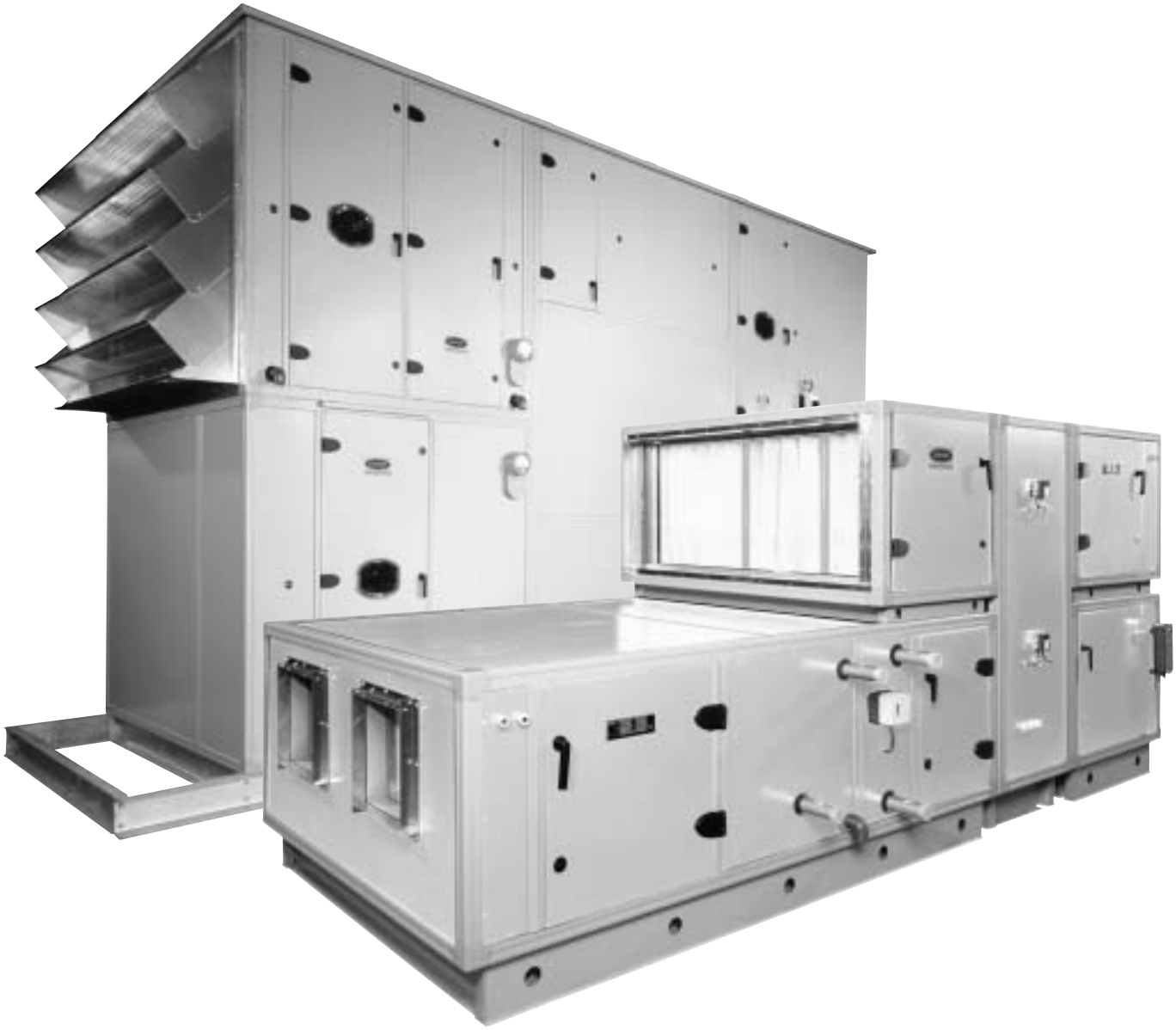
Carrier

39 HQ
Airovision Air Handling Units

Airovision



Installation, operation and maintenance instructions

CONTENTS

CONTENTS (continued)

1 - SAFETY CONSIDERATIONS

1.1 - General

The 39HQ air handling units (AHUs) has been designed and manufactured in accordance with the CE machine directive EN292. In order to guarantee safe operation and use of the unit, please carefully read and observe the instructions in this document and pay special attention to the warnings that apply to this unit. Any modifications in the design and/or installation of the AHU that are carried out without discussion with Carrier Holland Heating and without advance written agreement will result in the loss of the right to any warranty claims and any claim for injury to personnel as a result of these modifications.

Maintenance procedures may only be carried out by qualified personnel.

Heating and cooling elements are manufactured and supplied in accordance with guidelines of the Pressure Equipment Directive (PED).

1.2 - Applications

The AHU is designed for the movement and conditioning of air, unless otherwise agreed during the design stage.

1.3 - Instruction types

The following warning pictograms and labels with text are used.

Lifting point

This pictogram shows where the AHU must be lifted and is positioned on the support beam.

Lifting prohibited

This pictogram shows that no horizontal transport devices must be placed under this frame section, such as pallet lifters or the forks of fork lift trucks. It is also forbidden to place lifting devices for transport and storage under this frame element.

Earthing

This pictogram indicates where the AHU must be earthed and is on one of the support beams beneath the casing in the fan section.

- The electrical components in the AHU must be earthed, except for components with double insulation and/or components with a supply voltage below 50 V.
- The electrical components must be installed in accordance with national and local regulations.

Rotating parts

This pictogram indicates that there are rotating parts behind this access cover, door or panel which may cause injury. The components that include rotating parts are the fan and heat recovery wheel. If there are special customer-specific components behind doors, access covers or panels that include rotating parts and pose a potential risk, this is also indicated by this pictogram.

Hot surfaces

This pictogram indicates that there are components behind this access cover, door or panel that can cause serious burns when touched.

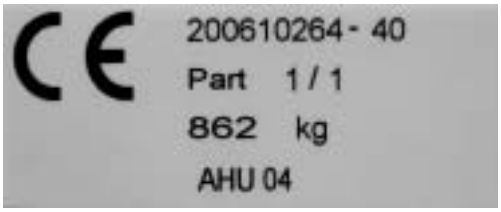
The components that may have hot surfaces are the steam humidifier, steam heater and the electric heater. If there are special special customer-specific components behind doors, access covers or panels that have hot surfaces and pose a potential risk, this is also indicated by this pictogram.

Electrical voltage
This pictogram indicates that there are electrical components behind this access cover, door or panel that may be dangerous for the user/installer. Only personnel qualified in accordance with NEN 3140 is permitted to carry out work on these components. The pictogram is attached to the access cover for the electric heater control box.

Removal of transport brackets
This pictogram is located at the bottom of the fan section. It indicates that the transport brackets must be removed during commissioning before the fan is started up.

Verwijder transportbeugels voor opstarten ventilator.
Remove transport brackets before starting up the fan.
Retirer les fixations de transport avant démarrage.

Central data
This label contains the data for the AHU, such as order number, position number etc. If present, the label is normally located on the access cover or the door of the fan assembly.



Opening the fan door
This pictogram is positioned on the outside of the door or access cover of the fan assembly. This pictogram warns that the fan must have been switched off and deenergised for a minimum of two minutes before the door or access cover is opened.

! WARNING!
Before opening doors, switch off and deenergise the fan, and ensure that it has stopped rotating.
(minimum of 2 minutes)

Caution: All doors and access covers must be closed before starting up the AHU.

Lifting and transport
An instruction is attached to the AHU that describes the procedures that must be followed for lifting and transport. The following chapter contains further details.

1.4 - Disposal of parts/materials

- The packaging material must be disposed of in a responsible manner and in accordance with local regulations.
- Components that are replaced, must be disposed of as described above.

2 - TRANSPORT AND LIFTING INSTRUCTIONS

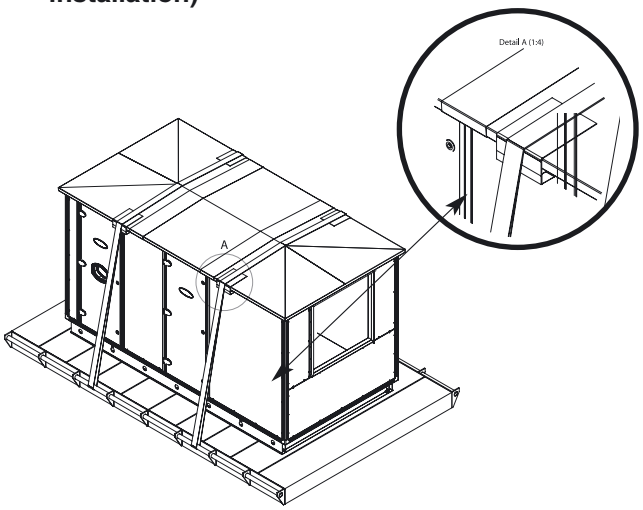
2.1 - General

Transport and lifting of the AHU must always be in accordance with the instructions below. If these instructions are not observed, irreparable damage may occur to the unit, and people in the immediate vicinity of the unit are also endangered. Carrier Holland Heating does not accept any responsibility if these instructions are not observed. Transport and lifting must be carried out by qualified personnel. The AHU must only be lifted with lifting bars supplied by Carrier Holland Heating. Lifting must be carried out in accordance with local regulations and with the help of certified lifting aids.

2.2 - Transport and storage

Lifting of the AHU is only permitted under the designated lifting points. Lifting under the cross beams is prohibited. This applies to transport as well as storage, and is indicated on the cross beam with the following label.

2.3 - Roof edge protection during transport (outside installation)



Roof edge transport protection
During transport by truck the units are attached to the loading surface with tie ropes, pulled across the unit towards the side edges of the truck.

On external units, to protect the roof edge from distortion by the tie ropes protection plates are added.

For safety reasons these protection plates must be fixed. This is done by attaching them with self-tapping screws to the roof edge.

Make sure that the protection plates are removed after arrival on site before the AHU is lifted.

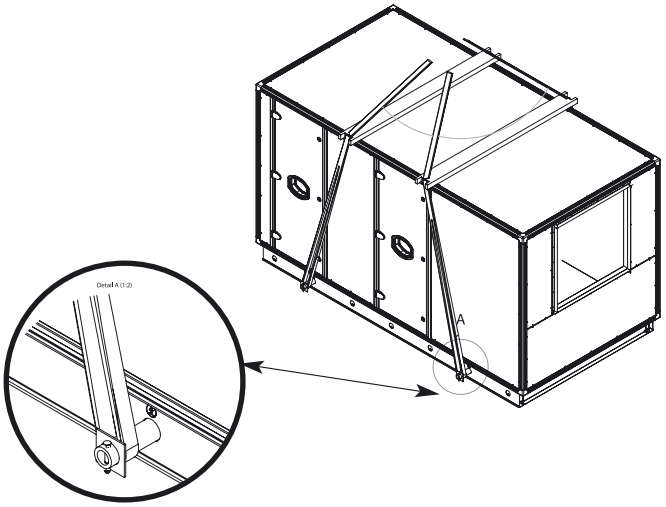
2.4 - Offloading and hoisting

Depending on the dimensions of the AHU and the situation on site, the AHUs are supplied in previously agreed transport sections.

Before proceeding with the transport and installation of the casing sections, always consult the applicable dimensional drawing that give the dimensions and weights of the sections, as well as the installation sequence.

The weight is given on each transport section. Each transport section is equipped with a subframe with four lifting points. These points are marked by the label shown below.

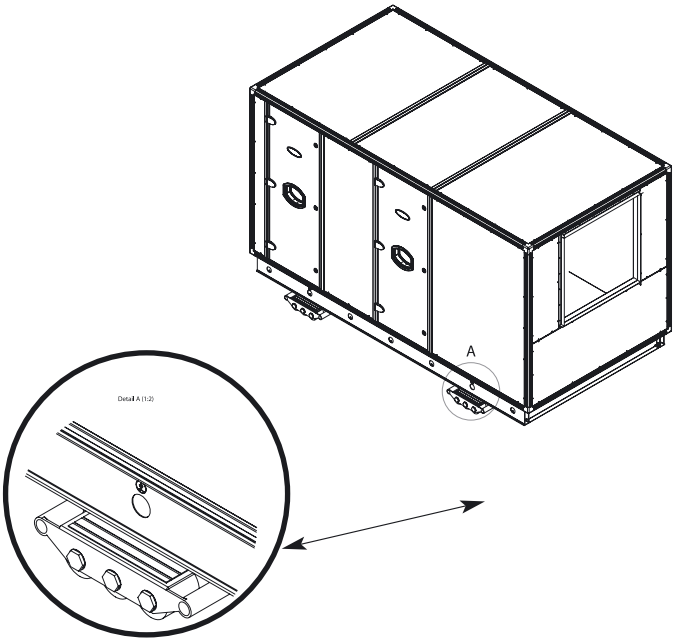
For offloading as well as hoisting lifting cables can be attached to the lifting bars. Evenly positioned spacer bars should be used between the lifting cables to prevent damage to the top of the unit and ensure that no excess pressure is applied to the side panels. For hoisting please ensure that the weight is evenly distributed.



The AHU should not be lifted or moved under the cross beams. This is indicated by the label below.

2.5 - Horizontal transport

For horizontal movement pallet lifters or transport skids can be placed under the installation frame or under the lifting bars. It is important that these support the lifting points. At no time should the cross beams at the ends of the unit sections be used for jacking or tracking the AHU. FOR HORIZONTAL TRANSPORT ALWAYS PROVIDE SUPPORT UNDER THE LIFTING POINTS. The use of bars as rollers can result in damage to the installation frame.



3 - CHECKLIST OF START-UP CHECK POINTS

3.1 - Checklist of start-up check points

The table below shows a general overview of the planning required to facilitate the installation of the AHU. The following pages give a more detailed description of the individual components.

! Caution !

Before starting up the AHU ensure that the components have the correct connection voltage and connect them in accordance with the regulations. The doors and access covers must be closed and the AHU must be earthed.

START-UP CHECK POINTS

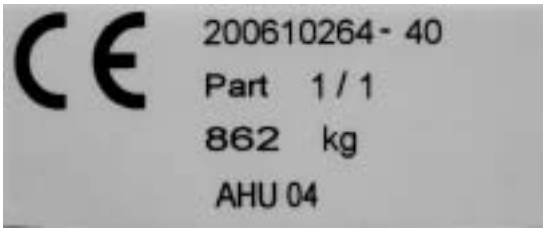
FUNCTION	COMPONENTS	CHECK POINTS	Start-up
General			
Indoor installation	Internal and external panels	Damage	
Outdoor installation	Internal and external panels	Damage	
	Joints	Cracks	
	Doors/access covers	Must be closed before start-up	
	Flexible connections	Correct installation	
	Earthing	Correct earthing in acordance with regulations	
Dampers		Correct operation	
	Actuators	Correct operation	
Filters		Correct filter type	
		Are the filters correctly installed	
	Pressure differential gauge	Correct operation	
	Pressure differential switch	Correct operation/set-up	
Heaters	Hot-water coil	Correct connections	
		Leakage	
		Operation of frost protection thermostat	
	Electric heater	Correct connections/safety devices	
	Steam heater	Correct connections/safety devices	
		Leakage	
Coolers	Cold-water coil	Correct connections	
		Leakage	
	Droplet eliminator	Correct alignment	
	Drain trap	Correct connection	
Heat recovery wheel	Rotor	Direction of rotation	
	Sealing	Correct installation	
	Drive	Motor/belt/rotation control	
	Controller	Correct set-up	
Plate heat exchanger	Damper (if used)	Correct operation	
	Actuator (if used)	Correct operation	
	Drain trap	Correct connection	
	Droplet eliminator	Correct alignment	

FUNCTION	COMPONENTS	CHECK POINTS	Start-up
Direct steam humidification	Connections and fittings	Leakage	
	Actuator/valve	Check connection and operation	
Electrical steam humidification	Connections and fittings	Leakage/operation	
	Electrical components	Check connection voltage	
		Check connection and operation	
Water humdifiers	Spray humidifier	See documentation supplied	
	Infrasonic humidifier	See documentation supplied	
	Wet cell	See documentation supplied	
Fan	Transport protection brackets	Remove	
	Fan housing and fan compartment	Remove obstacles and loose debris from the fan and fan compartment	
	Motor	Check connection voltage	
		Check connection	
		Check all phases	
	Drive belts	Check tension	
	Flexible connections	Correct installation	
	Operating switch	Check connection	
	Operating switch	Ensure switch is locked off during checks	
	Pressure switch	Operation	
Sound attenuator		Damage to splitters	
Lighting	Lamp	Check connection voltage	
	Switch	Check connection	

4 - START-UP INSTRUCTIONS

4.1 - Casing

The label with the unit data, such as order number, position number etc. is ususally located on the acccess cover or door of the fan compartment.



4.1.1 - Casing panels

Check the AHU panels for any damage. Any dirt or stains must be removed from the surface to prevent possible long-term damage. Building debris left on the roof must be removed. Dirt can be removed with water and a mild household soap solution. Damage can be repaired by thoroughly cleaning the affected surface, then treat and paint as necessary. If applicable check the sealing joints and repair if required.

4.1.2 - Doors and access covers

Check the operation of door handles, locks and movement of the hinges. For outside installation of the AHU check the storm cord.

Caution: Doors and access covers must always be closed before starting the unit.

4.1.3 - Flexible connections

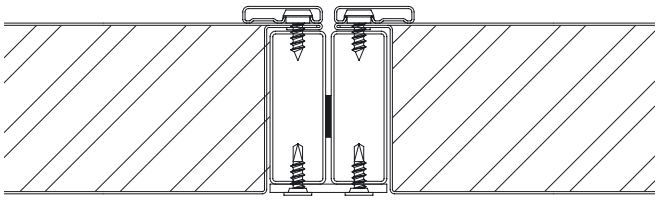
Check that all flexible connections are attached to the AHU. If necessary, tighten loose screws.

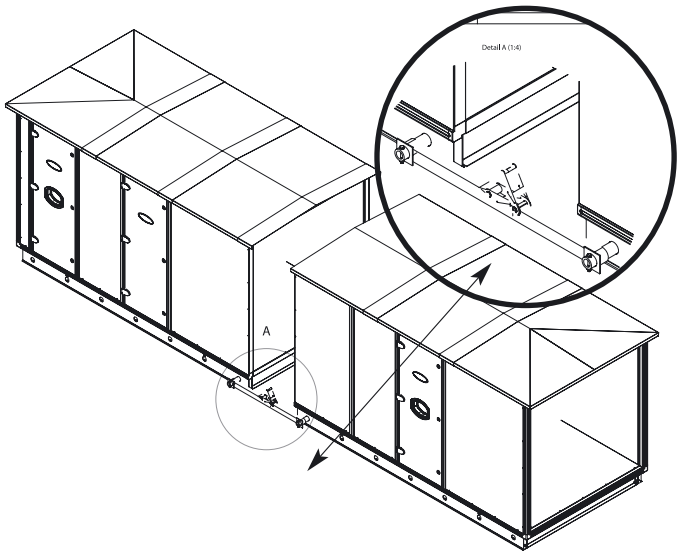
4.1.4 - Earthing

Ensure that the AHU has been earthed correctly and in accordance with local regulations. A label on the support frame indicates where the unit should be earthed.

4.1.5 - AHU installation and connection

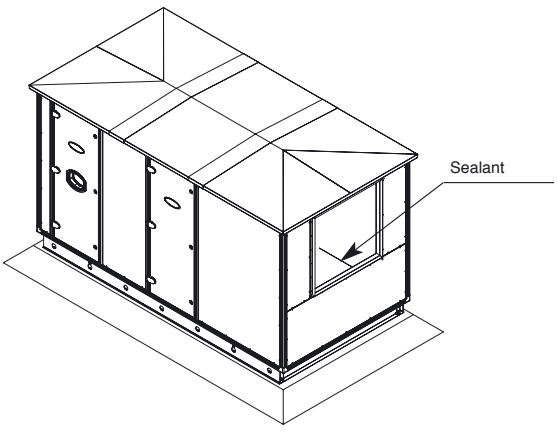
The floor in the room where the AHU is installed must be level and flat to prevent connection problems. Before the units are placed against or on top of each other, the sealing tape supplied must be attached between the casing sections.





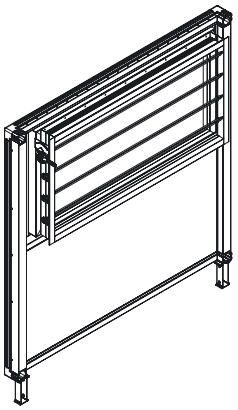
Place the casing sections as close as possible together before assembly. Pull the casing sections towards each other by placing the lifting bars first in one and then in the other casing section. Then pull both parts towards each other using pull ropes.

The casing sections are connected with the frames and fixing elements supplied. If the AHU is installed outside, the roof connecting plate provided must be installed on the roof and sealed.

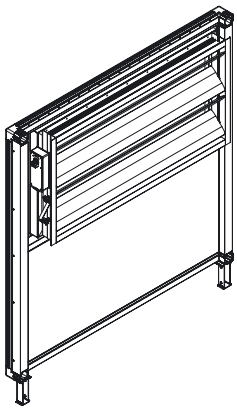


4.2 - Dampers

- Check if the actuator motor is installed in accordance with the supplier's instructions.
- Check if the correct angle has been set.
- Check if the dampers close properly.
- Check if the damper can open to the required angle.
- Check operation after the power has been restored following a power cut. Some dampers must be open, others must be closed.



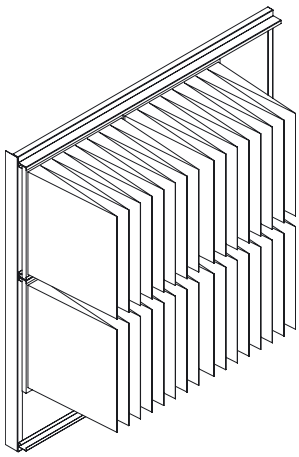
Manual operation



Actuator-assisted operation

4.3 - Air filters

- Check if the correct filters have been installed.
- Check if the filters have been installed correctly.
- Absolute filters are supplied separately, to prevent contamination during transport and start-up. Insert the absolute filters only after the unit has been cleaned.
- Set pressure switches or filter indicators, if used.
- Close the inspection door.



4.4 - HEATERS

4.4.1 - General

- Check connections in accordance with the dimensional drawing.
- Check connections for leakage.
- Ensure that the heater can supply heat to prevent frost formation when the fan is started.
- **Caution:** When the coils are drained, no water must remain in the circuits to prevent freezing at temperatures below zero.

4.4.2 - Electric heaters

- Ensure that the heater has been connected in accordance with the instructions of the supplier. The diagram is located on the inside of the connection module.
- Check the heater current.
- Check if the safety devices shown in the wiring diagram have been installed.
- Check if the heater has been earthed in accordance with local instructions.
- The electric heater may only be switched on if the minimum specified air flow rate across the heater exists.
- The electric heater must be switched off at least 5 minutes before the AHU is switched off.
- Ensure that no objects have been left in the heater section.
- The following warning pictograms are attached to the panel: electrical voltage and hot surface.

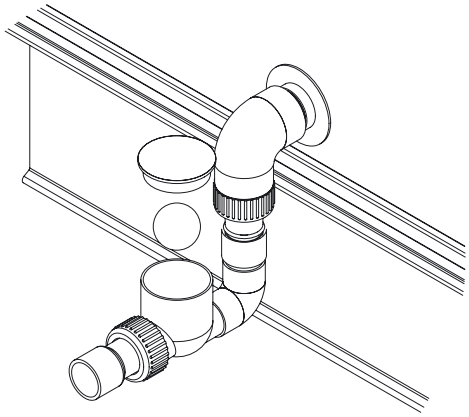
4.4.3 - Steam heaters

Steam heaters have surface temperatures above 100ºC.
Steam supply must be checked by qualified personnel.

- The steam heater may only be switched on if the minimum specified air flow rate exists across the heater.
- Ensure that no objects have been left in the heater section.
- The steam heater must be switched off at least 5 minutes before the AHU is switched off.
- The following warning pictogram is attached to the panel: hot surface.

4.5 - Coolers

- Check the connections in accordance with the dimensional drawing.
- Control the connections for leaks.
- Check drain trap. If CHH standard siphon trap is used, check it has been correctly installed. Check if siphon cover and ball have been correctly installed.



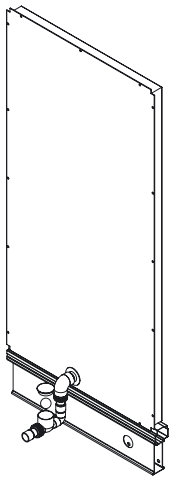
- Check if the droplet eliminator after the cooler has been correctly installed.
- Check if fins have been bent during transport. Correctly straighten the fins.
- If a cooling coil is incorporated, after several days of cooling operation check the condensate drain and operation of the plastic siphon. If necessary clean the siphon.

4.6 - Heat recovery wheel

- Check that the wheel is rotating in the correct direction. This is indicated by an arrow on the casing.
- Check if the wheel seals are fitting correctly.
- Check if belt tension is correct.
- Check if the motor and the rotation monitor have been correctly connected.
- Check if the controller has been correctly connected and set in accordance with the instructions of the supplier.
- Check if the rotor speed has been set correctly.
- The following warning pictogram is attached to the panel: rotating parts.

4.7 - Plate heat exchanger

Used if dampers are installed.
- Check if the actuator motor has been installed in accordance with the instructions of the supplier.
- Check if the correct angle has been set.
- Check if the dampers close correctly.
- Check if the damper can open to the correct position.
- Check operation after the power has been restored following a power cut. Some dampers must be open, others must be closed.
- Check if fins have been bent during transport. Correctly straighten the fins.
- Check if the siphon has been correctly installed. Check if siphon cover and ball have been correctly installed.



4.8 - Direct steam humidification

- Check the fixing of the steam pipe.
- Check the steam supply and condensate drain pipes.
- For longer pipes install an extra condensate pan in accordance with the instructions of the supplier.
- Check if the pollution trap has been installed.
- The condensate drain should not be without pressure in accordance with the manufacturer's instructions. Refer to the instructions of the supplier.
- If the AHU has negative pressure, install a special siphon ahead of the condensate drain.
- Before starting up the steam humidifier steam must be introduced slowly into the system to bring the humidifier to the correct operating temperature. Once the condensate pipe has reached the operating temperature, start the actuator motor electrically or pneumatically and set the desired humidity level. Refer to the instructions of the supplier.
- A few days after starting up the unit clean the sieve of the pollution trap and check the condensate drain. For casings with negative pressure the operation of the negative pressure system must be controlled with the check valve.
- The following warning pictogram is attached to the panel: hot surface.

4.9 - Electrical steam humidification

- Check the fixing of the steam generator.
- Check the steam supply and condensate drain pipes.
- The condensate drain should not be without pressure in accordance with the manufacturer's instructions. Refer to the instructions of the supplier.
- If the AHU has negative pressure, install a special siphon ahead of the condensate drain.
- Check the voltage and measure the total current draw.

- Connect the humidifier in accordance with the instructions of the supplier.
- The following warning pictogram is attached to the panel: hot surface.

4.10 - WATER HUMIDIFIERS

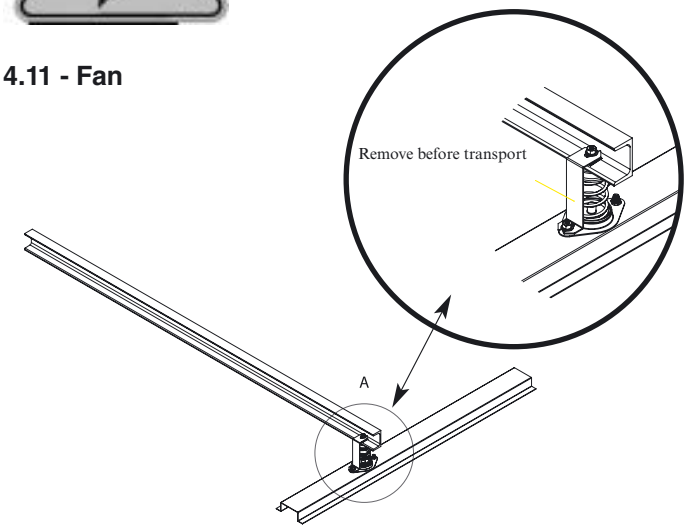
4.10.1 - Spray humidifier

Refer to the instructions supplied by the supplier.

4.10.2 - Infrasonic humidifier

- Carefully read the instructions from the supplier. The following points need extra attention.
- Check if connection voltage agrees with the unit voltage.
- Connect the unit according to the diagram supplied.
- Check that the drain is correctly connected.
- Check the connections of the high-pressure pipes. After starting the unit ensure that the pipes do not rub against anything.
- Check if the spray jets work correctly.
- Check the operation of the pressostats and the pressure.
- Check the water quality.

4.11 - Fan



- Remove the transport brackets. This is indicated by a label on the door.
- Check if the fan can move freely without obstructing the frame, flexible connection or wiring.
- Check the connection voltage.
- Check and/or connect the motor in accordance with local instructions and the data of the supplier.
- Check the direction of rotation of the impeller. The direction is indicated on the casing by an arrow.
- Separately measure the current draw of the electric motor for all phases. The current draw of all phases must be approximately the same and agree with the data on the name plate. Set the motor protection device to the nominal value.

Caution: The air flow may cause stationary parts to move (even a fan that is switched off)!

- The data for the belt type, belt tension, number of belts, size and type of pulley is indicated on a label attached to the fan housing.
- Check if the flexible connection is correctly installed.
- If used check the pressure switch and set the correct pressure.
- Check the operation of the main switch. **Caution:** While working on the fan the switch has to be locked open.
- The warning pictograms on rotating parts, electrical voltage and opening doors are attached to the door. The label to remove the transport brackets is located on the floor of the fan section.

! Warning !

Before opening doors, switch off and deenergise the fan, and ensure that it has stopped rotating. (minimum of 2 minutes)

4.12 - Sound attenuator

- Check the splitters for damage.

4.13 - Lighting

- Check the connection voltage.
- Check the operation of the switch. The switch must be connected in accordance with local regulations.

5 - MAINTENANCE CHECKLIST

5.1 - Checklist for check points and maintenance intervals

The checklist contains a general overview of the planning that facilitates the inspections and maintenance of the AHU. On the following pages there is a more detailed description of the individual components.

! Warning !

Remember to deenergise all components and to ensure that the fan has stopped rotating, before the doors and access covers are opened before inspections and maintenance take place.

CHECK POINTS AND MAINTENANCE INTERVALS

FUNCTION	COMPONENTS	CHECK POINTS	1 month	3 months	6 months	12 months	Depends on supplier and degree of contamination
Casing general							
Indoor installation	Internal and external panels	Contamination and damage				■	
Outdoor installation	Internal panels					■	
	External panels				■		
		Joints				■	
Doors/access covers	Hinges	Operation of hinges and locks				■	
	Locks					■	
	Door seal	Cracks			■		
	Flexible connections	Cracks				■	
Dampers	Damper blades	Sealing				■	
		Bearings				■	
	Damper controls	Actuator			■		
Outdoor air intake	Louvre/cowl	Check for blockages		■			
	Floor, condensate pan (if used) under filter	Contamination		■			
				■			
	Droplet eliminator (if used)			■			
Filters	Flat filter	Check filter condition pressure drop across filter, and sealing	■				■
	Bag filter		■				■
	Carbon filter		■				■
	Electrostatic filter		■				■
	Pressure differ. gauge	Operation				■	
	Pressure differ. switch					■	
Heaters	Hot-water coil	Contamination				■	
		Leakage				■	
	Thermostat	Operation				■	
	Electric heater	Connections				■	
	Steam heater	Contamination				■	
		Leakage				■	

FUNCTION	COMPONENTS	CHECK POINTS	1 month	3 months	6 months	12 months	Depends on supplier and degree of contamination
Coolers	Cold-water coil	Contamination				■	
		Leakage				■	
	Condensate pan	Contamination, operation				■	
	Droplet eliminator					■	
	Syphon					■	
Heat recovery wheel	Rotor	Contamination				■	
	Sealing					■	
	Drive: motor	Operation		■			
	Belt	Wear/voltage		■			
	Electrical components	Operation				■	
Plate heat exchanger	Fins	Contamination				■	
	Damper (if used)	Sealing				■	
		Bearings				■	
		Servo			■		
	Condensate pan	Contamination				■	
	Droplet eliminator					■	
Direct steam humidification	Connections and fittings	Leakage/operation			■		
	Servo	Operation			■		
Electric steam humidification	Connections and fittings	Leakage/operation				■	
	Electrical components	Operation				■	
	Boiler	Scaling on electrodes		■			
Spray humidifier							■
Infrasonic humidifier	Pipes	Connections touch	■				
	Spray banks	Operation	■				
	Pressostats	Operation/max. pressure	■				
	Rinse filter	Contamination	■				
	Operating pressure		■				
Fan	Bearings (larger types)	Lubrication/wear			■		■
	Impeller	Contamination				■	
	Motor (larger motors)	Lubrication			■		■
	Belt	Voltage/wear	■				
	Vibration dampers	Fixings				■	
	Flexible connections	Cracks				■	
	Pressure switch	Operation				■	

6 - MAINTENANCE AND OPERATING INSTRUCTIONS

6.1 - General

The AHU(s) require little maintenance. The smooth inside and outside finish of the panels makes maintenance very simple.

For dry sections: once a year thoroughly check the inside and outside of the AHU casing. For maintenance of wet sections (coolers and humidifiers) please refer to the air handling section concerned.

6.2 - CASING PANELS

6.2.1 - Inside installation

a) Internal inspection of the casing of double-skin panels and of all dry parts..

Remove contamination with water and a mild household soap solution. Where damage of the paint finish has occurred, if necessary remove rust and touch up with good quality anti-corrosive primer and paint. The outside air intake sections can show signs of corrosion as they contain wet parts and are affected by mist, rain and air pollutants.

b) Outside inspection of the coating.

If damage to the paint treatment has occurred, remove the rust (if necessary), and touch up with good quality anti-corrosive primer and paint.

6.2.2 - Outside installation

Check the sealed joints of AHUs installed outside and if required seal again with a UV-resistant and paintable kit. Treat damage as for inside installation.

6.3 - Doors and access covers

Check locks and hinges of all doors and access covers. For outside installation check the storm cord.

6.4 - Flexible connections

Check the flexible connections for damage.

6.5 - Earthing

Ensure that the unit is earthed and installed in the correct manner.

6.6 - Dampers

All damper hinges are equipped with plastic bearing bushings, so that no lubrication is required. Remove excess contamination by cleaning it with compressed air. Clean aluminium parts with water and a mild household soap solution. Check adjusting bolts and linkage and if necessary tighten. Ensure that the damper blades run free of the casing and do not touch the flexible connection.

6.7 - Outside air intake

Especially the outside air intake is contaminated by pollution taken in with the air. The maintenance interval must be observed, as irreparable damage of the panels might otherwise occur. Clean the outside air intake well and repair damage as described in point 6.2.1.

6.8 - Filters

The filters must be inspected once a month for excess pollution, pressure loss, damage and seating of the slide-in filters or built-in frames. With slide-in filters ensure that the filters have been correctly positioned and have been pushed well against each other from below. When replacing built-in filters you must ensure that the filter has been pushed well against the sealant and that the clips have been correctly installed. Filters must be replaced at the required intervals. The timing of the replacement depends on the type of filter, quality and the degree of contamination of the air. The pressure loss across the contaminated filter can be measured with a pressure differential gauge. Maintenance instructions of special filters are available on request.

6.9 - HEATERS

6.9.1 - Water, glycol and steam heat exchangers

Check the air intake once a year for contamination, and if necessary clean with compressed air against the direction of the air flow or clean the air intake with a vacuum cleaner.

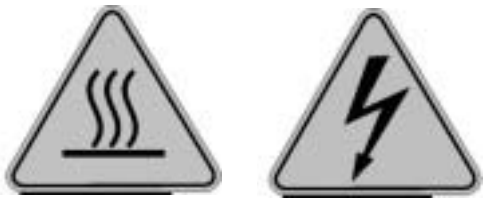
Check for leakage. Check the operation of the frost protection thermostat and check the correct control sequence when the themostat trips. Glycol-charged heat exchangers must be checked annually for the actual percentage of glycol in the water.

The following warning pictogram is located on the panel of the steam heat exchanger: hot surface.

6.9.2 - Electric heaters

Check once a year for contamination, and if necessary clean with compressed air. Check the connections in the control box. Check the operation of the thermostat.

The following warning pictograms are located on the panel: electrical voltage and hot surface.



6.10 - Coolers

Check once a year for contamination and if necessary clean with compressed air against the direction of the air flow or clean with a vacuum cleaner. The eliminator assembly after the cooler is removable. Check for leakage. Check the fins of the droplet eliminator after the coil. Clean the siphon and check its operation. Check the condensate pan for contamination and clean if necessary.

6.11 - Heat recovery wheel

Check the rotor once a year for contamination, and if necessary clean with compressed air. Check the rotor speed and compare it with the design data.

Check the operation of the rotation monitor. Depending on the rotor material the wheel can absorb moisture. When stationary the wheel will become moist on one side and thus heavier. The rotor speed can be set to intermittent in the controller so that the wheel will rotate “x” times per time unit.

The rotor bearings are lubricated for life and do not require maintenance. The drive motor is accessible via an inspection cover.

The V-belt is automatically tensioned by a spring-loaded rocking base on which the motor is installed. New belts expand a lot in the beginning. Check after two days if the belt still has enough tension. After this check the belt tension weekly during the first month and then check it once a month.

For further operation and maintenance details on the heat recovery wheel/controller refer to the documentation provided by the supplier.

The following warning pictogram is located on the panel: rotating parts.

6.12 - Plate heat exchanger

Check the plate heat exchanger once a year for contamination and if necessary clean with compressed air against the direction of the air flow. If dampers are used, follow the instructions in section 6.6.

Check condensate pan for contamination and clean if necessary.

6.13 - WATER HUMIDIFICATION

6.13.1 - Steam humidifier

Clean the pollutant trap in the steam supply of the control valve once a year. If a pollutant trap is installed, clean the condensate drain valve and the inside of the condensate pan at the same time.

Inspect the control valve, condensate drain and distribution box twice a year. With steam distribution pipes in negative pressure systems (air-side) there may be excess water present, as the condensate may not drain from the steam distribution pipe. For some brands a special siphon with a check valve is supplied. Check the operation of this valve twice a year.

At the periodical checks of the steam humidifier the casing sections after the humidifier facilitate the checking of the humidification level. Viewed in the direction of the air flow there should not be any steam plume at the end of the steam humidification section.

The electric humidifier capacity is strongly affected by contamination of the steam boiler and the electrodes. This is indicated on the LED. If necessary replace steam boiler.

For further operation and maintenance details on the steam humidifier refer to the documentation provided by the supplier.

The following warning pictograms are located on the panel: hot surface.

6.13.2 - Spray humidifier

For maintenance details on the spray humidifier refer to the documentation provided by the supplier.

6.13.3 - Infrasonic humidifier

- First carefully read the instructions from the supplier. The following points require extra attention.
- Check the connections of the high-pressure pipes.
- Ensure that the pipes do not rub against anything.
- Check if the spray banks work well.
- Check the operation of the pressostats and the pressure.
- Check the water quality.
- Check the contamination of the rinse filter.
- Check the operating pressure weekly. Higher pressure indicates an increase in contamination.

6.14 - FAN

6.14.1 - General

- Caution: The air flow may cause stationary parts to move (even a fan that is switched off)!
- Caution: While working on the fan, the switch has to be locked open.
- The data for the belt type, belt tension, number of belts, size and type of pulley is indicated on a label attached to the fan housing.

6.14.2 - Bearings

The bearings of the smaller fan types cannot be lubricated. If the larger fans are of the relubricated type, then they should be lubricated every six months. For higher temperatures and increased contamination the lubrication interval should be adjusted as required. The standard lubricant is Shell Alvania R3. For higher temperatures and a higher degree of humidity use a lubricant recommended by the supplier.

The electric motors are equipped with roller bearings. Depending on the motor size the bearings are lubricated for life or are equipped with a grease nipple. The lubrication interval and type of lubricant are as above.

6.14.3 - Transmission

After starting up the unit, but also after replacing the belts the belt tension has to be checked within one week and then after two weeks and further tensioned if required. After that check the belt tension and inspect the condition of the belts every three months.

The CORRECT BELT TENSION depends on:
- the belt type;
- power to be transmitted;
- belt velocity.

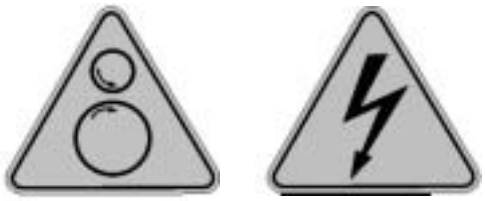
The belt tension is calculated for each transmission. If the belt tension is too high this can result in bearing wear and vibration, if it is too low this can result in belt slippage and belt wear.

Sequence for installation of new belts:
- Ensure that the pulleys are correctly aligned. If necessary re-align.
- Position all belts loosely on the pulleys, do not pull tensioned belts over the pulleys.
- Tension the belts and check the tension with a Sonic Tension Meter.
- Re-check the alignment.

If the fan speed changes or if a motor with different power specifications and/or speed is installed, the manufacturer must be informed. The supplier must re-calculate the bearing load as well as the impeller load. If this is not done, irreparable damage to the fan may incur. The supplier does not accept any responsibility for modifications that have not been approved. See chapter 1.1.

Caution: While working on the fan the switch has to be locked open.

- The warning pictograms indicating rotating parts, electrical voltage and opening of doors are attached to the door.



! Warning!
Before opening doors, switch off and deenergise the fan, and ensure that it has stoopped rotating.
(minimum of 2 minutes)

6.15 - Sound attenuator

Under normal conditions the sound dampers are maintenance-free. Nevertheless it is recommended to check the attenuators once a year for possible damage and loose fibres, in order to prevent further contamination of the system.

ISO 9001 : 2000

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Manufactured by: Carrier Holland Heating, Waalwijk,Netherlands

Order No.: 13932-11, 01.2007. Supersedes order No.: CHH/IOM -001.uk.
Printed in the Netherlands on Totally Chlorine Free Paper.