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# HC

**13-16-20-25-30-40-50-60**  
**80-100-120-150-190-240**  
**300-360-450-580-720**

AIR HANDLING UNITS



**Installation and Use Manual**

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General

Connection/Installation

Maintenance

### GENERAL WARNINGS

This manual has been designed to enable the unit to be installed, started up and maintained correctly, making it essential to observe the following points:

- these instructions should be read carefully;
  - the unit must be installed, tested and maintained by expert personal who meet the relevant legal requirements (Italian law No. 46 of 5/3/1990).
  - The manufacturer declines all liability for any electrical and/or mechanical changes to the unit, which also invalid its guarantee. Any operations whatsoever that have not been expressly authorised and do not respect the information in this manual shall invalidate the guarantee.
  - Observe the local safety regulations in force when installing the unit.
  - Make sure the power supply conforms to the data on the unit's rating plate, located inside the door of the main electrical panel.
  - This manual and the unit's wiring diagram should be carefully stored so that they are readily available to the operator when required.
  - The packaging material (plastic bags, polystyrene foam, nails, etc.) is potentially dangerous and should therefore be kept away from children and recycled in compliance with the local regulations in force.
  - The unit must only be used for the specific purpose it was designed, as described in the paragraph GENERAL TECHNICAL SPECIFICATIONS. Any use other than that specified does not imply any commitment or constraint by the manufacturer in any way whatsoever.
  - Switch off the unit in the event of faults or poor operation.
  - Only have repairs carried out by a service centre authorised by the manufacturer, and insist on the use of original spare parts only.
- Failure to comply with the above may compromise the safety of the unit.

The manufacturer declines all liability for any damage that may be caused whether directly or indirectly to persons or things if these instructions are not heeded.

### GENERAL SPECIFICATIONS

#### CASING:

The series of HC air handling units features casing with a load-bearing frame and sandwich panels.

#### FRAME:

Extruded anti-corrosion aluminium alloy sections, assembled using die-cast aluminium corner joints. Heat insulation versions are also available.

#### PANELS:

Sandwich panels, total thickness 46mm with internal insulation made from:

- polyurethane foam (std)
- mineral wool (opt.)

Contained between two metal plates:

- galvanised steel
- light grey plastic-coated galvanised steel (std)
- peraluman
- AISI 304 stainless steel

#### FASTENING THE PANELS:

The panels are fastened using self-tapping screws inserted into special nylon bushes, ensuring optimum tightness of the screws without deforming the panel. A rubber gasket placed between the panel and the frame ensures perfect air-tightness.

#### ROOF:

In the event of outdoor installation, a roof made from fretted embossed aluminium plate is available. Assembly is the responsibility of the customer, using the screws and brackets supplied.

#### INSPECTION DOORS:

Fitted with hinges and handles. The handles are fitted flush and feature a mechanism for adjusting the closing pressure. The doors in the pressurised zones open inwards for reasons of safety and so as to be self-sealing. The doors can optionally be fitted with inspection portholes.

#### BASE:

Made using "C"-shaped galvanised steel plate, fastened at the ends to die-cast aluminium joints with holes for lifting the sections. Set out around the entire perimeter of the unit. The height of the base is as follows:

- 100mm: HC 013 ÷ HC 300
- 140mm: HC 360 ÷ HC 720
- 380mm: all sizes with nozzle humidifiers (total height base + feet)

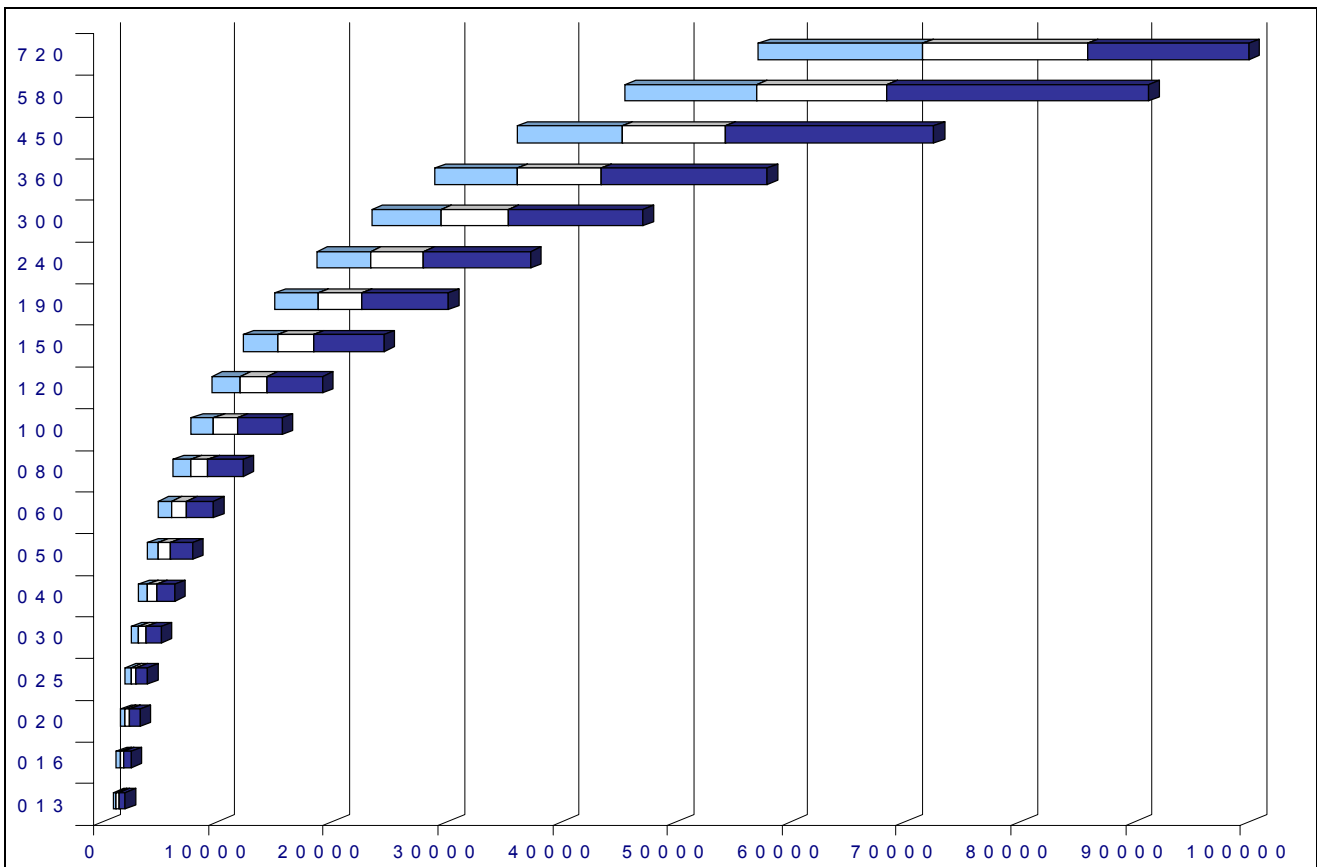
CHARACTERISTICS OF THE CASING ACCORDING TO "EN 1886"

Classified characteristic	Table EN 1886	Class
Mechanical strength of the casing	1	2A
Air-tightness of casing - 400 Pa	2	A
Air-tightness of casing + 700 Pa	3	A
Filter bypass	4	F9
Heat transfer factor	5	T2
Heat bridge factor, base version	6	TB3
Heat bridge factor, with heat insulation	6	TB2

Centre band frequency	Hz	63	125	250	500	1000	2000	4000	8000
Acoustic abatement	dB	8	11	23	29	36	34	31	29

**OPERATING LIMITS**

The diagram shows the operating fields envisaged for the 19 sizes of the HC series, in relation to the front speed at the heat exchanger coils.



Air flow-rate:

- A. Front speed from 2 to 2.5 m/s:
  - Recommended for reducing energy consumption in units with large numbers of components.
  - Suitable for air-conditioning.
  - Suitable for fan heating.
  
- B. Front speed from 2.5 to 3 m/s. Average range:
  - Suitable for air-conditioning with the use of drift eliminators for the cooling coils and the humidifiers.
  - Suitable for fan heating.
  
- C. Front speed from 3 a to m/s:
  - Recommended for reducing the overall dimensions of the unit.
  - Suitable only for fan heating.

General

Connection/Installation

Maintenance

Component	Size	UOM	Limit	Notes
Casing	Max. pressure	Pa	2000	
	Max depression	Pa	2000	
Water heat exchanger coils	Max. operating pressure	kPa	2000	
	Max. temperature pipe side	°C	120	Higher values upon request; in this case, see the technical specifications enclosed with the machine
	Min. temperature pipe side	°C	5	Without glycol
	Max front speed without drift eliminator	m/s	2.6	Cooling coils
Plate heat recovery units	Max. pressure differential	Pa	400	
Humidifiers	Max front speed without drift eliminator	m/s	2.6	
Fans	Max. rotation speed	RPM	as supplied	Before modifying the transmission, contact the office
	Max. power input	kW	as supplied	Before modifying the transmission, contact the office

## DIMENSIONS

Refer to the drawing enclosed with the machine.

## SOUND LEVELS

Refer to the technical sheet enclosed with the machine.

## INTENDED 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).

## ADDITIONAL SAFETY PRECAUTIONS

This unit has been especially designed and manufactured so to prevent any risk to persons and health hazard.

For this reason, design solutions fit to eliminate (where possible) any cause of risk and sensibly reduce the probability of danger have been adopted.

Please refer to the "Residual Risks" section of this manual and strictly observe the behaviour prescriptions listed there in order to prevent any possible risk that hasn't been possible to avoid in the design stage.

## - REGULATIONS AND CERTIFICATIONS -

### UNI EN ISO 9001 CERTIFICATION

Clivet S.p.A., in order to guarantee customer satisfaction, has chosen the ISO 9001 Quality System as the reference for all its business activities. This is demonstrated by the company's commitment to ongoing improvements in the quality and reliability of its products; its sales, design, purchasing, production and after-sales service activities are the means used to reach such purpose.



### CE MARK

Clivet products bear the CE mark, in compliance with the requirements of the following EC directives, including the latest amendments, and with the corresponding national approximated legislation:

- 98/37/CE
- 89/336/CEE as modified by the directives 92/31/CEE and 93/68/CEE
- 73/23/CEE as modified by the directive 93/68/CEE



General

Connection/Installation

Maintenance



### UNIT IDENTIFICATION

The units are identified by the serial number label shown to the side.

The label shows the type of equipment (series and size), the serial number, the main operating data and the year of construction.

The label is applied to the external panelling of the outlet fan section, on the inspection side.

The label must not be removed for any reason.

		Z.I. 32030 VILLAPAIERA FELTRE (BELLUNO) ITALIA			
TIPO TYPE GERÄTE TYP TYPE MODELO	_____	APPARECCHIO SERIE UNIT SERIES GERÄTE SERIENNUMMER APPAREIL SERIE NUMERO SERIE	_____		
				MANDATA SUPPLY ZULUFT SOUFFLAGE IMPULSION	RIPRESA RETURN ABLUF REPRISE RETORNO
PORTATA / FLOWRATE / MENGE / DEBIT / FLUJO		m <sup>3</sup> /h	_____		
PRESIONE UTILE / EXT.STATIC PRESSURE / ÄUSSERER STATISCHEN DRUCK / PRESSION STATIQUE UTILE / PRESION ESTATICA UTIL		Pa	_____		
F.L.I.		kW	_____		
TENSIONE / VOLTAGE / SPANNUNG / TENSION		V/Ph/Hz	_____		
PRESS.MASS.BATTERIE / MAX COIL PRESSURE / MAX WAERMETAU- SCHERDRUCK / PRESS.MAX BATTERIE / MAX PRESION BATERIAS		kPa	_____		
ANNO DI FABBRICAZIONE / MANUFACT. YEAR / HERSTELLUNGSJAHR ANNEE DE FABRICATION / AÑO FABRICATION			_____		

### INSPECTION UPON RECEPTION

The units are normally shipped without packaging. Upon request, they can be sent on pallets, in crates or in boxes.

When it arrives, check the unit has not been damaged during transport and that it has been supplied complete with all the parts specified in the order. If there is any visible damage make a note of it on the transport document, accompanied by the words: "ACCEPTED WITH RESERVATIONS DUE TO OBVIOUS DAMAGE TO PACKING" since delivery free to factory includes cover for damage to be borne by the insurers, in compliance with Italian law no. 450 dated 22/08/85 "limite di risarcibilità".

#### IMPORTANT

ALL THE FOLLOWING OPERATIONS MUST BE CARRIED OUT IN COMPLIANCE WITH THE SAFETY STANDARDS IN FORCE, RELATING TO BOTH THE EQUIPMENT AND THE METHODS USED.

#### CAUTION

BEFORE PERFORMING THE HANDLING OPERATIONS, CHECK THAT:

- THE HOISTING CAPACITY IS SUITABLY-RATED FOR THE WEIGHT OF THE UNIT IN QUESTION
- THE DISTRIBUTION OF THE WEIGHTS AND THE POSITION OF THE CENTRE OF GRAVITY MUST BE CAREFULLY CONSIDERED
- THE WEIGHT CAN BE SEEN ON THE DRAWING SUPPLIED WITH THE MACHINE.

#### WARNINGS

THE INSTRUCTIONS PROVIDED ON THE OUTSIDE OF THE PACKAGING MUST BE FOLLOWED SO AS TO ENSURE THAT THE UNIT IS PHYSICALLY INTACT AND FUNCTIONAL, TO THE BENEFIT OF THE END USER. THEREFORE, PLEASE HEED THE FOLLOWING WARNINGS:

- HANDLE WITH CARE
- KEEP DRY
- ALWAYS PLACE THE UNIT VERTICALLY
- AVOID STACKING OTHER OBJECTS ON THE UNITS AT ALL COSTS

### HANDLING

Special attention must be paid during the loading, unloading and transport operations. The units fitted with support feet allow them to be easily lifted using a forklift or alternatively suitable cables or straps.

The units without feet are fitted with a metal base structure featuring holes for fastening hooks or inserting pipes that simplify hoisting by cable.

Special eyebolts are fitted to special or large units.

! Do not leave the load suspended above the ground.

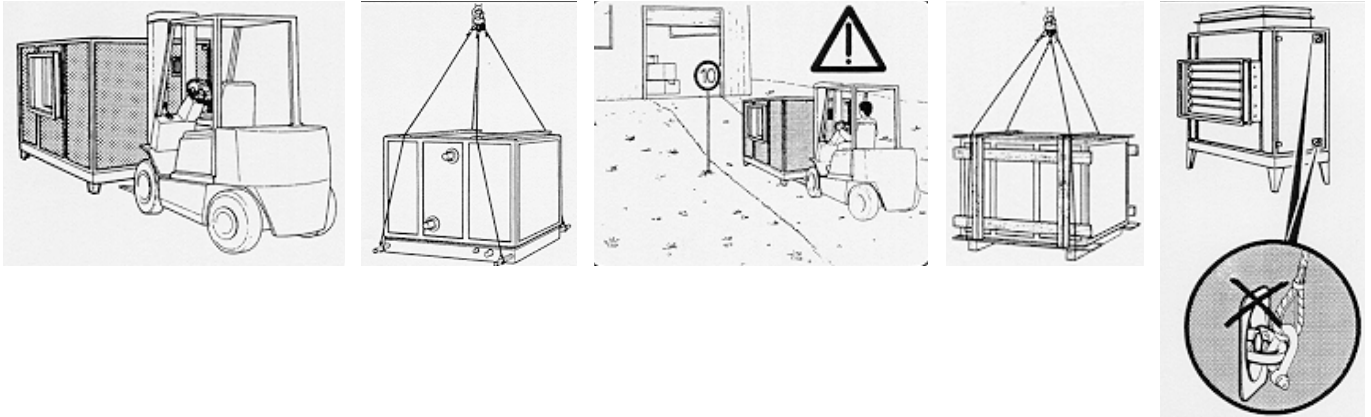
! During movements proceed at low speed, pay attention to the admissible inclinations.

! When unloading the unit from the means of transport, positioning the unit and assembling the sections, avoid damaging the casing and the more delicate components, such as: rotors, bearings, coils, etc.

The various sections must be loaded and unloaded with special care paid to the protruding parts: hinges, handles, water fittings, etc., which should under no circumstances be used as grips or supports for the assembly movements.

To limit the risk of damage:

- apply a protective cover to the casing when using cords for unloading the unit and spacer bars between the lifting rods.
- do not drop the unit but rather rest it down carefully, so as to avoid cutting blows to rivets, screws, etc.



## REMOVING THE PACKING

When removing the packaging the operator should, for personal safety, use suitable protective materials (gloves, glasses etc.)

Check for any visible damage.

Dispose of the packaging by taking it to specialist collection or recycling centres (in accordance with local regulations).

Remove the PVC and polystyrene packaging and the corresponding fasteners, making sure not to damage the unit.

## POSITIONING AND FUNCTIONAL CLEARANCES

- The unit support surface must be level so as to avoid detrimental stress on the panels and on the frame when coupling the sections together.
- The unit must be positioned using a spirit level, adding spacers where required to the supports, so as to allow the easy opening of the inspection doors.

! The unit can be installed directly on floors able to support its weight.

- It is in any case useful to built, from scratch, a base made from concrete or metal section bars.
- Normally the installation of shock absorbers between the base of the unit and the floor is not required, as the internal moving parts are dynamically isolated from the structure. If in special cases antivibration supports are required between the unit and the floor, contact the manufacturer.
- The hanging units must be suspended from the ceiling using special tie rods that are suitably rated for the overall weight of the unit.

The installer must make sure that the position of the unit allows all maintenance and component replacement operations to be performed. In particular:

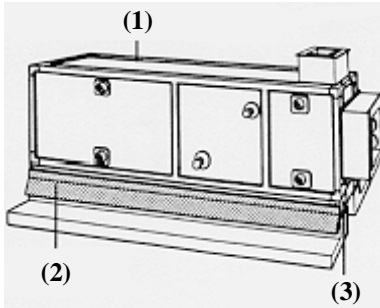
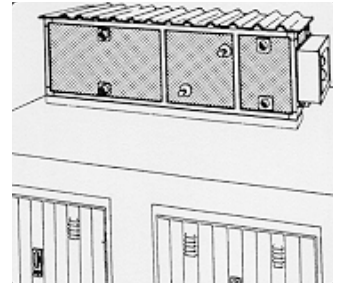
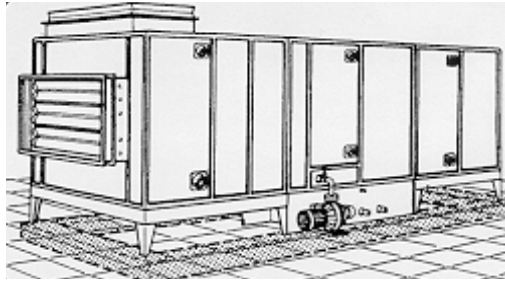
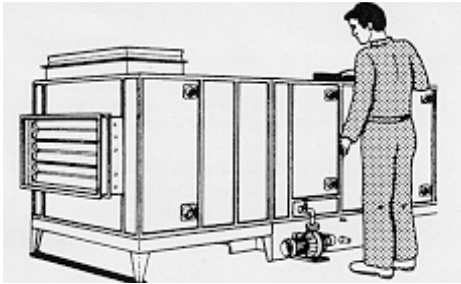
- a corridor whose width is equal to the length of the finned coils (approximately equal to the width of the machine) must be available to allow the removal of the coils.
- on the sides with inspection doors, a corridor must be left to allow the doors to be opened completely, and in any case no less than 600mm
- before positioning the unit, remember to arrange the head of the drain trap and calculate the incline of the drain pipe.

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.

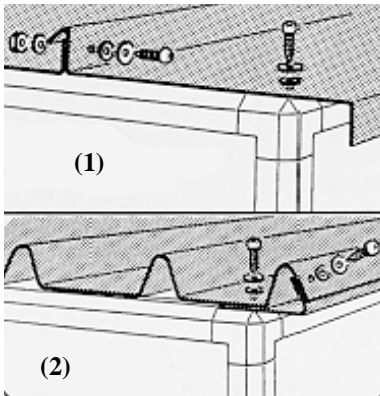
- Special attention should be paid to the seal gaskets.
- Any flashing fitted to the base must be installed so as to prevent the infiltration of water, therefore pay special attention to the gasket and the silicon seals. The height of the step supporting the unit must be sufficient to avoid any water 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.



1. Protection ondolux
2. Flashing
3. Gasket



1. Aluminium roof
2. Fiberglass roof

## WEIGHT DISTRIBUTION AND CENTRE OF GRAVITY

The weights can be seen on the drawing enclosed with the machine.

Check the position of the centre of gravity by gradually lifting the machine, before hoisting it for unloading or positioning.

## STORAGE

The Units must be stored in a dry place, protected from atmospheric agents.

- Keep away from: direct sunlight, rain, sand and wind
- Temperature: maximum 60°C minimum -10°C
- Maximum humidity: 90%

Protection against oxidation is guaranteed in such conditions.

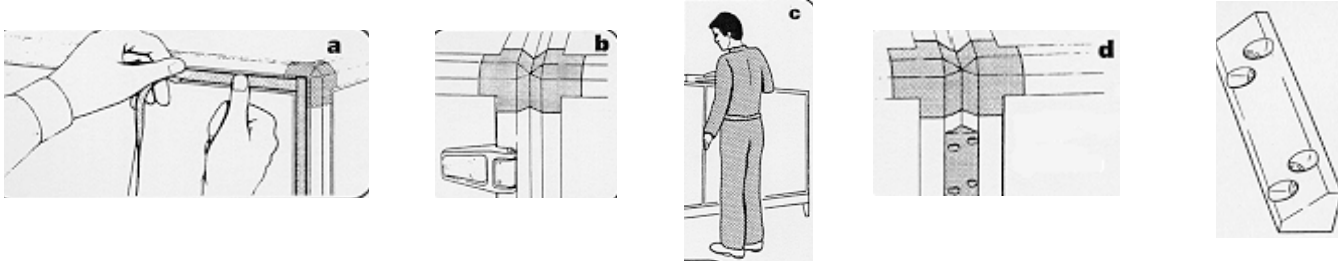
CLIVET does not supply, except when specifically requested by the customer, machines with protection against rain, dust or the like on the air inlets or outlets. Any protection covers must be removed when positioning the unit.

! Important: the panels are externally protected by a plastic film (except for the galvanised/galvanised panels). The protective film must be removed within two weeks of being exposed to atmospheric agents: after this, it may be impossible to remove.

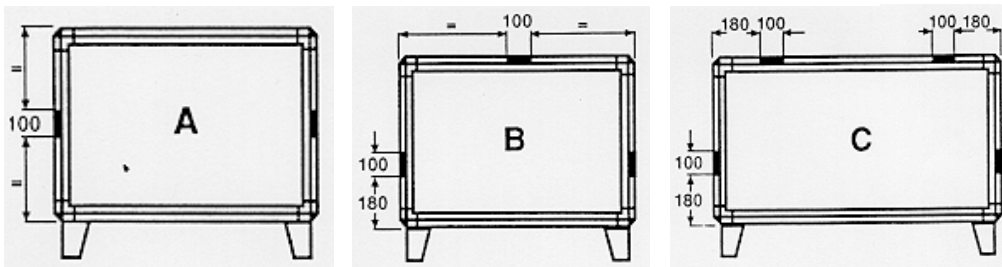
## JOINING THE SECTIONS

When installing units made up of a series of sections, pay special attention to the identifying plates on the various sections. The sections are joined on the outside of the unit, using joining blocks, as per the table below. After having applied the self-adhesive gasket (a), bring the parts together so that they are perfectly aligned (b), making sure during this operation that the unit is level (c). Apply the joining blocks, made from thermoplastic material, to the rounded edge of the section bars; the wedge shape of the blocks helps ensure the perfect alignment of the parts (d).

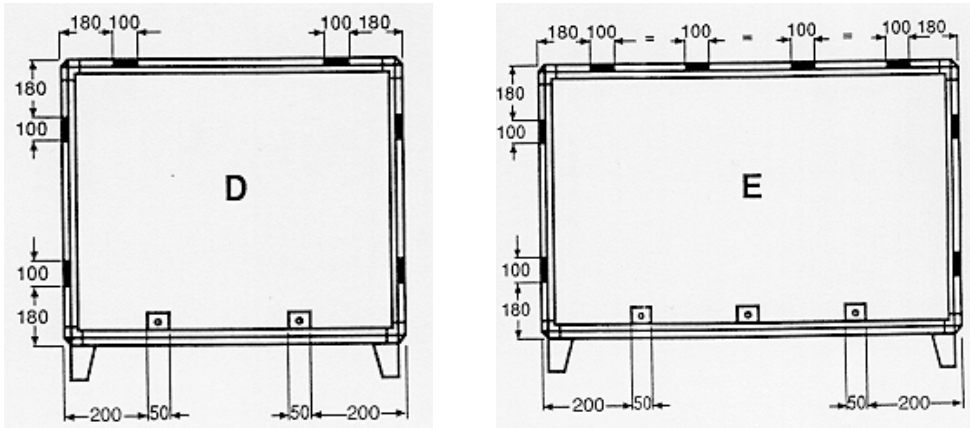
The gasket, the blocks and the fastening screws are inside the bag supplied.



### BLOCKS FASTENED WITH SELF-THREADING SCREWS



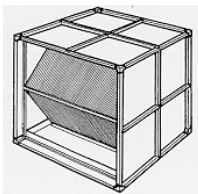
### BLOCKS FASTENED WITH SELF-THREADING INSERTS



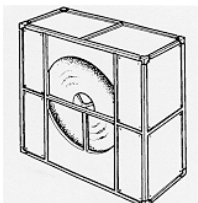
HC	Type of assembly
013	A
016	A
020	A
025	A
030	B
040	B
050	B
060	B
080	C
100	C
120	C
150	C
190	C
240	D
300	D
360	D
460	E
580	E
720	E

## 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.

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## - RESIDUAL RISKS -

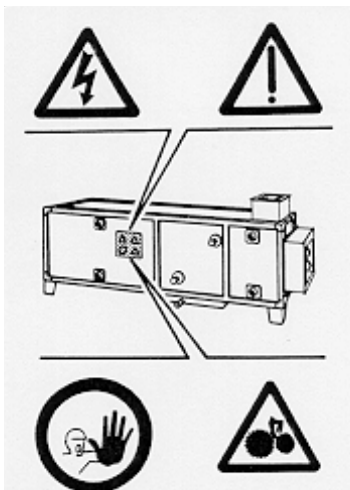
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### SAFETY INSTRUCTIONS

#### CAUTION

THIS BULLETIN DESCRIBES EVERY OPERATION THAT MAY CAUSE A SITUATION OF RISK, AS WELL AS THE PRECAUTIONARY MEASURES TO BE HEEDED IN EACH CASE

#### GENERAL



Residual risks identify all dangers that cannot be totally eliminated by the design and protection techniques, or alternatively involve non-evident potential dangers.

All UNITS feature pictograms with danger warnings.

The drawing shows the positions and the various warnings.

The units are safe machines as long as they are not tampered with or the safety devices removed.

Technical preparation, the observance of the procedures illustrated in this manual and the signs placed on critical points of the unit in any case ensure safe operation.

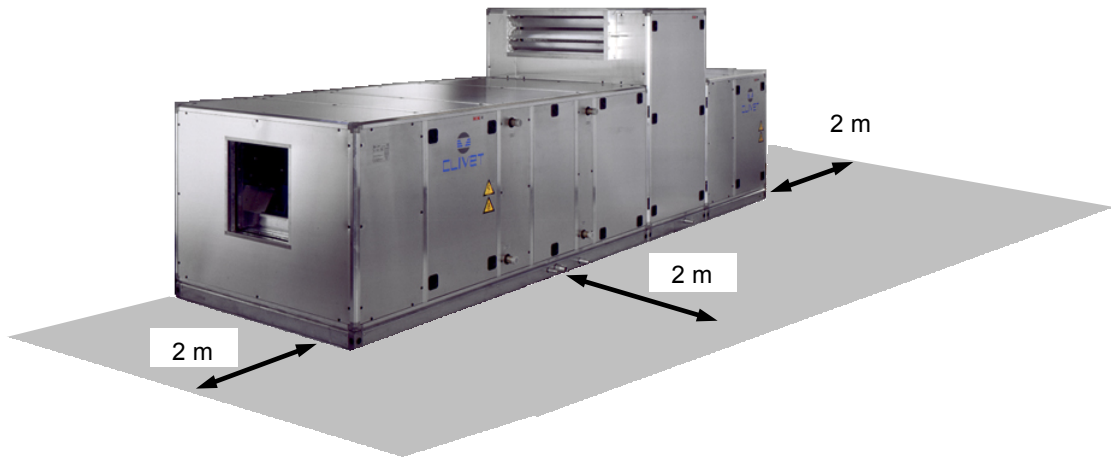
During the installation, commissioning, operation maintenance of the air handling units, the following safety warnings must be heeded:

- Pay attention when lifting the unit, as the centre of gravity may be off-centre.
- Pay attention when fastening the hoisting cables/hooks.
- Do not operate the unit without having connected the unit and its electrical components to the building's earth system.
- Do not operate the unit without having connected the fan outlet to a duct or alternatively having protected it with safety mesh.
- Do not use the unit as support for other machinery
- Do not use the unit as a walkway or trestle
- Do not use the unit to store equipment, spare parts, etc.
- Before accessing the unit, check that all the electrical utilities are disconnected. In particular, before opening the inspection doors, check that the fan is off and cannot be started without the person working on the unit knowing.
- Avoid opening the inspection doors when the fan is in operation, especially in the pressurised sections of the unit.
- Always replace the protective cover of the fan section before re-starting the fan.
- Do not leave the doors partially closed; check that all the handles or the knobs are properly closed.
- Beware of the edges of metal plates inside the unit.
- Beware of the corners of the roof in the outdoor units.
- Beware of possible burns from the heating coils
- Beware of possible burns from steam humidification systems
- Beware of the motorised dampers, as these may close without warning.

## DEFINITION OF DANGER AREA

The figure below highlights the area in which only authorised personnel may operate.

- External danger zone, identified by a precise area around the unit and its vertical projection on the ground in the case of hanging unit.
- Internal danger zone, identified by the area that can be entered only after having intentionally removed the protecting panels or parts of these



## SAFETY PRESCRIPTIONS

To avoid injury to the user, third parties or the authorised personnel and damage to property, the following instructions **MUST** be heeded; incorrect use due to these instructions being neglected may cause damage or injury, the seriousness of which is classified according to the following symbols:



- WARNING: if used improperly may lead to serious injury



- DANGER: may lead to serious injury, death, etc.



- PROHIBITION: may damage the appliance and consequently the health of the user

### WARNING!



- Avoid accidental contact with the exchanger coils, by always using protective gloves and applying the special protective grilles. Contact may cause minor injuries.

- Use protective gloves to avoid injury due to contact with sharp edges.

### DANGER!



- Pay special attention to the correct sizing of the cables and the protection devices on the mains power connection line, so as to avoid possible fires due to short circuits or the overheating of the cables upstream of the machine's isolator switch, which may cause death by serious burns and intoxication.

- Pay special attention when earthing the metal earth of the machine, making sure that the metal earth is not live and may thus cause death by electrocution.

- Make sure the main isolator switch is open and padlocked before removing guards, in that contact with the live parts that are accessible after having removed the guards may cause death by electrocution or serious burns.

### PROHIBITIONS



- Do not access the inside of the unit without opening the isolator switch on the unit's power supply line (installed by the customer), to avoid injury due to contact with the fan drive and inlet.

## - DECOMMISSIONING OF THE UNIT -

### DISCONNECTING THE UNIT

- The units must be disconnected by authorised personnel, who before proceeding must first read the Residual Risks section in this manual.

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

1. the refrigerant (if the circuits cannot be isolated): the refrigerant must be removed using suction devices operating in a closed circuit, so as to ensure that none of the compound is released into the atmosphere.

2. the antifreeze in the circuits: when removing this fluid, make sure that none leaks or is released into the environment. The antifreeze fluid must be stored in special containers.

**IMPORTANT:**

When recovering the substances present in the unit, all measures must be taken to avoid damaging persons and things and polluting the surrounding area.

- During the disconnection operations for the decommissioning of the unit, all the identification plates located on the unit must be removed and destroyed, and the manufacturer notified of such action.

- 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.

### 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.

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 machine	Present
Steel plate	Base, panels, stoppers, motor, fan, drift eliminators	High	Always
Aluminium	Frame, fan frame, motor casing, coils, dampers, condensate collection basins, drift eliminators	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	Low	Optional

**NOTE:**

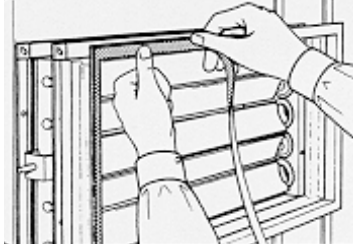
For further information on the decommissioning of the unit, contact the manufacturer.

### AERAILIC CONNECTIONS

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.

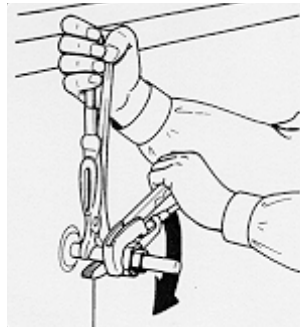
Connection operations:

- 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.



### WATER CONNECTIONS - GENERAL

- For correct design and subsequent installation, follow local regulations and the safety standards in force.
- Install shut-off valves near parts that require maintenance, so as to allow such parts to be replaced without having to empty the system.
- Temperature and pressure indicators should be installed at the inlet and outlet of the exchangers; these will help the routine checks and maintenance on the assembly.
- A mesh filter should be installed to protect the exchangers from foreign material.
- Carefully check that there are no leaks in the pipes when filling the system.
- To prevent the hardening of the copper pipes and consequent breakage, the water system must not transmit vibrations to the coils. The connections must be made with a high degree of precision. Twisting the fittings on the coils will damage the copper pipes and the basin drain fittings.



### CONNECTING THE WATER COILS

! All persons exposed to and operating in the vicinity of the coils must wear suitable safety clothing. DANGER OF BURNS. 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.

An air vent must be fitted for each coil. This vent will obviously be located at the highest point of the coil, while lowest point must be fitted with a discharge for the complete draining of the coil, if required.

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.

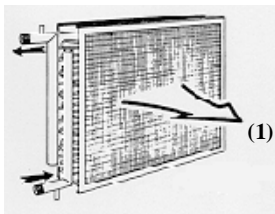
The connections in the circuit must not impede the removal of the coil from the unit.

Do not load the weight of the connecting pipes onto the coil fittings: special brackets should therefore be used.

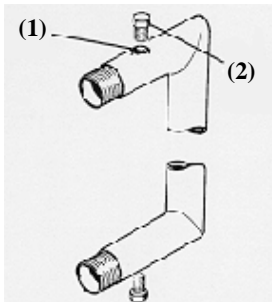
A shut-off valve and, if possible, a water flow-rate adjustment valve, should be installed at the fluid inlet.

! 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.

! To avoid the breakage of the coils due to frost, when the air temperature falls below 3°C, add antifreeze fluid to the water or alternatively completely drain the coil. These precautions mainly refer to systems with intermittent operation.



1. Air flow



1. Thread  
2. Fixation screw

### CONNECTING THE STEAM COILS

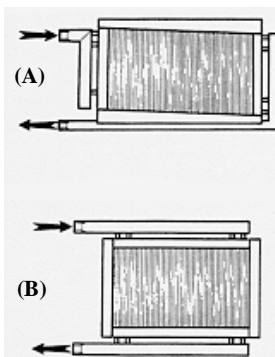
! All persons exposed to and operating in the vicinity of the coils must wear suitable safety clothing. **DANGER OF BURNS.** All the coils are already fitted with pipes sloped towards the outlet manifold to help drain the condensate, or alternatively with vertical pipes.

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.

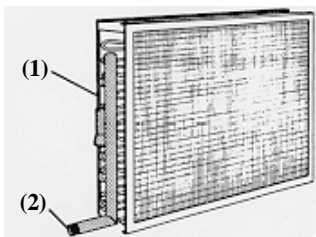
! Overheating inside the fan unit represents a danger ! The accidental stopping of the fan will cause the overheating of the stagnant air in the unit, with consequent damage to the motor, the bearings, the insulation and the plastic parts. The system must be fitted with suitable equipment to by-pass the passage of steam through the coil.



A. Inclined pipes  
B. Horizontal pipes

### 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

## 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

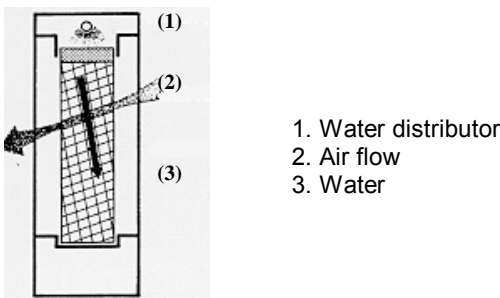
## WET DECK HUMIDIFICATION

IDENTIFYING THE CHARACTERISTICS OF THE HUMIDIFIER:

- With run-through water, type P.
- With water circulation by pump, type R.
- Thickness of the wet deck: 100 or 200mm.
- From size MC-013 to 300, side removal (type EL), from size MC-360 to 720, front removal (type EF).

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.

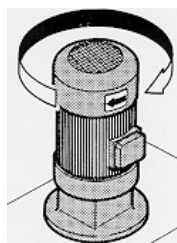


## RUN-THROUGH WATER HUMIDIFICATION, TYPE P

- 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.

## HUMIDIFICATION WITH WATER CIRCULATION, TYPE R

- 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.



## SPRAY NOZZLE HUMIDIFICATION

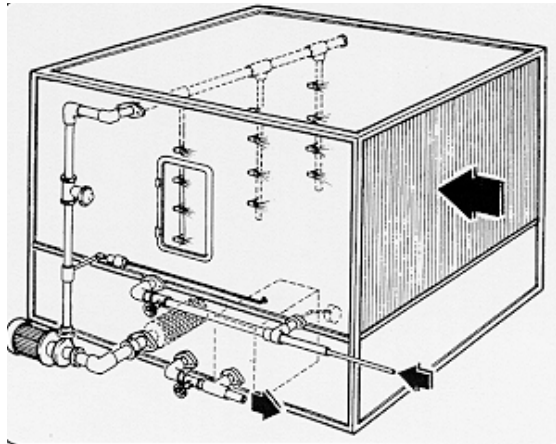
- Connect the humidifier to the water distribution network.
- Fit the tank drain pipe with a trap.

! 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.



### EVAPORATIVE HUMIDIFICATION BY ELECTRIC HEATING

- Use treated water with so as to avoid the problem of the salt deposits (lime scale).
- The heater must be connected electrically according to the standards in force:
- Fit the mains water supply with a flare coupling for easy removal, and a shut-off valve (not supplied). The float valve is supplied by us, with the tank.
- The drain connected to the overflow must be fitted with a valve and flare coupling for removal, and a drain trap for the regular down-flow of water and to avoid the intake of polluted secondary air.
- The proximity device cuts off current to the heater when the water level falls below the minimum value, so as to protect the heater.

### 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.

### 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.

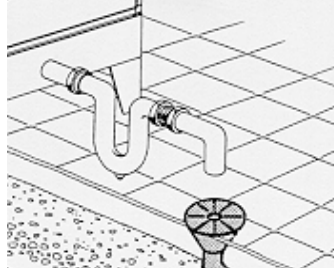
! The drain must be fitted with a TRAP, to prevent the unit's fan from taking in miasma or bacteria from the decomposition of sewerage, and thus creating inside the unit conditions ideal for the proliferation of pathogenic germs, fungi and micro-organisms and favouring the spread of "Legionella Pneumophila",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

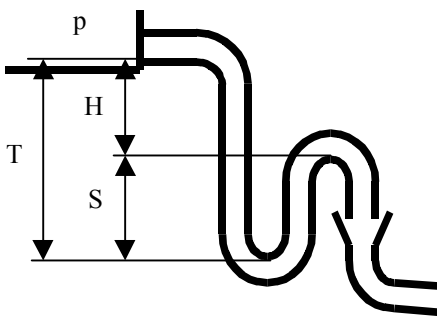
- The connection pipe after the drain trap must be sufficiently sloped towards the sewerage drain and have a diameter no less than the drain pipe.
- The drains may be made from various materials: steel-copper-PVC. If the drain is poorly anchored it may belly, creating pockets of air and preventing the 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.



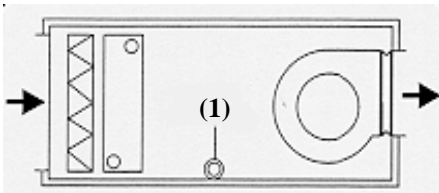
Key:

$p$ : 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



Formula:

$$T = -2p$$

$$S = T/2$$

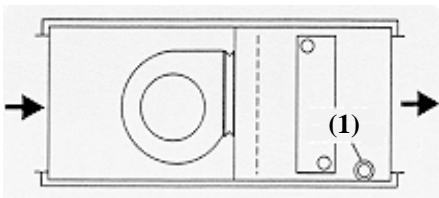
Example

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

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

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

#### PRESSURE DISCHARGE



Formula

$$T = 2p$$

$$S = T/2$$

Example

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

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

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

1. Discharge

## - ELECTRICAL CONNECTIONS -

### GENERAL

#### CAUTION!

ALL OPERATIONS INVOLVING THE CONNECTION OF ELECTRICAL APPLIANCES MUST BE CARRIED OUT WITH THE POWER SUPPLY DISCONNECTED.

MAKE SURE THAT THE MAINS ISOLATOR SWITCH ON THE MACHINE AND THE ISOLATOR DEVICE AT THE ORIGIN OF THE LINE ARE OPEN.

The air handling units are supplied without the electrical panel. The installer must wire the motors directly to the panel terminal block.

Pay special attention to the following:

- The electrical connections must be made by qualified installers.
- The power cables must be protected upstream against short-circuits and current overloads by a suitable device, in compliance with the standards in force.
- The cross-section of the cable must be suitable for the calibration of the protection system fitted upstream and must take account of the temperature, the type of laying, the number of cables laid in parallel and the type of insulation. Refer to the tables provided by the standards in force.

The earth connection must be made with due care, using wires with a suitable cross-section and of appropriate quality (refer to the standards in force). The earth wire must be laid parallel to and next to the power cables.

When sizing the machine's power supply line, refer to the total current input, power input and peak current values shown in the electrical data table and on the motor rating plate.

### 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.

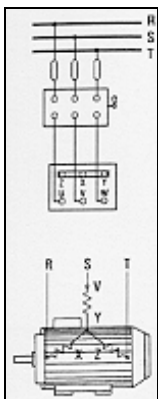
The cables inside the fan section must be carefully fastened to the structure, as they are in the fan intake air flow.

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".

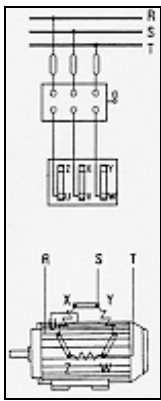
### MOTOR TERMINAL LAYOUT



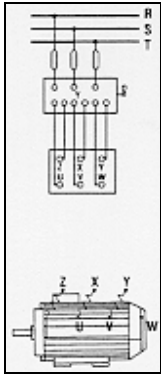
1. Direct starting with star connection.

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

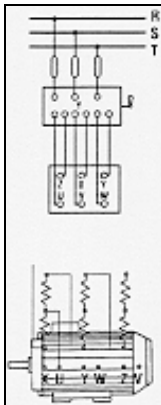
Polarity: 2, 4, 6, 8



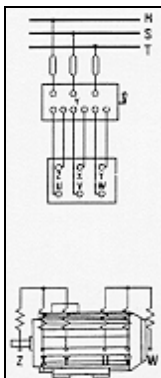
2. Direct starting with delta connection.  
 Terminals U V W should be connected to the line switch.  
 Polarity: 2, 4, 6, 8



3. 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)



4. 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



Two separate windings.  
 5. 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

## MOTOR ELECTRICAL DATA (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 <sup>2</sup>	Al mm <sup>2</sup>		
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)

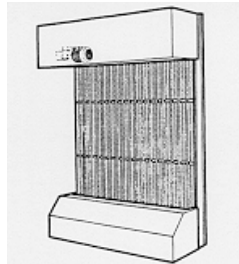
Regarding the increase in temperature, the start-up time cannot exceed the value indicated in the table.

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

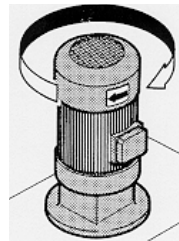
## ROTARY FILTERS

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.



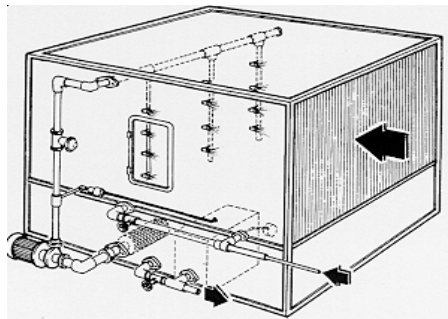
## HUMIDIFICATION WITH WATER CIRCULATION, TYPE R

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.



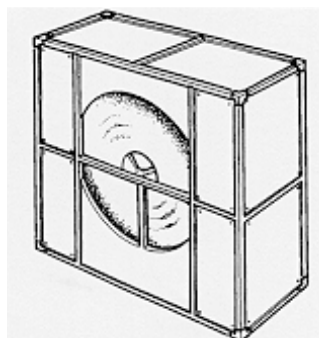
## SPRAY NOZZLE HUMIDIFICATION

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.



## ROTARY HEAT RECOVERY UNIT

For the electrical connections, follow the manufacturer's instructions enclosed with the appliance.  
The electrical connections must be carried out to EC standards.  
The access door must be fitted with a microswitch.



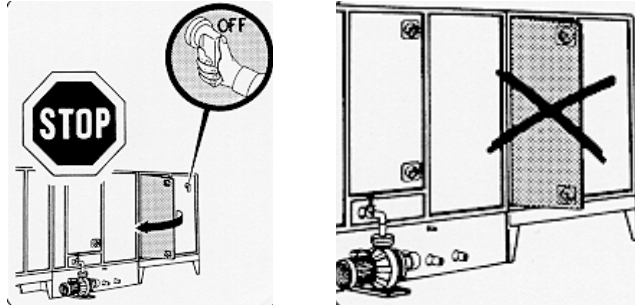
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## - START-UP -

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### 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

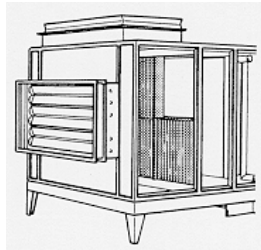
Check the operation of the dampers to avoid starting the fan with the dampers closed. If closed, structural damage may occur on machines fitted with high pressure fans.

#### 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.



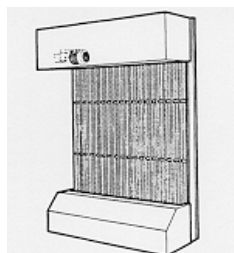
#### ROTARY FILTERS

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.

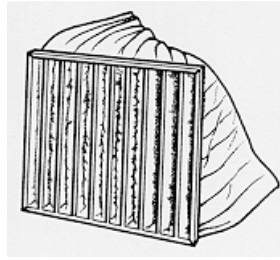


! Caution: the bag filters, absolute or activated carbon, are fitted to the unit after half an hour of system operation. This operating period cleans the ducting from dust, scoria and other debris resulting from the assembly operations; this will avoid blocking, depleting or damaging the non-regenerable filters.

### NON-RIGID BAG FILTERS

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

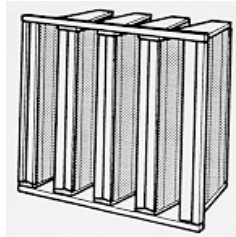
The bags deteriorate quite readily at the attachment to the frame, due to the continuous sagging and the weight of the dust.



### RIGID BAG FILTERS

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

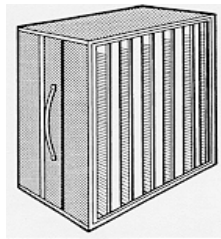
! Handle with care, as the filtering material is made from paper and rather delicate fibreglass.



### ABSOLUTE FILTERS

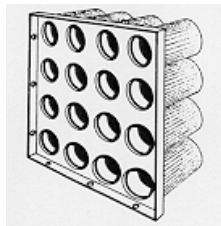
The seal gasket must be applied and the filter support wall should be checked for deformations that may have occurred when positioning the unit; any cracks must be sealed by silicon so as not to allow the by-pass of air.

! 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.

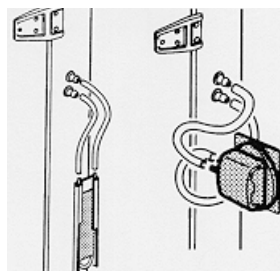


### DIRTY FILTER DETECTION DEVICE

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.

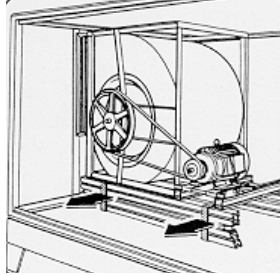
Check the alignment of the pulley and the tension of the belts (see "Maintenance").

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.

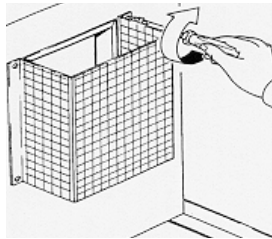
Measure the effective power input of the motor and compare it against the rated value. If the input of the motor is too high, above the rating, or alternatively is less than envisaged, check the pressure drops in the system circuits. High power inputs indicate, especially for fans with forward blades, 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.



## EQUALISER

The fans that discharge air into any type of plenum are fitted with an equaliser for the uniform distribution of air.

For reasons of transport and handling, the equalisers are delivered dismantled; assembly is quite simple, as the holes for fastening the screws are already provided.



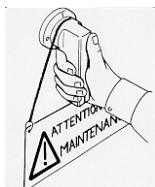
## - ROUTINE MAINTENANCE -

### GENERAL

The maintenance operations must only be carried out by authorised technical personnel.

The maintenance personnel must strictly follow the safety standards in force.

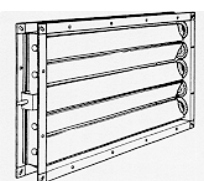
Before starting any work, the maintenance technician must isolate the unit from the electrical power supply and place it out-of-service. In addition, all maintenance operations must be signalled using special signs.



### 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.



### 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.

### CELL PRE-FILTERS

Up to sizes HC 300, the pre-filter cells are installed in the unit on U guides, with sliding movement.

From size HC 360 to HC 720 the cells are fitted in counter-frames and locked by springs.

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.

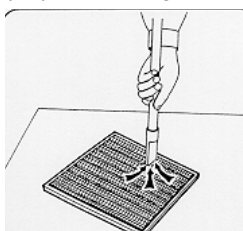
#### CELLS MADE FROM REGENERABLE SYNTHETIC MATERIAL

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.



### 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.

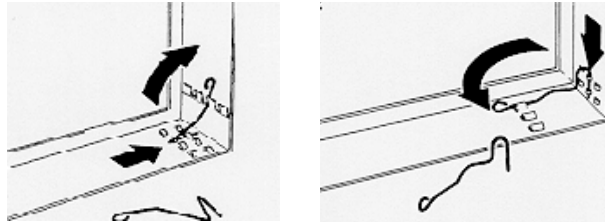


## RIGID AND NON-RIGID BAG FILTERS

- 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.

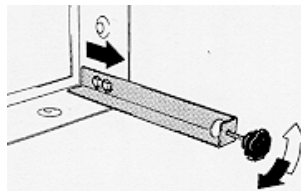
The bag filters EU4-EU7-EU8 are installed for operation in metal counter-frames (galvanised - aluminium - stainless steel). The counter-frame is fitted with a gasket glued to the lip of the filter support, so as to ensure perfect air-tightness and prevent any by-pass.

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



## ABSOLUTE FILTERS

The absolute filters EU11 and EU13 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.



## 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:

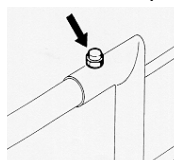
- check the transmission belt (degree of wear and tension).
- check the gear motor.
- grease the supports.

## 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.



## TANKS

Check and periodically clean the condensate collection basins and humidification tanks.  
Clean the corresponding drain traps and check that they always contain water.

## 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:

### TYPE R WITH WATER CIRCULATION:

- 1 Stop the electric pump
- 2 Close the water shut-off valve
- 3 Remove the click-in overflow from the drain pipe, using the rubber ring, 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, laterally in sizes MC 013 to MC 300
- 6 Remove the casing panel corresponding to the humidifier
- 7 Remove the water distributor
- 8 Remove the wet deck
- 9 From MC 360 to MC 720, remove from the front, inside the unit itself
- 10 Remove the section bar stoppers on the front panel of the container
- 11 Remove the water distributor

### TYPE P WITH RUN-THROUGH WATER:

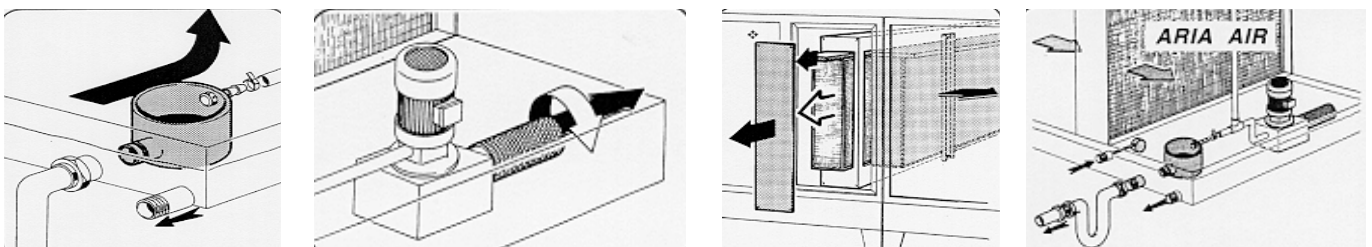
- 1 Close the water shut-off valve
- 2 Remove the wet deck from the unit, laterally in sizes MC 013 to MC 300
- 3 Remove the casing panel corresponding to the humidifier
- 4 Remove the water distributor
- 5 Remove the wet deck

The wet deck may be washed with water for any slimy deposits, but must be replaced in the case of lime scale deposits. The water spray pipe, located on the honeycomb distributor, is cleaned using a metal brush and steel pins for the holes. To take it off its mounting first remove the rubber water hose. Check that the rubber hose is in good condition, without holes or cuts that may cause leaks.

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 on installation).

When restarting the humidifier, check correct operation.



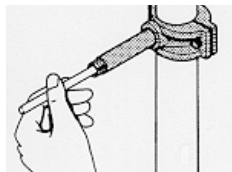
## SPRAY NOZZLE HUMIDIFICATION

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

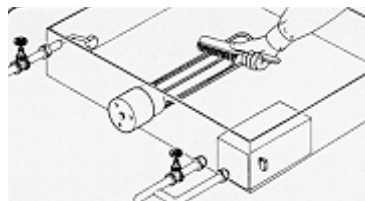
water and detergent.

- 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.



## EVAPORATIVE HUMIDIFICATION BY ELECTRIC HEATING

- Frequently check the level of salt deposits.
- Remove the deposits from the tank, especially from the heater.
- Check the microswitch.



## ATOMISED WATER HUMIDIFICATION

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

- 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.

## FANS

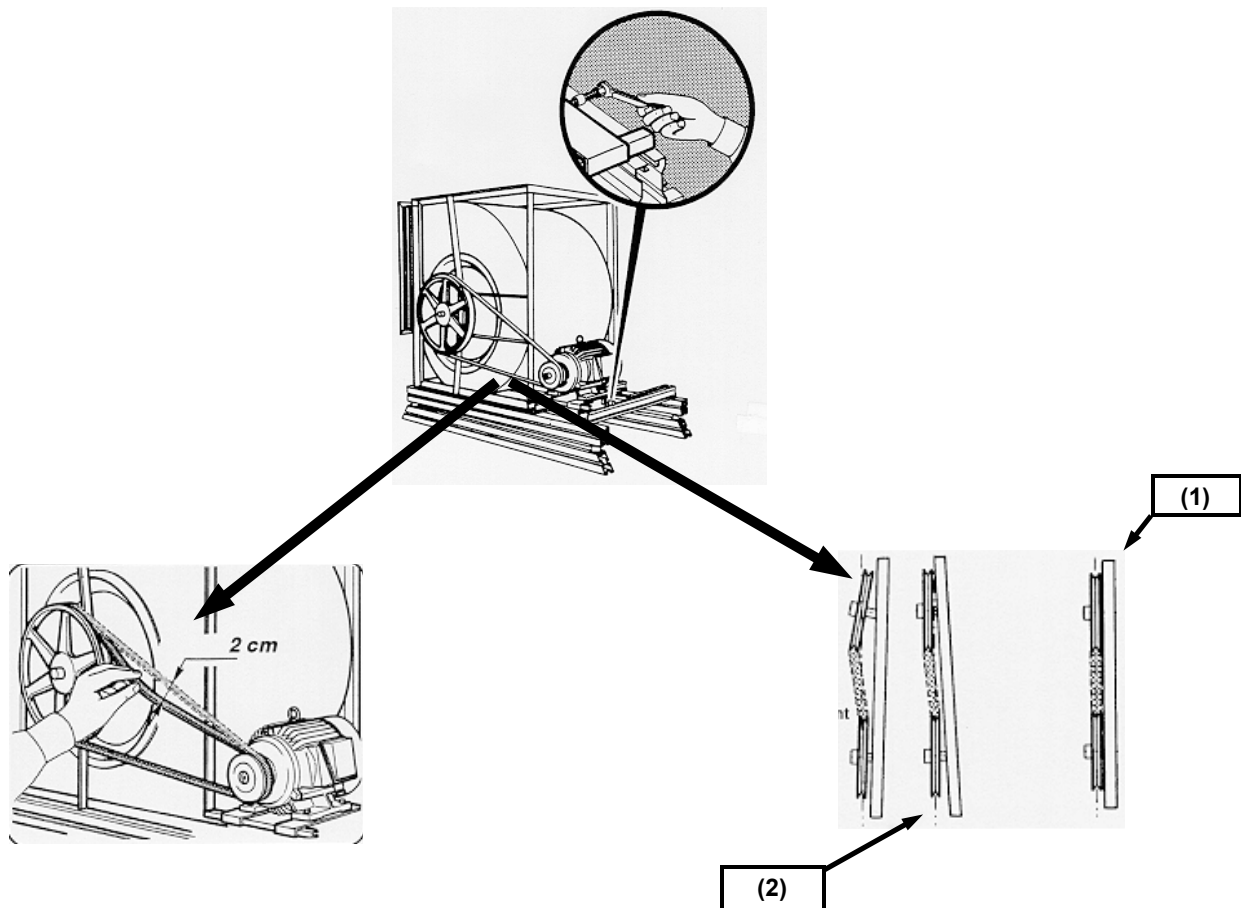
! In accordance with the safety standards in force, before working on the motor-fan assembly, check that the main switch is off.

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.

The inlet guide vane dampers fitted to the reverse-blade fan must be cleaned and lubricated every 6 months.



- 1. Correct alignment
- 2. Incorrect alignment

**PULLEYS**

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

**DISMANTLING**

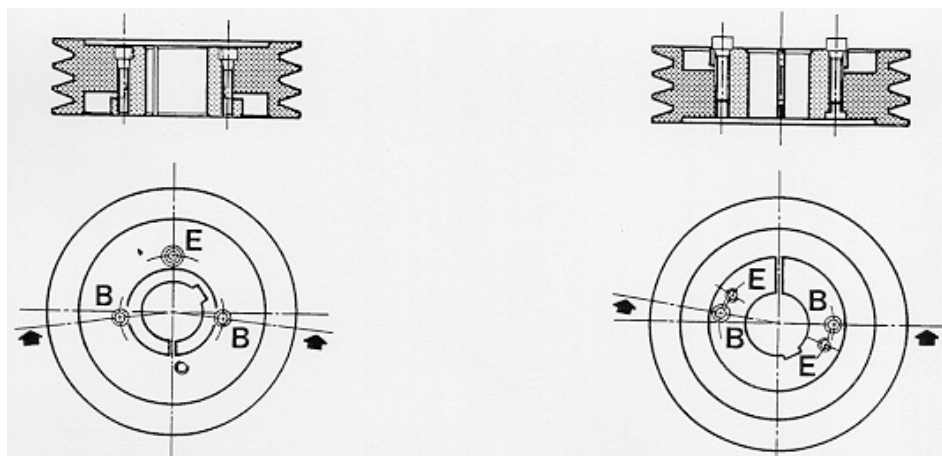
Completely unscrew the locking screws, and fully tighten one of them in the removal opening until the pulley is released.

**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

### 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

General

Connection/Installation

Maintenance



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