OZONAIR HYDRONIC

AIR HANDLING UNITS

CCM - CTH - CTHb Operating & Maintenance Instructions

CCM20 - 315
CTHb 380 to 510
CTH 460/600 to 460/1300
CTH 600 to 1300

CONTENTS

I – INSTALLATION

1 – DELIVERY

1.1 – General Delivery Conditions

Unless stated in the specifications, the Ozonair Hydronic air-handling units will be supplied packed in heavy duty polythene film.
Equipment receipt assumes the availability of the lifting and handling facilities and aids required as appropriate to size and weight (see "handling" section).
Check the equipment condition on arrival. In the event of any damage, note the reservations on the delivery docket and confirm to the carrier by registered mail within the three days following delivery.

1.2 – Delivery method

Freestanding and of bolted construction, the units are delivered either:

- In sections ready for assembly.
  Assembly accessories (seals, bolts, flexible sealing cement) are delivered in the packages together with the unit components.
- Or as single or dual units.

2 – HANDLING

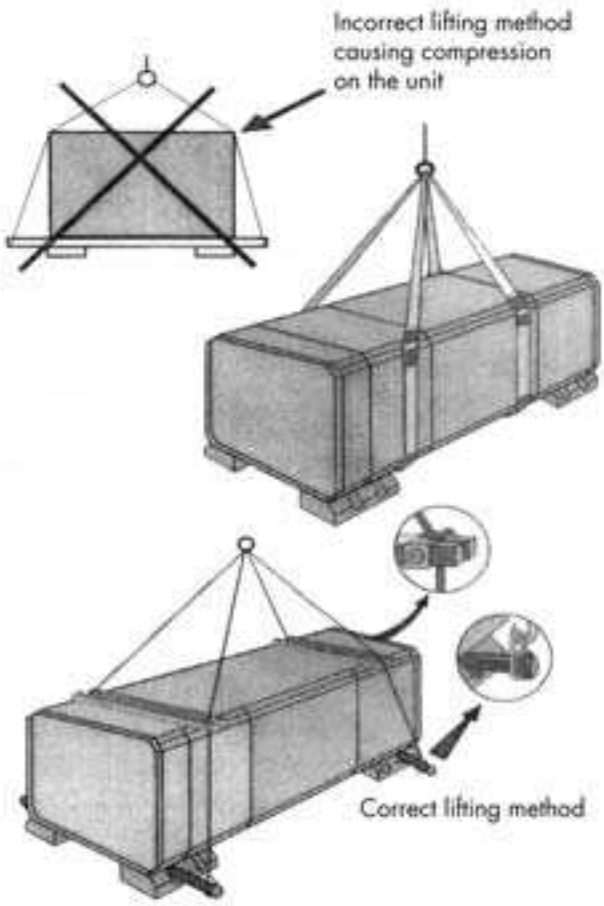
2.1 – General handling Conditions

The Ozonair Hydronic CCM air-handling units must be handled as detailed by the following diagram.

2.2 – General precautions

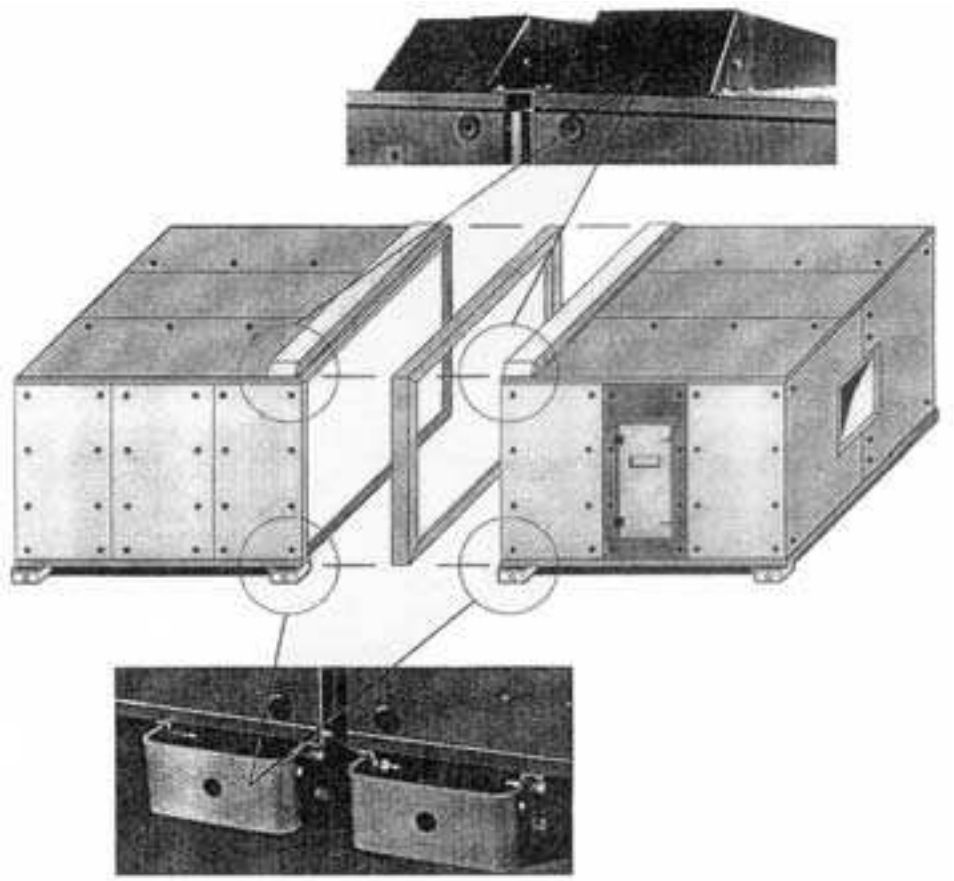
Never attach a sling on to couplings, flanges, tubes, access handles, hinges, suction apertures.
Never carry out any handling operations that could cause damage to internal components (turning the unit onto its side, etc.) without having first removed these components.

If possible, avoid using levers, scaling bars, etc. without inserting a wooden shim. This will prevent damage to the unit's finish and sealing.
Failure to respect the above rules will result in Ozonair Hydronic's guarantee becoming null and void.



2.3 – Lifting lugs

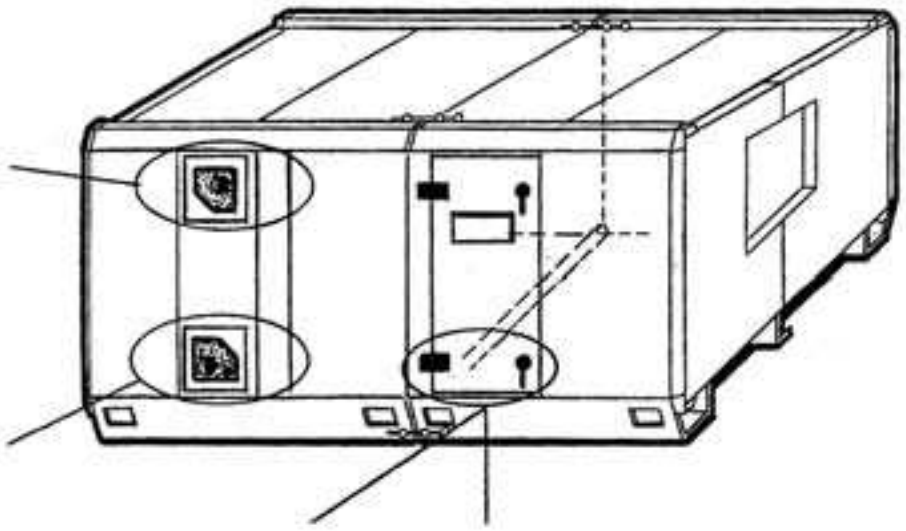
The Ozonair Hydronic air handling units are fitted with lifting lugs (depending on size).
Units must only be lifted by overhead gantry or crane using the lifting lugs fitted to their lower surface. These lugs can be removed after the units have been positioned.



Each unit is equipped with upper and lower spars. The lower spars are fitted with lifting lugs marked CE.
In order to interconnect the sections, a coupling frame is factory fitted to one of these sections and the next section fits into this frame. Fixing into this frame is carried out from the outside on the vertical sections and from the inside on the horizontal sections of the frame. In addition, threaded rods fitted between the upper spars on the one hand and the lower spars on the other, ensure that the sections are correctly aligned and tightened against each other.

2.4 – Special case of the CTHb air handling units

These air-handling units are equipped with spars in the airflow direction or upper section and on the lower section. The spars on the lower section have openings to take straps or tubes for slinging and handling purposes.

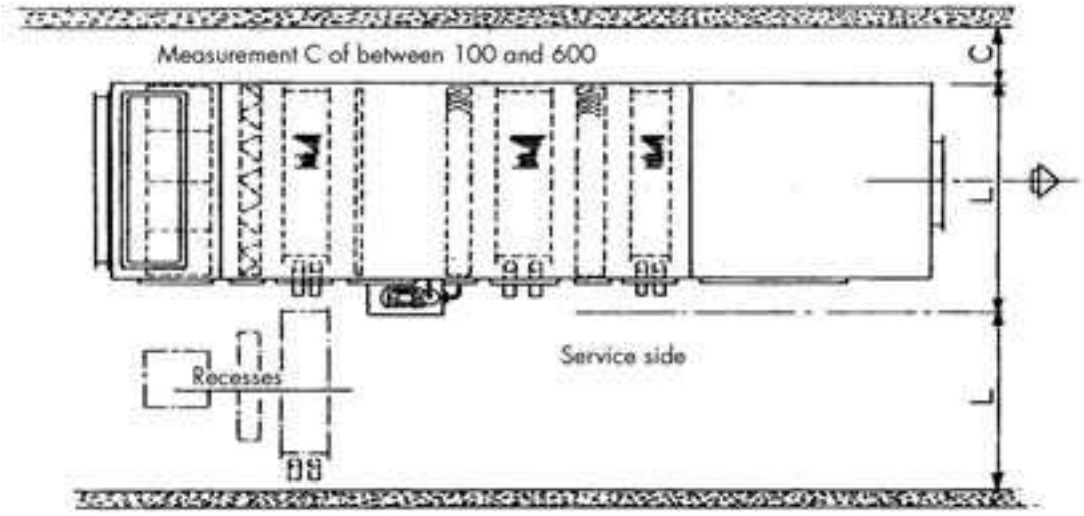


3 – SELECTING THE LOCATION

3.1– Location

Ozonair Hydronic air handling units can be installed in any plantroom or outdoors depending on the models concerned and subject to compliance with the following recommendations:

- Side away from the service surface:
  this has no access and the air handling unit can be easily positioned against a wall, allowing for minimum clearance to enable a man to pass between it and the wall if necessary.



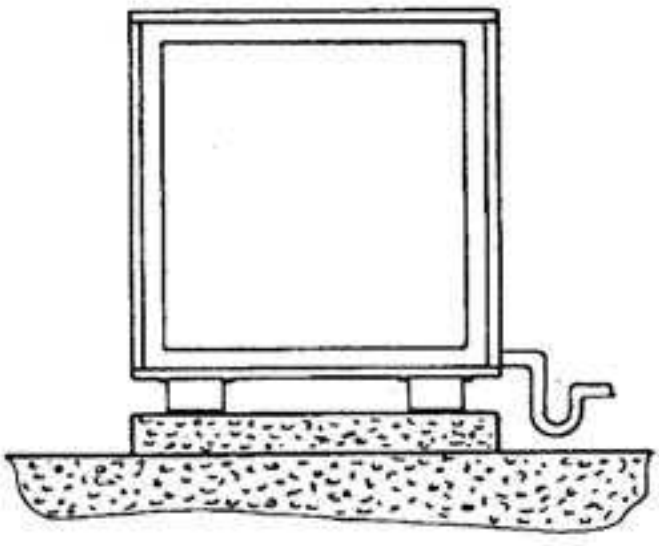
- The service side surface has access points and removable panels together with pipe couplings. It is essential that the location selected provides sufficient clearance for horizontal removal of filters, coils etc.

In order to avoid even partial removal of ducts, provide screw flanges, or any other equivalent coupling system that is easily removable.

Motors, pumps, damper controls, sensors and all control and inspection equipment will be mounted on the service side.

3.2– Installation surface

Ensure that the ground and supports can withstand the operating load (refer to weights tables in current technical documentation). Check that the floor or the supports taking the equipment are perfectly level. We strongly advise against using levelling shims as this could have an adverse effect on correct alignment and sealing of the units in relation to each other.



3.3 – Setting up

When the air-handling unit has been assembled, allowance must be made for installing siphons before the unit is positioned.

There are 2 possible options:

1. either the siphon is fitted in a gutter and the air-handling unit placed directly on the ground,
2. or there is no gutter and the unit must be raised, either using support feet that can be supplied by us, or low concrete walls or a concrete slab.

In all cases, a GRIPSOL or similar non-slip product must be used beneath the unit.

N.B. Equipment installed at height will be mounted on a support which will itself be suspended from the structure of the building.

4 – ASSEMBLY

The various components that make up the Air Handling Unit must be assembled in the air flow direction (e.g. mixbox or filter towards the fan).

In addition to instructions given in the preceding pages, assembly must take the following general considerations into account as well as the special points applicable to each type of unit.

4.1 – General

In the case of units delivered assembled, check overall level and locking of all nuts and bolts.

4.2 – Unit assembly

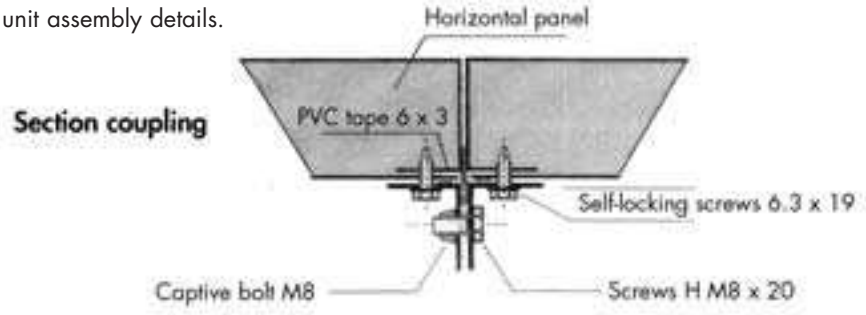
In the case of units delivered in the form of separate sections, insert the self-adhesive seals before assembling.

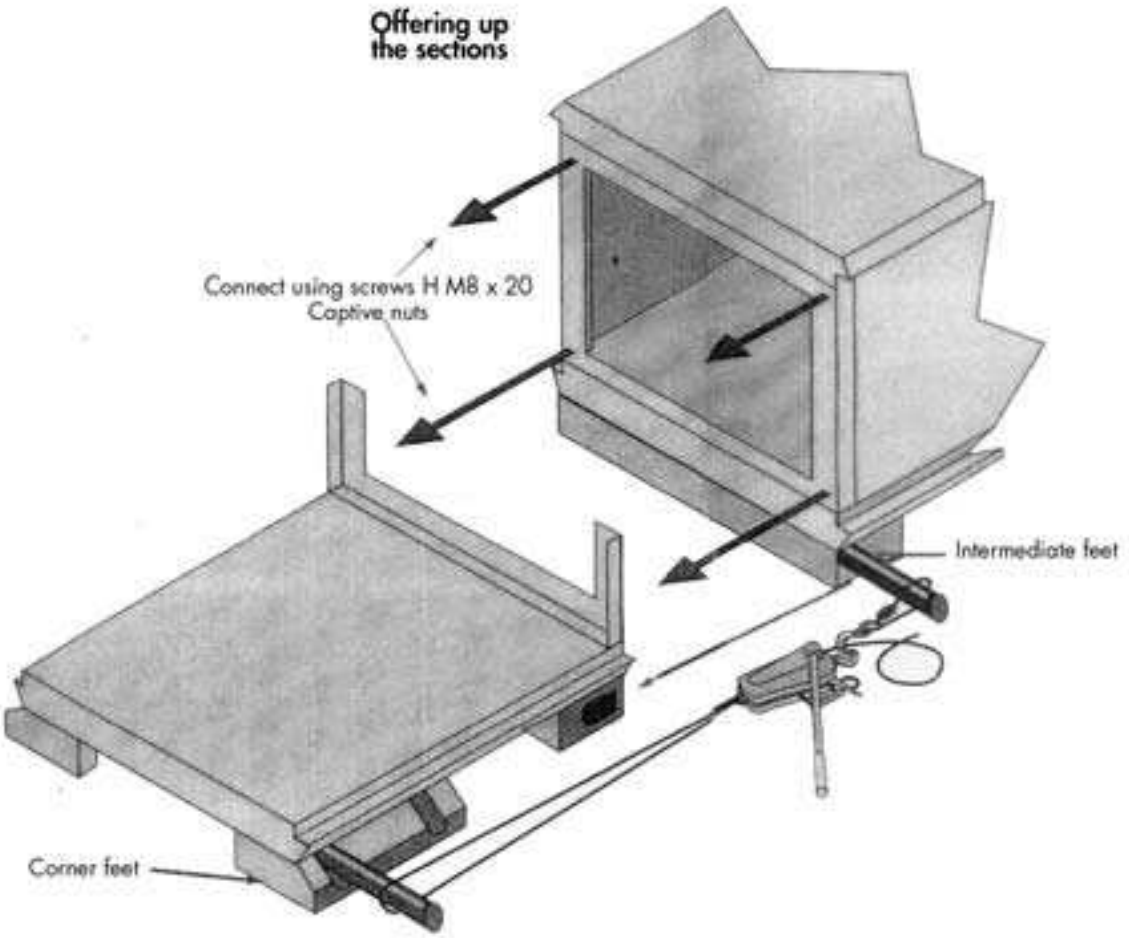
4.2.1 – using bolts when access is possible on both sides of the coupling frame, either through a door or by removing a front panel.

4.2.2 – or using screws into captive nuts when access is limited on one side (captive nuts are factory fitted).

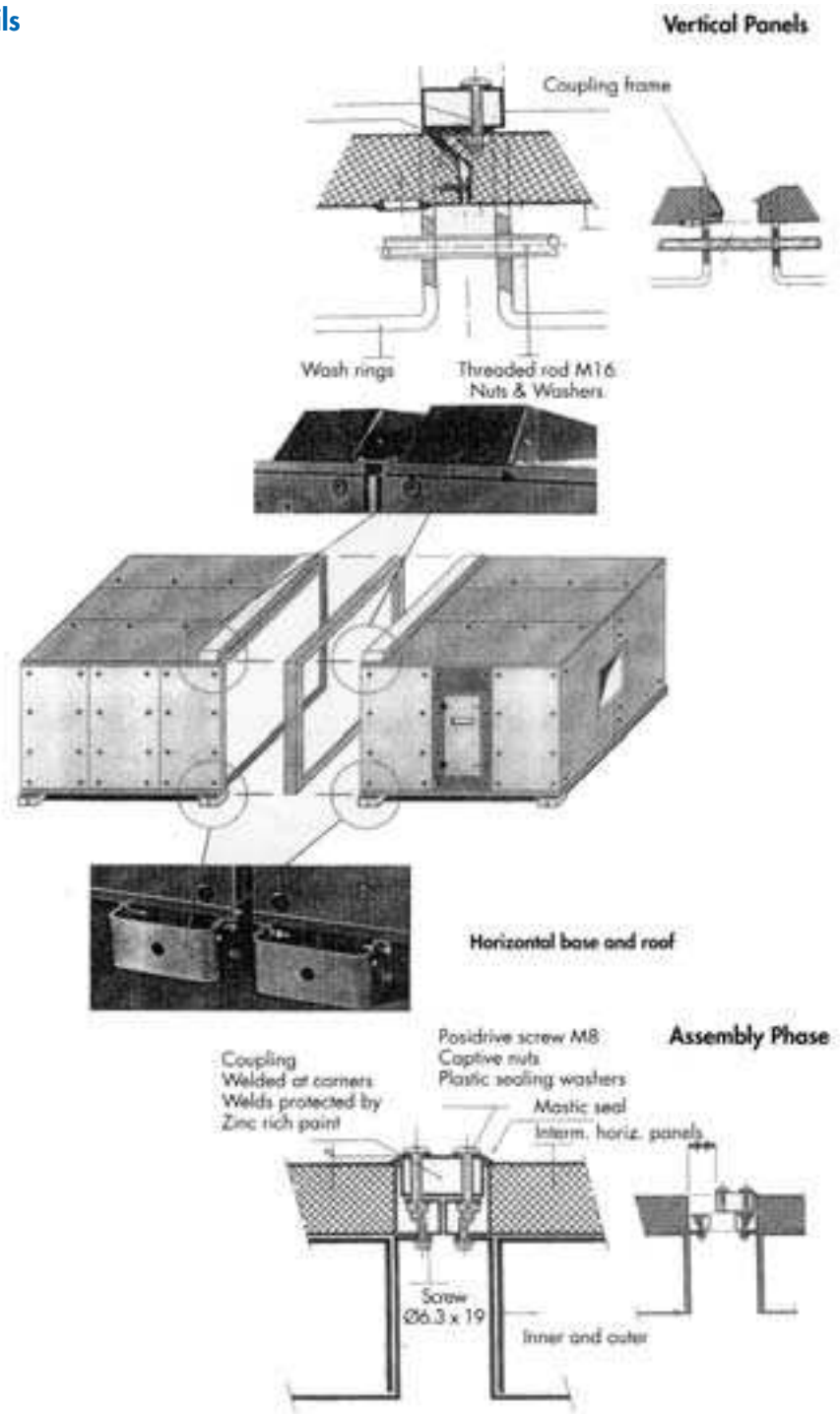
INSTALLATION

Ozonair Hydronic CCM air handling unit assembly details.





CTH coupling details



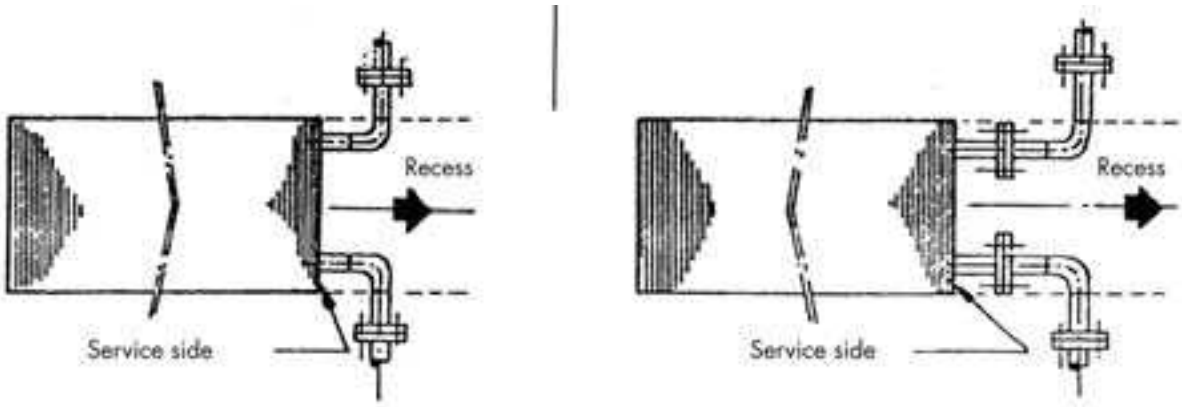
Each section is equipped with upper and lower spars. The lower spars are fitted with lifting lugs marked CE.
In order to interconnect the sections, a coupling frame is factory fitted to one of these sections and the next section fits into this frame. Fixing into this frame is carried out from the outside on the vertical sections and from the inside on the horizontal sections of the frame.
In addition, threaded rods fitted between the upper spars on the one hand and lower spars on the other, ensure that the sections are correctly aligned and tightened against each other.

Reservations:
If, for reasons of site installation and the installation's requirements themselves, our equipment is used to support equipment, cables, walkways or for any other purpose other than designed for, we will decline any claim under guarantee in respect of damage to metal sheeting, accidents affecting equipment associated with the main items supplied by us (motor, pump, etc.).
We are released from any liability when any external items are fitted on the items supplied by us without following recognised good practices.
E.g. servomotor not powerful enough to drive the dampers, permanent battery connection etc.

4.3 – Battery connection

4.3.1 - All high points must be fitted with an air trap and all low points with a settlement chamber fitted with a drain cock.

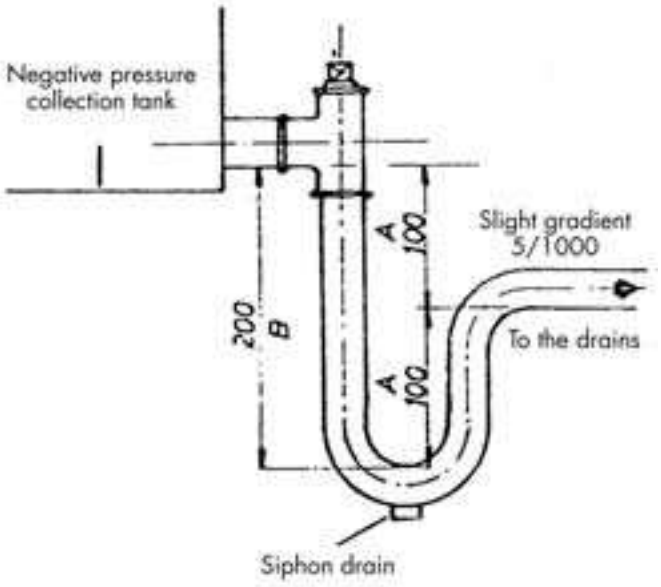
Connections must comply with local administration rules, technical specification requirements and recognised good practices.
In order to facilitate inspection, maintenance and any dismantling required, couplings must be removable and capable of being isolated from the incoming and return fluids systems, without affecting the free space required by the batteries.
Before connecting up, check that the dimensions excluding the clamps allow for the batteries to be withdrawn and for the use of screw clamps.
The cold battery sections have been designed to take a pipe for evacuating condensates into a collection tank. Connect this pipe into the drains with a gradient and include an adequate siphon, preferably using 'T' couplings instead of bends to make cleaning easier.
Fit a funnel for checking evacuation.



4.3.2 – Fitting the siphon All water evacuation pipes must be fitted with a siphon, i.e.
- Evacuation of condensates from the cold battery tank and from direct pressure release.
- Humidifier overflow.

It is essential that the siphon be correctly fitted as shown in the following schematic diagram.

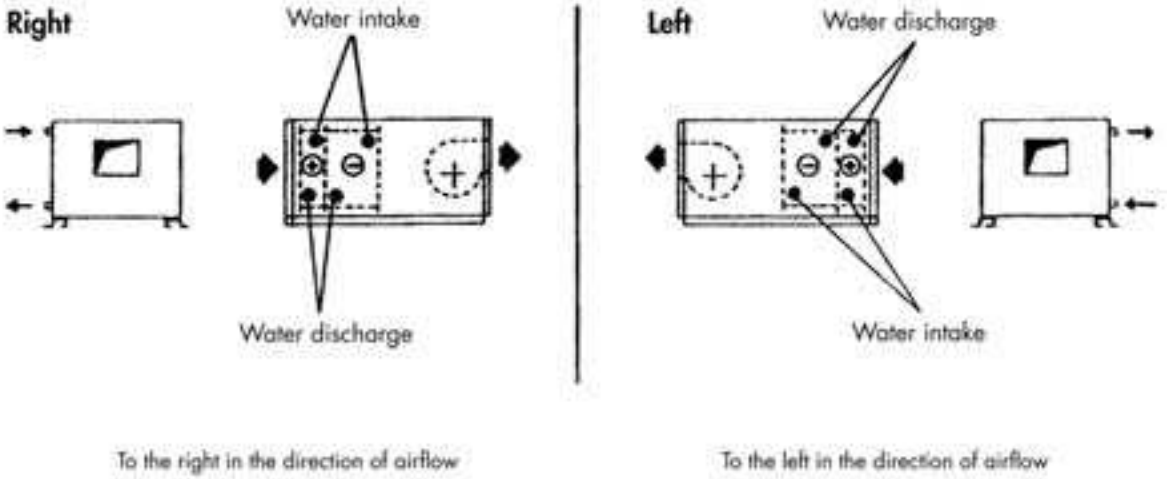
Spihon Schematic diagram



Measurement 'A' must always be equal to twice the unit's negative pressure in mm.
For example: with 50 Pa negative pressure, the siphon must have the measurements shown above.

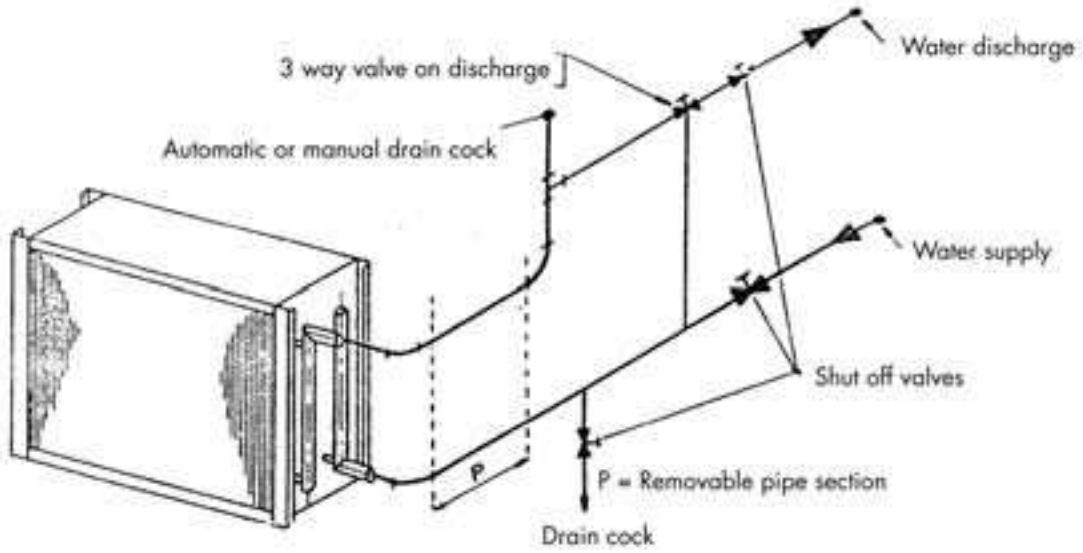
WARNING
With respect to the pipe exit diameter on the section, never used any taper.
Tilt the evacuation pipe to ensure a free flow into the drain (gradient of approximately 5/1000).
We also recommend the fitting of an inspection funnel on the pipes going into the drains in order to check flow.

4.3.3 - Assembly instructions The instructions given below **MUST** be followed in order to avoid faulty operation or possible damage to the battery:
In so far as possible, the battery must be positioned so that both fluids (air and water or steam) flow back: the system is designed for this type of circulation. This is achieved when air enters through the side from which the other fluid emerges and vice versa:
Two installation options.
In the case of batteries supplied with water vapour, pipes must always be located on the upper part of the battery: the discharge pipe on the lower part.



It is compulsory for these pipes to be fitted with expansion mechanisms.
The water vapour must be desaturated, i.e. without any drops of water in suspension. The water vapour supply pipe must be fitted with a separator and the discharge pipe with a thermostatic or floater type drain cock.

In order to avoid any water hammer phenomena when using superimposed units, every precaution must be taken to ensure that condensates can flow normally out of each unit.
The piping system must have its own independent support system, separate from the BATTERY.
BATTERIES that could be subject to frost in winter must be completely drained (a tapping has been provided for this purpose on the water supply pipe).
When batteries are required to operate in winter (hot batteries) and take in air from the outside, standard anti-freeze protection



precautions must be taken: anti-freeze damper, anti-freeze thermostat shutting down the fan and triggering the hot valve to open by default.
The batteries delivered must not be allowed to overheat in such a way as to effect the properties of the metal or to cause distortion or weakening. All welding carried out on the unit outside our own facilities or by anybody other than our own personnel automatically invalidates our guarantee. Seal off openings crossed by tubes using putty or adhesive tape.

4.4 - General safety instructions for connecting electric batteries

4.4.1 – Interlocking with the fan

It is compulsory for the electric heating battery to be controlled by fan movement or by the air pressure generated by the fan. Any deliberate or accidental shutdown of the pulse unit MUST result in power being cut off from the heating elements.
In addition, it is absolutely essential to include a pause to ensure that the fan only stops after the battery has been cut off. The heat that has accumulated in the heating elements must be dissipated over a period that can vary from 10 to 15 minutes, depending on battery output. We recommend the use of a control circuit having a maximum of 48 volts.
When the fan is equipped with a 2-speed motor, control must be such that any airflow reduction immediately causes a proportional fall in battery output, i.e.:

e.g. 1500/750 rpm motor
Battery output: 60 kW

At low speed, the power dissipated by the battery must not exceed 30 kW.

4.4.2 – Protection against overheating

The battery comprises a manual reset thermostat. It must always be fitted to the top section and on the air outlet. It **MUST** be connected according to the diagram opposite before attempting any start-up.
Electric elements can overheat for a number of reasons and, consequently trigger the thermostat.

They include:

- Energising the battery without the fan operating
- A partly blocked filter
- Fan direction of rotation reversed (frequent occurrence on start-up)
- Suction or discharge air flaps operational error
- Too much slack in fan drive belts

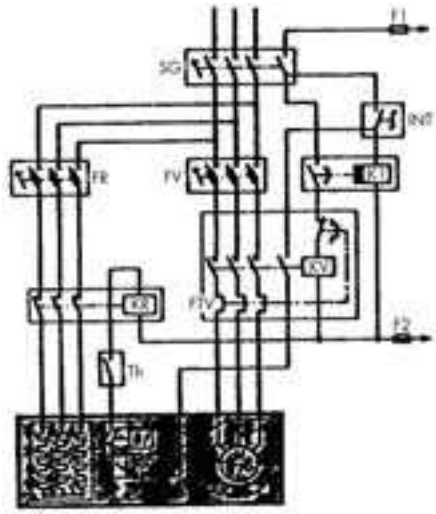
4.4.3 – Electric connections

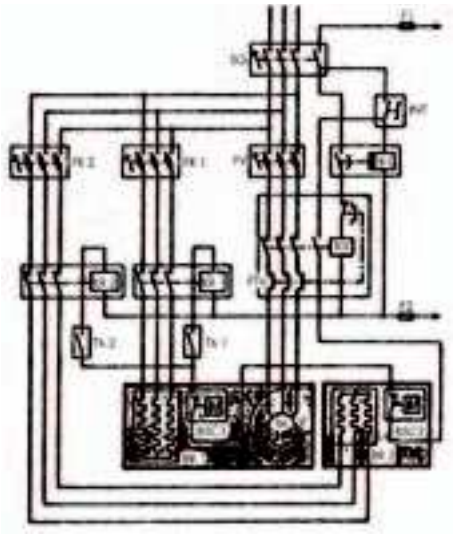
Compliance with general instructions on safety and connection is essential.
Electrical connections are made at terminal strips provided for this purpose and at the manual reset thermostat terminals located inside the caisson. Stage reference marking (output – connection terminals) are indicated by same colour labels:

Power Ph 1	Ph2	Ph3

This set of labels will be found three times, once for each of the three stages, but using different colours.

1. General case consisting of one battery





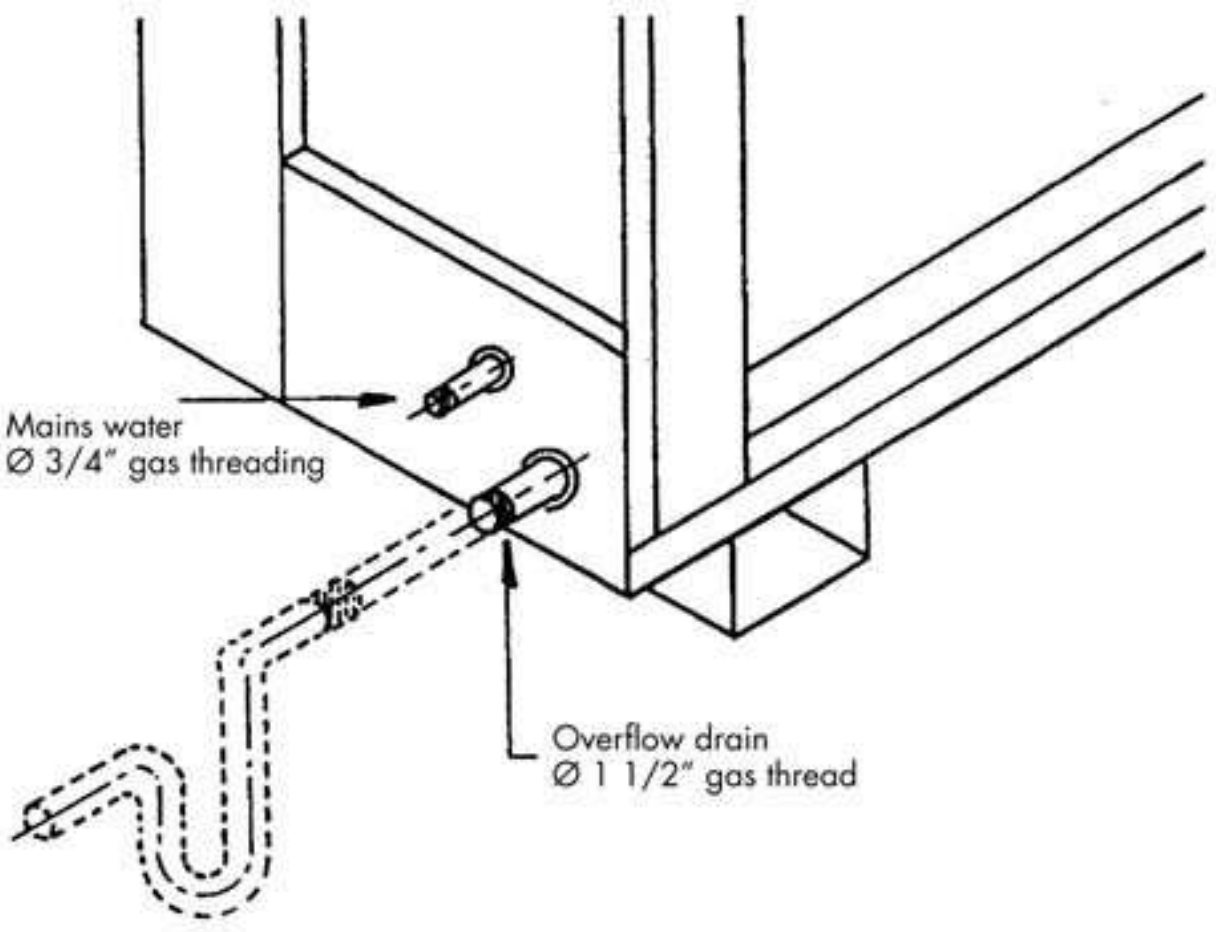
SG:	General disconnect switch	INT:	PAM switch	M:	Fan motor	FR:	Resistor disconnect fuse
FV:	Fan fused disconnect	K1:	Delay relay	KR:	Resistor contactor	BR:	Resistor array
KV:	Fan contactor	FTV:	Thermal relay	BSC:	Safety thermostat	Th:	Room thermostat

N.B. Tighten connections after 48 hours of operation

4.4 - Runoff humidifier RH 60%, 80%, 90%

- The mains water supply crosses a stop valve. It can be fitted with a water filter (porosity <500).
- The water drainage pipe must be fitted with a siphon.
- Make the pump electric connection by ensuring that its operation is controlled by that of the air handling unit's fan.
- Check the airflow direction. Comply with the direction shown by the arrow on the packing.

Hydraulic connection of a run off humidifier



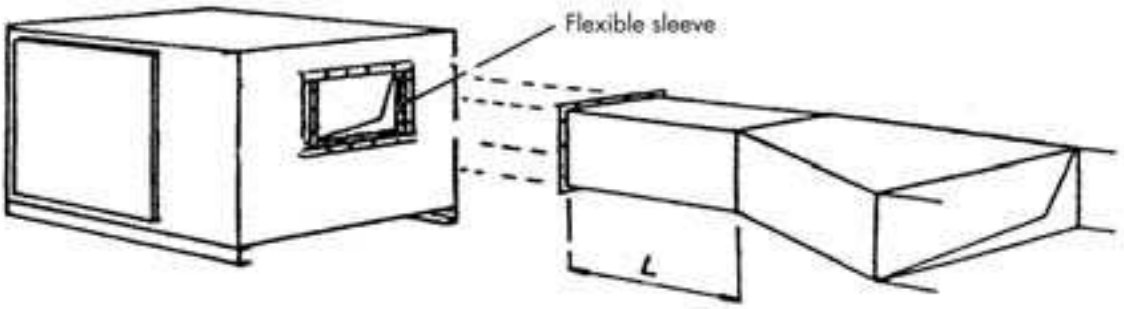
Pump electric output table (in Watts) - Runoff Humidifier

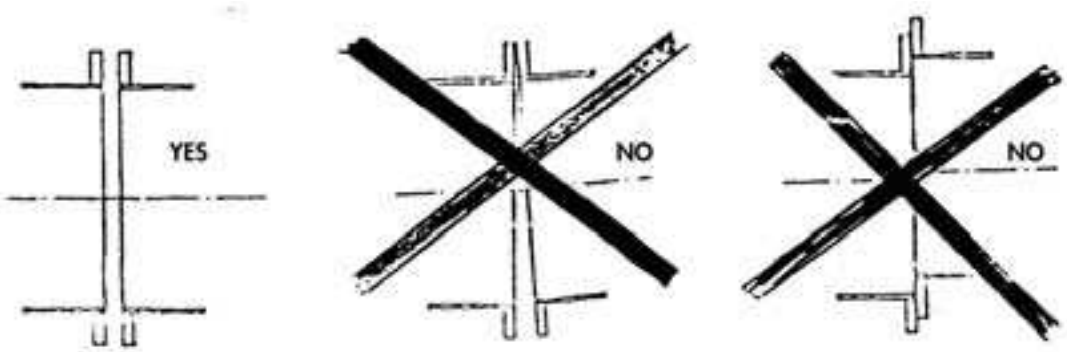
Type	CCM 20	CCM 45	CCM 65	CCM 85	CCM 125	CCM 170	CCM 210	CCM 255	CCM 315
Output (W)	120	120	120	120	120	120	120	120	120
Type	**CTH 380**	**CTH 445**	**CTH 510**	**CTH 600**	**CTH 770**	**CTH 940**	**CTH 1100**	**CTH 1300**	
Output (W)	180	180	180	180	180	180	180	180	

4.5 – Fan unit connection

The duct or flexible sleeve is bolted onto the unit's discharge or onto the front panel. In all cases, the motor fan unit must be mounted on shock absorbers, and a flexible sleeve isolates this unit from the air-handling unit and, therefore, from the fitter's duct.

In order to ensure satisfactory operation by the fan, the length L shown in the following sketch must be equal to at least 1-1/2 times the fan impeller diameter.





Intake and discharge alignment

Avoid subjecting the fan to loads caused by any expansion of the ducts by fitting flexible sleeves.

4.6 – Connecting the electric motor

Refer to the manufacturer for information on motor start-up and maintenance.
With regard to connection, ensure that leads of the right section are used.
Follow the wiring diagram supplied with each motor.
N.B. tighten connections after 48 hours of operation.

II – START-UP

PRELIMINARY CHECKS

Before starting up and air handling unit, we recommend the following checks be carried out.
They will vary according to the unit's contents.

1 – SUCTION ANTI-FREEZE DAMPER

1.1 – Manual control - Check:
* That the rod is locked onto the shaft
* That there are no sticking points on either shaft
* That the flaps overlap properly and do not jam
* That the flaps are in the open position.

1.2 – Automatic control

Same comment and check servomotor output, its power supply (or electrical connection), its travel, its control unit and operating direction.

2 – MIXER UNIT

2.1 – Manual control

Same comment as above in addition to a check on damper travel linkage.

2.2 – Automatic control

Same comment as above in addition to a check on damper travel linkage.
In both cases, check visible panel sealing and door closure.

3 – FILTRATION UNIT

3.1 – Pleated filters - Check:
* Presence and condition of cells, presence and condition of seals, access panel sealing and door closure.
* The supplier will indicate the airflow direction for some of the cells.

3.2 – Automatic deployment - Check:
* That the media has been fitted, that it is evenly deployed by testing the drive mechanism (refer to Manufacturer instructions).
* The position of the media in relation to the direction of airflow.
* Clogging control operation, if fitted.

3.3 – At high efficiency and absolute - Check:
* that all frames are correctly tightened on their mountings.
* that the dihedrals are properly fixed to their respective frames.
* access panel sealing.

4 – ELECTRIC BATTERIES - Check:
* that wiring has been carried out according to standard practices.
* that the safety thermostat has been properly connected.
* that battery operation is governed by fan operation – **COMPULSORY** (refer to assembly instructions).

5 – WATER BATTERIES

5.1 – Before filling with water, check:
* That all couplings (clamps, couplings, sleeves, drain cocks, etc) have been tightened and locked.
* That the cold battery's condensate drain and the siphon are free of all obstacles (rags, welds, etc).
* That the blanking plates between the battery frame and the casing provide a satisfactory seal and that the section is free of all obstacles.

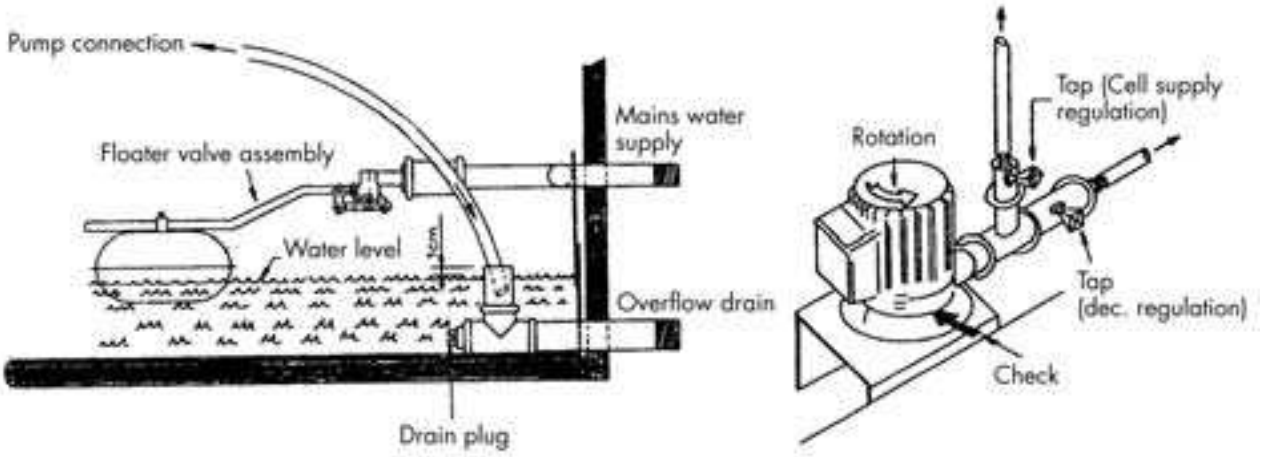
5.2 – Filling with water:
* Fully open high point air traps and valves.
* Fill the system.
* Start up the pumps.
* Check the system sealing (pressure gauges).
* Drain the load through the system's lowest point in order to remove dirt, scale etc. left in the pipes and capable of blocking the battery.
* If it had been treated, check water condition (pH). We recommend injecting the system with an anti-scale, anti-corrosion product.
* Refill and completely bleed off air by shutting down the pumps.
* If necessary seal off any leaks from couplings.

5.3 – Fluid inspection
* Check fluid pressures and temperatures, adjust control equipment and balance circuits.

6 - RH RUNOFF HUMIDIFIER

6.1– Clean the tank to remove dust created during the assembly operation

* Check the pump's direction of rotation.
* Adjust tank water level which must come up to 1 cm below the overflow.



6.2 – Blow down water flow adjustment

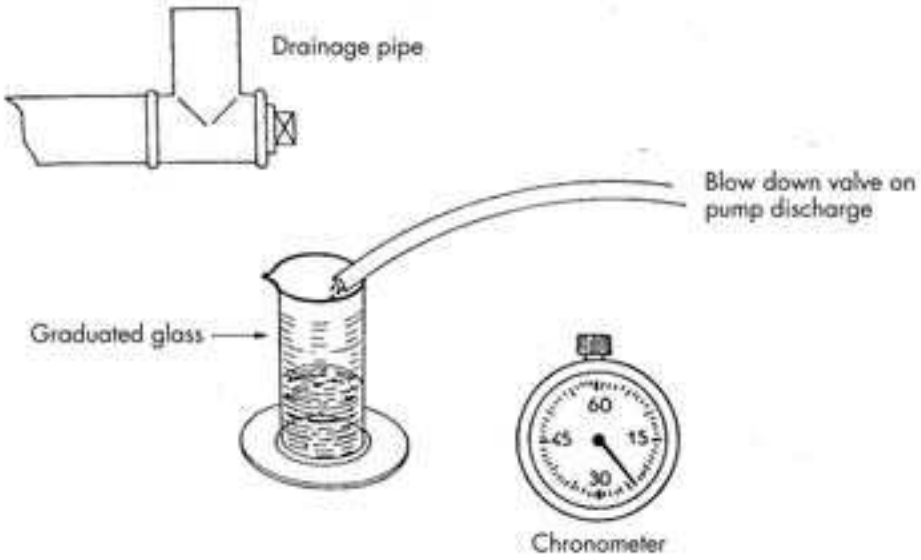
Start-up carried out without a water analysis or water softening system.
For safety purposes, the blow down water flow must be equal to the evaporated water output (refer to following table) after one month's operation and, in order to reduce excessive water consumption, refer to the blow down measurements given below.

EVAPORATION AT NOMINAL OUTPUT EXPRESSED IN l/hr FOR AN INLET TEMPERATURE OF 30°C, 40% RH.

Type	Q nominal in m^3/s	Humidification efficiency		
		60%	80%	90%
CCM 20	0.55	6	8	9
CCM45	1.25	13	18	19
CCM 65	1.81	19	26	28
CCM 85	2.36	25	33	36
CCM125	3.47	37	49	53
CCM 170	4.72	50	66	72
CCM 210	5.83	61	82	88
CCM 255	7.08	74	99	107
CCM 315	8.75	91	122	132
CTHb 380	10.56	110	147	159
CTHb 445	12.22	127	171	184
CTHb 510	14.17	148	198	214
CTH 600	16.67	174	233	251
CTH 770	21.39	223	298	322
CTH 440	26.11	272	364	393
CTH 1100	30.56	318	426	460
CTH 1300	36.11	375	503	544

A comparison of these elements might reveal the need or otherwise to fit an appropriate water softening system.
In all operating cases that do not include a softener, it is essential, after a period of one month, that the blow down water flow be adjusted based on water quality.
Each time work is carried out on the water supply system, on the softener or on the humidifier, this flow must be checked.

Blow down output is adjusted using a constant output valve, a graduated glass and a chronometer. After completing any adjustments, do not forget to replace the blow down hose into the water drainage pipe.



7 – FAN SECTION

Pre start-up checks

* Check electrical connection. Based on mains voltage, it must be as indicated by the diagram on the motor data plate. Take this opportunity to check the direction of rotation by rotating the motor once.
* Check winding insulation (400,00 ohms) between phases and between each phase and earth (inadequate insulation, which **MUST** be carried out again, is not covered by the guarantee as this is a cause external to the items supplied).
* Check the winding PTF or PTO ipsothermal protection had been connected.
* Check that the start-up system meets the order's specifications: across-the-line starting or add a starter. In either case, calculation of the power transmitted by the belts is not the same and will not be entertained as a claim under our guarantee in respect of premature belt wear.
* Check that relay fitted contactor thermal settings match the maximum current specified on the motor data plate.
* Check vibration proof mounting fixing.
* Check fixing and keying of removable hubs on drive and receiver pulleys (refer to maintenance instructions for removable hubs).
* Use a rule to check pulley alignment.
* Adjust belt tension according to recognised good practices and to manufacturer recommendations, after having checked belt length reference markers.
* Check that the FAN and MOTOR shaft ends are horizontal. Ensure that no foreign body has been trapped in the volute.
* Rotate the FAN manually to ensure that there is no sticking point and that the impeller does not come into contact with the volute at any point.
* Lubricate motor bearings (according to manufacturer specifications) as well as the FAN bearings, except life sealed bearings that have been factory lubricated (refer to lubrication maintenance document). Failure to carry out this operation will automatically result in the guarantee becoming null and void.
* Fit the protective housing on the transmission, ensuring that there is sufficient clearance to prevent it being rubbed by the belts.

During start-up

Implement all special instructions that may have been issued by the manufacturer.

Checks to be carried out after start-up and in stabilised operation conditions

* Check FAN and MOTOR speeds of rotation.
* After the system has run uninterruptedly for a quarter of an hour, check bearing temperature (warm to the touch) and motor temperature (slightly hot to the touch).
* Check that the supply line voltage is normal when the motor is running under load. (An inadequate line section could produce voltage drops that could jeopardise the life of the winding and in respect of which, in such cases, the guarantee will not apply).
* In the case of a three-phase current, check that the three phases are properly balanced (any phase imbalance could cause motor operating incidents that could result in its deterioration, an aspect that is not covered under the guarantee).

Measure current input at the MOTOR terminals. At the very most, this must be the same as the current shown on the motor data plate. (The guarantee does not extend to motors that have burned out as the result of overloading).

III – EXTREME OPERATING TEMPERATURE

* Unless otherwise specified as part of an agreement reached beforehand, our air-conditioning units must not operate at temperatures in excess of 60°C.

IMPORTANT:

Any accidental overshooting of the extreme temperature of 60°C must be made impossible by using a safety system, a possible voltage cut-off or pressure cut-off in the pneumatic control system.
In this case, the HEATING BATTERY supply valves (that may be supplied with superheated water) will be sent to closed mode by a reset mechanism actuated by a voltage or pressure failure.
However, in the case of a PREHEATING BATTERY, an anti-freeze mechanism must be used such as a preset bypass valve, in order to ensure that the post battery temperature is 15°C, even when it is freezing outside.
The above information is not exhaustive and all necessary precautions, specific to each plant, must be taken to endure that the above temperature is never exceeded. If this is not done, then the warranty becomes null and void.

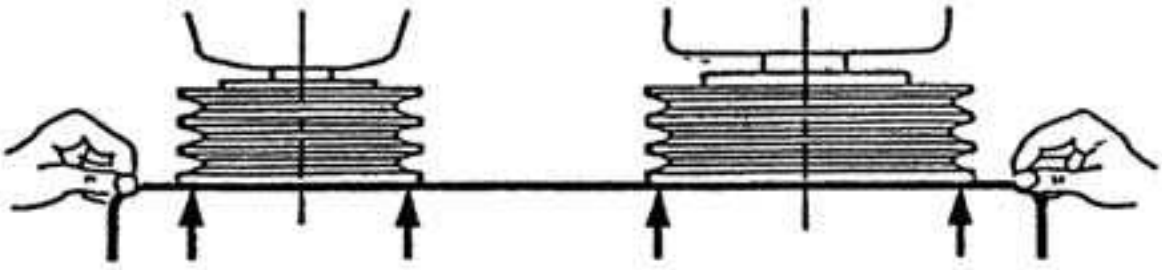
1 - MOTOR FAN UNIT MAINTENANCE

Action and reaction type fans fitted with life-greased bearings, require no maintenance.

Action and reaction type fans fitted with greased bearings incorporating grease lubricators, require maintenance as detailed in the following pages.
If the fan is soiled, clean it using a brush and a vacuum cleaner.

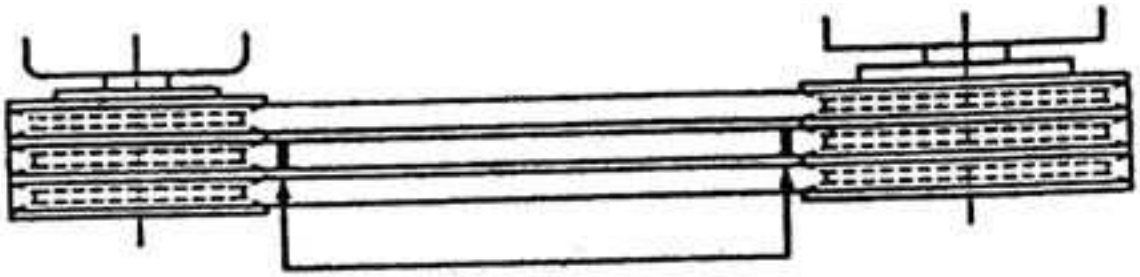
1.1 – Transmission assembly and maintenance

* Pulley grooves must be free of any sign of impact and cleaned before the belts are fitted.
* Pulley shafts must be parallel and pulleys aligned.
* Before locking the motor or the machine, check pulley alignments as indicated below.



* Adjustable distance between centres (motor or machine mounted on slides). In order to fit and adjust pulley belt tension, leave an adjustment travel equal to –3% and +3% of either side of the actual distance between centres calculated as E. Never force the belts as this could damage the reinforcement.
* Belt tensioning

Before tensioning the belts fitted on the pulleys, mark two fine transverse lines on the reverse side of the central belt in the array; these marks must be as far apart as possible while remaining on the straight part of the belt strand (see sketch below).
Gradually tension the belts after having allowed them to run for about one minute until the distance between the reference marks reaches the percentage shown in the following table.
After approximately 24 hours operation, inspect the transmission and re-tension the belts if required in order to comply with the elongation between two new reference marks shown in the table.



Fine lines on the straight part of the belt strand

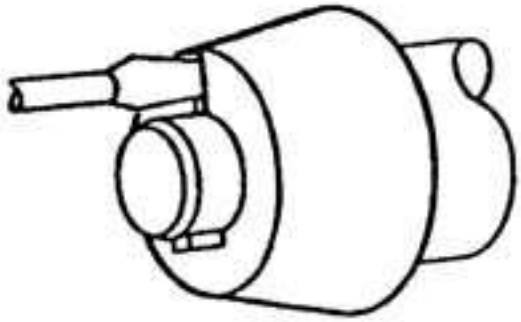
EXAMPLE:
An initial distance of 1000mm between the two reference marks will be achieved by tension play to 1006mm (0.6%), 1008mm (0.8%) or 1010mm (1%) depending on the case.

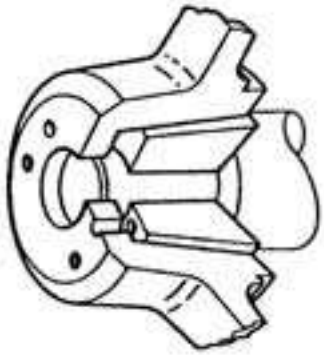
Transmission characteristics	Uniform motor torque and resistance	Irregular motor torque and resistance
A small diameter pulley a short distance between centres (E < D+d)	0.6 %	0.8 %
Pulleys of a medium to large diameter medium or long distance between centres	0.8 %	1 %

Inadequate tension will cause slip and premature belt wear. We recommend that the transmission be checked at regular intervals and the belt re-tensioned if necessary.

1.2 – Dismantling pulleys with removable hubs

FIRST STEP:
First fit the split taper bushing on the shaft after having opened the bushing opening using a screwdriver.

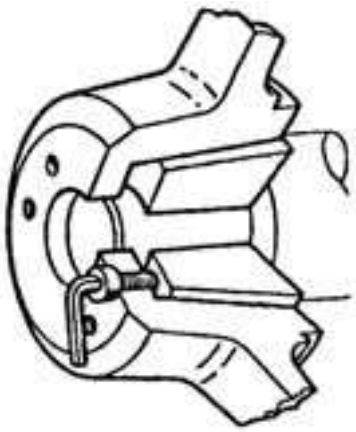


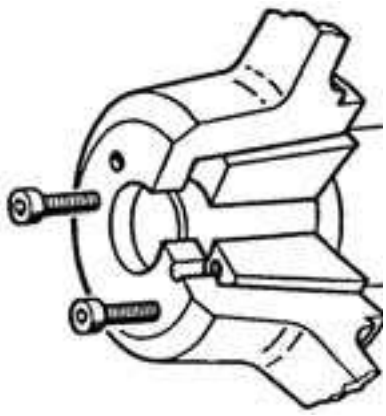


SECOND STEP:
Offer the pulley up on to the taper bushing by adjusting the angle to ensure that the bushing clamping holes match those of the pulley.

THIRD STEP:
Alternately and gradually tighten fixing screws until the assembly is properly locked (refer to table for screw tightening torque).

	2 x	N.m
25	M4 x 20/20	2.5
28	M4 x 20/20	2.5
32	M5 x 25/25	5
36	M5 x 25/25	5
40	M6 x 30/30	8.4
45	M6 x 30/30	8.4
50	M8 x 35/35	20
56	M8 x 35/35	20
63	M10 x 45/45	40
80	M12 x 50/50	68
100	M16 x 60/60	165
125	M20 x 75/75	320
160	M24 x 90/90	560





EASILY DISMANTLED:
Just release the two tightening screws, to screw them into the pulley release holes and to tighten them alternately until the bushing is released from the shaft.

1.3 – Lubrication

a) ADVANTAGE OF USING GREASE

It is essential that you always use a special bearing grease. There are many types and grades available. In addition, lubricating with a grease makes monitoring and maintenance easier: in effect, this lubricant does not tend to come out of the bearing which constitutes a major advantage on smooth, oil lubricated bearings. Another advantage of ball bearings, particularly appreciated by the food and textile industries is cleanliness.

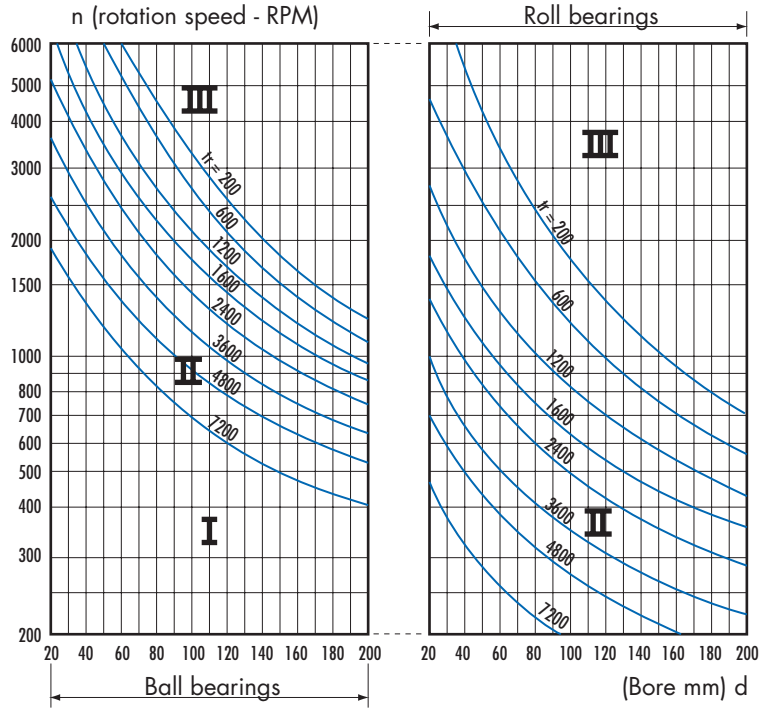
In addition to its lubricating qualities, grease plays an efficient role in sealing the bearing and protecting it against penetration by foreign bodies. Additionally, the rust prevention properties of bearing greases help to preserve the bearing and its components.

b) MOTOR AND FAN GREASING FREQUENCY

Depending on the bearing operating conditions, using grease allows us to consider 2 types of greasing: long-term greasing and frequent interval greasing. The limit between these two greasing methods can be set at 1 year.

When establishing greasing frequency, we mainly need to take into account the type of bearing and its rotation speed. The diagrams given opposite for diameter 3 series bearings, operating under moderate load and temperature conditions, constitute an excellent basis for evaluating the various greasing intervals. The data given in the diagram may have to be amended to take into account a number of factors whose impact can be difficult to assess: therefore, in the case of a bearing from a diameter series lower than 3, the interval will be shorter and, conversely; the type of ball race; atmospheric conditions (humidity, presence of dust) in which the bearing is operating; load and temperature conditions specific to the plant may also have an effect.

Maintenance



Greasing frequency (in operation hours)

Storage life

Less than 6 months	6 months to 1 year	More than 1 year
Correctly stored, the machine can be brought into service without greasing	Grease the machine when it is brought into operation	Grease repeatedly in order to renew all the grease

1.4 – Greasing practices

a) «Long-term» GREASING

No greasing mechanism fitted to the bearing will be of any use when the lubricant is only replaced once a year maximum: this applies to a number of current applications.

On assembly, thoroughly apply grease to the bearing itself and constitute reserves on each side by half filling the bearing's empty spaces.
Do not fill up to over 2/3rds.

Warning: over greasing could cause the bearing to overheat!

When carrying out general machine inspections or overhauls, open up the bearings to replace the grease. This operation must be carried out in suitably clean conditions: clean the outside of the bearing before removing the cap, drain out the grease and clean the bearing using white spirit before repacking with grease.

b) «Short-term» GREASING

1°) Lubrication on shutdown: Bearing equipped with a lubricator

If charts specify lubrication intervals that are too short to coincide with a general overhaul, the bearing may be fitted with a lubricator.
The amount of grease to be added when topping up can roughly be established using the following formula:
G = 0.005 DxB where

G = amount of grease in grams
D = External diameter of the bearing in mm
B = Width of the bearing in mm.

Lubrication can be carried out when the machine is stopped or while it is running: the best option consists in allowing the bearing to rotate slowly in order to achieve an even distribution of grease. It is important to always use the same grade of grease and to work in extremely clean conditions.

To avoid overfilling the bearing when a number of topping up operations has been carried out, it should be opened up from time to time and the spent grease drained out.

2°) Lubrication «while running»

Bearing equipped with a grease valve In some cases, the lubrication intervals shown on the chart will be found to be too short because they will cause:

* either excessively frequent shutdowns for cleaning and lubrication that are incompatible with a cost-effective operation.
* or excessive flow from the bearing if fresh grease is added without stopping the machine and removing the spent lubricant.

To overcome this state of affairs, SFK has developed a mechanism known as the GREASE VALVE which automatically discharges excess or spent grease.

The GREASE VALVE is particularly applicable to machines that operate uninterruptedly, bearings that are difficult to access or subject to high temperatures.

Thanks to the possibilities offered by this system, «while running» lubrication helps to reduce machine operating costs by eliminating shutdown for greasing.

1.5 Installation

a) SHAFT TOLERANCE
To achieve a correct assembly, thoroughly clean the shaft and slide on the sleeve, bearing, lock washer and nut so that the nut is tightened in the opposite direction to shaft rotation. To facilitate movement of the sleeve along the shaft, use a screwdriver to open up the slot.

The lock washer must be position so that its tabs are facing outward and the chamfered side of the nut must face the bearing. A nut is used to tighten the bearing on its sleeve. Operation is checked by observing the smoothness of the rotation and the outer race ease of discharge. When the beginning of resistance to discharge is noted, this signifies that the insertion is sufficient.

At this point, the assembly should still turn easily. Finally, lock the nut by folding down the locknut tab that is the nearest to the slot; if it does not quite match up, do not release the nut but, on the contrary, tighten it a little more.

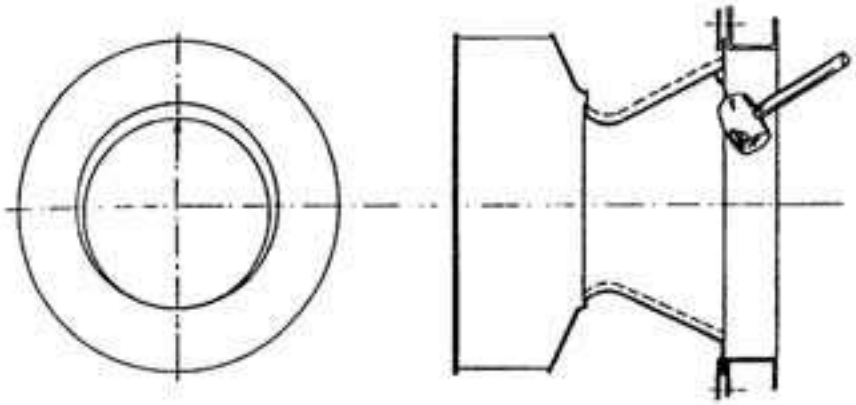
b) HOUSINGS Ensure that bearing housings are CLEAN AND OILED in order to avoid any rusting which could axially immobilise the free outer ball race.

c) AMOUNT OF GREASE If the bearing has to be packed with grease when it is assembled, do not fill more than 2/3rds full: any excess grease could cause the bearing to overheat. In order to ensure that the grease contributes to sealing, take care to coat all the walls of the bearing. (For further details, refer to the section on Lubrication on the preceding page).

c) FITTING THE COVER The bearing housing was machined after the bearing body and cover were assembled. When installing the bearing, it is important that they are assembled in the same manner: Take great care to reference mark these two components when dismantling them. Also, a cover must not be fitted on the body of a different bearing.

1.6 – Adjusting the reaction fan cowl

In order to adjust the cowl, gently tighten the screws on the suction wall so that it can be centred by means of a series of light taps. As soon as it has been satisfactorily centred, permanently set it by tightening the screws on the suction wall.



Dismantling the fan

After the volute has been wedged, unbolt and remove the front wall and withdraw the cowl.
Remove the screw from the end of the shaft in order to withdraw the turbine. If necessary, use a hub extractor.
Separate the volute from the stool and remove the covers from the bearings.
Release the bearings to withdraw the shaft and then unbolt the body of the bearing and separate it from the stool.

2 – WATER TREATMENT

2.1 – Water hardness

Water that is hard is excessively charged with calcium ions and with magnesium ions.
Water's Ca or Mg salt content characterises its hardness level.
Hardness is expressed in degrees TH (hydrotimetric title). Each degree refers to a concentration of 4 mg/litre of Ca and of 2.43 mg/litre of Mg or 10 g of Ca salts (CaCo) per m_.

Example

The evaporation of 1 m_ of water that has a 30° hardness will cause the formation of a deposit of 30 x 10 = 300 g of Ca salts.

TH	TH < 7° < TH < 15° < TH < 30° > 30°			
Water hardens	Soft water in general			

IMPORTANT

Do not confuse water hardness expressed in degrees TH with the corrosive action of water expressed as its pH (hydrogen potential) and which varies from 0 to 14.

2.2 – Corrosive action of water

This characterises a water's degree of alkalinity or acidity.
A water having a pH < 7° is an acid water (its alkalinity is reduced). It is, therefore, corrosive.
PH = 7°, neutral water.
PH > 7°, alkaline and non-corrosive water.

It should be noted that a water's pH declines as its temperature rises.

TH	0		14
Water hardens	Acid water	Neutral water	Water corrosion
	Corrosion		Scaling

2.3 Water treatment

In treatment plant equipped with washers or humidifiers, water treatment is essential in order to prevent both corrosion and scaling.

In effect, in our washers or humidifiers, spraying and evaporation alter the balance of the water which still contains dissolved salts and carbon dioxide. This causes variations in the hardness and corrosive nature of recycled water.

This demonstrates that the problem is extremely complex and that great thought must be given to the choice of water treatment (anti-scaling or water softener equipment).

We recommend contacting specialist firms.

2.4 Blow down valve

In addition to water treatment, ongoing blow down is necessary in order to limit the concentration of dissolved salts.
The output of this blow down is a case in point and depends above all on water quality.
That is why we recommend, at 3 to 4 weeks from commissioning, that a check be carried out on the pH of the water in the collection tank and, if necessary, a change to blow down output.

✔ BLOW DOWN TO BE ALLOWED FOR

For guidance:

- For water treated by injecting a silicate, the blow down output must be equal to the evaporation output.
- For permutated sodic water treated by injecting a silicate, the blow down output must be equal to 1/3rd of the evaporated output.
- For water that has been demineralised by using anti-scaling products, the blow down output must be equal to 1/10th of the evaporated output.
- In the case of normal water, (pH 7) and of an average hygrometric level (7 < TH < 15), the blow down output must represent between 1 and 5% of the recycled water output. (HUMIDIFIER).

3 - RUNOFF HUMIDIFIER MAINTENANCE

3.1 - Maintenance

Regular maintenance is the key to satisfactory humidifier operation.

Maintenance frequency largely depends on evaporation rates, dust contained in the air, water quality and the principle applied in respect of the distribution of water retained (recycling or direct).

Check the humidifier 4 times a year and clean it at least twice a year.

While carrying out the inspection, check the following:

- That both sides of the humidification surfaces must be damp. If this is not the case, then check the distribution system included with the module.
- That the blow down valve is delivering a water output. If it isn't, clean it and re-adjust the output. When using demineralised water, the lower output could clog up the valve faster.
- That the humidification module and the tank are clean.
- That the siphon is filled with water.
- That the front and rear surfaces of the humidifier are free of any deposits. If deposits are found, then increase the blow down output by 25%.

3.2 - Special operating conditions

If humidification has to be interrupted for a time, the tank must be drained of water and cleaned.

In the case of extended shutdowns, remove the modules and store them in a sheltered place.

When the humidifier is exposed to high levels of calcium and bicarbonate in the water, or to dust laden air, allow for more frequent inspections. When recycled water is used, the blow down output can be increased. These actions will depend on each case and can be determined by testing.

Precautions to be taken before commencing major work

Shut down the pump or close the supply valve and allow ventilation to run for about 30 minutes in order to dry out the humidifier. The module is relatively fragile when damp and must be handled with care.

3.3 - Descaling

In order to descale washers and humidifiers, allow the ventilation and the pump to run after having introduced a special descaling agent into the tank (not strong acids such as mineral acids for instance, but a descaler that will attack neither zinc nor aluminium) and that can be found under a variety of brands from water and surface treatment specialists.

Drain – copiously rinse with clean water – and then clean with another specialist product (no powerful bases such as soda or potassium) that is available from the same specialists.

This product will remain as part of the plant's loading without causing any problems.

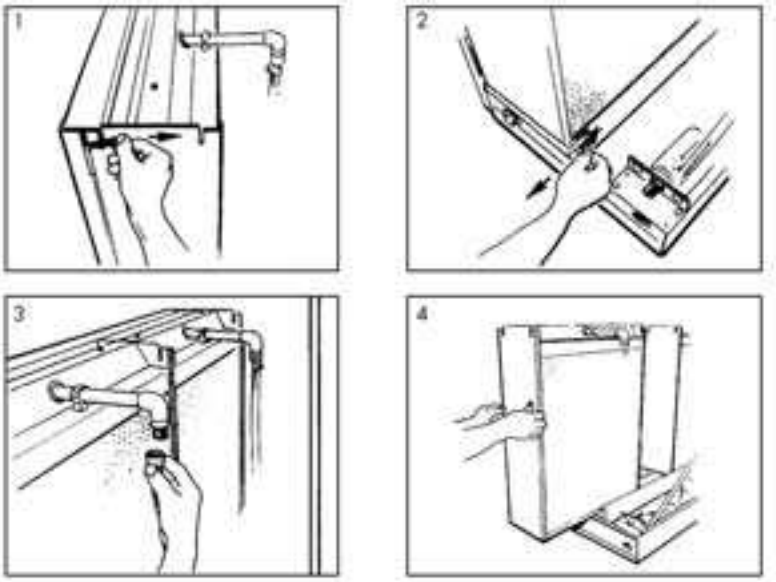
3.4 - Cleaning the modules

* Remove the closure panel
* Remove the upper (1) and lower (2) clips
* Remove the pipes (3)

The modules can be pulled forward on their slides (4).

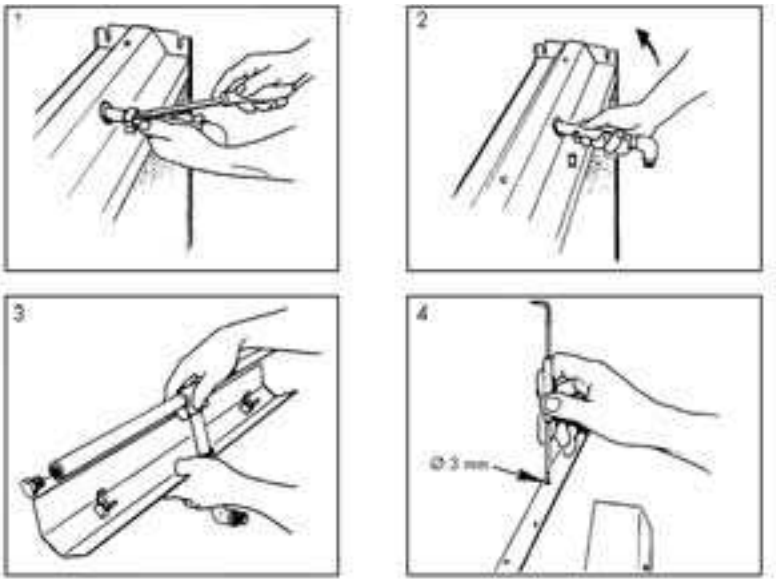
Clean them using pressurised water (water jet).

NB – Check that the supply pipes are replaced in the same order that they were removed.



3.5 – Cleaning the distribution system above the module

Pipes are easily accessible once the module has been removed. Remove the clamp holding the pipe (1) and lift it by levering it against the housing. Withdraw the distribution pipe (3) from the clamps holding the cover. Remove manifold blanking plugs. Clean water spray openings using a punch having a maximum diameter of 3mm (4) or equivalent and finally rinse the distribution pipe.



V - MAINTENANCE OPERATION FREQUENCY

5 - GENERAL MAINTENANCE

Generally speaking, for each type of unit, follow the indications provided in chapter II:

INSTALLATION – PRELIMINARY CHECKS

The maintenance operation frequency detailed below apply to equipment that is in regular use. If the equipment is not in regular use, base maintenance on hours actually operated.

5.1 - Monthly

a) Clean air filters (flat or pleated filters) and replace as required.

b) Check the inside of the humidifier or washer and in particular the absence of any scaling or incipient corrosion caused by the water used (analyse and titrate as necessary).

c) Clean the washer filter pump.

Check that the float valve is working freely.

5.2 - Quarterly

a) Grease motor fan bearings as detailed by the manufacturer, paying particular attention to the grease grades recommended (refer to greasing instructions on preceding pages).

b) Check and adjust belt tension. When finger pressure is applied to each belt, it should deflect by about 25 mm in relation to its normal 'relaxed' position.

Should the belts slip after their tension has been correctly adjusted, clean them using carbon tetrachloride or another similar product. When a belt is worn or breaks and has to be replaced, it is essential that the entire set of belts is replaced in order to ensure that all the transmission strands are of the same length.

c) If necessary, use a descalant to remove any limestone deposits from the humidifier or from the washer (see WATER TREATMENT chapter).

Never use powerful acids such as mineral acids, for instance, but a descalant that does not corrode zinc available under various brands from firms specialising in this field. Drain and rinse copiously.

Check that the washer's metal mesh is in good condition; clean as required.

5.3 - Annual

The following operations must be carried out in addition to monthly and quarterly maintenance:

a) Check the general condition of the UNIT (corrosion) as well as internal and external accessories which may require cleaning.

b) Check that the damper rods, louver locking and actuation are working correctly. Do not grease damper spindle bearings when these are made of nylon.

c) Check that the tank collecting condensates beneath the cold battery does not contain and foreign bodies that could block the drainage pipe.

d) Use the siphon to check that condensates, overflow and WASHER drainage etc. are unobstructed.

e) Clean the fan turbine and shaft. Should any rust appear, use emery cloth to clean it off and apply a coat of rust-proofing paint (avoid drops or overloading the leading edges of the vanes as this could alter the FAN's characteristics.

Check that the state of the dampers is satisfactory.

f) The following is essential in the case of the humidifiers:

* Clean and descale the inside of the section.
* Check packing condition.
* Check water distribution mechanism.
* Clean or replace filters on the water supply.
* Rinse: blow down blow down, overflow, drain.
* Remove recycling pump and check is condition (turbine, seals, packing glands, bearing, etc.) and the state of the electrical connections (tightening).
* Check and adjust the float valve after it has been cleaned.
* Adjust pump discharge pressure and the blow down blow down output.
* Check that the overflow is working properly.
* Check sealing on access doors and replace seals as required.

VI - SPARE PARTS

Spare part types and reference numbers can be obtained from our services on request, by specifying the equipments' serial numbers.

Parts required for maintenance purposes are usually procured with the original order. We would be grateful if you would note their specifications for future use. As a rule, upon commissioning, provision must be made for wear parts and for emergency spares:

* Transmission belts
* Air filter sets
* Fan blades
* Electric motor bearings.

OZONAIR HYDRONIC

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Incorporation statement

(Article 4, paragraph 2 of modified directive 89/392/CEE) (1)

Ozonair Hydronic
71 High Street, Nailsea,
Bristol BS48 1AW

HYDRONIC declares that the air handling units types CCM, CTB2, CTHb & CTH and ancillaries, should **not** be put into operation until the installation, in which it has been fitted, has been declared to conform to the modified (1) 'Machinery Directive' 89/392/CEE

HYDRONIC declares that the equipment is in accordance with the provisions of the directives
'EMC' N° 89/336/CEE modified (2)
'Low voltage' N° 73/23/CEE modified (3)

(1) 89/392/CEE modified 91/368/CEE, 93/44/CEE, 93/68/CEE, 98/37/CEE
(2) 89/336/CEE modified 92/31/CEE, 93/68/CEE, 98/13/CEE
(3) 73/23/CEE modified 93/68/CEE

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