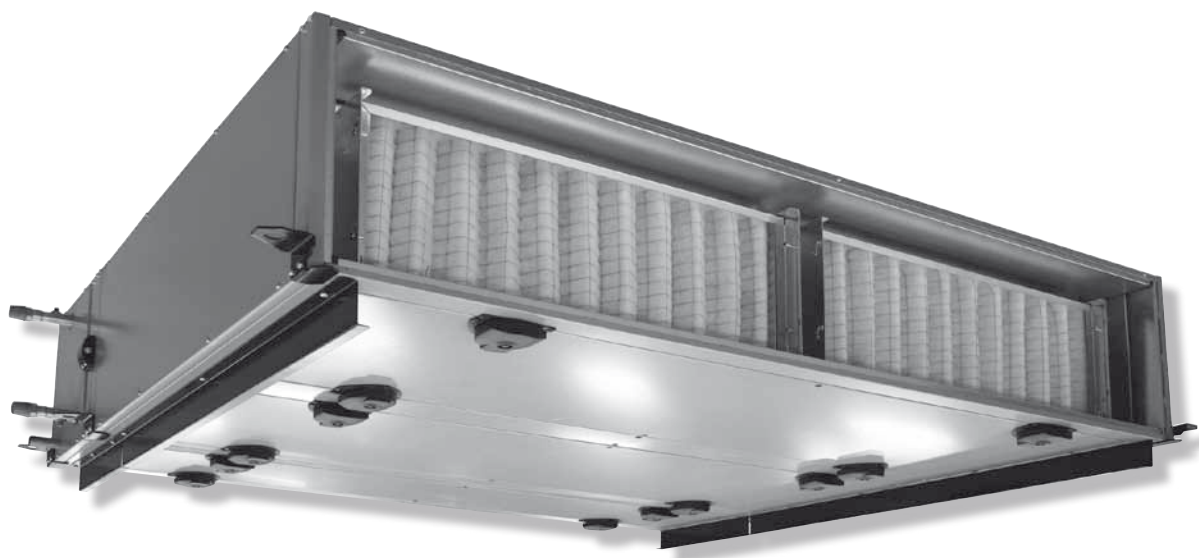


# Slim@ir AHU

## SR 0303 - 0318



English

Français

**Compact air handling units**

**Centrales compactes de traitement d'air**

**IOM SR-N.1GBF/07.11**

Part number / Code : **Q3NSTE880**

Supersedes / Annule et remplace : **None / Aucune**





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# 1 - Introduction

The purpose of this manual is to provide the installation, start-up, operating and maintenance rules to the users of the compact air handling units. It does not give a full description of all maintenance works assuring the long life and reliability of this type of equipment.

Only the services of qualified personnel, member of a registered maintenance company, can guarantee a reliable and durable running of the machine.

## 2 - Safety precautions

Before installing the unit, please read the following safety precautions carefully.



### Warning

Installation, operation and maintenance must be performed by qualified personnels who are familiar with local codes and regulations and experienced with this type of equipment.



### Warning

Confirm the unit is switched OFF before installing or servicing the unit.



### Warning

All field wiring must be installed in accordance with the national wiring regulations.



### Caution

Handling of the unit must be done by using the systems designed to support its weight.



### Warning

Ensure the rated voltage of the unit corresponds to the name plate before carrying out wiring according to the supplied wiring diagram.



### Caution

It is forbidden to undertake any work on electrical components of the unit before disconnecting the power supply.



### Warning

The unit must be GROUNDED to prevent possible hazards due to insulation failures.



### Caution

It is forbidden to undertake any work on electrical components of the unit, if there is presence of water and humidity.



### Warning

All wiring must not touch the heat source or any moving parts of fan motor.



### Caution

When undertaking water connection, make sure that any foreign matters will not be introduced into water piping.

**The manufacturer warranty will not be applied, if all installation instructions stated in this manual have not been followed.**

## 3 - Description

### 3.1 - Inspection and storage

When the equipment is received, all items must be carefully checked against the bill of lading to be sure all crates and cartons have been received. The units are shipped on pallet. Inspect all units for visible or concealed damages.

**In case of deterioration, formulate the precise reserves on the transport document and send immediately a registered letter to the forwarder, mentioning clearly the occurred damages and a copy of the letter to the manufacturer or its representative.**

Do not stand or transport the unit on its end. Temporary storage must be indoor, completely sheltered from rain, snow, etc.

Change in the weather (high and low temperatures) should not damage the unit. Excessively high temperature (60 °C or more) may deteriorate certain plastic materials and cause permanent damages.

In addition, some electric components and solid-state circuit boards may not operate correctly.

### 3.2 - Electrical data

#### Motor absorbed current - 230 V / 1 ph / 50 Hz - At 3.1 m/s on the coil

SR MODELS		0303	0306	0309	0312	0315	0318
Low Speed	A	2.0	4.1	4.7	9.4	8.6	14.8
Medium Speed	A	2.3	3.3	5.1	7.0	8.4	10.7
High Speed	A	2.9	3.7	6.3	7.6	10.1	11.5

#### Motor absorbed current - 230 V / 1 ph / 50 Hz - EC plugfan

SR MODELS		0303	0306	0309	0312	0315	0318
High Speed	A	3.7	4.1	8.0	8.2	12.2	12.3

#### Electric heaters - 400 V / 3 ph / 50 Hz (230 V / 3 ph / 50 Hz optional)

SR MODELS		0303			0306			0309			0312			0315			0318		
		BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3
Capacity	kW	3	6	9	6	12	18	9	18	27	12	24	36	15	30	45	18	36	54
Number of stages		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Capacity per stage	kW	3	3	3	6	6	6	9	9	9	12	12	12	15	15	15	18	18	18

If outlet air temperature is higher than 40 °C, the electric heater must imperatively be placed at supply side.

#### If Aqu@Net control (2 stages max.)

SR MODELS		0303			0306			0309			0312			0315			0318		
		BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3	BE1	BE2	BE3
Capacity	kW	3	6	9	6	12	18	9	18	27	12	24	36	15	30	45	18	36	54
Number of stages		1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2
Capacity per stage	kW	3	3	3+6	6	6	6+12	9	9	9+18	12	12	12+24	15	15	15+30	18	18	18+36

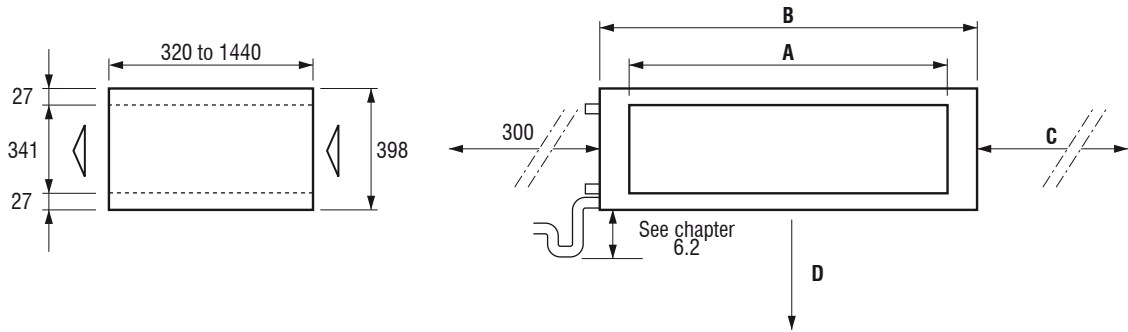
If outlet air temperature is higher than 40 °C, the electric heater must imperatively be placed at supply side.

### 3.3 - Operating limits

<b>WATER PIPING SYSTEM</b>	Maximum operating pressure	10 bars
	Minimum entering temperature	+ 4 °C
	Maximum entering temperature	+ 90 °C
<b>ROOM AIR TEMPERATURE</b>	Minimum temperature	5 °C
	Maximum temperature	32 °C
<b>SUPPLY VOLTAGE</b>	230 V ± 10 % / 1 ph / 50 Hz or 400 V / 3 ph / 50 Hz (plug fan wheel and electric heater)	

# 4 - Dimensions

## 4.1 - Dimensions



If access via panels on sliding rails : 300 mm  
 If access via hinged doors :

SR MODELS	0303	0306	0309	0312	0315	0318
<b>A</b>	455	720	1025	1330	1635	1940
<b>B</b>	509	774	1079	1384	1689	1994
<b>C</b>	536	801	1106	1411	1716	2021

Dimensions in mm.

Casing length (mm)	Minimum space (mm)
320	300
400	340
480	420
560	500
640	580
720	660
800	740
880	820
960	460
1040	500
1120	540
1200	580
1280	620
1360	660
1440	700

## 5 - Installation



### Caution

All panels of unit cabinetry are coated with a removable plastic film to protect them during the transportation.

This protection shall be removed as soon as the units are received on site, at the risk of meeting later on with difficulties of peeling caused by sun radiations and bad weathers.

### 5.1 - Unit handling

Be careful to avoid rough handling on the unit. **Do not lift the unit by the condensate outlet or by the water connections.** Use a lifting truck to facilitate the unit installation.



### Warning

Sharp edges and coil surfaces are a potential hazard. Avoid contact with them.



### Caution

Do not transport the assembled modules, but separately because the assembly clamps and the extremity profiles are not adapted to such a handling.



### Caution

For all manipulation, the units must be placed WITH CARE on the ground, the structure and the weldings cannot resist violent shocks.

In case of transportation by containers, precautions shall be taken to avoid these shocks.



### Caution

In case of monobloc unit (on a single piece base frame) equipped with lifting lugs, **USE IMPERATIVELY A LIFTING SYSTEM.**

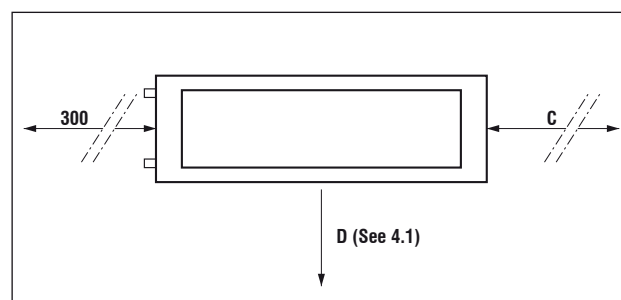
### 5.2 - Installation location

1. The units are intended to be installed above false ceiling, in false floor, along wall or outside according to the configurations.
2. Install the unit in a position having sufficient strength to carry the weight of the unit.
3. Install the unit in a position where ducts can be connected to inlet and outlet sides of the unit.
4. Install the unit in a position from where condensate can be run to waste easily.

5. Check the distance between the upper slab and false ceiling to ensure the unit will suit the distance.
6. Ensure there is sufficient space around the unit to service it (see table hereafter for minimum clearances on service side of filters and fan-motor assembly access).

### Minimum clearances on service side

SR MODELS	0303	0306	0309	0312	0315	0318
Lateral access door opposite to the connection (C) in mm	536	801	1106	1411	1716	2021



### Warning

Do not install the unit in a machinery shop or kitchen where vapour from oil or its mist flows into the unit.

### Service area to be provided for a unit with single inlet forward curved centrifugal fan (mm)

In the case of a single inlet forward curved centrifugal fan, provide a service area on C dimension even if the service side is accessible from the bottom.

**THIS SERVICE AREA IS MANDATORY, since the removal/installation of components is impossible.**

SR MODELS	0303	0306	0309	0312	0315	0318
Service area (C) in mm	455	720	513	665	545	647



### Caution

The fan is weighing about 20 kg. Particular precautions shall be taken in order to avoid unit fall and musculo-skeletal disorders.

## 5 - Installation (continued)

### 5.3 - Installation instructions



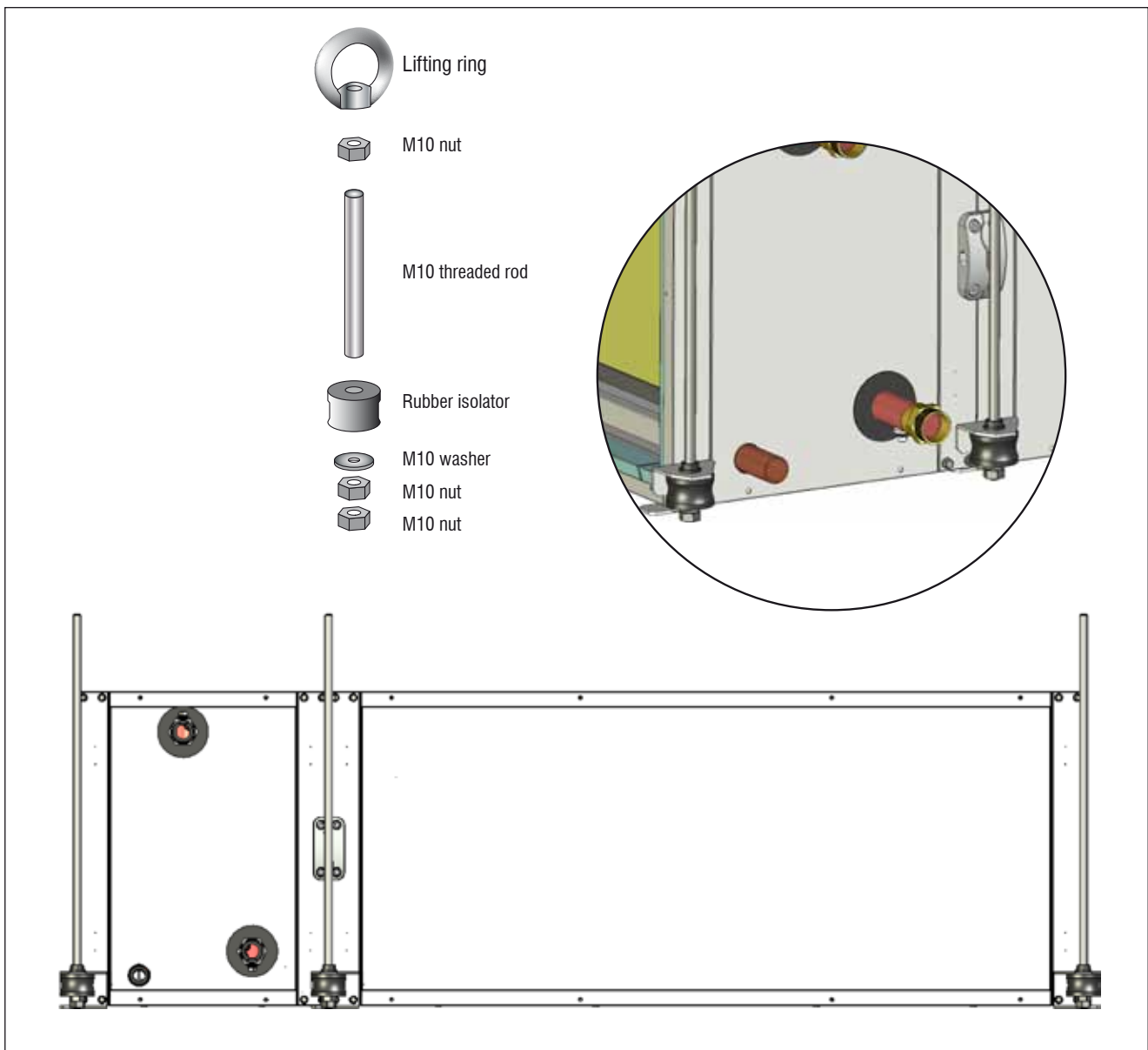
#### Warning

The assembled modules will have to be perfectly aligned and of level the ones compared to the others.

No slope will have to be observed, if however the adjustment is not 100% realizable, support a slope in the direction of flow of the condensates.

1. Unpack the unit and install the fixing brackets on it (see drawing below).
2. For ceiling suspended unit, fix it directly to the suitable supports or hang it to the ceiling by threaded rods or strengthened screws supplied by the installer (see drawing below).

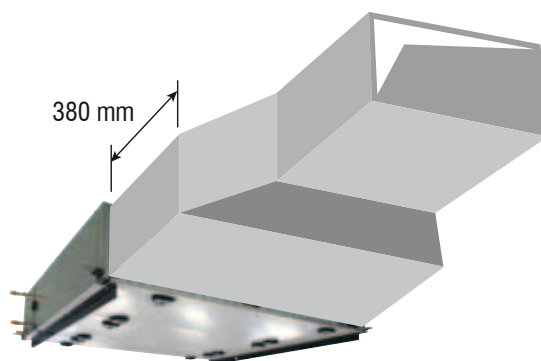
3. Secure the unit in its final position and **level it with a spirit level** to assure proper drainage and operation.
4. Unit must be mounted in such a way that water will flow toward drain connection.



## 5 - Installation (continued)

### Recommendation for the connection of the ducts with a single inlet forward curved centrifugal fan

For a good aeraulic operation of the fan, the length "L" in figure above must be equal at least to 1.5 times the fan wheel diameter.

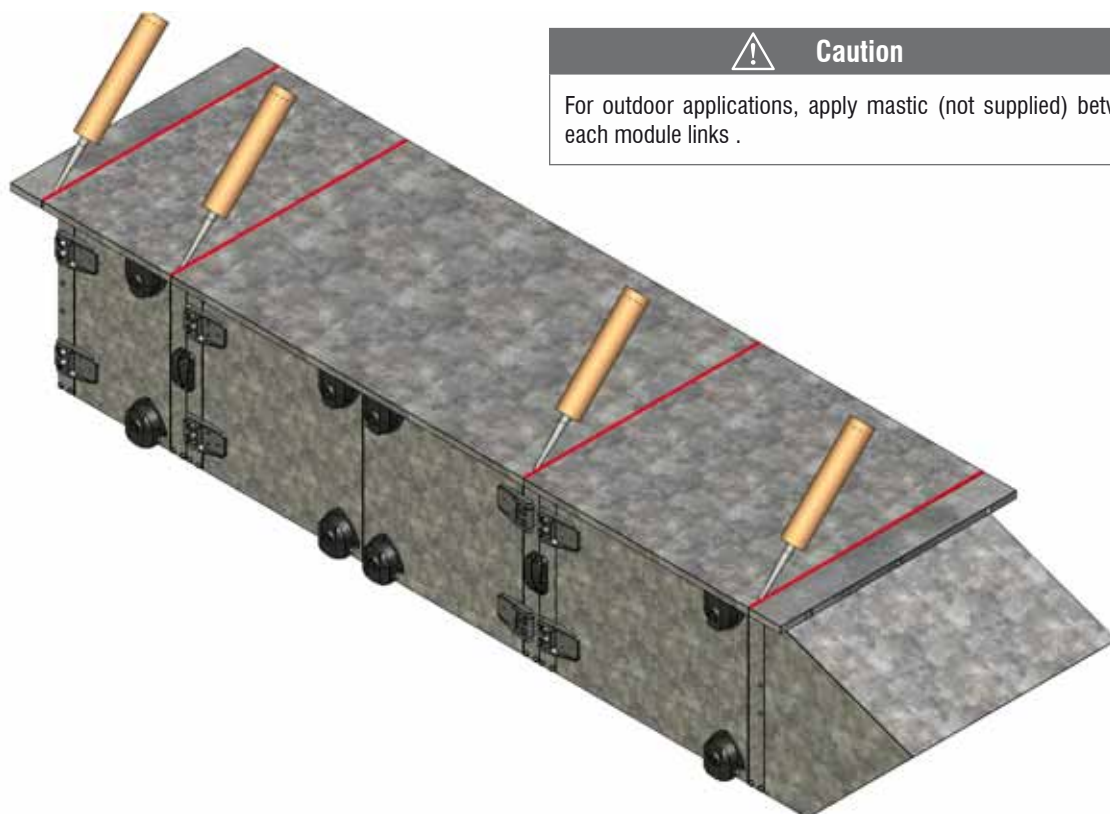


#### Caution

The unit shall not support the load of the installation ductwork.

Avoid making the fan support the efforts due to the possible dilatation of the ducts by using flexible connectors.

### Outdoor units



#### Caution

For outdoor applications, apply mastic (not supplied) between each module links .

## 6 - Water connections

### 6.1 - Water coils

#### Cooling coils water volume (in litres)

SR MODELS	0303	0306	0309	0312	0315	0318
3 rows	1.32	1.92	2.61	3.31	3.98	4.67
4 rows	1.59	2.39	3.32	4.24	5.14	6.06
6 rows	2.14	3.34	4.72	6.11	7.45	8.84

#### Heating coils water volume (in litres)

SR MODELS	0303	0306	0309	0312	0315	0318
1 row	1.05	1.45	1.91	2.37	2.82	3.28
2 rows	1.32	1.92	2.61	3.31	3.98	4.67
3 rows	1.59	2.39	3.32	4.24	5.14	6.06

### 6.2 - Condensate drain connection

The condensate drain pan is supplied with 1" OD copper tube outlet.

Ensure that water condensate will be properly drained out from the drain pan which must be connected to the main drain piping.

The drain line must be installed with a downward slope. Ensure water trap is available on drain piping.

On completion, the drain line should be insulated.



#### Caution

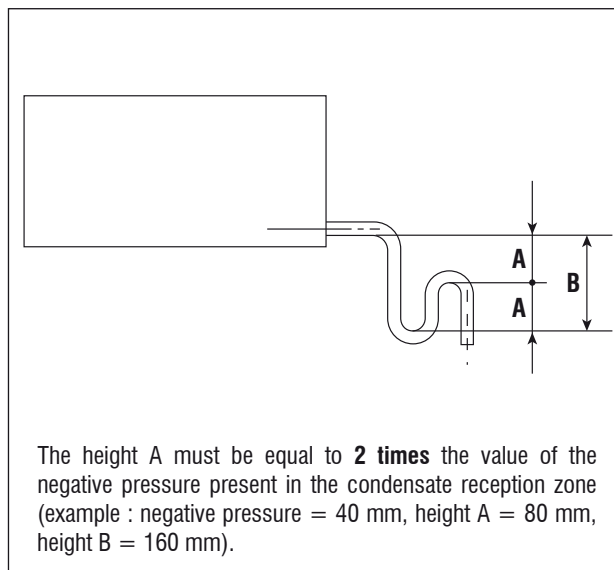
Check that there is no counter-slope which would prevent condensates from flowing.



#### Warning

All foreign material must be removed from the drain pan.

### Siphon for condensate evacuation



### 6.3 - Winterizing water coils

In winter, due to a general shutdown of the installation or a failure of outdoor air damper control, coil freeze-up may occur.

To avoid coil damage, it is recommended to drain completely the non used coils or to fill them with an anti-freeze solution.

The concentration of anti-freeze solution must be regularly and carefully checked before each winter season.

It is highly advised to place a heating coil before a cooling coil for an operation during winter season.



#### Caution

**Carefully read instructions for mixing anti-freeze solution used. Some products will have a higher freezing point in its natural state than when mixed with water. The freezing of coils is not the responsibility of the manufacturer.**

## 6 - Water connections (continued)

### 6.4 - Water coils connection

Each water coil is equipped with headers having  $\text{Ø}26/28$  male threaded type connection on water supply and water return.

Air vent must be installed at highest point of the water piping.

To ensure an optimum heat transfer efficiency, connections of water supply and return should be arranged in such **a way that a counter flow configuration between air and water is obtained.**

Flexible hoses are recommended for coil connections. Tighten normally the water connections.

Note that an excessive tightening can cause too strong material stresses at the time of significant temperature changes.

All water lines should be insulated to prevent sweating and heat loss.



#### Caution

Hot water and chilled water coils may contain a small amount of oil incompatible with plastic polyethylene piping (PER/HTA/PVC). Coils must be rinsed out before use to avoid any problem. It is the installer's responsibility to contact their pipe supplier and take into account the general instructions for use of plastic pipes (PER/HTA/PVC).



#### Caution

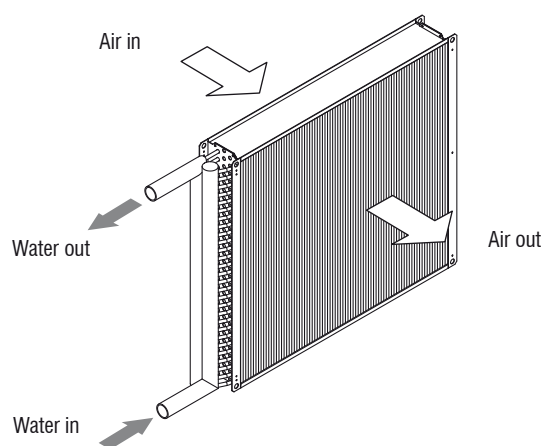
If the units are not equipped with control valves, the air temperature must not exceed  $50\text{ °C}$ .



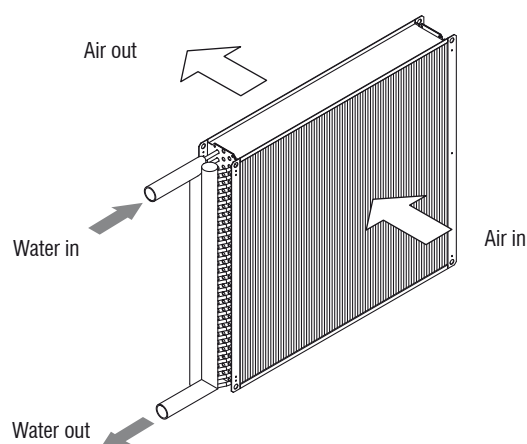
#### Warning

To avoid any damage on coil, use two spanners to tighten the water pipe fittings on each header.

#### RIGHT-HAND connection



#### LEFT-HAND connection



## 7 - Electrical connections

### 7.1 - Unit connection

**According to chosen fan type, the electrical connection will be different.**

Before undertaking any electrical connection, make sure that the fan motor is suitable for electrical power supply. Each unit is provided with an electrical junction block located outside the fan section.

All wiring must be done in accordance with applicable electrical codes and regulations.

**Earthing of unit is imperative.**

The manufacturer or its representative will not be held responsible for accidents caused by incorrect or non-existing earthing.

### 7.2 - Control

The standard units are supplied without any controls.

If an optional control is provided, please refer to the dedicated manual and to electrical diagram supplied with the unit.



#### Caution

**It is possible to connect several units to one speed selector or one control thermostat only.**

**However, it is mandatory to check that the sum of intensities absorbed by the units is compatible with the breaking capacity of the control device or power contacts.**

### 7.3 - Electric heater

The electric heater, when supplied (according to the configuration), has two high temperature safety thermostats.

One of them is of manual reset type. It must imperatively switch off the electric heater control in case of fan failure (motor stopping, clogged filter, closed damper,...).

Always refer to wiring diagram supplied with the unit for electrical connections.



#### Caution

Envisage a time delay maintaining the fan operation 15 minutes after the electric heating coil power supply is switched off.

The electric heating coils require a permanent ventilation.

It is essential to make sure that the ventilation is properly engaged before power supplying electric heating coil, and that there is a post-ventilation after the stopping of electric heating coil.

The discharge temperature of standard electric heating coils must not exceed 40 °C, if motor and fan are located downstream the coil.

The installation must allow a dissipation of heat generated by electric heating coil in case of a sudden current failure.

We decline all liability for any incidents that might occur due to non-compliance with the above measures.



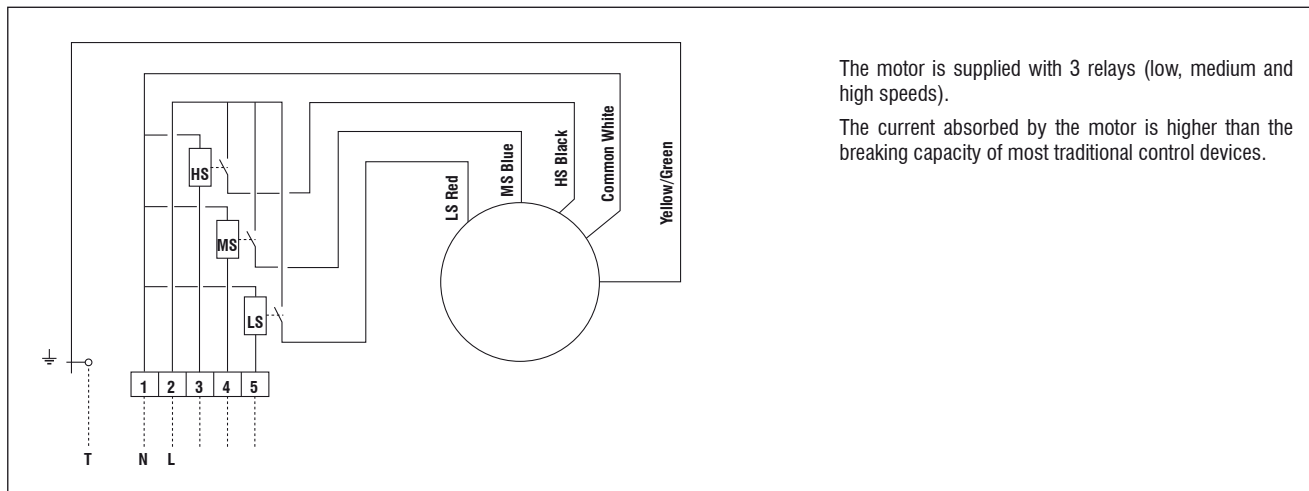
#### Warning

When an electric heating coil is used, the damper servo-motors must not have pull-back spring in order to avoid any inopportune closing of the dampers before complete shutdown of fan caused by a current failure.

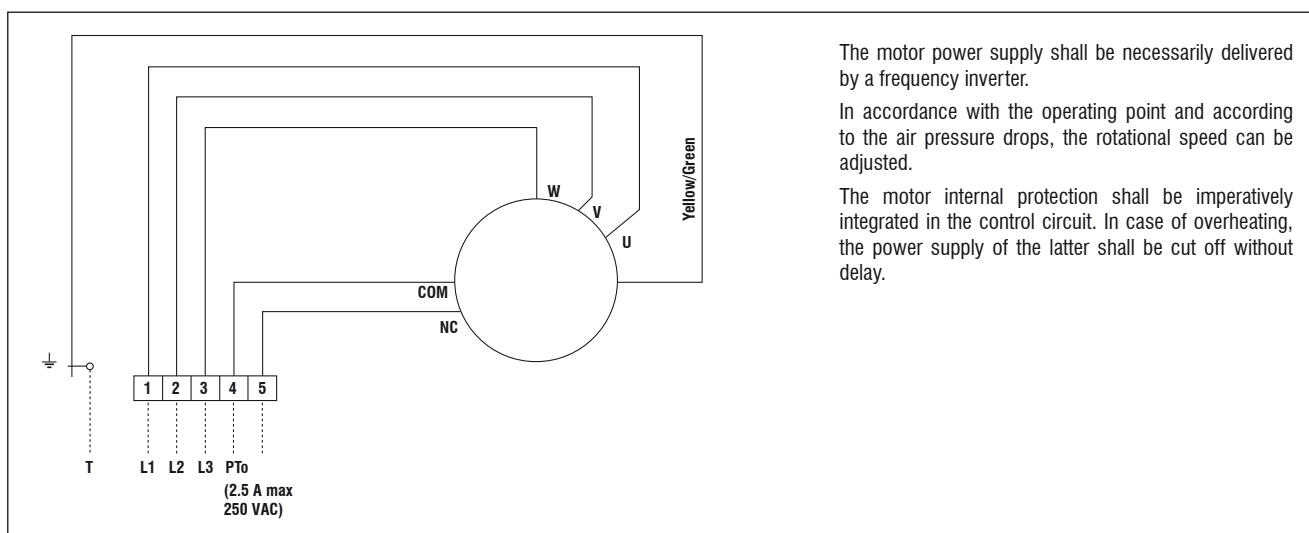
This would prevent evacuation of calories produced by electric heating coil and would involve a rise in temperature in the air handling unit being able to deteriorate the internal components, to even cause a fire.

## 7 - Electrical connections (continued)

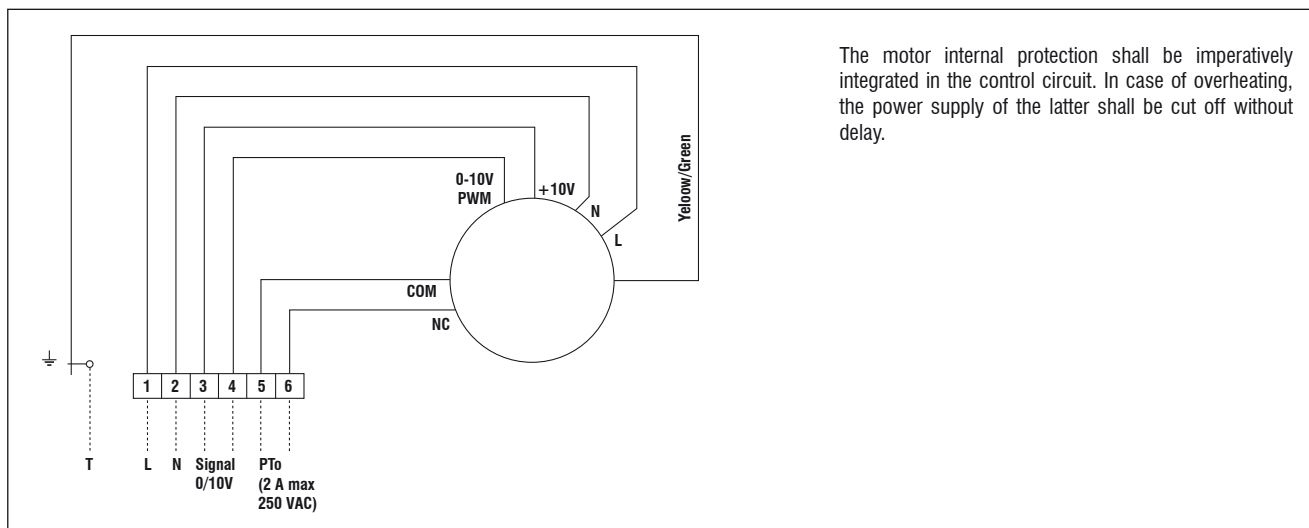
### Wiring diagram of a 3 speed single phase motor - 230 V / 1 Ph / 50 Hz



### Wiring diagram of a plug fan wheel with 3 phase motor - 400 V / 3 Ph / 50 Hz



### Wiring diagram of a plug fan wheel with EC single phase motor - 230 V / 1 Ph / 50 Hz



## 8 - Preliminary checks before start-up

1. Make sure that system piping has been cleaned and all the air has been purged, before starting up the unit.
2. Check that condensate drain pipe is connected and allows correct drainage. Also check that it is connected to a siphon.
3. Ensure that air filter is clean and properly installed.
4. Make certain that fan rotates freely.
5. Make sure that all water and electrical connections are properly tightened.

## 9 - Operating guidelines

### Temperature limits for some internal components

<b>Filters</b>	-20 °C / +70 °C
<b>Carbon filter</b>	-20 °C / +30 °C and 50% HR
<b>Dampers</b>	-20 °C / +80 °C
<b>Mastic</b>	-30 °C / +90 °C
<b>Motor*</b>	+60 °C

- \* For temperatures between 40 and 60 °C, motors must be undersized.  
At 50 °C, life expectancy of the motor is divided by 2.

### Undersizing factors of motor power according to the temperature

T(°C)	40	45	50	55	60
Factor	1	0.96	0.92	0.87	0.82

## 10 - Maintenance

It is recommended to proceed to the following maintenance works in order to ensure a good operation of the unit.



### Caution

Before performing any maintenance operation, disconnect the unit main power supply.

### 10.1 - Fan motor assembly

Check, during periodic maintenance, that fan wheel rotates freely without any friction.

If the fan motor overload protection is tripped, wait for safety automatic reset and try to find out the cause of overload protection tripping.



### Caution

On size 0303 equipped with single inlet forward curved centrifugal fan in bottom access configuration, **the removal of the fan is impossible.**

A service area on the side of the fan section shall be provided to allow a side withdrawal.

In case this service area is not possible, a complete removal of the unit is required.

The removal/installation and intervention costs are to be supported by others.

### 10.2 - Electrical connections

Re-tighten periodically the electrical connections.

### 10.3 - Water piping system

Once a year, drain the piping system and check the furring-up of the pipes.



### Caution

It is not the manufacturer's policy to make recommendations in terms of water treatment (please contact a specialised water treatment company).

However, given the critical nature of this subject, particular care should be taken to ensure that, if treatment is required, it works effectively.

Using untreated or unsuitable water leads to excessive clogging inside the coil tubes (earth and mud deposits, corrosion, etc.) with major consequences on the thermal efficiency of the unit and irreversible damage to the equipment.

The manufacturer and its representative decline all responsibility in the event of untreated or incorrectly treated water being used.



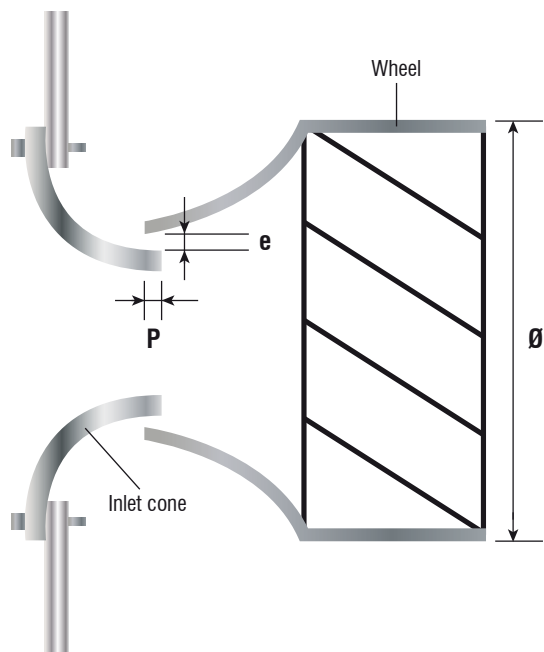
### Caution

If the water pipes are exposed to temperatures below 0 °C, take the necessary precautions (draining, antifreeze, etc.) to avoid the coils freezing.

Adding antifreeze to the circuit reduces the unit's performance (if necessary, please contact our sales network).

# 10 - Maintenance (continued)

## Insertion of plug fan wheel around its inlet cone

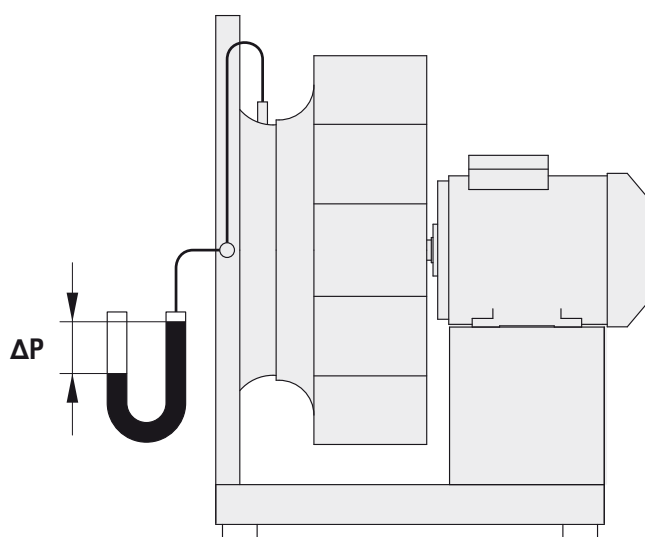


### Plug fan with 3-phase motor

Reference	Ø (mm)	e (mm)	P (mm)
2020	204	2	2
2222	230	3	3

### Plug fan with EC motor

Reference	Ø (mm)	e (mm)	P (mm)
R3G250	284	2	6



Air flow calculation :  $q_v = K \times \sqrt{\frac{2}{\rho} \times \Delta P} \times \text{Number of fans}$

$q_v$  = Air flow (in m<sup>3</sup>/h)

$K$  = Calibration factor (see table below)

$\rho$  = Air density (in kg/m<sup>3</sup>)

$\Delta P$  = Pressure difference (in Pa)

Number of fans	0303	0306	0309	0312	0315	0318
RLM 2020 (K=58)	1	1		2		
RLM 2222 (K=67)			1		2	2

Air flow calculation with plug fan with EC motor :

$q_v = K \times \sqrt{\Delta P} \times \text{Number of fans}$

$q_v$  = Air flow (in m<sup>3</sup>/h)



$K$  = Calibration factor (see table below)

$\Delta P$  = Pressure difference (in Pa)

Number of fans	0303	0306	0309	0312	0315	0318
R3G250 (K=70)	1	1	2	2	3	3

# 10 - Maintenance (continued)

## Periodic table of service and maintenance

TASKS PER COMPONENTS		ACTIONS	1 month	3 months	6 months	1 year	2 years
			Recommended inspection and maintenance interval				
<b>1 - AIR INLET AND OUTLET</b>							
1.1	Control possible contaminations, damage and/or corrosion.	Clean completely and repair if required.				X	
1.2	Control the absence of elements at air inlet side.	Make sure that inlet side is always cleared and clean in order to always have optimal operation.	Autumn and winter : every months (even every weeks in case of important snow) Spring and summer : every 3 months.				
<b>2 - CASING</b>							
2.1	Control possible contaminations, damage and/or corrosion.	Clean and repair if required.				X	
2.2	Check the possible presence of water (condensates, leakages,...).	Clean and look for the cause, then repair.			X		
2.3	Checks that siphons are operating properly, and that the evacuations are not blocked.	Clean if required.				X	
2.4	Check the condition of connectors.					X	
2.5	Check the condition of door gasket.	Replace if required.	At each inspection				
<b>3 - FILTERS</b>							
3.1	Check that there are no contamination, damage (air leakage) or odour.	The air filters must have a basic efficiency appropriate to the desired filter class for their complete lifetime. The filter must be replaced when contaminants or leakages would have been noticed. Replace affected air filter(s) if the previous control dates less than 6 months, the totality of the filtering bank in the contrary case.		X			
3.2	Check filter air pressure drops.	Replace filters from filtering bank if the maximum air pressure drop accepted by filters is exceeded.	X				
3.3	Check the non-cleanable filters changed most recently.					X	
3.4	Inspection of cleanness condition of filter section.	Clean the frame and the casing. Interval in conformity with VDI6022 recommendations of RLT Hygiene standard. Even if the casing seems clean, fungus or germs invisible to the naked eye can multiply.			X		
3.5	Inspection of cleanness condition of metallic filters.	Rinse filtering cells in an anti-fungicide and anti-bacterial disinfecting cleaning bath.			X		
<b>4 - HUMIDIFIERS</b>							
	The maintenance operations to be done and their periodicity depend on the risk of microbial proliferation.	It is recommended to get controls of water quality regularly realized by specialized laboratories.					
	Do not use cleaning products that may cause damage to the pan, the pump and/or the hydraulic pipes.	Use alcohol based cleaning and disinfecting agents.					
<b>Wet media type humidifiers</b>							
4.1	Regular servicing.	Open the deconcentration bleed valve by 1/4 turn, run the pump for 1/4 hour. Close again the valve by 1/4 turn.	Depends on supply water characteristics.				
4.2	Periodic maintenance.	Clean the orifices of each distribution ramp. <b>Note</b> : For dismantling, unclip the ramp and free it by turning. Connect the ramp to the city water supply to rinse. If required, clean the orifices with a pointed tool then rinse again.	Depends on supply water characteristics.				
4.3	Check the pan cleanness.	Drain the pan, clean and control the water level after refilling.			X		

# 10 - Maintenance (continued)

## Periodic table of service and maintenance (continued)

TASKS PER COMPONENTS		ACTIONS	1 month	3 months	6 months	1 year	2 years
			Recommended inspection and maintenance interval				
4.4	In case of unit shutdown.	For shutdown periods higher than 4 hours, the humidifier shall be dried 30 mn after the pump is switched-off. For prolonged shutdowns, it is necessary to protect the installation against freezing. Drain the pan and hydraulic pipes.	Every air handling unit shutdown higher than 4 hours.				
<b>Air washer</b>							
4.5	Check pan cleanness.	Drain, clean and disinfect regularly the pan in order to maintain the risks of bacterial proliferation below the maximum recommended values (refer to legislation in use).		X			
4.6	Regular servicing.	Open the deconcentration bleed valve by 1/4 turn, run the pump for 1/4 hour. Close again the valve by 1/4 turn.	Depends on supply water characteristics.				
4.7	In case of unit shutdown.	Run the pump for 30 mn (AHU fan not running and deconcentration bleed valve open) then stop the pump. Empty the pan, clean and disinfect it in a thorough manner (drain also hydraulic pipes : risk of freezing). Clean each spray nozzle and its orifice (for dismantling, unclip the nozzle and remove it, for cleaning, unscrew the translucent section). If required, the nozzle shall be replaced.	Every air handling unit shutdown higher than 4 hours.				
<b>5 - COOLING AND HEATING COILS, GENERAL</b>							
5.1	Control the condition of the section, check that there is no damage and corrosion.	Clean and repair.		X			
5.2	Control the condition of the coil, condensate drain pan and eliminator for corrosion and functionality.	Clean and repair. Heavy maintenance : If the heat exchanger cleaning in the casing is not sufficient, the heat exchanger must be pulled out and cleaned accordingly. Comb the fins on their edge, if required.			X		
5.3	Check that the siphon is running properly.	Modify the height / repair.		X			
5.4	Control the tightening of piping connections and fixations and check that water arrives and leaves properly the coil.	Readjust and repair, if required.				X	
5.5	Purge air.	(only with water)				X	
<b>Hot water coil</b>							
5.6	Control the condition of the section, check that there is no damage and corrosion.	Clean and repair.				X	
5.7	Check condition of access section, at clean air side.	Clean.				X	
<b>Electric heating coil</b>							
5.8	Check the condition of electric elements. Check that there is no damage or corrosion.	Clean and repair.				X	
5.9	Check the condition of the section.	Dry clean if required.				X	
5.10	Check the condition of electrical connections and safety devices.	Repair or replace if required.				X	
5.11	Check the screw tightening.	Retighten if required.				X	
<b>Chilled water (air/water) or direct expansion coil (air/refrigerant)</b>							
5.12	Chilled water (air/water) or direct expansion coil (air/refrigerant)	The siphon with or without condensate water non-return mechanism must be dimensioned and positioned in accordance with the pressure to ensure a good flowing of condensates.					
5.13	Control the condition of the section, check that there is no damage and corrosion.	Clean and repair.		X			
5.14	Control the condition of the coil, drain pan and eliminator for corrosion and functionality.	Repair.		X			


# 10 - Maintenance (continued)

## Periodic table of service and maintenance (continued)

TASKS PER COMPONENTS		ACTIONS	1 month	3 months	6 months	1 year	2 years
			Recommended inspection and maintenance interval				
5.15	Check cleanness of coil, eliminator, drain pan and siphon.	Clean.			X		
5.16	Check that water arrives and leaves the coil properly.					X	
5.17	Check that there is no icing.	(on direct expansion coils) possible only in operation.				X	
5.18	Check the protection devices against freezing (glycol, thermostat, ...)	<p>Repair or replace, if required.</p> <p>When air temperatures are low during winter and after a general shutdown of installation or a bad operation of outdoor air damper control, freezing of water contained inside the coil may occur.</p> <p>To avoid any problem of this type, it is recommended to drain completely the coils not used or to protect them by introduction of an antifreeze solution inside hydraulic circuit or other devices.</p> <p>⚠ The coil damage caused by freezing of water contained inside the coil is not the responsibility of the manufacturer.</p>	When there is risk of freezing.				
5.19	Control hygienic condition.	Clean and repair. Blow, if needed, the coil with compressed air by taking care not to damage the fins.				X	
<b>Droplet eliminator</b>							
5.20	Control the condition of the section. Check that there is no damage and corrosion (if an inspection section has been selected).	Clean. Heavy maintenance : A dismantling of eliminator can be necessary. During remounting, take care not to bore the coil tubes.			X		
<b>6 - HEAT EXCHANGER, GENERAL</b>							
(i)	To ensure the good running and performance, check regularly that there is no dust nor dirtinesses.						
6.1	Check that there is no contamination, corrosion or damage.	Clean and repair.			X		
6.2	Check that there is no by-pass between fresh air and return air.	Repair.			X		
6.3	Control the condition of drain pan, check that there is no damage or corrosion.	Repair.		X			
6.4	Check the running of the siphon.	Repair.		X			
6.5	Control the hygienic condition of the casing.	Clean the frame and the casing. Even if the casing seems clean, fungus or germs invisible to the naked eye can multiply.			X		
6.6	Control the gasket condition ensuring tightness.	Replace.				X	
6.7	Check (if present) the running of by-pass and servo-motor (if present).	Repair.			X		
<b>Thermal wheel</b>							
6.8	Check that there is no contamination, corrosion or damage.	Clean and repair.			X		
6.9	If self-cleaning realized by purge section is not sufficient, clean the rotor.	<p>For low importance deposits easily removable, use a vacuum cleaner.</p> <p>For more important clogging, use compressed air with care (do not damage the fins).</p> <p>If the dirtiness is firmly attached to the rotor, clean with hot water and a soft detergent (take care to surrounding electrical parts).</p>	X In period of pollen or in autumn	X Other periods without particular pollution			
6.10	Check that rotor rotates freely.	Repair, if needed.				X	
6.11	Check the presence of mastic seal to ensure tightness between flows in the case that the heat recovery section is supplied in two/three separate pieces. The mastic seal setting shall be done by installer before the start-up and the connection/assembly of the modules.	Make seal.					

# 10 - Maintenance (continued)

## Periodic table of service and maintenance (continued)

TASKS PER COMPONENTS		ACTIONS	1 month	3 months	6 months	1 year	2 years
			Recommended inspection and maintenance interval				
6.12	Control the belt tension.	Retighten. If needed, shorten (see paragraph on Thermal wheels).		X			
6.13	Control motor alignment.	Re-position.				X	
6.14	Control the brush seal.	The tightness between brush seals and casing must be checked during maintenance. The brush seals are easily adjustable by removing the screws. Replace the seals in the good position.				X	
<b>Heat pipe</b>							
6.15	Check the finned block status.	Clean with compressed air. Take care not to damage the fins.			X		
<b>Plate heat exchanger</b>							
	If the access doors (optional) have not been selected, the panel dismantling to carry out maintenance operations will be necessary.	During remounting, re-do tightness of the whole.					
6.16	Check the plate clogging by measuring the change in air pressure drop.	Clean with compressed air in the case of dusty surfaces or surfaces with dirtiness not firmly stuck (Take care not to damage plates and gaskets). With hot water or by using a pulverizer with detergent (i.e. Decade, ND-150, Chem Zyme, Primasept, PolyDet, Oakite 86M or similar) to remove greasy deposits (be careful to surrounding electrical parts) or if there is a lot of dirtiness firmly stuck. The use of alkaline substances or those that are corrosive to plates and gaskets must be avoided.			X		
6.17	Control the running of by-pass damper (if present).	Repair.				X	
6.18	Check the presence of mastic seal to ensure tightness between flows in the case that the heat recovery section is supplied in two/three separate pieces. The mastic seal setting shall be done by installer before the start-up and the connection/assembly of the modules.	Make seal.					
<b>7 - SILENCER</b>							
7.1	Check that there is no contamination, corrosion on the sideplates or damage.	Clean and repair. If they are not visible, they must be dismantled.				X	
7.2	Examine internal surface to detect the contamination and the corrosion.	Determine the cause, clean the corresponding air section.				X	
<b>8 - DAMPERS</b>							
8.1	Check that there is no contamination, corrosion or damage.	Clean if required.				X	
8.2	Check good running of the blades.	If necessary, add a WD40 type penetrating coil. Maintenance periodicity depends on the damper position : interior or exterior >		EXT.	INT.		
8.3	Check good running of the servo-motors (if present).	Check the running, repair if required. Remark : if servo-motors are installed, check that the screw of the hand quadrant is properly removed (at initial startup).				X	
<b>9 - FANS</b>							
9.1	Check that air diffuser is correctly fitted (at initial startup) and check the good tightening of the fixing screws.	Re-fit it correctly if required.					
9.2	Check that there is no contamination, corrosion or damage.	Clean if required.			X		
9.3	Check that fan is properly fixed.	Re-tighten if required.			X		
9.4	Check the blades to ensure balancing.	Clean if required.				X	
9.5	Check the bearings for the noise.	Repair if required.				X	
9.6	Check the condition of grease and grease nipples (except if greased for life).	Re-grease if required.		T > 70 °C	X		

## 10 - Maintenance (continued)

### Periodic table of service and maintenance (continued)

TASKS PER COMPONENTS		ACTIONS	1 month	3 months	6 months	1 year	2 years
			Recommended inspection and maintenance interval				
9.7	Check condition of flexible connector (or high density foam), make sure that there is no leakages.	Repair/Replace if required.				X	
9.8	Check condition of anti-vibration mounts (if present).					X	
9.9	Check locking of bearings on fan shafts.	Lock if required.			X		
9.10	Check free rotation of wheel.	Re-position if required.			X		
9.11	Check the running.	Make air flow/pressure measures.				X	
9.12	Check the position of wheel in its inlet cone for plug fans.	Adjust as per the corresponding table.				X	
9.13	If motor and fan supports are separate in the transport sections, check bolt tightening.	Re-tighten if required, apply Loctite glue if needed.			X		
<b>10 - DRIVE ELEMENTS</b>							
10.1	Electric motors.	Intervention to be realized by qualified personnel.					
10.2	Check direction of rotation (at the time of running).	Reverse phases.					
10.3	Check that motor is properly fixed.	Re-tighten if required.			X		
10.4	Check (voltage off) that motor shaft rotates without abnormal resistance.				X		
10.5	Check that there is no contamination, corrosion or damage.	Clean if required.				X	
10.6	Re-tighten the screws of terminal box and connection bars.					X	
10.7	Measure the voltage.	The measured data must be recorded in a test certificate.				X	
10.8	Measure the absorbed power.	The measured data must be recorded in a test certificate.				X	
10.9	Check that the phases are balanced.	The measured data must be recorded in a test certificate.				X	
10.10	Check bearings for noise.					X	
10.11	Check the condition of grease and grease nipples (except if greased for life)	Re-grease if required.				X	
10.12	Drive belts.						
10.13	Check that belts are in good condition, not worn, greasy or dirty.	Replace if required.			X		
10.14	Check tension and alignment.	Readjust if required.			X		
10.15	Check tightening of screws and nuts of fan-motor assembly and pulleys.	Re-tighten if required.			X		
10.16	Clean access section.					X	
10.17	Check that pulleys do not touch any part.	Re-position, replace pulleys if they are damaged.				X	
10.18	Check that belts are not damaged.	Replace if required (the whole in case of several belts for same drive).				X	
10.19	Check condition of side areas.	If wear : Replace pulleys and/or control alignment. If fracture : Remove heat source causing heating and/or check that temperature is not higher than 80 °C. If inflated : Remove presence of oil and/or grease and/or chemical product and/or temperature (< 80 °C).			X		

## 10 - Maintenance (continued)

### Periodic table of service and maintenance (continued)

TASKS PER COMPONENTS		ACTIONS	1 month	3 months	6 months	1 year	2 years
			Recommended inspection and maintenance interval				
<b>11 - PLUG FAN WHEEL WITH ELECTRONIC COMMUTATION MOTOR (EC)</b>							
11.1	Check the protective casing against accidental contact for damage and to ensure that it is intact.	Repair or replace the device.			X		
11.2	Check the device for damage to blades and housing.	Replace the device.			X		
11.3	Check connections.	Fasten.			X		
11.4	Check the insulation of the wires for damage.	Replace wires.			X		
11.5	Impeller for wear/deposits/corrosion and damage.	Clean or replace impeller.			X		
11.6	Check tightness of screwed cable gland.	Retighten, replace if damaged.			X		
11.7	Check the ball bearings to ensure they are quiet, can move easily and are free of play.	Replace device in case of noise, difficulty of movement or clearance of the bearings.			X		

# 11 - Troubleshooting

<b>ABNORMAL TRANSMISSION NOISE</b>
Check that the pulleys are tightened and aligned properly in accordance with the recommendations contained in this manual.
Check that the pulleys do not touch against any metal parts or other components.
Ensure that the belt tension complies with the recommendations contained in this manual and that, in the case of multi-groove pulleys, the tensions are identical.
Ensure that the belts are in good condition, and are not worn greasy or dirty.
<b>ABNORMAL MOTOR NOISE</b>
Ensure that the motor is attached correctly.
Ensure that the voltage is correct and that the 3 phases are balanced. Check as required (qualified personnel) the connections to the terminal blocks and the tightness of the connection bars.
If the voltage is not correct, check the supply voltage and/or whether the 3 phases are out of balance. Check bearing resistance.
<b>ABNORMAL FAN NOISE/VIBRATION</b>
If fan operation seems unbalanced, check that there is sufficient expansion after the fan and that the network is not blocked and/or dampers are not closed.
Ensure that the fan is attached correctly.
Ensure that the turbine is centred properly in the scroll and that it has not suffered any impact (For plug fans, see corresponding section).
Ensure that the turbine is in good condition, and is not damaged, greasy or dirty.
Check the balancing (No dust accumulation/presence of balancing piece).
Ensure that there are no foreign bodies in the scroll.
Check that the bearings are properly greased (if required) and not faulty.
Check that the bearings are properly lubricated, free of any traces of rust, and aligned properly.
Check that the shaft support (if present) is properly tightening.
Check that the speed of rotation complies with the operating point. If this is not the case, check that the network pressure losses comply with the demand.
Check that belt tension is sufficient.
Check that transmission is not overloaded.
<b>ABNORMAL INSTALLATION NOISE</b>
Ensure that the duct cross section is appropriate and that the firebreak dampers and other components inside the duct are properly dimensioned and correctly attached and do not create pressure losses different to those initially planned.
Ensure that the transition duct cross section is properly dimensioned and that there are no brutal changes in duct cross section.
Also check that the installation does not contain any excessively tight bends.
Check that belt tension is sufficient, check that transmission is not overloaded.
<b>INSUFFICIENT AIR FLOW</b>
Ensure that the network pressure losses comply with demand and are perfectly balanced.
Check that motor phase sequence is correct for normal direction of rotation.
Ensure that the fan inlet cones are not blocked.
Ensure that the duct cross section is appropriate and that the firebreak dampers and other components inside the duct are properly dimensioned and correctly attached and do not create pressure losses different to those initially planned.
Ensure that the dampers are in the open position.
Ensure that the air intake is not blocked.
Ensure that expansion of 1.5 times the turbine diameter is present after the fan, before the elbow.
Check that the air handling unit's internal components are not clogged: filters, coils, plate heat recuperator,...
Check that the flexible connector/foam seal is in good condition.
Check that the air diffuser is fitted properly as detailed in the present manual.
Check the belt condition.
Check whether transmission initially dimensioned is always appropriate with new operating point.
<b>HIGH AIR FLOW</b>
Ensure that the network pressure losses comply with demand and are perfectly balanced.
Ensure that the doors are closed properly.
Ensure the presence of all initially planned components: filters, coils, plate heat recuperator,...

## 11 - Troubleshooting (continued)

<b>MOTOR OVERHEATING (CHECK TO BE PERFORMED BY QUALIFIED PERSONNEL)</b>
Check that the absorbed power complies with the selection.
Check that the installed motor capacity complies with the selection.
Check that the mains supply voltage is normal.
Check the terminal block connections and connection bar tightness and coupling.
Check the windings electrical continuity and resistance and/or the installation electrical continuity, and that there are no partial short circuits.
Check that the ambient air temperature does not exceed 40° C.
<b>MOTOR DOES NOT START (CHECK TO BE PERFORMED BY QUALIFIED PERSONNEL)</b>
Check (mains supply off) that the motor shaft rotates without any abnormal mechanical resistance.
Check (mains supply off) that the supply is continuous: fuse, thermal overload protection (TOP),...
<b>STAGNANT WATER IN THE COOLING COIL</b>
Check that the pan drain is not blocked.
Check that the siphon is correctly dimensioned as detailed in this manual.
Check that air handling unit installation is level.
Check in the case of air handling unit has several base frames, that all base frames are properly on a levelled support.
<b>THERMAL WHEEL DOES NOT ROTATE PROPERLY</b>
Check whether motor is running normally.
If a controller is installed, refer to controller technical specification.
If there is a constant drive installed : check that the drive is correctly connected. Note that all electrical maintenance and installation must be performed by qualified personnel.
Disconnect the belt and check that the motor is running correctly.
Rotate the wheel by hand (belt disconnected from the motor). Is it possible to smoothly rotate the wheel or does the wheel interacts with the casing ? If there is mechanical friction, locate the position.
Make sure the diagonal measures of the casing side where the motor is positioned are equal.
<b>VIBRATION CAUSES</b>
Fan unbalanced : Dust accumulation or foreign bodies on the wheel, loss of wheel balancing piece, wheel damaged following a shock or an over-speed of operation.
Fan shaft damaged.
Drive failure : Misalignment of pulleys, defective belts or incorrect tension, unscrewing of pulleys or wheels.
Faulty bearings.
Electric motor unbalanced.
Defective fan suspension.
<b>PLUG FAN WHEEL WITH EC MOTOR - IMPELLER RUNNING ROUGHLY</b>
Imbalance in rotating parts : Clean the device; if imbalance is still evident after cleaning, replace the device. If you have attached any weight clips during cleaning, make sure to remove them afterwards.
<b>PLUG FAN WHEEL WITH EC MOTOR - MOTOR DOES NOT TURN</b>
Mechanical blockage : Switch off, de-energise, and remove mechanical blockage.
Mains supply voltage faulty : Check mains supply voltage, restore power supply, apply control signal.
Faulty connection : De-energise, correct connection, see connection diagram.
Thermal overload protector responded : Allow motor to cool off, locate and rectify cause of error, if necessary cancel restart lock-out.
<b>PLUG FAN WHEEL WITH EC MOTOR - OVERTEMPERATURE OF ELECTRONICS/MOTOR</b>
Insufficient cooling : Improve cooling. Let the device cool down. To reset the error message, switch off the mains supply voltage for a minimum of 25 seconds and switch it on again.
Ambient temperature too high : Reduce the ambient temperature. Reset by reducing control input to 0 Volt.

## 12 - Details to be noted prior to contacting the after sales department

Maker's plate details :				Information about the intervention :			
(Inside face of the supply fan door)							
Model :				Site :			
Order N° :		FT N°		Date :			
Client code :				Company :			
Date of manufacture :				Technician's name :			
Aeraulic problem :							
Theoretical fan data :				Fan measured/recorded data :			
Fan type/size :		e.g. : RDH 315L		Rotation speed :		r.p.m.	
Type of vibration isolators :		Rubber	Spring	Visual condition of isolators :		Good	Bad
Type of connector :		Flexible	Foam seal	Visual condition of connector/seal :		Good	Bad
If plug fan				Visual condition of bearings :		Good	Bad
Support length		mm		Visual condition of shafts :		Good	Bad
Chair height		mm		Visual condition of scroll :		Good	Bad
Theoretical motor data :				Motor measured/recorded data (door closed) :			
Motor type :		e.g. : Siemens, ABB, ...		Network frequency :		Hz	
Reference :		e.g. : 1LA77166-2AA60		Thermal overload protection connected :		Yes	No
Plated capacity :		kW		Measured average amperage :		A	
Plated amperage at 50Hz :		A		Measured phase 1 amperage :		A	
Plated cos phi :				Measured phase 2 amperage :		A	
Rotation speed :		r.p.m.		Measured phase 3 amperage :		A	
				Measured cos phi :			
Transmission data :							
Fan pulley diameter :		mm		Motor pulley diameter :		mm	
Fan hub diameter/type :		mm		Motor hub diameter/type :		mm	
Distance between pulleys :		mm		Number of belts :			
Belt type :				Visual condition of belts :		Good	Bad
Performance problem :							
Theoretical coil data :				Measured/recorded data :			
Theoretical air flow m³/h :		m³/h		Air flow m³/h measurement 1 :		measurement 2 :	
Inlet air theoretical temp./hygrometry :		°C/%HR		Inlet air temperature/hygrometry measurement 1 :		measurement 2 :	
Outlet air theoretical temp./hygrometry :		°C/%HR		Outlet air temperature/hygrometry measurement 1 :		measurement 2 :	
Theoretical water flow :		l/s		Water flow measurement 1 :		measurement 2 :	
Theoretical water pressure loss :		kPa		Water pressure loss measurement 1 :		measurement 2 :	
Inlet/Outlet water temperature :		°C		Inlet/Outlet water temperature measurement 1 :		measurement 2 :	





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