts for the machine.

Intervention requests

From the serial number label, take note of the characteristic data on the table so they are easily available if required.



For request of intervention, always give the following data.

Range
Size
Serial number
Year of manufacture
Wiring diagram

2.1 Preliminary information

Work respecting the current safety standards.

For detailed information (dimensions, weights, technical features, etc.) refer to the TECHNICAL INFORMATION chapter.



To perform the operations use the protective equipment: gloves, goggles, etc.

2.2 Check upon arrival

Before accepting delivery, check:



The unit has not been damaged during transport. That the delivered material corresponds to that indicated on the transport document, comparing data with the matriculation plate positioned on the pack.

In case of damages or anomalies:

- immediately make a note of the found damage on the transport document and write the wording: "Collection with reserve for evident shortages/damages due to transport".
- notices via fax and with registered letter with acknowledgement receipt to carrier and supplier.

The notifications must be made within 8 days from receipt, after this date they will not be accepted.

2.3 Storage

Respect the indications on the outside of the pack.

2.4 Handling

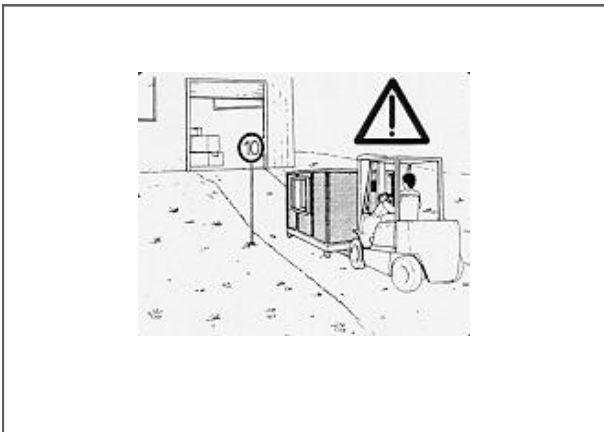
Check the weight of the unit and capacity of the lifting mean.

Identify the critical points in the handling path (holy paths, ramps, steps, doors).

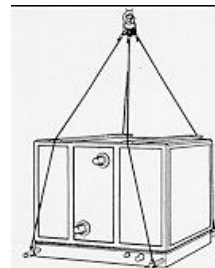


Check the position of the centre of gravity .

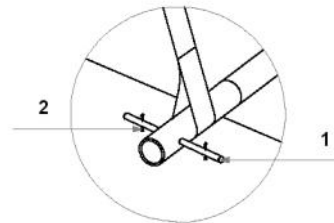
Ensure the unit is stably balanced before starting handling.



Use protections to avoid damaging the unit.



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



2.5 Removal of packaging

Attention not to damage the unit.

Recycle and dispose of the packaging material according to local standards.

3 - POSITIONING

3.1 Preliminary information



Work respecting the current safety standards.

To perform the operations use the protective equipment: gloves, goggles, etc.

3.2 Functional spaces



The functional spaces have the aim of:

- guarantee good operation of the unit
- allow maintenance operations
- protect the authorised operators and exposed persons.

Respect the functional spaces

A corridor whose width is equal to the length of the finned coils (approximately equal to the width of the machine) must be available to allow the removal of the coils.

On the sides with inspection doors, a corridor must be left to allow the doors to be opened completely, and in any case no less than 600mm

Double the functional spaces if more units are aligned.

3.3 Positioning



The units have been designed to be installed :

- OUTDOORS
- in permanent position.

Choose the place of installation depending on the following criteria:

- level of sound emissions admitted by the local standards
- Customer approval
- safely accessible position
- technical spaces requested by the unit
- maximum distance admitted from the electric connections
- support points with adequate capacity for the unit weight
- spaces for air ejection and suction
- disposal of condense water

Prefer places where the unit does not disturb neighbours.

Avoid snow accumulating obstructing the coils

Avoid places that may be subject to floodings

Install the unit lifted from the ground.

Protect the unit with suitable fence in order to avoid access to unauthorised personnel (children, vandals, etc.)

Limit the transmission of vibrations:

- use anti-vibration devices or neoprene strips on the unit support points
- install flexible joints on the hydraulic connections
- install flexible joints on the aeraulic connections.



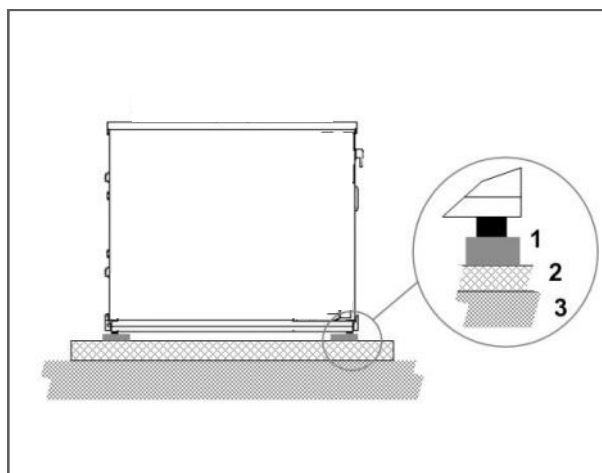
A correct air circulation on the coil is essential to guarantee the good operation of the machine.



Avoid:

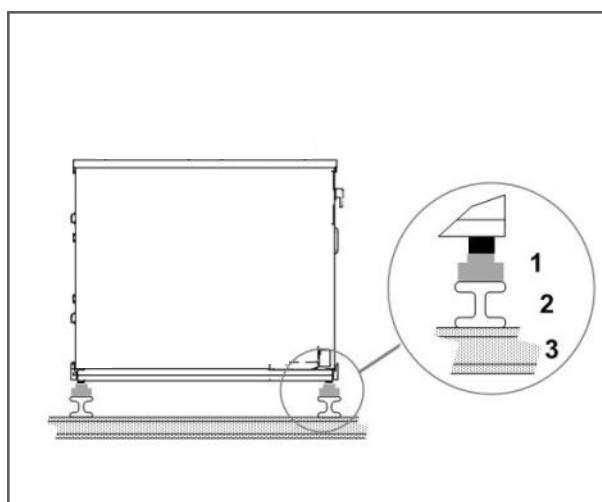
- obstacles to air flow (strong prevailing winds, hedges, fences, etc.)
- difficulty of exchange
- leaves or other bodies that can obstruct the exchange coils
- winds contrasting or favouring the air flow
- heat sources near the unit (chimneys, extractors, etc.)
- sources of dust or pollutants
- stratification (cold air that stagnates at the bottom)
- recirculation (ejected air that is taken back via suction)

Positioning on concrete floor



- 1 2 cm thick neoprene strips
- 2 concrete floor
- 3 floor

Positioning on steel structure

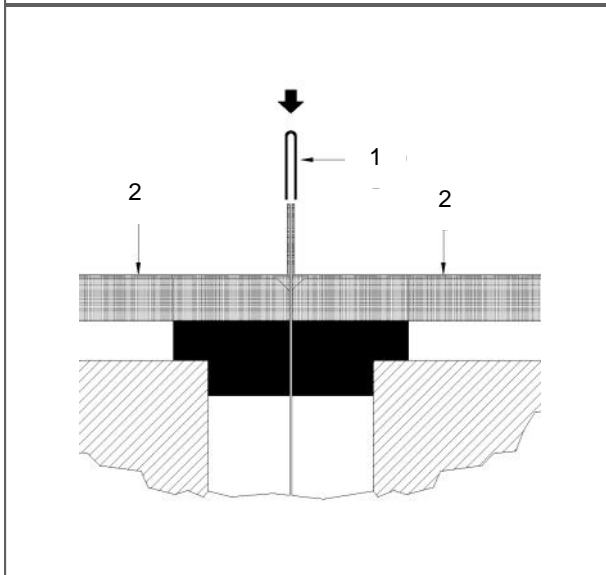
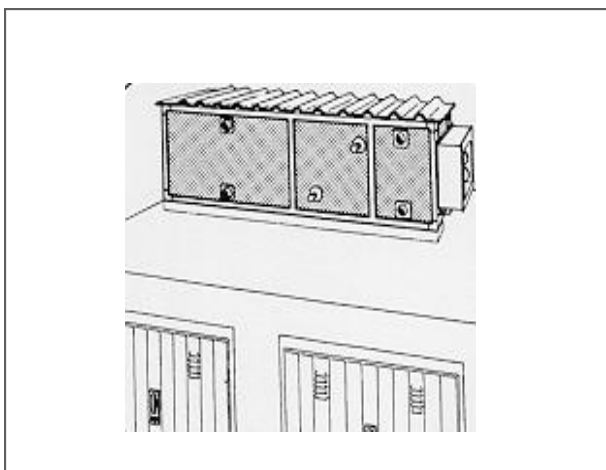


- 1 anti-vibration devices
- 2 steel structure
- 3 steel structure

3 - POSITIONING

The units installed outdoors require greater care, both for the reasons already mentioned and due to the correct application of the rain cover, which is subject to strong winds.

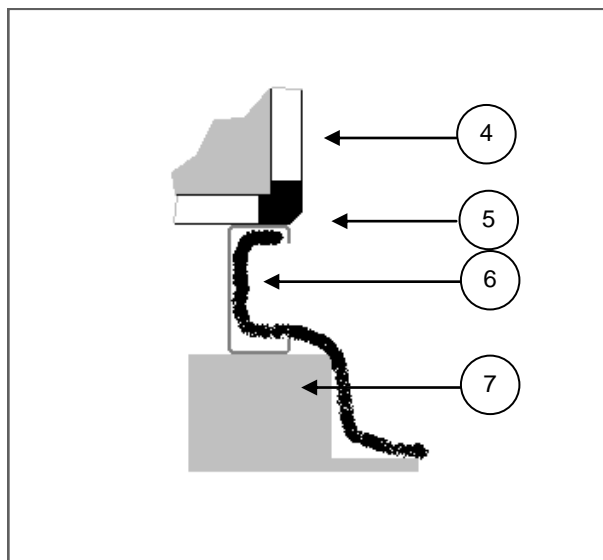
- Special attention should be paid to the seal gaskets.
- Any flashing fitted to the base must be installed so as to prevent the infiltration of water, therefore pay special attention to the gasket and the silicon seals. The height of the step supporting the unit must be sufficient to avoid any water or snow from stagnating and that may cause infiltration.
- If the cover is already fitted to the unit and fastened to the roof of the casing, check for any breakages or loosening of the screws.
- If the cover needs to be installed, make sure all the material supplied is present: sheets, stiffeners, screws.
- Special attention should be paid when fitting the gasket; use silicon to ensure a perfect seal, where required.



ROOF:

In the event of outdoor installation, a roof made from aluminium plate is available.

The joining elements on the units divided into a series of sections must be assembled by the customer, using the ABS joint protections (1).



1. Joint protection (ABS)
2. Roof
4. Aluminium frame
5. Base
6. Waterproofing
7. Support base

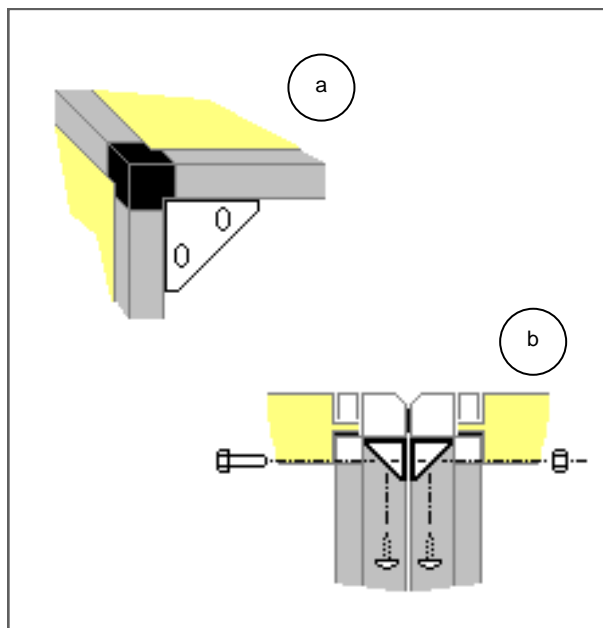
3.4 JOINING THE SECTIONS

During the installation of units consisting of a series of sections, pay special attention to the rating plates located on the sections.

After having applied the self-adhesive gasket between the strips on the sections being joined, bring the parts together so that they fit perfectly. It is important during this operation to make sure that the unit is level.

Tighten the corner gussets (Fig. a) and lock the joint using the L-shaped nylon blocks (Fig. b).

The gasket, the blocks and the fastening screws are inside the bag supplied.



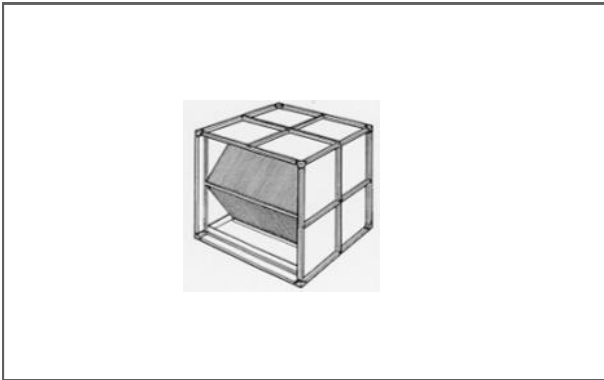
3.5 HEAT RECOVERY UNITS

For reasons of bulk, the heat recovery units may be supplied as separate sections or partially dismantled. In these cases, special attention should be paid when assembling the recovery unit, being made from fragile and delicate material. Check that the gaskets and the silicon seals prevent the by-pass of air.

Check that the air by-pass damper, if present, is working perfectly, so as to ensure complete closing.

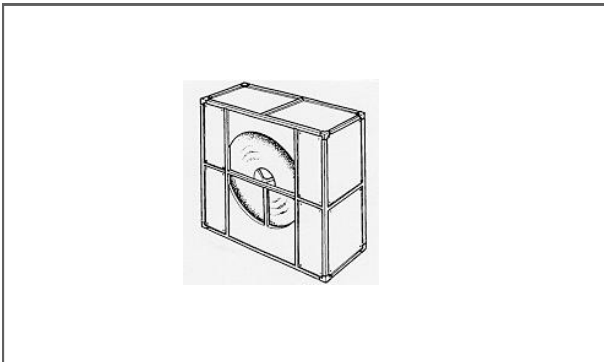
STATIC CROSS FLOW RECOVERY UNIT

Check that the finned coil is not dented, broken or crushed.



ROTARY RECOVERY UNIT

Check the positioning of the recovery unit, that it is level and that the movement of the wheel is regular and not misaligned. Check that the fins are not damaged.

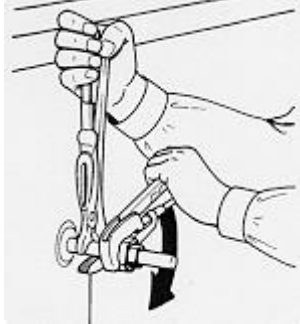


4 - HYDRAULIC CONNECTIONS

4.1 PRELIMINARY INFORMATION

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

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



4.2 COMPONENTS

CUT-OFF VALVES :

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

THERMOMETERS AND MANOMETERS :

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

AN AIR BLEED VALVE :

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

DRAINAGE TAPS :

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

EXPANSION TANK :

- It keeps a correct system pressure when the water temperature changes. It must be dimensioned as a function of water content. 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 never should be removed, this operation invalidates the guaranty

SUPPORTS :

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

4.3 OPERATION SEQUENCE

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

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

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).



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

4 - HYDRAULIC CONNECTIONS

4.7 WATER COILS

The water coils must be installed with perfectly horizontal pipes. They must be connected following the indications on the plates. In any case, the fluid must flow through the coil in the opposite direction to the air being treated, so as to achieve maximum heat output.

Do not size the piping in the circuit in reference to the diameter of the coil fittings, as these are sized according to constructional requirements and are in any case standardised.

The connections in the circuit must not impede the removal of the coil from the unit.

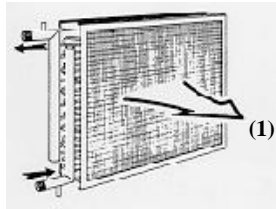
Overheating inside the fan unit represents a danger



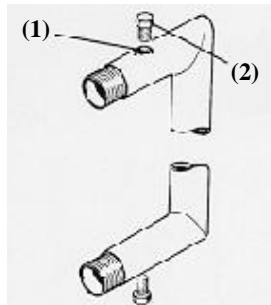
The accidental stopping of the fan will cause the overheating of the stagnant air in the unit, with consequent damage to the motor, the bearings, the insulation and the plastic parts.

The system must be fitted with suitable equipment to by-pass the passage of water through the coil.

1. Air flow



1. Thread
2. Fixation screw



4.8 DOUBLE FINNED COIL HEAT RECOVERY UNITS

The pump, expansion vessel and connection pipes are not supplied.

The water and electrical connections to the electric pump must be performed by the purchaser, following the normal procedures for water coils.

4.9 STEAM COILS

All the coils are already fitted with pipes sloped towards the outlet manifold to help drain the condensate, or alternatively with vertical pipes.

When connecting to the supply mains, refer to the previous precautions and comments.

In order to avoid damage to the coil (water hammer), special attention should be paid to the sizing and the adjustment of the valves and condensate drains.

Prevent stagnant condensate from forming inside the coil, in the manifolds and in the supply mains.

Each coil must be fitted with its own condensate drain.

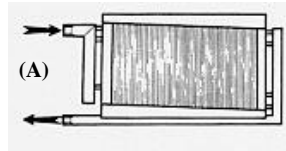
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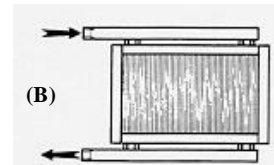
The accidental stopping of the fan will cause the overheating of the stagnant air in the unit, with consequent damage to the motor, the bearings, the insulation and the plastic parts.

The system must be fitted with suitable equipment to by-pass the passage of steam through the coil.

A. Inclined pipes



B. Horizontal pipes

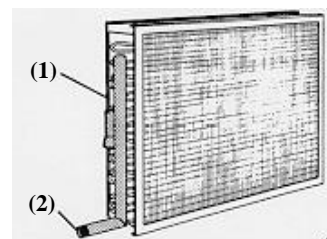


4.10 CONNECTING THE DIRECT EXPANSION COILS

Before starting to connect the coil, check that the pipes are perfectly horizontal and run counter-current.

When performing the connections, all the adjustment and control equipment must be installed.

1. Distributor
2. Discharge



4 - HYDRAULIC CONNECTIONS

4.11 WET DECK HUMIDIFICATION

IDENTIFYING THE CHARACTERISTICS OF THE HUMIDIFIER:

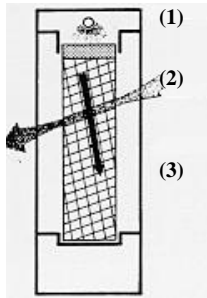
- With run-through water, type P.
- With water circulation by pump, type R.
- Thickness of the wet deck: 150mm.

PRELIMINARY OPERATIONS:

- Connect the humidifier to the mains water supply.
- Fit a trap to the tank drain.
- Connect the electric pump to the mains power supply, using EC compliant equipment.

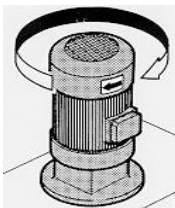
Caution: the wet decks are fitted in the humidifier in a pre-set position in reference to the opposing flows of air and water. Incorrect positioning will affect correct operation and may cause water to be dragged into the sections downstream.

1. Water distributor
2. Air flow
3. Water



4.12 HUMIDIFICATION WITH WATER CIRCULATION

- Fill the water tank and adjust the float valve so that it is closed when the level of water is around 15mm below the overflow.
- Check, after 5 minutes of operation, that the wet deck is completely wet.
- When new, the wet deck will release foam for a short time only.
- The evaporation of water causes an increase in the concentration of lime scale, and the air carries dust that causes slurry and the formation of algae; to reduce these problems, use the bleed valve.

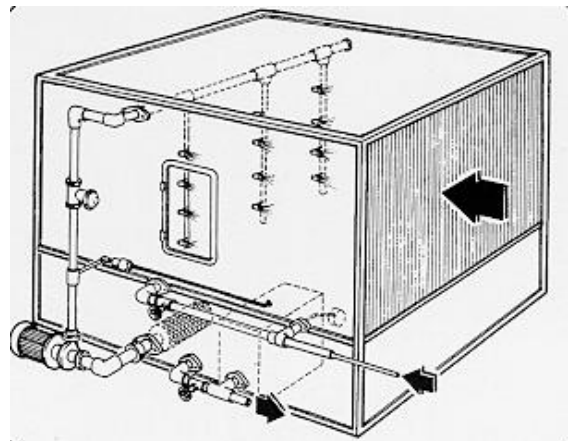


4.13 RUN-THROUGH WATER HUMIDIFICATION

- The humidifier is complete with a constant flow valve.
- To drain the water, use a drain trap and do not decrease the diameter of the drain pipe to the sewerage, so as to avoid flooding or unpleasant odours.
- Check, after 5 minutes of operation, that the wet deck is completely wet.
- When new, the wet deck will release foam for a short time only.

4.14 SPRAY NOZZLE HUMIDIFICATION

- Connect the humidifier to the water distribution network.
- Fit the tank drain pipe with a trap.
- A preliminary operation involves filling the tank using the float valve or the quick fill, checking that this occurs correctly. The float must shut-off the supply of water when the level is two centimetres below the overflow.
- If necessary, adjust the arm of the float.
- It is good practice to clean the humidifier equipment for the first time according to the following instructions:
 - Operate the electric pump for half an hour, empty the water collection tank.
 - Check whether the nozzles are blocked, clean the water inlet filter.
 - Check the operation of the drain function so as to avoid the concentration of salts and pollutants in the water in the tank: the drain function must change all the water in the tank each week, and more frequently in special cases.
- Check the position of the water filter.
- Check the seal of the tank, which may have been damaged during transport.



4 - HYDRAULIC CONNECTIONS

4.15 ATOMISED WATER HUMIDIFICATION

- There are two lines in parallel: for water and air.
- The customer-installer must connect the humidifier to the system lines according to the diagram provided by the manufacturer.
- The jet of atomised water must not come into direct contact with objects, so as to avoid condensation and dripping; in addition, check that the jet hits the humidification zone;
- The alignment of the two air/water lines and atomising heads are well distributed to uniformly cover all the entire area involved;
- The ends of the two lines must be fitted with a ball valve for cleaning or bleeding, specifically the first time the unit is started and when started each new season.
- For all other information on the operation, water-air and electrical connections, refer to the manual provided by the manufacturer of the humidifier.
- The humidification zone is fitted with an inspection door that must be opened only after having isolated it electrically.
- The maintenance technician must have closed the air and water gate valves before working on the machine.
- The maintenance technician must wear suitable safety clothing and protective devices.

4.16 Heater humidifier

- read the manufacturer's manual
- The customer-installer must connect the humidifier to the system lines according to the diagram provided by the manufacturer
- Connect the steam production module with the steam distribution module (2 mt pipes supplied)

4.17 CONDENSATE DISCHARGE

The condensate collection basins, both for the cooling coils and the humidifiers, are fitted with threaded male drain pipes. The pipe protrudes by around 100mm from the side of the tank.

! The drain must be fitted with a TRAP, to prevent the unit's fan from taking in miasma or bacteria from the decomposition of sewerage, and thus creating inside the unit conditions ideal for the proliferation of pathogenic germs, fungi and microorganisms and favouring the spread of "Legionella Pneumophila", responsible for "Legionnaires disease".

Drains without traps or with incorrect traps will cause air to flow up through the drain and thus make it difficult to discharge the condensate, which as a result will overflow into the adjacent sections and leak from the air-conditioner when the fan stops, flooding the entire surrounding zone.

IMPORTANT

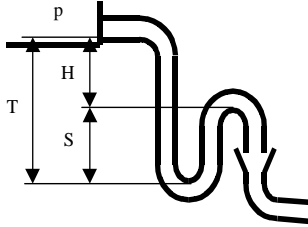
- The trap must not be connected to the drain with an air-tight seal, so as to allow the venting of air and the absorption of any sewerage that may return.
- A drain trap that is under pressure must never, for obvious reasons, be connected to a trap under depression.
- The connection pipe after the drain trap must be sufficiently sloped towards the sewerage drain and have a diameter no less than the drain pipe.
- The drains may be made from various materials: steel-copper-PVC. If the drain is poorly anchored it may belly, creating pockets of air and preventing the correct down-flow of condensate.
- It is good practice to externally insulate the pipes and the drain trap, to prevent the condensate from dripping; for the antifreeze function, if necessary fill the drain trap with antifreeze during the cold season.
- Observe the evaporation from the drain trap during periods without condensation operation. The maintenance technician must always keep the drain trap topped up; in special cases, drain traps can be created with a high water content.
- It is commonly believed that a very deep drain trap is the best solution. Sizing a drain trap requires knowledge of what may occur when the drain is upstream and downstream from the fan.
- The drain trap must be fitted with a bleeding hose and cap in the most suitable position.
- The basin must be regularly cleaned, to avoid stagnant condensate, deposits and the formation of algae.



THEORETICAL CALCULATION OF THE DRAIN TRAP

The theoretical calculation of the height of the drain trap involves a number of considerations, depending on the position of the drain trap in reference to the fan.

Failure to heed the following rules will lead to the emptying of the drain trap and thus incorrect draining of the tank.

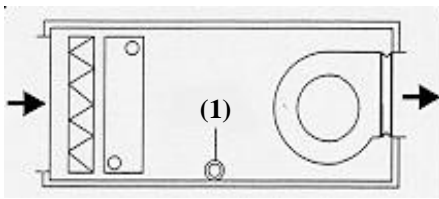


p : pressure in the tank being drained in mm wc (1 mm wc = 9.81 Pa)

T : vertical distance between the lower edge of the tank drain and the upper edge of the first loop of the drain trap (mm)

S : vertical distance between the upper edge of the first loop of the drain trap and the lower edge of the second loop (mm)

DEPRESSION DISCHARGE



1. Discharge

Formula:

$$T = - 2 p$$

$$S = T / 2$$

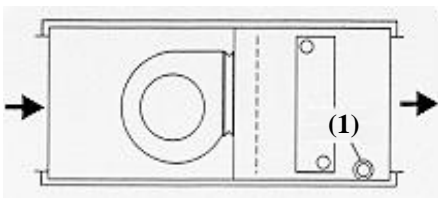
Example

$$p = - 300 \text{ Pa} = - 30 \text{ mm}$$

$$T = 60 \text{ mm}$$

$$S = 30 \text{ mm}$$

PRESSURE DISCHARGE



Formula

$$T = 2 p$$

$$S = T / 2$$

Example

$$p = 400 \text{ Pa} = 40 \text{ mm}$$

$$T = 80 \text{ mm}$$

$$S = 40 \text{ mm}$$

5.1 Generality

The dimensioning and correct execution of the aeraulic connections are fundamental to guarantee good unit operation and adequate level of silence in the room.

When designing and manufacturing the channels, consider LOAD LOSSES, AIR FLOW AND SPEED that must be consistent with the unit features.

Particularly consider that load losses higher than the unit useful prevalence, lead to reduction in flow rate, with consequent unit blocks.

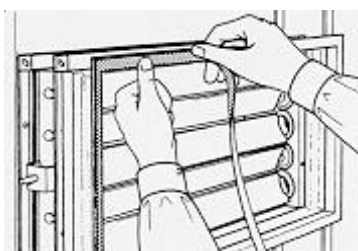


- the weight of the channels must not burden on the connection flanges
- place anti-vibration joints between channels and unit
- connection to the flanges and between the various sections of the channels must guarantee air seal, avoiding dispersions penalising the overall efficiency of the system
- limit the load losses by optimising the path, the type and number of bends and junctions
- use wide bends evaluating the opportunity of equipping them with deflectors (in particular with high air speed or bends with reduced radius).

The rubberised canvas connection joints must be sufficiently relaxed to effectively perform their function, that is, to prevent the transmission of vibrations to the air ducting or vice-versa; as a result, never connect the ducts directly to the unit.

Connection operations:

- apply a gasket to the flange so as to prevent air leaks.
- tighten the screws sufficiently, even those in difficult positions.
- Apply silicon to ensure the perfect seal of the fissures.



5.2 Treated air channelling

The internal surface of the channel must be smooth, enable its washing and must not contaminate the air

Thermally isolate the channels and the flanges to avoid energy losses and forming of condensation

DIFFUSERS INLETS GRILLES

A correct diffusion of the air in the room is determining for the level of comfort.

When choosing and positioning the grilles, inlets and diffusers, avoid:



- excessive air speed
- forming of stagnant and stratification areas
- cold air delivery in room
- forming of localised currents (also due to uneven distribution of air)
- excessive room temperature variations, vertically and horizontally
- short circuits of the supply air towards the return air.

For sound comfort, consider that :



- the air diffusers must be chosen verifying the sound power generated at nominal flow rate conditions
- the cut-off to diffusers must be carried out with flexible elements
- the return grilles must be widely dimensioned.

6.1 Preliminary information

The features of the lines must be determined by personnel enabled to the designing of electric systems, complying with the standards in force.

The protective equipment of the unit supply line must be able to shut-off the presumed short circuit current, which value must be determined in accordance with the system features.



The section of the power supply cables and of the protective cable must be determined in accordance with the features of the used protections.

All electrical operations must be carried out by personnel having the legal requisites, trained on the risks related to these operations.

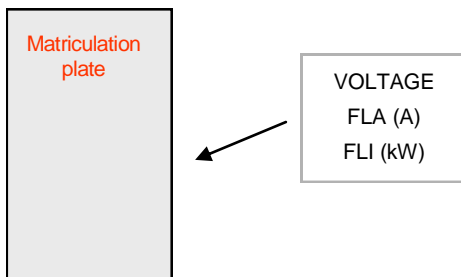
Work respecting the current safety standards.

6.2 Electric data



The matriculation plate shows the electric data specific of the unit, including any electric accessories.

The electric data indicated in the technical schedule and in the manual refer to the standard unit, excluding accessories. Refer to the data reported in the matriculation plate.



- F.L.A. Full load ampere
absorbed current at maximum admitted conditions
- F.L.I. Full load input
Power absorbed with full load
(at maximum admitted conditions)

6.3 Connections

Refer to the wiring diagram of the unit (the number of the wiring diagram is indicated in the matriculation plate)

Check the mains have features conform with the data reported on the matriculation plate

Before starting work, check the isolation device at unit power supply line start is open, blocked and provided with sign

First carry out the earth connection

Protect the cables using adequately sized cable glands

Before electrically powering the unit, ensure all protections removed during electric connection are restored.

6.4 Data-signal lines

Do not exceed the maximum admitted distance, that varies based on the type of cable and signal.

Lay the cables away from the power lines, with different voltage, or that emit interferences of electromagnetic origin.

Avoid laying the cables near the equipment that can create electromagnetic interferences.

Avoid laying in parallel with other cables, any intersection with other cables is admitted only if at 90°C.

The screen must be connected to earth without interferences.

Guarantee screen continuity for the entire extension of the cable.

Respect the indications on impedance, capacity, attenuation.

6.5 Electric motor connection

Remove the cover of the terminal block on the electric motor, and check that the connections of the terminals conform to the power supply voltage.

Note that the air handling units are supplied as follows:

STANDARD motor, single polarity up to 4kW:

Motor with direct starting, 230/400V

230V delta, 400V star

N.B.: The 230/400 motors may have a star/delta connection only where 230V three-phase power is available.

STANDARD motor, single polarity above 4kW:

Motor with 400V star/delta starting

400V delta, 690V star

Connect the line cable to the terminal block, including the earth connection, in accordance with the EC standards; refer to the table "Motor electrical data".

The hole to be made for the passage of the cable through the casing of the unit, in the position chosen by the customer-installer, must be fitted with a suitable cable gland.

The cables inside the fan section must be carefully fastened to the structure, as they are in the fan intake air flow.

The motor power supply must be protected by fuses, and the power input of the motor must be controlled by a thermal overload device, suitably calibrated for the rating of the motor. Please refer to the table "Motor electrical data".

To prevent moisture forming in the terminal block, check that the gasket is fitted in its housing and correctly fastened by the cover.

As regards the starting time, refer to the table "Starting times".



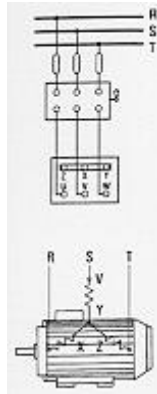
For the grounding connection use the 6.8 mm holes present on the base

6.6 MOTOR TERMINAL LAYOUT

Direct starting with star connection.

Terminals U V W should be connected to the line switch.

Polarity: 2, 4, 6, 8



Single start with switch (Dahlander).

Switch connection:

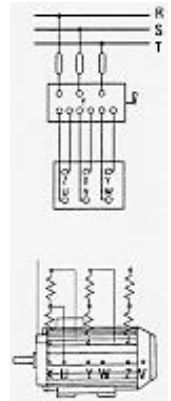
High speed:

terminals U V W to the three-phase supply terminal Z to X and to Y

Low speed:

terminals Z X Y to the three-phase supply terminals U V W open

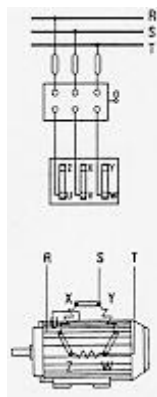
Polarity: 2/4, 4/8



Direct starting with delta connection.

Terminals U V W should be connected to the line switch.

Polarity: 2, 4, 6, 8



Two separate windings.

Switch connection:

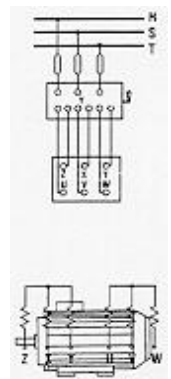
High speed:

terminals Z X Y to the three-phase supply terminals U V W open

Low speed:

terminals U V W to the three-phase supply terminals Z X Y open

Polarity: 4/6



Starting with star-delta connection.

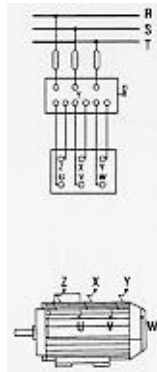
Switch connection:

Starting:

terminals U V W to the three-phase supply terminal Y to X and to Z (star connection)

Operation:

terminals U V W to the three-phase supply terminal U to Z, V to X and W to Z (delta connection)



6 - ELECTRIC CONNECTIONS

ADMISSIBLE STARTING TIMES (from ABB MOTORS catalogue)

Power kW	Current at 400 V A	Size 4 poli	Laying A		Thermal overload relay A	Fuse suggested for direct starting with Isp/IN ≤ 7 A
			Cu mm ²	Al mm ²		
0.18	0.7	63 B	1.5		0.6 - 1	6/4
0.25	0.85	71 A	1.5		0.6 - 1	6/4
0.37	1.15	71 B	1.5		1 - 1.6	6/4
0.55	1.55	80 A	1.5		1.6 - 2.5	10/6
0.75	2	80 B	1.5		1.6 - 2.5	10/6
1.1	2.9	90 S	1.5		2.5 - 4	16/10
1.5	3.7	90 L	1.5		2.5 - 4	16/10
2.2	5.2	100 LA	2.5		4 - 6	20/20
3	6.9	100 LB	2.5		6 - 9	25/20
4	9	112 M	2.5		6 - 9	35/25
5.5	12	132 S	2.5		9 - 13	35/35
7.5	16	132 M	6		13 - 18	50/50
11	23	160 M	6		18 - 23	63/63
15	30	160 L	10	16	28 - 42	80
18.5	37	180 M	10	16	28 - 42	80
22	44	180 L	10	16	40 - 52	100
30	59	200 L	16	25	52 - 65	125
37	71	225 S	25	35	60 - 75	160
45	86	225 M	35	50	72 - 100	200
55	104	250 M	50	70	72 - 100	200
75	144	280 S	70	120	102 - 170	250
90	172	280 M	95	150	102 - 170	315

ADMISSIBLE STARTING TIMES (from ABB MOTORS catalogue)

Regarding the increase in temperature, the start-up time cannot exceed the value indicated in the table.

In the event of repeated starts at unchanged rated power, the motor must, before each start-up, have the same temperature as before the first start-up; to ensure the values in the table, it is assumed that the motor is cold.

Size	Starting method	2	4	6	8
63	direct	25	40	-	40
71	direct	20	20	40	40
80	direct	15	20	40	40
90	direct	10	20	35	40
100	direct	10	15	30	40
112	direct	12	15	20	25
	△ / △	36	45	60	75
132	direct	12	12	20	25
	△ / △	36	36	60	75
160-250	direct	15	15	20	20
	△ / △	45	45	60	60

6.7 ROTARY FILTERS

Check the mains have features conform with the data reported on the matriculation plate

Electrically connect the gear motor, checking the direction of rotation.

Check that the gearing chain is well aligned and suitably greased.

Fit the layer of filtering material, checking that the alignment is square so as to ensure correct rewinding.

The manufacturer has enclosed a complete series of documents inside the filter electrical panel, including wiring diagrams, instructions for connections to the equipment, etc.



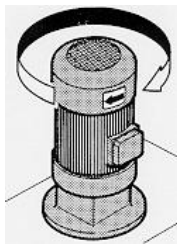
6.8 UMIDIFICATION WITH WATER CIRCULATION

Check the mains have features conform with the data reported on the matriculation plate

Connect the electric pump to the mains power supply using compliant devices (three-phase power supply).

Check the direction of rotation.

Check the power input.



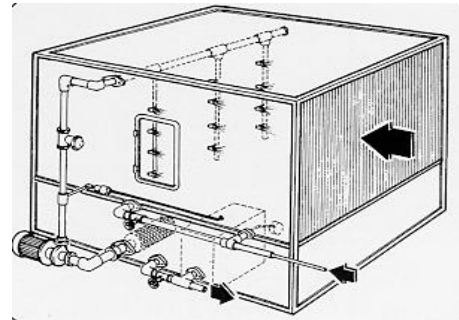
6.9 SPRAY NOZZLE HUMIDIFICATION

Check the mains have features conform with the data reported on the matriculation plate

Connect the electric pump to the mains power supply using compliant devices (three-phase power supply)

Check the direction of rotation.

Check the power input.



6.10 ROTARY HEAT RECOVERY UNIT

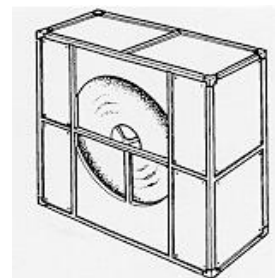
Check the mains have features conform with the data reported on the matriculation plate

For the electrical connections, follow the manufacturer's instructions enclosed with the appliance.

Read the manufacturer's manual

The electrical connections must be carried out to EC standards.

The access door must be fitted with a microswitch.



ELECTRIC HEATERS

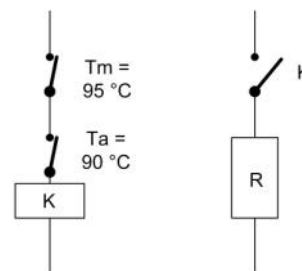
1. Remove the cover of the terminal block
2. Check that the connections of the terminals conform to the power supply voltage.
3. Carry out the earth connection
4. Connect the line cable to the terminal block,

Ta safety thermostat, automatic reset (supplied)

Tm safety thermostat, manual reset (supplied)

K contactor (not supplied)

R electric heaters



7 - START-UP

7.1 Preliminary information

The indicated operations must be carried out by qualified technicians and specifically trained on the product.

Upon request, the after-sales assistance centres execute start-up.

The electric, hydraulic connections and the other work of the system are the responsibility of the installer.

Agree the start-up date with the after-sales assistance centre with sufficient advance

7.2 Preliminary checks

Before starting any check, verify that :

- the unit is perfectly installed and in compliance with that reported in this manual
- the electric power supply line of the unit is isolated at start-up
- the isolation device of the line is open, blocked and equipped with relative signal.

7.3 Hydraulic circuit

Only with hot water coil - humidifier options

- Find out if, before connecting the unit, the hydraulic system has been washed and the washing water drained.
- Check the hydraulic circuit has been loaded and pressurised.
- Check the shut-off valves on the circuit are in "OPEN" position.
- Check there is no air inside the circuit, eventually bleed it through the vent valves in the high points of the system.
- In case of using solutions to be cooled, check the percentage is suitable for the type of use.

Glycol in weight (%)	10	20	30	40
Freezing temperature (°C)	-3.9	-8.9	-15.6	-23.4
Safety temperature (°C)	-1	-4	-10	-19

7.4 Electric circuit

Check the unit is connected to the earth system.

Check fastening of the conductors: the vibrations caused by handling and transport may cause loosening.

Power the unit by closing the isolation device but leave in OFF.

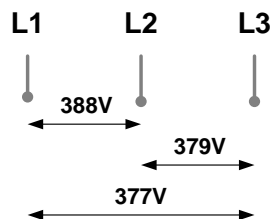
Check the network frequency and voltage values, that are within the limits:

$$400/3/50 \pm 10\%$$

Check the unbalancing of the phases:

must be below 2% .

Example :



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

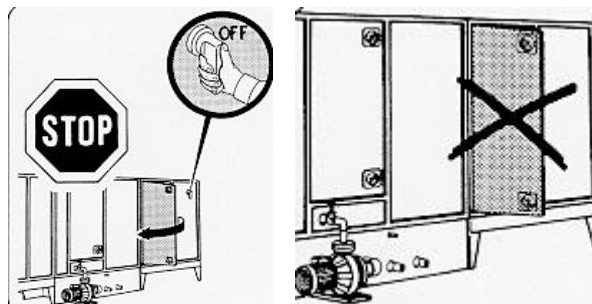
$$2) \text{MAX} - A = 388 - 381 = 7$$

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

Operation outside the limits can entail irreversible damages.

PRECAUTIONS DURING SET UP

- The doors must only be opened when the unit is off. Turn off the fan before working on the unit.
- The retractable handles are not in any case suitable for opening under depression, that is, when fan is in motion.
- When the fan is operating the inspection door must be closed, so as to avoid overloading the motor and activating the thermal overload device.



CHECKS BEFORE AND DURING SET UP

ELECTRICAL PANEL (SUPPLIED BY OTHERS):

Check the calibration of the thermal overload devices.

AIR DISTRIBUTION NETWORK (SUPPLIED BY OTHERS)

Check the position of any dampers; these must be in the position envisaged for normal operation. Otherwise there may be pressure drops in the system that do not correspond to the design specifications, compromising the operation of the air handling unit.

DAMPERS

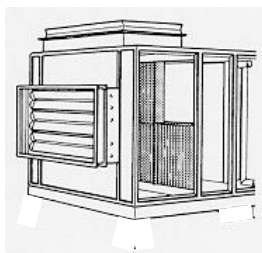
Check the operation of the dampers to avoid starting the fan with the dampers closed. If closed, structural damage may occur on machines fitted with high pressure fans.

CELL FILTERS

Check that the pre-filters have been correctly installed, are these are cell- or bag-type.

The pre-filters must be fitted in the unit the first time it is started.

Check that the gaskets are fitted, to avoid any by-pass of air.



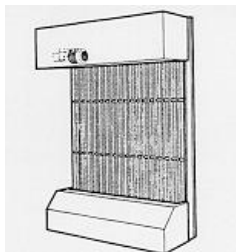
ROTARY FILTERS

Electrically connect the gear motor, checking the direction of rotation.

Check that the gearing chain is well aligned and suitably greased.

Fit the layer of filtering material, checking that the alignment is square so as to ensure correct rewinding.

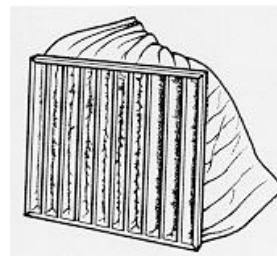
The manufacturer has enclosed a complete series of documents inside the filter electrical panel, including wiring diagrams, instructions for connections to the equipment, etc. Caution: the bag filters, absolute or activated carbon, are fitted to the unit after half an hour of system operation. This operating period cleans the ducting from dust, scoria and other debris resulting from the assembly operations; this will avoid blocking, depleting or damaging the non-regenerable filters.



NON-RIGID BAG FILTERS

Check that the bags are not blocked and that there are no obstacles to the passage of air.

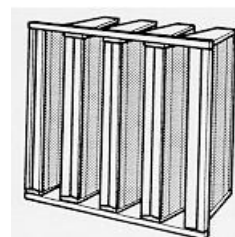
The bags deteriorate quite readily at the attachment to the frame, due to the continuous sagging and the weight of the dust.



RIGID BAG FILTERS

Check that the gaskets are fitted, so as to avoid any by-pass of air.

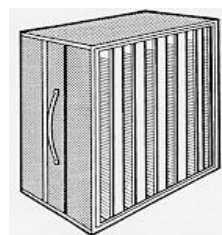
! Handle with care, as the filtering material is made from paper and rather delicate fibreglass.



ABSOLUTE FILTERS

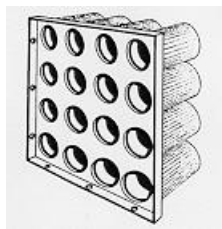
The filter support wall should be checked for deformations that may have occurred when positioning the unit; any cracks must be sealed so as not to allow the by-pass of air.

! Warning: the cells are very delicate, if the filtering material is broken it must be replaced.



ACTIVATED CARBON FILTERS

Check that the cartridges containing the carbon are correctly inserted and check the operation of the air seal gasket.

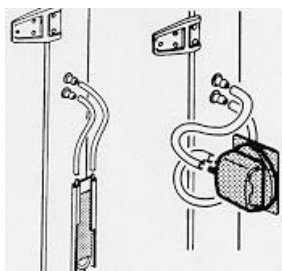


DIRTY FILTER DETECTION DEVICE

Upon request, a differential pressure gauge can be supplied to fit to the pre-filter, bag filter and absolute filter sections.

A differential pressure switch, visual or audible, can also be supplied for the same purpose.

The rotary filter is supplied as standard with a differential pressure switch.



FAN

Remove any safety locking devices from the fan assembly, leaving the shock absorbers in operation.

Check the alignment of the pulley and the tension of the belts (see "Maintenance").

Check the correct direction of rotation of the fan, in reference to the arrow applied.

Check that the operation of the fan assembly is free of vibrations. If not, carefully check the assembly.

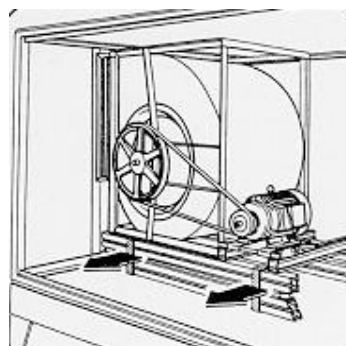
Check that, after the first hour of operation, the temperature of the fan supports does not exceed 60°C.

Measure the effective power input of the motor and compare it against the rated value. If the input of the motor is too high, above the rating, or alternatively is less than envisaged, check the pressure drops in the system circuits.

High power inputs indicate, especially for fans with forward blades, an excessive volume of air due to lower resistance in the circuit, and thus the overloading of the electric motor.

Vice-versa, low input indicates poor air flow due to higher pressure drops than envisaged.

To normalise the system, adjust the transmission to vary the speed of the fan. In no circumstances, in fact, are such problems due to the fans, as these are built in series, extensively tested, and their typical curves are to be considered accurate (except for the max. deviation of 5%, as declared by the manufacturer). The precise calculation of the pressure drops in the entire circuit is thus essential, so as to prevent the above problems.



VOLTAGES

Check the air and water temperatures are within the operational limits.

Start the unit; refer to the "Adjustment" section for indications on the control system.

With the unit running, meaning in stable conditions and near the work ones, check:

- power supply voltage
- unit overall absorption
- absorption of the individual electric loads.

START-UP REPORT

To detect the objective operational conditions is useful to control the unit over time.

With the unit running, meaning in stable conditions and near the work ones, detect the following data:

- Overall absorptions and voltages with unit in full load
- Absorptions of the various electric loads
- Temperatures and flow rates of the various fluids (water, air) at input and output of the unit

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

8.1 Generality

Maintenance must be carried out authorised after-sales assistance centres or by specialised personnel.

Maintenance allows:

- maintaining the unit efficient
- reduce deterioration speed to which each equipment is subject in time
- collect information and data to understand the efficiency state of the unit and prevent possible faults



8.2 Frequency of interventions

Frequency of the inspections must be at least six-monthly. However, frequency depends on the type of use.

- heavy (continuous or highly intermittent, near to operation limits, etc.)
- critical (essential service).

8.3 Machine schedule

Foresee a machine schedule to keep trace of the interventions made on the unit.

In this way, it will be easier to adequately schedule the various interventions and facilitate any troubleshooting.

On the schedule note:

- date
- type of intervention made
- description of intervention
- measurements taken, etc. .

8.4 Stand-by

If foreseen a long period of inactivity:

- disconnect voltage to avoid electric risks or damages following lightning
- prevent the risk of freezing (empty or glycol the sections of the system exposed to negative temperatures, keep any antifreeze heaters powered)

It is advised that start-up after a period of inactivity be carried out by a qualified technician, in particular after seasonal stops or for seasonal switch-over.

Upon start-up, follow that indicated in the START-UP section.

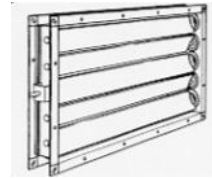
Plan in advance the technician intervention to prevent misunderstandings and be able to use the system when required



8.5 DAMPERS

Extruded aluminium with nylon gears.

This type of damper does not require lubrication, but simply normal cleaning, as there are no parts subject to oxidation.



8.6 FILTERS

The pressure drop values increase in proportion to the storage of dust.

The filter must be cleaned or replaced at regular intervals, depending on the concentration of dust in the air.

If the unit is fitted with the differential pressure gauge for the audible or visual signalling of pressure drops, the operation is simplified, otherwise it must be performed according to experience, establishing the maintenance times on a case-by-case basis.

A series of filter cells should be kept on hand, to avoid extended unit down time, or worse still operation without filters.

8.7 CELL PRE-FILTERS

Pre-filter cells are installed in the unit on U guides, with sliding movement.

These are inserted and removed manually, using a hook where required. The U guides must be clean and the cells inserted correctly side-by-side, to avoid the problem of air by-pass.

CELLS MADE FROM REGENERABLE SYNTHETIC MATERIAL

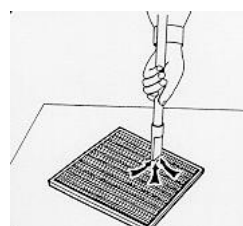
Clean:

- by simply shaking;
- using a vacuum cleaner, making sure to operate the vacuum cleaner in the opposite direction to the flow of air through the filter;
- using drinking water, again in the opposite direction to the air flow;

If no pressure gauge or pressure switch is fitted, the layer of filtering material or the cells must be replaced according to the judgement of the maintenance technician.

METAL CELLS

- Clean with warm water and detergent, or alternatively by immersing in caustic soda, and oil with mineral oil.



8.8 ROTARY FILTERS

Every 6 months clean and lubricate the gear mechanisms and check the tension of the gearing chain.

The filter is always fitted with a differential pressure switch and electrical panel, for the "filter depleted" signal.

CAUTION: the access door to the filter zone is fitted with a microswitch that cuts off power. See the safety standards.



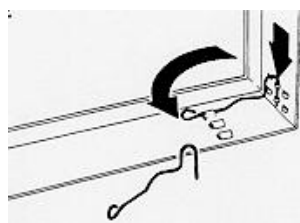
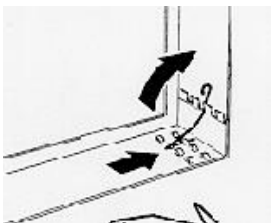
8.9 RIGID AND NON-RIGID BAG FILTERS

- The synthetic pre-filter bags are not regenerable, and can thus be cleaned only a few times by shaking, after which they must be replaced.
- The high-efficiency bags, being non-regenerable, must be replaced. To extend their duration, fit them with a cell pre-filter.
- The gasket, which must be intact and ensure a perfect seal, should be controlled each time the filters are changed, and replaced in the event of anomalies.
- The four fastening springs must all be functional, as a fault in even one of these may cause air by-pass.
- When removing the bag full of dust take care to close the air inlet side (for example, with a sheet of paper) so as to avoid spilling the contents.

The bag filters are installed for operation in metal counter-frames (galvanised - aluminium - stainless steel).

The counter-frame is fitted with a gasket glued to the lip of the filter support, so as to ensure perfect air-tightness and prevent any by-pass.

The filtering cell is fastened to the counter-frame using "removable" springs, as shown.

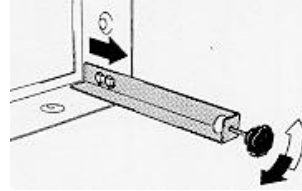


8.10 ABSOLUTE FILTERS

The absolute filters fitted with gaskets are installed in special metal counter-frames.

They are fastened using four tie rods with hand screws.

The tie rods can be removed: see the figure.



8.11 HEAT RECOVERY UNITS

The exchanger must be cleaned delicately and with care, as the fins are rather fragile.

Clean using brushes, a vacuum cleaner or jets of water.

In the rotary recovery unit, also:

- check the transmission belt (degree of wear and tension).
- check the gear motor.
- grease the supports.

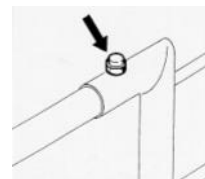
8.12 WATER COIL

Completely discharge the air contained in the pipe through the relief valve, repeating the operation periodically.

Wash the exchanger with jets of water at the start of both seasons, so as to prevent deposits.

For best results in removing deposits, use brushes or suitable chemicals, with great care.

This operation, which involves a number of difficulties, must be performed with maximum care and without haste.



8.13 TANKS

Check and periodically clean the condensate collection basins and humidification tanks.

Clean the corresponding drain traps and check that they always contain water.

8.14 WET DECK HUMIDIFICATION

The duration over time and the absence of faults depends on constant cleaning, the frequency of which depends on various different factors:

- the concentration of dust in the air.
- the hardness of the water.
- the type of operation, run-through water or circulation.
- discontinuous operation.

The wet deck and the honeycomb distributor are assembled on the unit using parts in commercially-available sizes: mm 600x1000.

For the wet deck to dry, the fan must continue running when the humidification function is off, allowing the flow of air to evaporate all the water in suspension.

To clean proceed as follows:

WITH WATER CIRCULATION:

1. Stop the electric pump
2. Close the water shut-off valve
3. Open the drain pipe, so as to empty the water tanks
4. Remove the stainless steel water filter from the pump holder and clean using an ordinary brush
5. Remove the wet deck from the unit
6. Remove the casing panel corresponding to the humidifier
7. Remove the water distributor and the wet deck system
8. Remove the side panels

WITH RUN-THROUGH WATER:

1. Close the water shut-off valve
2. Remove the wet deck from the unit
3. Remove the casing panel corresponding to the humidifier
4. Remove the side panel
5. Remove the wet deck

The wet deck may be washed with water for any slimy deposits, but must be replaced in the case of lime scale deposits.

Remove the upper panel of the honeycomb distributor and clean it using steel pins for the holes.

Wash the inside of the tank and the various components.

! The wet decks must be fitted in the exact correct position in the humidifier.

The air and water flow in a specific direction (counter-current).

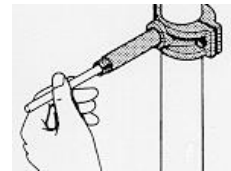
Incorrect positioning affects correct operation (see the section "Reception/Positioning").

When restarting the humidifier, check correct operation.

8.15 SPRAY NOZZLE HUMIDIFICATION

To clean, proceed as follows:

- Cleaning should be performed monthly.
- Check if the spray from the nozzles forms a regular cone, otherwise clean the nozzles by removing the cover and cleaning the holes from any impurities using a simple steel pin. The nozzles applied to the rod are easy to change. Check the rubber gasket.
- Clean the stainless steel water filter screwed onto the intake pipe. This is normally replaced annually.
- At the start and at the end of the operating period, use a brush and a spatula to clean the tank from slurry, with the aid of water and detergent.
- If there are deposits on the fins of the drift eliminators, clean these using a spatula and brush.
- If required, remove the fins on the eliminator.



8.16 ATOMISED WATER HUMIDIFICATION

Systematic preventative maintenance should be performed at weekly intervals, keeping in mind the hardness of the water used.

Check if there is reverse osmosis filtering system

- Once a year remove and clean the nozzles, immersing them in a solution of water and acetic acid to eliminate any lime scale deposits.
- At least once a year vent the connection pipe, to eliminate any sediments, traces of oil and dirt.

Refer to the maintenance manual provided by the manufacturer of the humidifier.

8 - MAINTENANCE

8.17 FANS

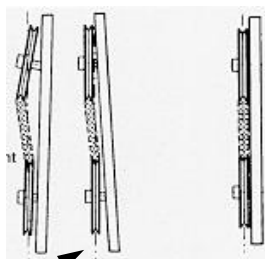
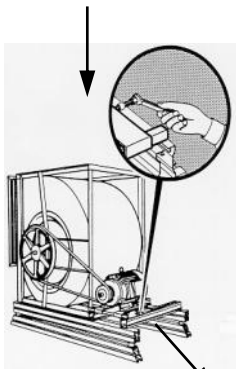
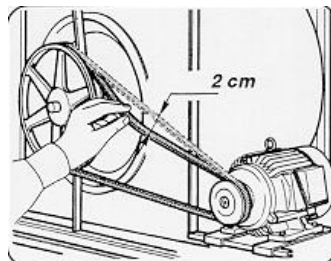
In accordance with the safety standards in force, before working on the motor-fan assembly, check that the main switch is off.

After the first operating period (two days) check the tension of the transmission belts, restoring initial tension as follows:

- Use a normal spanner on the belt tightening slide worm screw. For motors fitted to the fan shroud, use the spanner on the tightening screw.
- The tension of the belts is ideal when they allow flexion of around two centimetres half way between the pulleys.
- Excessive belt tension will damage the bearings.
- Check that the motor and fan axes are parallel and that the pulleys are still aligned.

The fans featuring supports with open-type bearings require periodical lubrication (around every 6 months), whereas the sealed self-lubricating supports do not require maintenance for a maximum of 20,000 operating hours.

The deterioration of the bearings is signalled by an increase in noise and the overheating of the bearings, with the release of liquid grease.



(2)

1. Correct alignment
2. Incorrect alignment

8.18 PULLEYS

The transmission pulleys are fitted to the shafts using conical locking bushes that allow easy replacement.

DISMANTLING

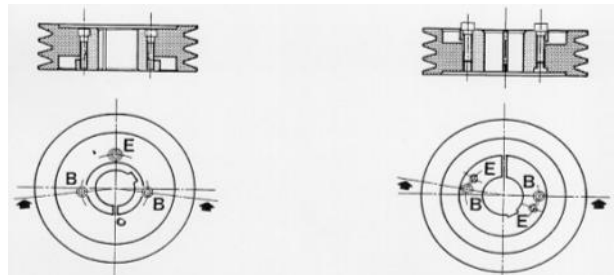
Completely unscrew the locking screws, and fully tighten one of them in the removal opening until the pulley is released.

ASSEMBLY

Carefully clean the conical bore of the pulley. Place the pulley on the bush, ensuring that the corresponding fastening holes are aligned.

Oil the thread and under the head of the screws.

Place the screws in position and then fully tighten them, uniformly and alternately.



B1 = Fixation screw (NORMAL)

B2 = Fixation screws (REVERSIBLE)

E = Removal holes

8.19 ELECTRIC MOTOR - BEARINGS

Check regularly if unusual noises are presents.

High size fans are equipped with grease nipples where grease for bearings must be periodically added.

8.20 Heater humidifier

Refer to the maintenance manual provided by the manufacturer of the humidifier.

- check the water filter
- cleaning and check the cylinder every 90 days
- replace cylinder if is too dirty

9 - TROUBLESHOOTING

GENERAL

The aim of the following sections is to provide possible solutions to a number of anomalies that may arise on the unit.

The information provided does not cover the entire range of possible cases.

The activation of a safety device indicates abnormal operation; before resetting it, check and eliminate the causes.

The following is a list of possible problems and the corresponding causes and solutions.

CAUTION

These operations must be carried out by specialist technical personnel possessing the legal requirements and in compliance with the safety standards in force.

Before performing any checks on moving or live parts, switch the unit off at the mains isolator switch.

ON START-UP

POOR AIR FLOW-RATE:

- Damper not calibrated
- Incorrect direction of rotation of the fan
- Loose belts
- Power supply voltage lower than envisaged
- Resistance of the circuit higher than envisaged or accidental obstructions

EXCESSIVE AIR FLOW-RATE

- Resistance of the circuit lower than envisaged
- Dampers not calibrated
- Filters not installed
- Doors open or panels missing

ELECTRIC MOTOR

- Power input higher than the rated value. Check the problems related to excessive air flow-rate.
- Incorrect direction of rotation. Reverse two phases powering the motor

POOR COIL HEATING CAPACITY

- Insufficient temperature or flow-rate of the thermal carrier fluid
- Incorrect water connections
- Air in the coil. Vent.
- Automatic control malfunctioning
- Unsuitable condensate discharge (steam coils).

INSUFFICIENT HUMIDIFICATION

- Incorrect direction of rotation of the pump. Reverse two phases powering the motor
- Dirty nozzles
- Insufficient water level in the tank, due to defective control by the float

WATER DRAGGED THROUGH THE ELIMINATOR

- Excessive air flow-rate
- Excessive water flow-rate to the humidifier
- Defective seal on the eliminator

EXCESSIVE NOISE

- Fan assembly locking devices still in place
- Defective bearings
- Magnetic howling of the motor due to a voltage drop or manufacturing defect
- Foreign material in the fan shroud
- Vibration of the damper fins
- Howling due to vibration of the ducts, baffles, outlets, diffusers
- Fan "pumping" (excessive back-pressure in respect to the flow-rate)
- Excessive air flow-rate

IN OPERATION

DECREASE IN AIR FLOW-RATE

- Increase in circuit resistance due to dirty filters or the formation of frost
- Increase in circuit resistance due to fin coils blocked by deposits
- Increase in circuit resistance due to non-calibrated dampers
- Increase in circuit resistance due to deposits in the wet deck
- Increase in circuit resistance due to dirty heat recovery unit
- Faulty transmission
- Accidental obstructions or blocked components in the air distribution network

EXCESSIVE AIR FLOW-RATE

- Decrease in circuit resistance due to non-calibrated dampers
- Decrease in circuit resistance due to missing or damaged filters
- Decrease in circuit resistance due to open doors
- Decrease in circuit resistance due to non-calibrated outlets

ELECTRIC MOTOR

- Power input higher than the rated value. Check the problems related to excessive air flow-rate.
- Incorrect direction of rotation. Reverse two phases powering the motor

POOR COIL HEATING CAPACITY

- Insufficient temperature or flow-rate of the thermal carrier fluid
- Reduced air flow-rate
- Air in the coil. Vent.
- Automatic control malfunctioning
- Condensate discharge malfunctioning (steam coils)

INSUFFICIENT HUMIDIFICATION

- Dirty water filter
- Dirty nozzles
- Deposits in the wet deck
- Insufficient water level in the tank, due to defective control by the float or accidental leaks

WATER DRAGGED THROUGH THE ELIMINATOR

- Excessive air flow-rate
- Excessive water flow-rate to the humidifier
- Defective seal on the eliminator

EXCESSIVE NOISE

- Slipping of the belts
- Defective bearings
- Magnetic howling of the motor due to a voltage drop or manufacturing defect
- Foreign material in the fan shroud
- Vibration of the damper fins
- Howling due to vibration of the ducts, baffles, outlets, diffusers
- Loosening of the wheel on the shaft
- Loose fan cut-off
- Loose motor cooling fan
- Excessive air flow-rate

10 - TECHNICAL INFORMATION

Characteristics of the casing according to "EN 1886"

Classified characteristic	polyurethane foam	mineral wool
Mechanical strength of the casing	D1	D1
Air-tightness of casing - 400 Pa	L1	L2
Air-tightness of casing + 700 Pa	L1	L2
Filter bypass	F9	F9
Transfer factor	T2	T3
Heat bridge factor	TB3	TB3

Frequency	Hz	125	250	500	1000	2000	4000	8000
Acoustic abatement (polyurethane foam)	dB	6	11	12	14	13	29	36
Acoustic abatement (mineral wool)	dB	11	14	15	20	20	28	36

11.1 Disconnection

The disconnection operations must be carried out by qualified technicians.

- Avoid pouring or leaking in room.
- Before disconnecting the unit recover, if present :
 - the coolant gas
 - solutions to be cooled present inside the hydraulic circuits
- While awaiting dismantling and disposal, the unit can be stored, even outdoor, as bad weather and temperature changes do not cause damaging effects for the environment, as long as the unit has the electric, cooling and hydraulic circuits intact and closed.

11.2 Dismantling

FOR DISMANTLING AND DISPOSING THE UNIT MUST ALWAYS BE DELIVERED TO AUTHORISED CENTRES.

During dismantling, the fan, the motor and the coil, if working, may be recovered by the specialised centres for an eventual reuse.

All materials must be recovered or disposed or in compliance with the relative national standards in force.

For further information on the dismissal of the unit, contact the manufacturing company.

11.3 EC WEEE Directive

The units falling within the standard in question are marked with the symbol at the side.

With a view of respecting the environment, our units are manufactured in accordance with EC Directive on waste electric and electronic equipment (WEEE).

The potential effects on the environment and on personal health, due to the presence of dangerous substances, are reported inside the use and maintenance manual, in the residue risks section.

If necessary, additional information to that listed below can be requested from the manufacturer/distributor/importer, as responsible for the collection/treatment of waste deriving from equipment contemplated by EC - WEEE, and the dealer from where the equipment was purchased or the local services in charge of waste collection.

The EC-WEEE Directive foresees that the disposal and recycling of electric and electronic equipment, indicated therein, are compulsorily managed through appropriate collection, in adequate centres, separate to that used for the disposal of mixed urban waste.

The user must not dispose of the equipment at the end of its life-span, as urban waste, but convey it to appropriate collection centres, as foreseen by the current standards or indicated by the distributor.



The materials used for the construction of or that are present in the components are listed in the table.

Material	Use	Quantity in relation to the weight of the	Present
Steel plate	Base, panels, stoppers, motor, fan, drift eliminators	High	Always
Aluminium	Frame, fan frame, motor casing, coils, dampers, condensate	High	Always
Copper	Coils, motor	Medium	Always
Polyurethane	Panels	High	Optional
Mineral wool	Panels, silencers	High	Optional
Rubber	Gaskets, antivibration mounts, antivibration canvas	Low	Always
Nylon	Handles, hinges	Low	Always
Paper	Wet deck	Medium	Optional

NOTE:

For further information on the decommissioning of the unit, contact the manufacturer.

12 - RESIDUE RISKS

Generality

The most common situations, as they cannot be controlled by the manufacturer, that may give rise to risk situations for things or persons are found in this section.

Dangerous area

It is the area in which only an authorised operator can act. The dangerous area is the area inside the unit, accessible only via removal of the cowling or parts of it.

Handling

The handling operations, if carried out without all the necessary safety devices and without the due caution, can cause the falling or overturning of the unit with consequent damages, even serious, to things, persons and the unit itself.

Handle the unit following the instructions on the packaging, in this manual and according to the local standards in force.

In case of coolant gas leak, refer to the coolant "Safety sheet".

Installation

An incorrect installation of the unit can cause water leaks, condense storage coolant leaks, electric shocks, fires, malfunctioning or damages to the unit itself.

Check installation is carried out only by qualified technical personnel and that the instructions in this manual and the local standards in force are complied with.

The unit installation in a place where, even occasionally, the flammable gas leaks and consequent storage of these gases in the area around the unit itself, can cause explosions and fires.

Installation of the unit in an unsuitable place to support the weight and/or guarantee an adequate anchoring, can cause the falling and/or overturning, with consequent damages to things, persons or the unit itself.

Carefully check positioning and anchoring of the unit.

The easy access to the unit by children, unauthorised persons or animals, may give rise to accidents and injuries, even serious.

Install the unit in places accessible only by authorised personnel and/or foresee protections against intrusions in the dangerous area.

General risks

Burnt odour, smoke or other signs of serious anomalies may show the arising of situations that can cause damages to things, persons or the unit itself.

Electrically isolate the unit (yellow-red isolator).

Contact the after-sales authorised assistance centre to identify and resolve the problem at origin of the anomaly.

The accidental contact with exchange coils, compressors, supply piping or other components can cause injuries and/or burns.

Always wear adequate clothing that includes protective gloves for operations inside the dangerous area.

Maintenance and repair operations carried out by unqualified personnel can cause damages to things, persons or the unit itself.

Always contact a qualified after-sales assistance centre.

The lack in closing the unit panels, or lack in checking the correct fastening of all fastening screws of the panelling, can cause damages to things, persons or the unit itself.

Periodically check closing of all panels and their correct fastening.

In the event of fire, the coolant temperature can reach values such to bring the pressure over the safety value, with consequent possible projection of coolant or explosions of the circuit that remain isolated from closure of the cocks.

Do not stand near the safety valve and never leave the cooling system cocks closed.

Electrical part

An incomplete connection line to the electric mains and/or with incorrectly dimensioned cables, and/or with inadequate protective equipment, can cause electric shocks, intoxication, damages to the unit or fires.

Carry out all work on the electric system with reference to the wiring diagram and this manual, assuring use of a dedicated system.

An incorrect fastening of the lid of the electric components can favour entry of dust, water, etc. inside and consequently cause electric shocks, damages to the unit or fires.

Always securely fasten the lid to the unit.

The metal masses of the unit, when powered and not correctly connected to the earth system, can cause electric shocks or death for electrocution.

Carefully execute connection to the earth system.

Contact with the accessible powered parts inside the unit after the removal of guards can cause electric shocks, burns or death for electrocution.

Open and padlock the main isolator before removing the guards and signal the works in progress with relative sign.

Contact with parts that may power due to unit start-up, can cause electric shocks, burns or death for electrocution.

When not necessary.

Moving parts

Contact with the transmissions or suction of the fans can cause injuries.

Before accessing inside the unit, open the isolator on the unit connection line, padlock it and expose appropriate sign.

Contact with the fans can cause injuries.

Before removing the protective grilles or fans, open the isolator on the unit connection line, padlock it and expose relative sign.

Coolant

The intervention of the safety valves and the consequent coolant gas expulsion can cause injuries and intoxication. Always wear adequate clothing and protective goggles for operations inside the dangerous area.

In case of coolant gas leak, refer to the coolant "Safety sheet".

Contact between naked flames or sources of heat with coolant, or the heating of the pressurised gas circuit (e.g. during welding), can cause explosions or fires.

Do not place any source of heat inside the dangerous area.

The maintenance or repair interventions requiring welding must be done with system drained.

Hydraulic part

Defects in the piping, in the connections or in the shut-off parts, can cause water leaks or projections, with consequent damages to things or short circuits of the unit.

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