39SQ/39SQC/39SQR/39SQP

Airostar Air Handling Units

Installation, operation and maintenance instructions

Contents

Abbreviations

AHU - Air handling unit
PED - Pressure Equipment Directive
BMS - Building Management System
SSR - Solid-state relay
SUP - Supply air
ETA - Extract air
ODA - Outdoor air
EHA - Exhaust air
HMI - Human-Machine Interface
rh - Relative humidity

1 - SAFETY CONSIDERATIONS

1.1 - General

The 39SQ air handling units (AHUs) has been designed and manufactured in accordance with the CE machine directive. 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.

All work must be carried out by sufficiently trained personnel.

All applicable personal safety devices must be used to ensure safe working conditions. Safety gloves and glasses must be worn for all maintenance operations. A respiratory protection mask must be worn when changing the filters.

The A-weighted equivalent continuous sound pressure level can be above 85 dB(A), depending on the motor size, fan size, fan speed and the location where the AHU is installed. This means that ear defenders must be worn, when the fan is running.

All doors and hatches must have at least one lock that can only be opened with a special device.

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

Do not walk on the roof panels of units installed inside or outside.

Only sufficiently qualified personel is allowed to work on (electrical) components. All power supplies to the unit must be disconnected, before any work can be carried out.

Switch off the supply voltage using the main disconnect switch.

CAUTION: Electric heaters have a separate supply and must be switched off separately.

If work lighting is required, use only lighting with 24 V maximum.

Use of electical equipment with a voltage above 48 V is only permitted if an earth leakage switch is installed that complies with local and national regulations.

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.

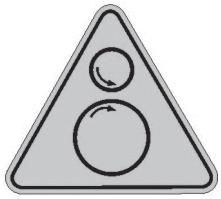
Lifting point
This pictogram shows where the AHU must be lifted and is positioned on the support beam.

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 can be earthed and is on one of the support beams beneath the casing in the fan section. If a unit consists of several sections, only one section needs to be earthed, provided the sections are connected in the correct way.

- 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.

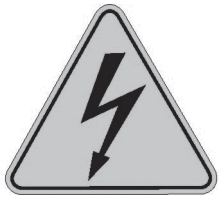
Rotating parts
This pictogram indicates that there are rotating parts behind this access cover, door or panel which may cause injury. The components that include rotating parts are the fan and heat recovery wheel. If there are special customer-specific components behind doors, access covers or panels 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 surfaces that may be hot are the heater surfaces. 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.

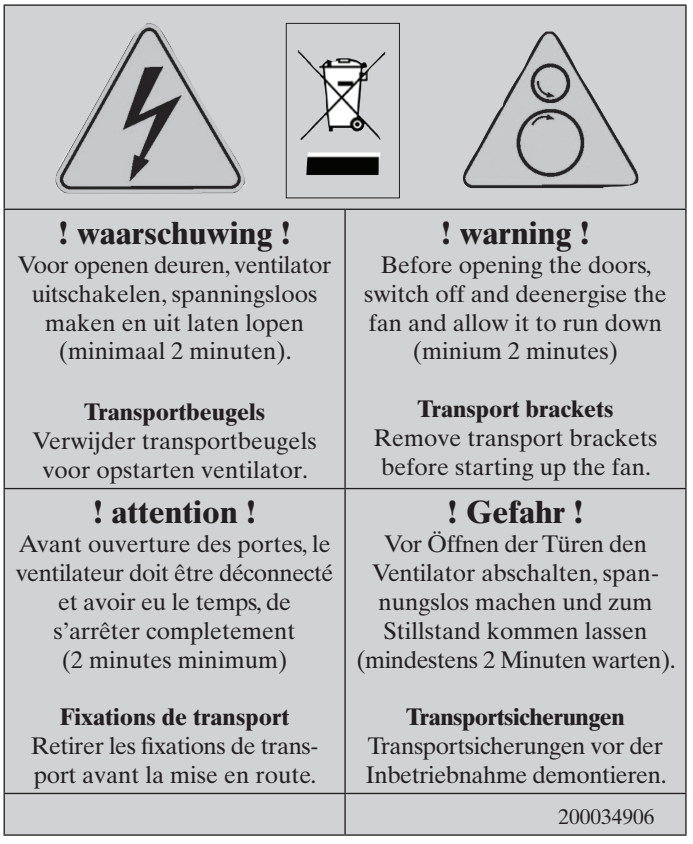
Electrical voltage
This pictogram indicates that there are electrical components behind this access cover, door or panel that may be dangerous for the user/installer. Only qualified personnel is permitted to carry out work on these components. For this work the regulations of the applicable international (a.o. IEC 61557, EN 50110 and ES 59009) and national (e.g. BS 7671) standards must be observed. The pictogram is attached to the access cover for the electric heater control box.



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

If the AHU consists of several parts, each part must have a label with the required data.

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. This pictogram also indicates that transport brackets must be removed before the fan is started up.



! waarschuwing ! Voor openen deuren, ventilator uitschakelen, spanningsloos maken en uit laten lopen (minimaal 2 minuten). **Transportbeugels** Verwijder transportbeugels voor opstarten ventilator.	**! warning !** Before opening the doors, switch off and deenergise the fan and allow it to run down (minium 2 minutes) **Transport brackets** Remove transport brackets before starting up the fan.
! attention ! Avant ouverture des portes, le ventilateur doit être déconnecté et avoir eu le temps, de s'arrêter completement (2 minutes minimum) **Fixations de transport** Retirer les fixations de transport avant la mise en route.	**! Gefahr !** Vor Öffnen der Türen den Ventilator abschalten, spannungslos machen und zum Stillstand kommen lassen (mindestens 2 Minuten warten). **Transportsicherungen** Transportsicherungen vor der Inbetriebnahme demontieren.
	200034906

Other warning labels

! waarschuwing ! Vervuilde filters zijn brandbaar.	**! warning !** Polluted filters are inflammable.
! attention ! Les filtres encrassés peuvent être inflammables	**! Gefahr !** Verschmutzte Filter sind leicht entflammbar.
	200034907

! waarschuwing ! Na het uitzetten van de elektrische verwarmer moet de ventilator nog minimaal 5 minuten draaien.	**! warning !** After switching off the electric heater the fan must continue to run for at least 5 minutes.
! attention ! Après la déconnexion de la résistance électrique, le ventilateur doit continuer à tourner pendant au moins 5 minutes	**! Gefahr !** Nach Abschalten der Elektroheizung muss der Ventilator noch mindestens 5 Minuten weiterlaufen.
	200034908

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 respon-sible 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

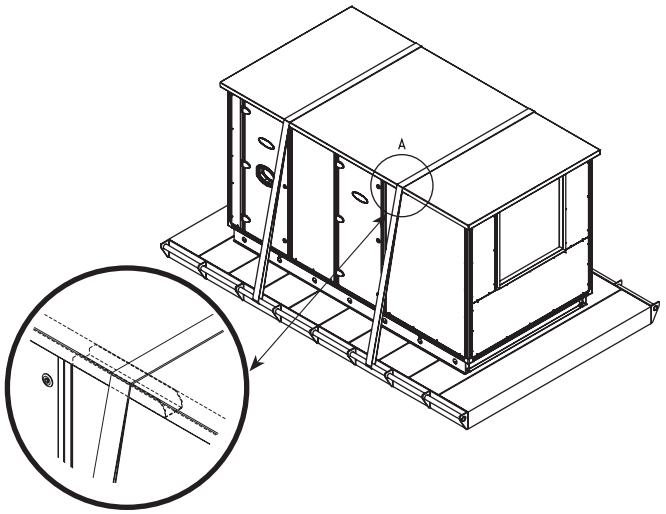
Transport and lifting of the AHU must always be in accordance with the instructions below. If these instructions are not observed, the unit may be irreparably damaged, and people in the immediate vicinity of the unit are endangered. Carrier Holland Heating does not accept any responsibility if these 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 (box profile 30 x 30 x 4 mm, quality 52). Lifting must be carried out in accordance with local regulations and with the help of certified lifting aids.

Only one set of lifting bars is supplied per order/position number per unit width (if ordered). These lifting bars are suitable for single use and only for the parts of this order/position number. The lifting bars are certified by an authorised person using a type test.

2.2 - Transport and storage

During transport and storage the air handling unit must only be supported under the designated lifting points. Supporting and lifting under the cross beams is prohibited. This 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.

To protect the roof edge on outside units that are wider than 1500 mm, protection plates are added in place of the tie ropes to prevent distortion of the roof edge.

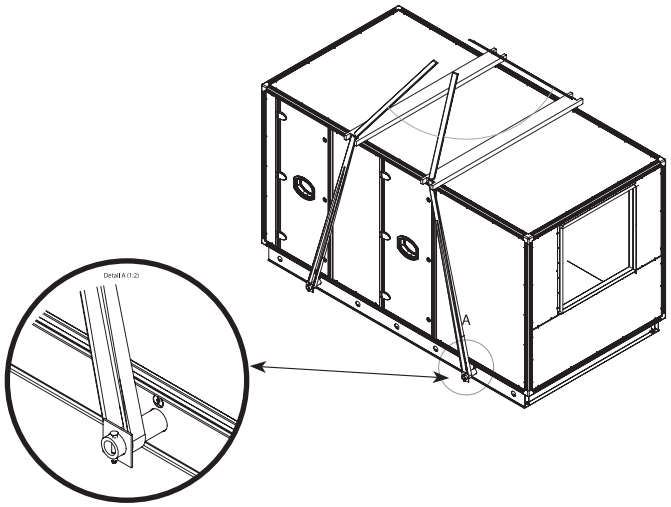
2.4 - Offloading and hoisting

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.

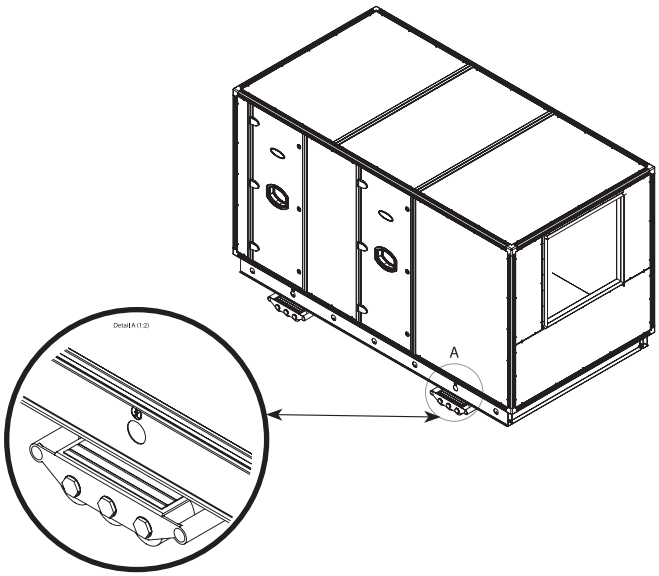
For offloading as well as hoisting lifting cables can be attached to the lifting bars. Evenly positioned spacer bars should be used between the lifting cables to prevent damage to the top of the unit and ensure that no excess pressure is applied to the side panels. For hoisting please ensure that the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



The AHU must not be raised under the cross beams during lifting or moving operations. 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.



2.6 - Storage

The packaging in which the AHU is supplied can cause condensation to be formed between the packaging and the AHU, if the unit is stored in an unconditioned place.

If the AHU is not immediately used it is recommended to store it in a conditioned location on-site. If the AHU is kept outside for a short period direct sun radiation must be avoided.

If the fans are shut down for a longer period (longer than three months) bearing damage can occur. To prevent this it is recommended to loosen the belt tension or to temporarily remove the fan belts. When the fans are re-started the belt tension must be reset to the specified tension. Controlled rotation of the fan impeller can also prevent this type of damage. This is also recommended for direct-drive fans.

2.7 - Assembly

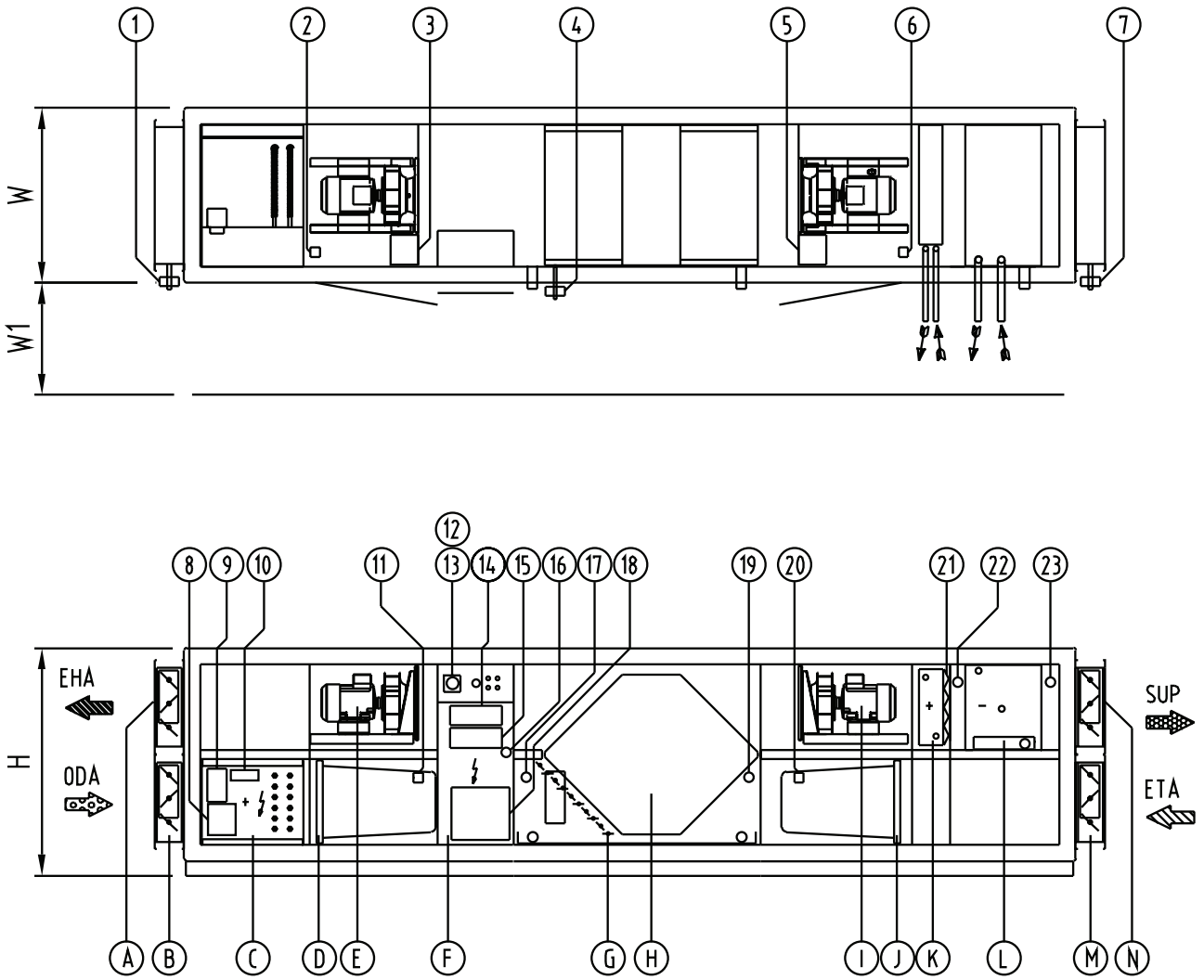
For the assembly of our units please refer to our instruction manual “Assembly”.

2.8 - Schematic diagram of an air handling unit with controls

The three versions of the 39SQ with heat recovery and control are shown here in schematic diagrams with a short description. The drawings in this document are for information only and show the various versions. They do not include possible external sensors or control devices. The air flow direction shown is from LEFT to RIGHT.

The dimensions given in the drawings (H and W) refer to the outside dimensions of the AHU casing (excl. connections and additional components). Dimension $W1_{min}$ is the required service clearance in front of the AHU. $W1_{rec}$ is the recommended service clearance in front of the AHU to replace components.

39SQC with high-efficiency counter-flow plate heat exchanger
Sizes 0405, 0506 and 0606



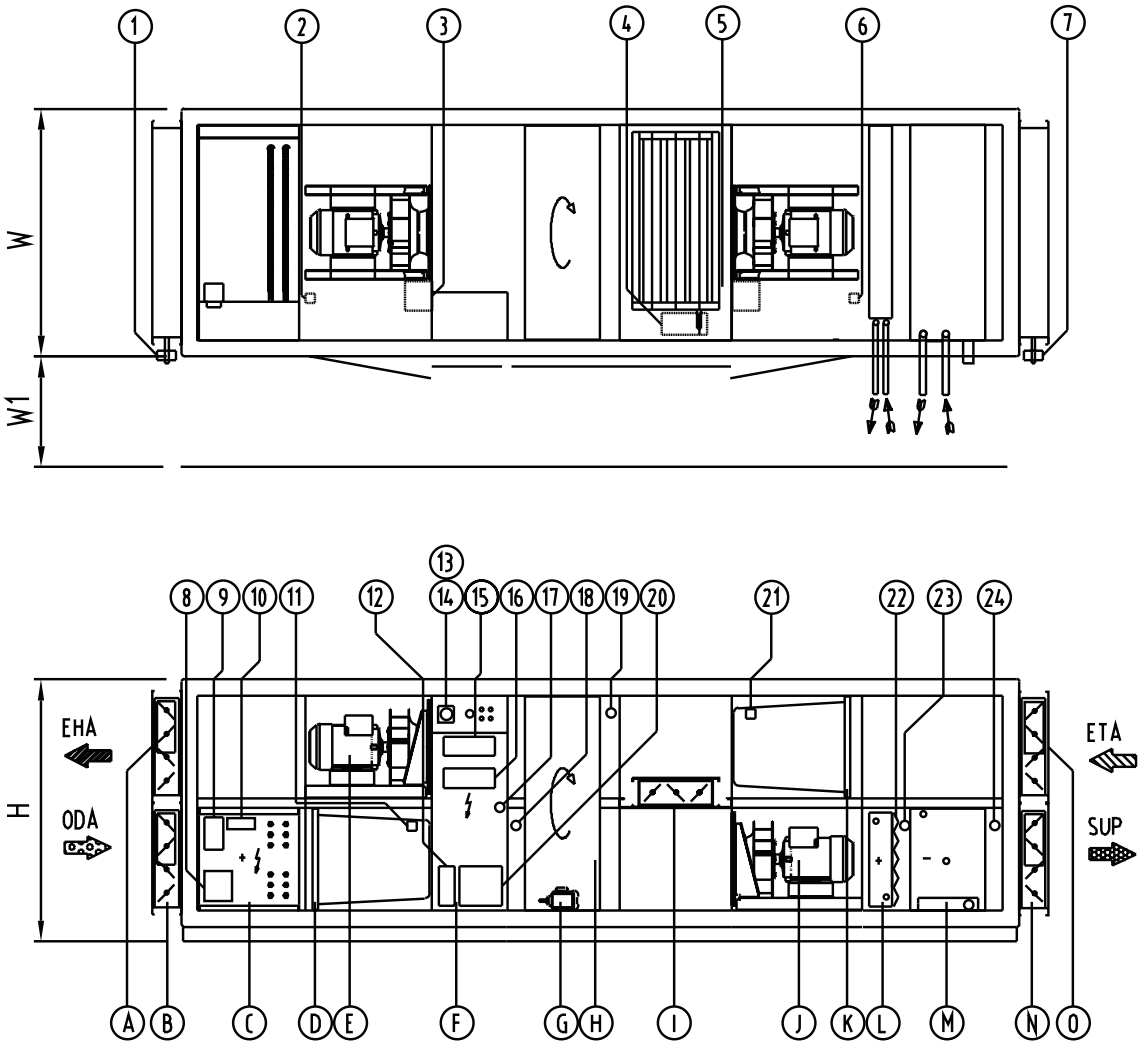
Dimensions

39SQC	Dimensions in mm			
	H	W	$W1_{min}$	$W1_{rec}$
0405	960	738	600	780
0506	1120	898	750	940
0606	1120	1058	900	1100

Legend
A. Exhaust air damper
B. Outdoor air intake damper
C. Electric pre-heater (hot water)
D. Supply air filter
E. Extract air fan
F. Control panel
G. Face/bypass damper
H. Counter-flow plate heat exchanger
I. Supply air fan
J Exhaust air filter
K. Electric reheater (hot water)
L. Cooling coil with changeover
M. Extract air damper
N. Supply air damper

Legend
1. Actuator, outdoor air damper
2. Pressure sensor, extract air fan
3. Frequency converter, extract air fan
4. Actuator, face/bypass damper, plate heat exchanger
5. Frequency converter, supply air fan
6. Pressure sensor, supply air fan
7. Actuator, extract and supply air damper (2 x)
8. Main disconnect switch (supply), electric heater
9. Solid state relay, electric heater
10. Fuses, electric heater
11. Pressure switch, supply air filter
12. Main supply connection, control panel, electric heater
13. Main disconnect switch AHU (excl.electric heater)
14. Connection terminals
15. Pro Dialog control
16. Reset button
16. Connection terminals
17. Temperature sensor, air intake
18. Relay
19. Temperature sensor, extract air
20. Pressure switch, extract air filter
21. Frost protection thermostat, heating coil
22. Temperature sensor, DX coil inlet
23. Temperature sensor, supply air

39SQR with high-efficiency heat recovery wheel
Sizes 0606, 0707, 0808, 0909, 1010, 1111 and 1212



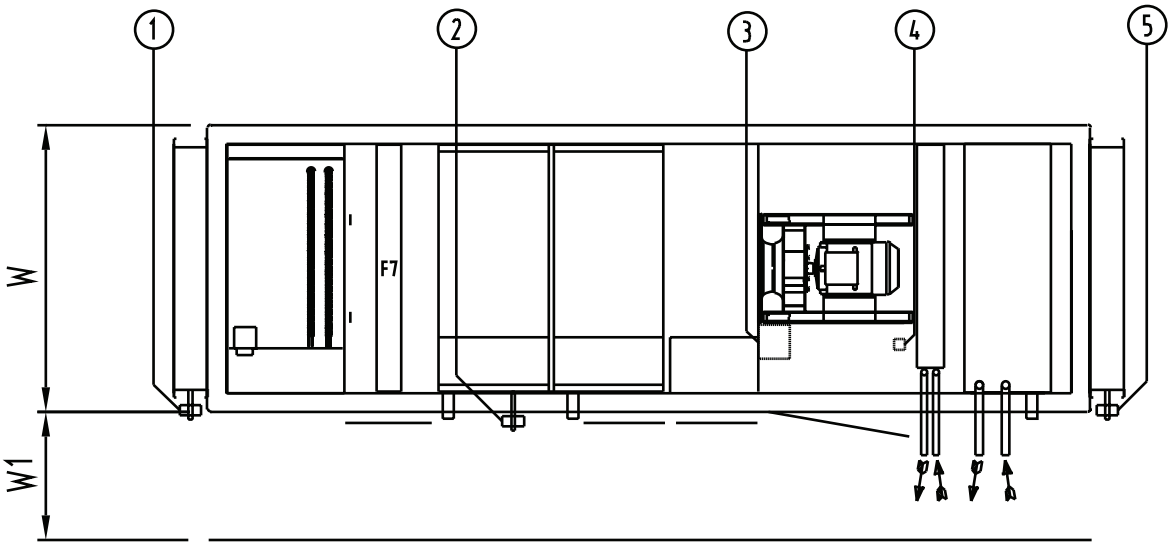
Dimensions

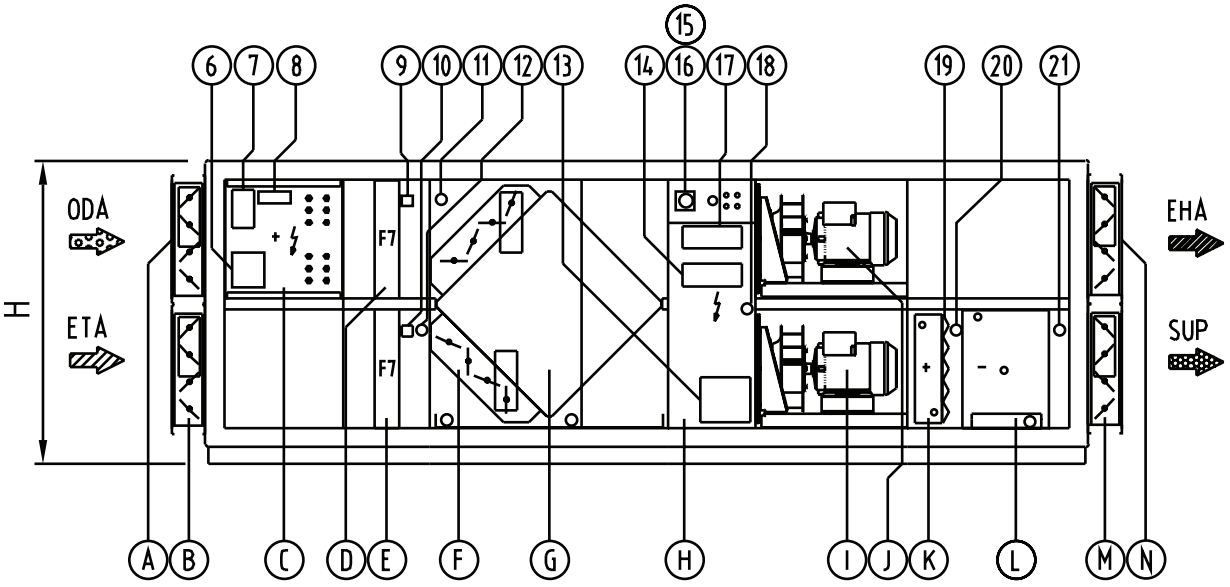
39SQR	Dimensions in mm			
	H	W	$W1_{min}$	$W1_{rec}$
0606	1120	1058	900	1100
0707	1280	1218	700	1260
0808	1440	1378	700	1420
0909	1600	1538	700	1580
1010	1760	1698	700	1740
1111	1920	1858	700	1900
1212	2080	2018	700	2060

Legend
A. Exhaust air damper
B. Outdoor air intake damper
C. Electric pre-heater (hot water)
D. Supply air filter
E. Extract air fan
F. Control panel
G. Motor, heat recovery wheel
H. Heat recovery wheel
I. Recirculation damper
J. Supply air fan
K. Extract air filter
L. Electric reheater (hot water)
M. Cooling coil with changeover
N. Supply air damper
O. Extract air damper

Legend
1. Actuator, outdoor air damper
2. Pressure sensor, extract air fan
3. Frequency converter, extract air fan
4. Actuator, recirculation air damper
5. Frequency converter, supply air fan
6. Pressure sensor, supply air fan
7. Actuator, extract and supply air damper (2 x)
8. Main disconnect switch (supply), electric heater
9. Solid-state relay, electric heater
10. Fuses, electric heater
11. Pressure switch, supply air filter
12. Controller, heat recovery wheel
13. Main supply connection, control panel
14. Main disconnect switch (excl. electric heater)
15. Connection terminals
16. Pro-Dialog control
17. Reset button
18. Temperature sensor, air intake
19. Temperature sensor, extract air
20. Pressure switch, extract air filter
21. Relay
22. Frost protection thermostat, heating coil
23. Temperature sensor, DX coil inlet
24. Temperature sensor, supply air

39SQP with cross-flow plate heat exchanger
Sizes 0405, 0506, 0606, 0707, 0808, 0909 and 1010





Dimensions

39SQP	Dimensions in mm			
	H	W	$W1_{min}$	$W1_{rec}$
0405	960	738	600	780
0506	1120	898	750	940
0606	1120	1058	900	1100
0707	1280	1218	700	1260
0808	1440	1378	700	1420
0909	1600	1538	700	1580
1010	1760	1698	700	1740

Legend
A. Outdoor air intake damper
B. Extract air damper
C. Electric pre-heater (hot water)
D. Supply air filter
E. Extract air filter
F. Recirculation damper, plate heat exchanger
G. Plate heat exchanger, incl. face/bypass damper
H. Control panel
I. Supply air fan
J. Extract air fan
K. Electric reheater (hot water)
L. Cooling coil with changeover
M. Supply air damper
N. Exhaust air damper

Legend
1. Actuator, outdoor air, extract air damper (2 x)
2. Actuator, face/bypass and/or recirculation air damper, plate heat exchanger
3. Frequency converter, extract/supply air fan (2 x)
4. Pressure sensor supply/extract air fan (2 x)
5. Actuator, supply/exhaust air damper (2 x)
6. Main disconnect switch (supply), electric heater
7. Solid-state relay, electric heater
8. Fuses, electric heater
9. Pressure switch, supply air filter
10. Pressure switch, extract air filter
11. Temperature sensor, air intake
12. Temperature sensor, extract air
13. Relay
14. Pro-Dialog control
15. Main supply connection, control panel
16. Main disconnect switch, AHU (excl. electric heater)
17. Connection terminals
18. Reset button
19. Frost protection thermostat, heating coil
20. Temperature sensor, supply air

3 - CHECKLIST OF START-UP CHECK POINTS

Before commissioning the unit, all functions below and the associated components must be checked, using the check list below. The table below shows a general overview of the operations 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	All functions	Remove obstacles and loose debris from compartment	
	All functions	Check for possible condensate and if necessary dry the parts	
Indoor installation/ outdoor installation	Internal and external panels	Damage	
	Internal and external panels	Damage	
	Joints	Cracks	
	Doors/access covers	Must be closed and locked before start-up	
	Flexible connections	Correct installation	
	Earthing	Correct earthing in accordance with regulations	
	Roof covering (outdoor installation)	Check if roof is completely watertight	
Dampers		Correct operation	
		Blades fully closed and at zero position	
	Actuators	Correct operation	
		Check rotation direction	
		Actuator end position same as damper end position	
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	
		Air vent the coil	
		Leakage	
		Frost protection thermostat connected	
	Electric heater	Check heater earth	
		Check hatch earth	
		Correct fuse size	
		Check wiring diagram	
		Check for possible condensate and if necessary dry the heater	
Coolers	Chilled-water coil	Correct connections	
		Air vent the coil	
		Leakage	
	Droplet eliminator	Correct alignment	
	Drain trap	Correct connection	
Heat recovery wheel	Rotor	Check rotation direction	
	Seal	Correct seal towards wheel	
	Drive	Check connection voltage	
		Correct connection	
		Check current in all phases	
	Drive belt	Check tension	
	Rotation monitor	Correct connection	
	Controller	Correct connection	
Plate heat exchanger	Damper (if used)	Correct operation	
	Actuator (if used)	Correct operation	
	Syphon trap	Correct connection	
	Droplet eliminators (if used)	Bent fins	
Fan	Transport protection brackets	Remove	
	Fan housing and fan compartment	Remove obstacles and loose debris from the fan and fan compartment	
	Fan compartment, fan, motor, frequency converter	Check for possible condensate and if necessary dry the parts	
	Impeller	Check rotation direction	
	Motor	Check connection voltage	
		Correct connection	
		Check current in all phases	
	Drive belt	Check tension	
	Flexible connections	Correct installation	
	Operating switch	Check connection	
		Ensure switch is locked off during checks	
	Pressure switch/sensor	Operation	
Silencer (duct silencer)		Damage of the top layer	
		Check for air-tight connection at the correct opening	
		Is the duct silencer sufficiently supported	
Frequency converter	Connections	Correct connection/complies with EMC	
	Frequency converter	Check for possible condensate and if necessary dry the converter	
	Voltage	Check connection voltage	
	Settings	Check correct settings	
	Phases	Check voltage in all phases	
Lighting	Lamp	Check connection voltage	
	Switch	Check connection	
Control panel	Components	Check for possible condensate and if necessary dry the components	
	Power supply	Check power supply voltage	
		Check neutral	
		Correct earthing in accordance with regulations	
		Power supply with correctly sized fuses	
	External sensors/control devices	Connect according to wiring diagram	
	Alarms	Connect to BMS or external panel	
Controller	Parameters	Set all specific project parameters	

4 - START-UP INSTRUCTIONS

4.1 - Casing

The unit data, such as order number, position number etc. is given on the nameplate.

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 of units installed inside and outside 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. Check if the door closure (on the inside of the door) is tightly fitted, so that there are no excessive air leaks at the doors. For outside installation of the AHU check the storm cord. For the sections that are under pressure it is recommended to order a door lock with an pressure safety device.

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

4.1.3 - Flexible connections

- Check that all flexible connections are firmly attached to the AHU. If necessary, tighten loose screws.
- The stretched length of a single-skin flexible connection is 130 mm, but a flexible connection must NOT be installed stretched between the AHU and the duct. Once installed the operating length of the flexible connection must be 100 mm.

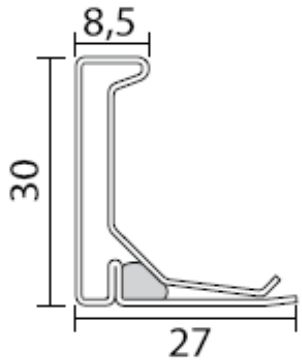
4.1.4 - Earthing

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.

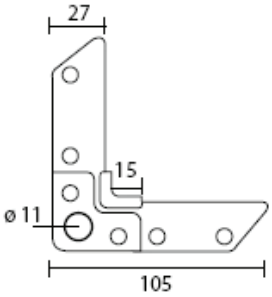
4.1.5 - Connected ducts

There are corner frames attached to all openings to be connected. These corner frames allow connection of the air duct to the AHU.

- It is recommended to use Europrofile connections (type E30) at the corner frame as well as at the duct to be connected.

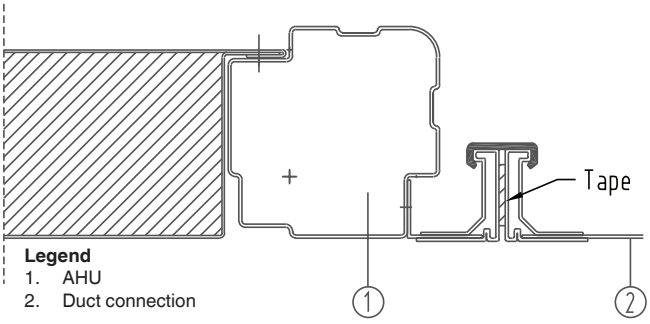


- The Europrofile connections are available in fixed lengths and can be cut to the required length with a saw. These profiles can easily be placed over the corner frame. Allow for a maximum profile height of 30 mm, so that ducts that are positioned one above the other can be installed correctly.
- The four corners between the profiles can be completed with a corner piece (type H30).

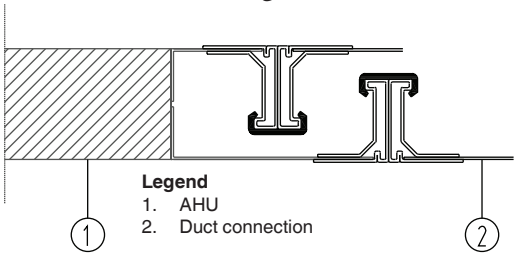


- The profile at the corner frame can be attached to the profile on the duct using a drive slip (type SR).

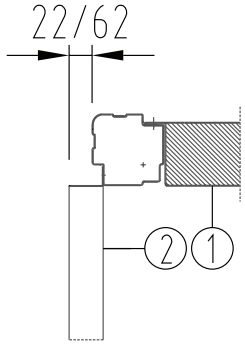
- Attaching self-adhesive tape between the two profiles ensures an air-tight seal, as shown in the drawing below.



- To be able to make two openings one above the other the corner frames of the two openings have a different length so that there is always enough space to place and attach the profiles. Using the drive slip means that there is no need to use screws in the limited space between the two ducts that are one above the other, as shown in the drawing below.

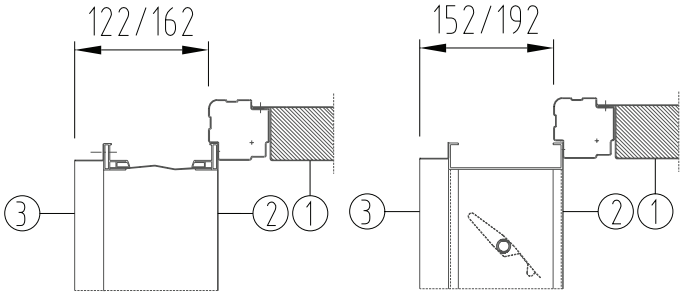


- The corner frame has a length of 32 or 72 mm and extends 22 or 62 mm beyond the external AHU dimension, as shown in the drawing below.



Legend
1. AHU
2. Duct connection

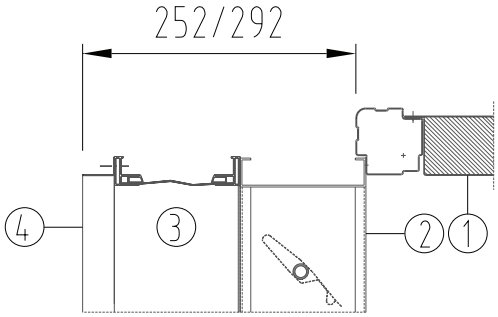
- The flexible connection, including the installed corner frame, extend 122 or 162 mm beyond the external AHU dimension, and a damper set 152 or 192 mm, as shown in the drawing below.



Legend
1. AHU
2. Flexible connection or damper
3. Duct connection

(single-skin flexible connection - ± 30 mm press fit)

- The combination of flexible connections and dampers, including the installed corner frame, extends 252 or 292 mm beyond the external AHU dimension, as shown in the drawing below.



Legend
1. AHU
2. Damper
3. Flexible connection
4. Duct connection

(single-skin flexible connection - ± 30 mm press fit)

4.1.6 - Outdoor air intake

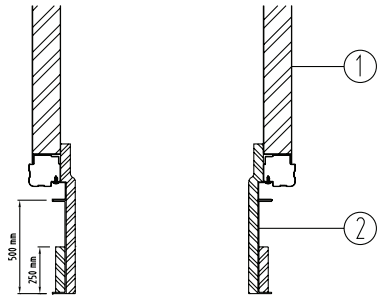
Ensure that the air intake duct is correctly connected. High air velocities must be avoided, and no rain drops should get into the duct. This can be prevented by installing rain protection air intake grilles (Caution: The maximum air velocity for the grille is as given by the supplier). The rear air intake duct must be sized to avoid higher than allowable air velocities in the grille. High air velocities in the openings can also be caused by wind attacks at one of the openings. If these can be expected for the installation or geographical location, try to minimise them with partitions. If there is any possibility that rain water can be drawn in, droplet eliminators must be added behind the air intake grille. A pre-heater for the filters can be installed to prevent that mist causes the filters to become too wet. The pre-heater will reduce the relative humidity of the air.

Connection of the outdoor air intake duct

If condensation can be expected in or on the ducts, these must be insulated on the outside.

To connect the outdoor air intake duct to a unit that is installed inside we recommend the following procedure:

- Connect a 500 mm long adapter piece to the corner frame of the air handling unit.
- Insulate the inside of the complete adapter piece up to the unit panel.
- Insulate the outside of the adapter piece so that there is a 250 mm overlap between inside and outside insulation.
- The remainder of the adapter piece needs to be insulated on the outside, as shown in the drawing below.



Legend
1. AHU
2. Duct connection

If a damper is installed on the unit it is recommended to insulate up to the unit (over the damper). The damper can cause condensation to form on the unit.

4.1.7 - Assembly and placement of the air handling unit

Ensure that the floor in the room where the unit is installed is even and waterproof. The joints between the parts must be covered with the sealing tape provided. The sections can then be placed in the correct order. Place the sections as close as possible together and ensure that they can be moved. Using a support, pull the sections towards each other with a pull-rope. Check if all parts are water-tight and if necessary slide spacers under the support where required (see also chapter 2). Then attach the profiles supplied to the joint. The roof of units installed outside must be sealed so that no water can leak to the inside. Always attach a unit installed outside to the floor of the support frame, to ensure that the unit cannot move or fall. (take the force of the wind into account). For units installed inside please make sure that the unit cannot move from its support points. If necessary, the unit must be attached to the support.

For a detailed description of the assembly please refer to the instruction manual “Assembly”.

4.1.8. Air contamination
If the exhaust and outdoor air intake openings are close to each other there is a risk of air contamination. To reduce contamination the air must be rarefied. To do this correctly, the air volume, the horizontal and vertical distance to the two openings and the position of the two openings in relation to each other must be taken into consideration (is the outdoor air intake lower or higher than the exhaust air opening).

It may be necessary to position the two openings further apart, using an extra piece of duct at the outdoor air intake opening. If the units are installed outside, this piece of duct should be placed between the air handling unit and the pre-installed suction cap (if used). The piece of ducting must always be supported in an appropriate way.

4.1.9 - Condensation in or on the AHU
Condensation can form on the inside and outside the AHU. This depends on the installation location (indoor or outdoor), temperature and relative humidity inside and outside the AHU and the thermal bridge factor (theTB value) of the AHU. Always select an AHU with a thermal bridge factor that will not lead to condensation at the indoor and outdoor conditions. For units installed inside the following points must be considered:

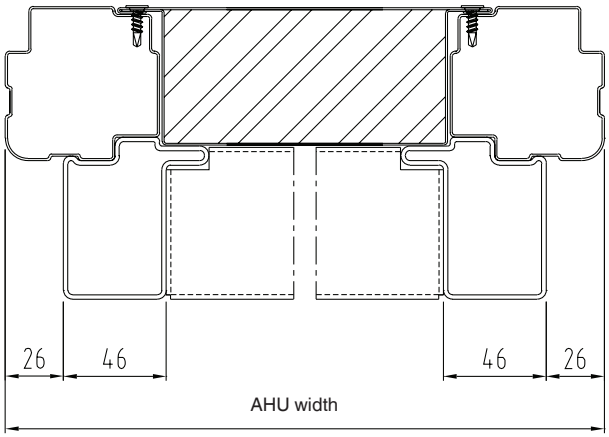
- Open water collection tanks (e.g. vapour/condensate collection tank). These must always be unpressurised and covered so that the relative humidity in the plant room is minimised.
- Sufficiently insulate the cold water and condensate lines up to the AHU.
- Sufficiently insulate air ducts with a possible air temperature below the dew point of the air in the plant room, as described earlier.

For units that are installed outside the following points must be considered:

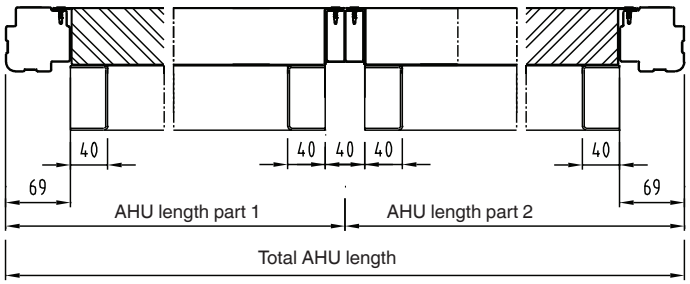
- Always insulate air ducts with a possible air condition (temperature and relative humidity) with a dew point above the expected outdoor air condition, to prevent condensate formation in the duct. It is recommended to insulate all ducts from and to the building to minimise heat transfer and to ensure good control.
- After connecting the ducts to the building immediately connect the unit to the power supply, switch it on and start it up. If this is not done moisture will move from the building ducts to the AHU, causing an increase of the relative humidity in the AHU. At low outdoor temperatures (if the AHU is not operating) this can lead to condensation in the AHU and at the control panel. This must always be prevented.

4.1.10 - AHU support
The AHU incorporates a 62-mm high self-supporting base. If the AHU is placed on a base or an external frame, the following dimensions of the support under the AHU must be taken into consideration.

Unit width:

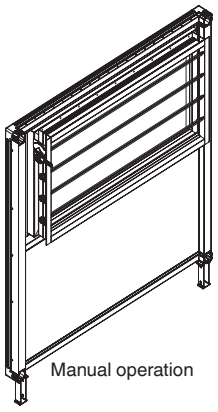


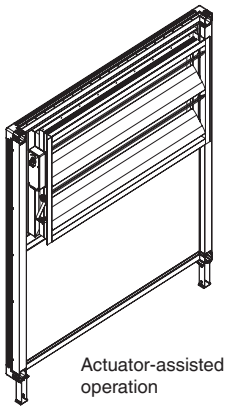
Unit length:



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 be set to the fully open position.
- Check operation and damper position of the spring return after a power cut. Some dampers must be open, others must be closed.
- Ensure that the end position of the damper is the same as the end position of the actuator so that the drive lever of the damper is unloaded in the end position.


Manual operation

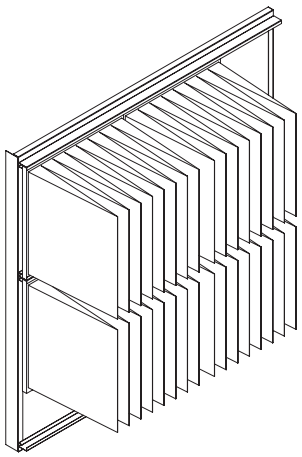

Actuator-assisted operation

AHU with control
The unit is supplied as standard with actuator(s).

- Open/closed
- Spring return

4.3 - Air filters

- Check if the correct filters have been installed.
- Check if the filter bags have been installed correctly.
- Set pressure switches or sensors, if used.
- Close the inspection door.



AHU with control
The supply and extract air filters are equipped with a pressure switch that is configured in series and normally closed.

4.4 - Heaters

4.4.1 - Hot water coil
- Check the connections on the dimensional drawing.
- Ensure that the coil has been fully purged.
- Check connections for leakage.
- Ensure that the frost protection thermostat has been correctly connected and set up,
- It is possible that the coil is the last or second last component in the AHU. The frost protection thermostat must be made accessible by providing a field-installed inspection hatch in the supply air duct.
- 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.

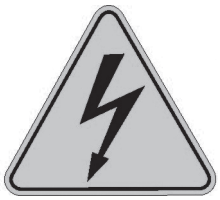
AHU with control
The first hot water coil without glycol in air flow direction is equipped with a frost protection thermostat. This is set to a cut-out temperature of 5°C.

4.4.1.1 - Coils containing glycol
If coils are filled with a water/glycol mixture, this requires extra attention.
- Glycol can react violently with strong oxidation solutions.
- When working on the coil, always check which medium is used. Before adding anything to the heat exchange medium, always check with the installer.
- Always wear safety glasses and gloves.
- Do not smoke or use an open flame.
- When sizing the expansion tank take the higher heat transfer coefficient into account, (± 25% larger).
- Watertight seals are not always tight for water/glycol mixtures. It is therefore better to use weld/solder connections.
- Water/glycol causes increased sludge formation.
- Always observe the instructions of the right glycol manufacturer.
- Check the mixture to ensure that the glycol concentration (by weight) is correct.

4.4.2 - Electric heater
- Check and/or connect the heater in accordance with local regulations and the data from the manufacturer.
- Ensure that the terminal strip earth and the inspection hatch earth have been connected.
- Check for possible condensate/moisture. Condensate may form in the period before the first start-up of the AHU as a result of weather change and/or humid air from the building. Remove all condensate from the construction components and dry the electrical components using warm (dry) air (e.g. with a hair drier).
- Check the connection voltage.
- Check the existing amperage on all phases. The values must agree with the data on the heater name plate.
- To ensure safe operation of the heater, it is equipped with a thermostat with auto reset (80°C) and a high limit thermostat with manual reset (128°C).

ATTENTION:
- ***Do not enter the AHU if the electric heater is on.***
- ***The instructions must clearly specify that the fan must be operating, before the electric heater is switched on. After the heater has been switched off, the fan must continue to run for at least five minutes.***
- ***As not all electric heater stages have variable control, always ensure that the minimum speed across the heater is 2 m/s. If all stages have variable control the air velocity over the element can go down to 1.5 m/s.***

- The warning label for electrical voltage is attached to the inspection hatch.



- The earth warning label is attached to the inside of the heater and the inspection hatch.

- The warning label for the procedure to switch off the heater is found on the door or hatch of the fan assembly.

! waarschuwing !	! warning !
Na het uitzetten van de elektrische verwarmer moet de ventilator nog minimaal 5 minuten draaien.	After switching off the electric heater the fan must continue to run for at least 5 minutes.
! attention !	**! Gefahr !**
Après la déconnexion de la résistance électrique, le ventilateur doit continuer à tourner pendant au moins 5 minutes	Nach Abschalten der Elektroheizung muss der Ventilator noch mindestens 5 Minuten weiterlaufen.
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AHU with control
If an AHU with control includes an electric heater, this must have a separate power supply (400 V ± 10%, 3 phase, 50 Hz). The electric heater supply must be protected by a correctly sized fuse. The control ensures the correct control signal and the minimum air flow across the heater.

The electric heater includes:
- A main disconnect switch
- Internal fuses (fast acting)
- Solid-state relays (SSR) that ensure modulating control. The SSRs used switch via neutral.

The product complies with residential EMC standards (61000-6-3) with the following restrictions, related to the flicker effect.

Only one heater			
Heating capacity	**Current/ phase**	**Maximum impedance Z**	**Declaration of the connection condition to comply with**
7.5 kW	11 A	0.309	Minimum power supply capability at the building connection point to the public network > 100 A per phase
9 kW	13 A	0.257	
11 kW	16 A	0.210	
15 kW	22 A	0.154	Maximum allowable power supply network impedance < 0.15 Ohm
18 kW	26 A	0.129	Maximum allowable power supply network impedance < 0.13 Ohm
19 kW	27A	0.122	Maximum allowable power supply network impedance < 0.12 Ohm
24 kW	35 A	0.096	Maximum allowable power supply network impedance < 0.10 Ohm
27 kW	39 A	0.086	Maximum allowable power supply network impedance < 0.09 Ohm
35 kW	51 A	0.066	Maximum allowable power supply network impedance < 0.07 Ohm
40 kW	58 A	0.058	Maximum allowable power supply network impedance < 0.06 Ohm

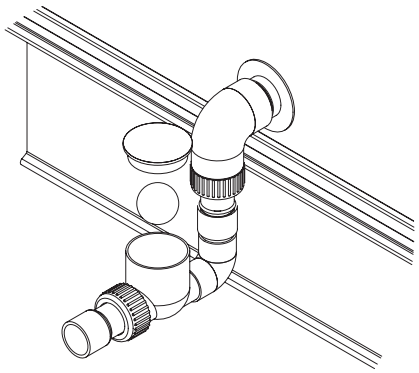
* Maximum value at the point of common coupling (PCC) of the machine and other electrical devices sensitive to the flicker effect.

The values in the table above are calculated based on the following assumptions
- A voltage change as defined by the standard corresponds to a cycle ON – OFF – ON
- For an interval period of 50 seconds
- Power supply 400 V
- Safety margin 15%

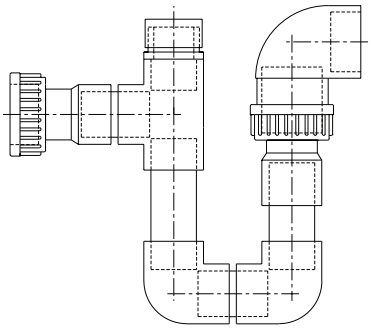
4.4.3 - Electric heater in combination with changeover coil
For an AHU with control an electric heater combined with a changeover coil can be used. The changeover coil provides primary heating and cooling. The electric heater is used as a back-up heater in case there is no hot water available for the changeover coil at a demand for heating. The electric heater must NOT be used if the changeover coil is operating and the required entering temperature is not achieved.

4.5 - Coolers

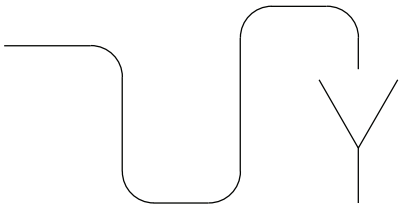
- Check the connections on the dimensional drawing.
- Ensure that the coil has been fully purged.
- Control the connections for leaks.
- If a changeover coil is supplied by a heat pump, the installation must be designed to compensate for the required heat during the system heat pump defrost cycle and the heat cannot be drawn from the supply air. Otherwise the supply air temperature cannot be achieved. During the heat pump defrost cycle it must be possible to add so much heat into the system that the desired entering temperature (heater design capacity) as well as the required heat for heat pump defrosting can be guaranteed.
- Ensure that the AHU is installed high enough to enable the siphon trap to work correctly.
- Check that the siphon trap (option) has been correctly installed. Ensure that there is a watertight connection at the angle bend of the condensate pan tap by using PTFE tape. Leave approximately 32 mm WITHOUT tape between the siphon casing and the connection to the pipe, as this part is sealed by the rubber ring provided.
- The negative pressure siphon supplied by Carrier is suitable for a negative pressure of up to 800 Pa in the associated section.



- Check if siphon cover and ball have been correctly installed.
- The gauge pressure siphon supplied by Carrier is suitable for a gauge pressure of up to 1200 Pa in the associated section.



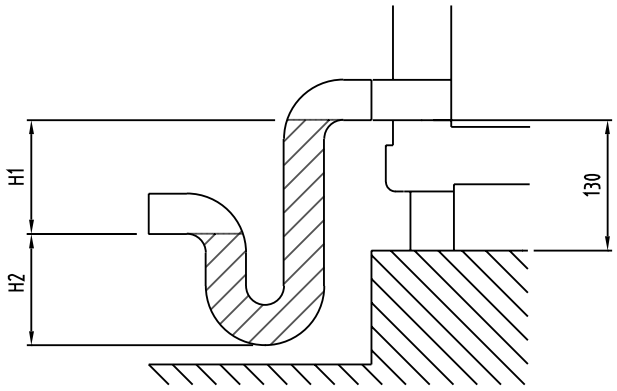
- Check that the (negative or gauge) pressure corresponds to the siphon type installed.
- The outlet of the siphon trap connected to the drain must not be under pressure.



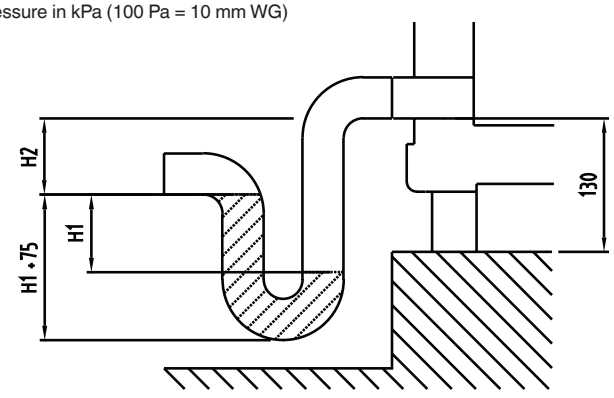
- It is not recommended to connect a siphon in a negative pressure section and a siphon in a gauge pressure section via a manifold that is not under pressure to the drain. Instead two separate manifolds should be used.
- If the field-prepared siphon is used, follow the instructions in the drawing below.

Fill siphon with water, if the fan is switched off.

Negative pressure:
H1 = maximum negative pressure in the cooler section (in mm WG) + 50 mm
H2 = >1/2 x H1



Gauge pressure:
H1 = >maximum gauge pressure in the cooler section (in mm WG) + 50 mm
H2 = 50 mm
Pressure in kPa (100 Pa = 10 mm WG)



- Check if the droplet eliminator after the cooler has been correctly installed.
- Check if fins have been bent during transport.
- Correctly straighten the fins.
- The fins will only work correctly after several days in dehumidification mode.
- Start-up the cooling coil by opening the shut-off valves and switching on the controller. After several days of cooling operation check the condensate drain and operation of the plastic siphon.
- If necessary clean the siphon.

AHU with control
The first hot water coil without glycol in air flow direction is equipped with a frost protection thermostat. This is set to a cut-out temperature of 5°C (the frost protection thermostat is also on a cooling coil that is used as a changeover coil).

4.6 - DX-coils

- The DX-coils are supplied without refrigerant.
- The coils must never be pressurised with water. They must be sealed and pressurised with a gaseous medium to prevent pollution of the coil.
- A qualified person should charge the coil and the rest of the system with a sufficient amount of the refrigerant specified in the technical specifications.
- When connecting the DX-coil to the compressor/ condensing unit always follow the supplier specifications and the instructions of the qualified personnel.
- It is not recommended to connect several DX-coils to one compressor/condensing unit.
- It is best to use an infinitely variable controller for the compressor/condensing unit. If the condensing unit has infinitely variable control, one of the temperature controls in the controller can be selected.
- If the condensing unit does not have infinitely variable control, set the AHU control for supply air temperature control, and connect the DX entering temperature sensor instead of the supply air sensor. The desired (room) temperature must then be controlled by a separate controller at the condensing unit.

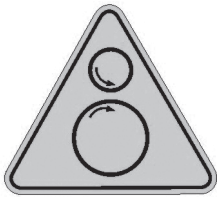
If a changeover coil is supplied by a heat pump, the installation must be designed to compensate for the required heat during the system heat pump defrost cycle and the heat cannot be drawn from the supply air. Otherwise the supply air temperature cannot be achieved. During the heat pump defrost cycle it must be possible to add so much heat into the system that the desired entering temperature (heater design capacity) as well as the required heat for heat pump defrosting can be guaranteed.

AHU with control
To ensure that the correct control strategy for an AHU with DX-coil can be selected, there is a temperature sensor on the intake side of the DX-coil. If a heater is placed directly before the DX-coil, this sensor is only accessible, if an inspection section is installed between the two coils.

4.7 - Heat recovery wheel

- Ensure that the heat exchanger face area is not damaged.
- 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 (5 mm play between sensor and detection point on the wheel).
- Check if the controller has been correctly connected and set in accordance with the supplier instructions. The instructions for the controller supplier apply.
- Ensure that the rotor speed has been correctly set. The 39SQ condensation rotor must have a maximum speed of 10 min^{-1}; a sorption rotor must have a maximum speed of 20 min^{-1}. Refer to the user manual for the heat recovery wheel controller.
- If the air intake temperature is below -15°C, a pre-heater is recommended for the heat recovery wheel to prevent freezing.
- The following warning sign is shown on the panel.

Rotating parts



AHU with control
The heat recovery wheel is supplied with rotor control, included in the central control panel. The rotation monitor for the rotor is pre-installed and connected.

If required the heat recovery wheel can include a pressure sensor that protects the rotor against freezing.

4.8 - Plate heat exchanger

- Ensure that the face area of the heat exchanger is not damaged.
- If dampers are installed, also 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 dampers can reach the fully open position.
- Before connecting the siphon trap and checking the droplet eliminator (if installed), see chapter 4.5.
- If the air intake temperature at the is below -10°C in a cross-flow plate heat exchanger, a pre-heater is recommended for the plate heat exchanger to prevent freezing.
- In a counter-flow plate heat exchanger a pre-heater is recommended for the plate heat exchanger, if the air intake temperature is below -5°C, to prevent freezing.

AHU with control
The plate heat exchanger is supplied with a modulating actuator (24 V).

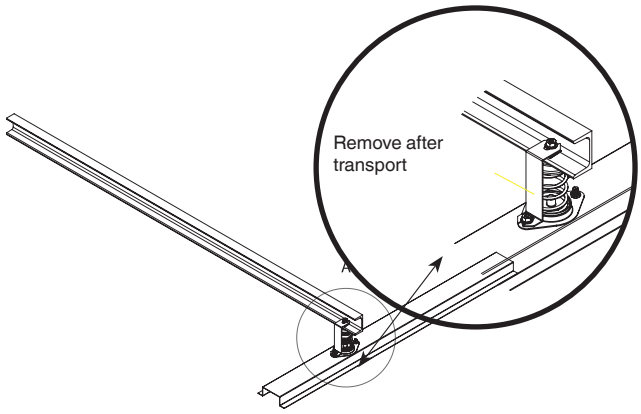
If required the heat recovery wheel can include a pressure sensor that protects the heat exchanger against freezing.

4.9 - Recirculation damper

- Before operating this damper refer to chapter 4.2
- The damper must always be closed at a power failure or when the unit is shut down.
- If a recirculation damper is used a damper must be included for both the outdoor entering and exhaust air opening.
- The recirculation damper used is designed for an open/closed application.
- The AHU with recirculation damper is therefore NOT suitable for modulating operation of the recirculation damper. This is due to the non-guaranteed damper authority and the fan position in the AHU relative to the recirculation damper.

AHU with control
The recirculation damper is supplied with an open/closed actuator with spring return (24 V). The control used for the recirculation damper is an open/closed control.

4.10 - Fan

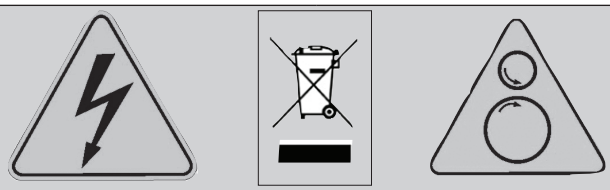


CAUTION: The air flow may cause stationary parts to move (even a fan that is switched off)!

- 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 for possible condensate/moisture. Condensate may form in the period before the first start-up of the AHU as a result of weather change and/or humid air from the building. Remove all condensate from the construction components and dry the electrical components using warm (dry) air (e.g. with a hair drier). This applies to both motor and frequency converter.
- 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 fan 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.
- The motor data shown is for an altitude above sea level of up to 1000 m and an ambient temperature of 40°C maximum.
- The data for belt type, belt tension, number of belts, size and type of pulley is given on a sticker on the fan housing.
- If the fans are shut down for longer periods (longer than three months), the bearings may be damaged. To prevent this it is recommended, to reduce the fan belt tension or to remove the fan belts temporarily. When the fans are restarted the belt tension has to be reset to the specified value. This type of damage can also be prevented by controlled rotation of the fan impeller This is recommended for direct-drive fans.
- 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.



! waarschuwing ! Voor openen deuren, ventilator uitschakelen, spanningsloos maken en uit laten lopen (minimaal 2 minuten). **Transportbeugels** Verwijder transportbeugels voor opstarten ventilator.	**! warning !** Before opening the doors, switch off and deenergise the fan and allow it to run down (minium 2 minutes) **Transport brackets** Remove transport brackets before starting up the fan.
! attention ! Avant ouverture des portes, le ventilateur doit être déconnecté et avoir eu le temps, de s'arrêter completement (2 minutes minimum) **Fixations de transport** Retirer les fixations de transport avant la mise en route.	**! Gefahr !** Vor Öffnen der Türen den Ventilator abschalten, spannungslos machen und zum Stillstand kommen lassen (mindestens 2 Minuten warten). **Transportsicherungen** Transportsicherungen vor der Inbetriebnahme demontieren.
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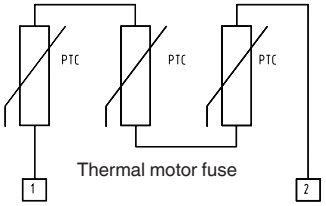
If the machine has stopped due to an unexpected power supply failure, sudden re-starting of the machine must be avoided. The control system must include an appropriate protection device.

General data, fan motor

Insulation class motor	:	F
PTC trip temperature	:	155°C
Connection voltage	:	3 x 230 V/50 Hz 3 x 400 V/50 Hz 3 x 690 V/50 Hz

The fan motor must have a power supply of 230 V, 3 ph, 50 Hz or 400 V, 3 ph, 50 Hz. The connection must be made with short circuit protection (fuses) and a thermal motor safety switch, matched to the nominal current of the motor. The motor can also be protected against overheating by three series-connected PTC thermistor fuses, installed in the windings. If a frequency converter is used the thermistors must be connected to the converter.



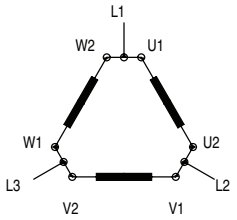
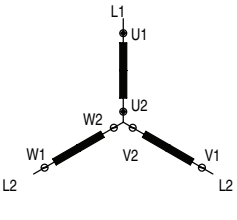
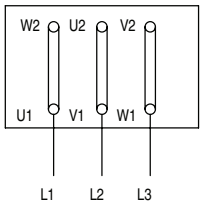
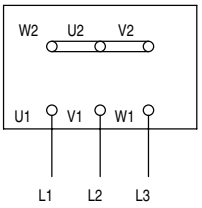
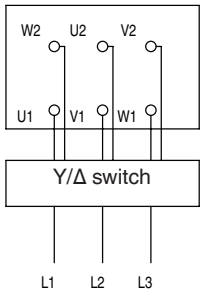
Before connecting the power supply please check the diagrams on the next page to ensure that they agree with the data on the motor name plate and the data in the technical documentation.

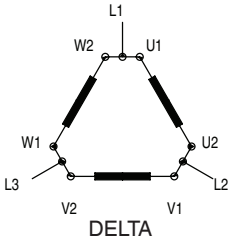
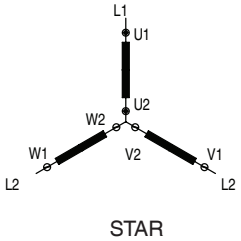
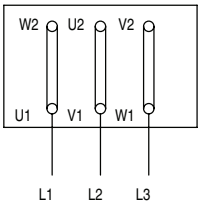
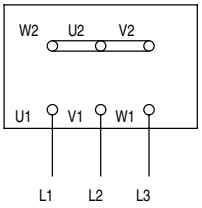
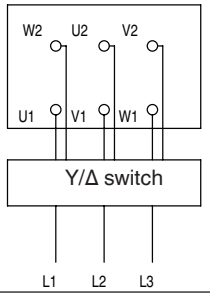
The disconnect switch is located on or near the fan section. When working on the unit the switch must be turned off and secured with a padlock. Switching off the disconnect switch must be done when the unit is not energised.

Before opening the door or inspection hatch of the fan section (failure, maintenance, service) the AHU must be de-energised.

CAUTION: Motors with a power output of up to 2.2 kW (230 V/400 V) can have across-the-line starting. Motors with a power output of 3 kW (400 V/690 V) should be started with the star/delta switch.

Connection diagrams: connection of the power supply cable and of the terminals on the terminal strip

Motor with the name plate data: 230 V/400 V - Y/Δ			
	Direct mains connection with a voltage between two phases of: 230 V	400 V	Indirect mains connection Y/Δ with a voltage between two phases of: 230 V
Winding connection diagram	 DELTA	 STAR	
Connection method of the conductors to the motor terminals			

Motor with the name plate data: 400 V/690 V - Y/Δ			
	Direct mains connection with a voltage between two phases of: 400 V	690 V	Indirect mains connection Y/Δ with a voltage between two phases of: 690 V
Winding connection diagram	 DELTA	 STAR	
Connection method of the conductors to the motor terminals			

4.10.1 - Plug fans

Plug fans are fans without a scroll that are directly driven by the motor. To get the correct operating point for this type of fan a frequency converter is required. The maximum frequency at which the plug fan can rotate depends on the motor/impeller assembly and should normally be higher than 50 Hz. The maximum frequency is given on the fan name plate.

Plug fans are equipped with a pressure measurement point in the intake cone of the fan. By measuring the pressure drop between the pressure for the fan and the pressure in the intake cone the actual air flow can be calculated using the following formula: $V = k \cdot \sqrt{\Delta p_{st}}$

Where

V = actual air flow rate in m^3/h

k = specific fan coefficient

Δp_{st} = pressure differential cone/air intake section in Pa

The k-value depends on the fan size used. This value can be found in the table below.

k-values	
Fan size	**Plug fan**
225	47
250	60
280	75
315	95
355	121
400	154
450	197
500	252
560	308
630	381
710	490

4.10.2 - Frequency converters

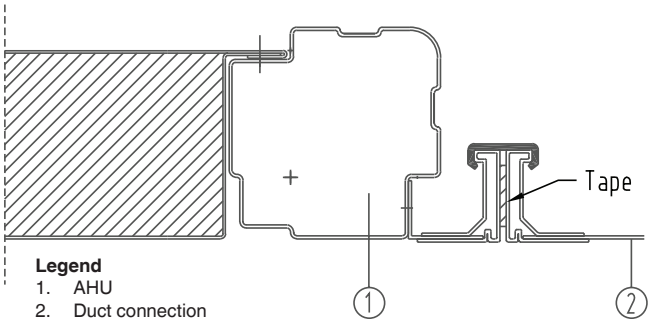
It is recommended to install a frequency converter with an integrated operating switch. If a separate operating switch is installed on the unit and near the frequency converter, this can be located in the supply voltage for the frequency converter. If the frequency converter is not isnstalled near the unit/operating switch, the operating switch can be placed in the control power circuit, that switches the supply voltage to the frequency converter via a relay. To connect the frequency converter, please refer to the wiring diagram for the converter installed. Ensure that the EMC directives are observed and pay attention to the shielded cables.

The frequency converter must always be correcly set to suit the motor and type installed. Observe the instructions of the supplier of the frequency converter. Special attention should be given to the following parameters:

- Correct application of the general motor data
  - Pay special attention to the motor frequency.
  - For subsynchronous operation (lower than the network frequency) it must be set in accordance with the motor nameplate.
  - For supersynchronous operation (higher than the network frequency) it must be set for the maximum admissible frequency of the motor/impeller assembly (this applies above all to plug fans.)
- Operating type, square variable connection
- It is recommended to cut out so-called overmodulation
- Setting of the normal start-up/shut-down times.
- Check for possible condensate/moisture. Condensate may form in the period before the first start-up of the AHU as a result of weather change and/or humid air from the building. Remove all condensate from the construction components and dry the electrical components using warm (dry) air (e.g. with a hair drier).

4.11 - Silencers

The silencers for the 39SQ are supplied separately on a pallet as duct silencers. The duct silencer must be installed on site at the correct opening. For this use the connection profiles supplied and use the method described in chapter in 4.1.5 - “Duct connections”. The conection to the rest of the duct system can also be made in this way, as shown in the drawing below.

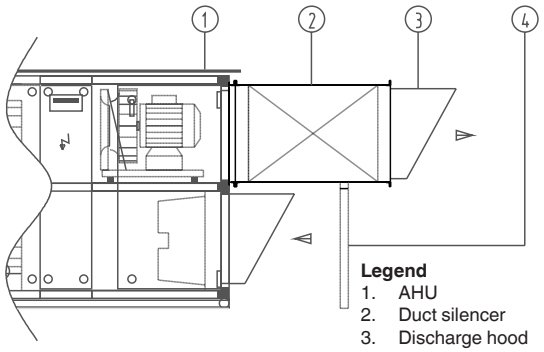


Legend
1. AHU
2. Duct connection

Please ensure that the duct silencers are always correctly supported on the floor or suspended from the ceiling. Make sure that the following weights are taken into consideration:

Duct silencers	
Unit type	**Weight, kg**
0405	30
0506	35
0606	45
0707	50
0808	70
0909	75
1010	105
1111	110
1212	135

The duct silencer can also be used for units installed outside. After installation they must always be insulated on the outside to ensure that they are water- and steam-tight. The pre-installed air intake and discharge hood (if used) must be removed first. Install the corner frame, supplied separately, at the opening of the silencer, before installing the silencer. Finally replace the air intake and discharge hood at the opening of the silencer. Here too the duct silencer must be sufficiently supported, as shown in the drawing below.



Legend
1. AHU
2. Duct silencer
3. Discharge hood
2. Support (to be field-supplied)

4.12 - Lighting

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

4.13 - Control panel

Connect the supply voltage to the control panel in accordance with the wiring diagram supplied. The general data for the control panel is given in the table below.

Electrical data for 39SQC/R/P units

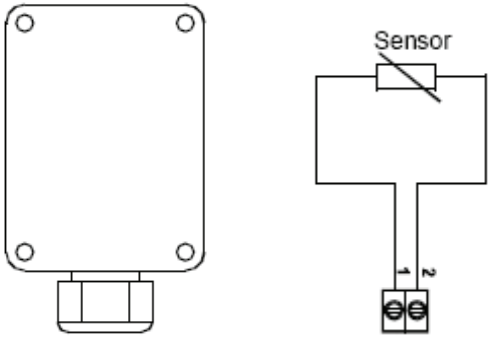
Model 39		SQC 0405 SQP 0405	SQC 0506 SQP 0506	SQC 0606 SQP 0606	SQR 0606	SQR 0707 SQP 0707	SQR 0808 SQP 0808	SQR 0909 SQP 0909	SQR 1010 SQP 1010	SQR 1111	SQR 1212
Main power circuit		Built-in main disconnect switch									
Nominal power supply	V-ph-Hz	400-3-50 + neutral									
Voltage range	V	360-440									
Maximum unit power	kW	3.6	5.8	7.7	7.7	10.5	14.1	14.1	18.9	27.3	27.3
Maximum supply cable size	mm^2	2.5	4	4	4	6	6	6	10	16	16
Main switch	A	25	25	25	25	40	40	40	63	63	63
Unit short circuit capacity	kA	15	15	15	15	15	15	15	15	15	15
Recommended fuse protection, power circuit	A	20	25	25	25	35	35	35	50	63	63
Control circuit power		Built-in 24 V control transformer									

- Check for possible condensate/moisture. Condensate may form in the period before the first start-up of the AHU as a result of weather change and/or humid air from the building. Remove all condensate from the construction components and dry the electrical components using warm (dry) air (e.g. with a hair drier).
- Check the supply
- The unit supply must be protected by a correctly sized fuse.
- Connect all external sensors, control devices and external controls to the terminal board as shown in the wiring diagram supplied.
- If required include alarms, release signals and similar elements in the BMS or on the external panel.
- Set the controller for the specific project parameters, such as operating times, holidays etc. Follow the instructions given in the operating instructions for the "Pro Dialog AHU control".
- The control panel is ventilated using exhaust air. To ensure the air flow there is a grille in the control panel hatch. This must not be covered.
- The hatch locks for the control panel must always be locked when the AHU is started.

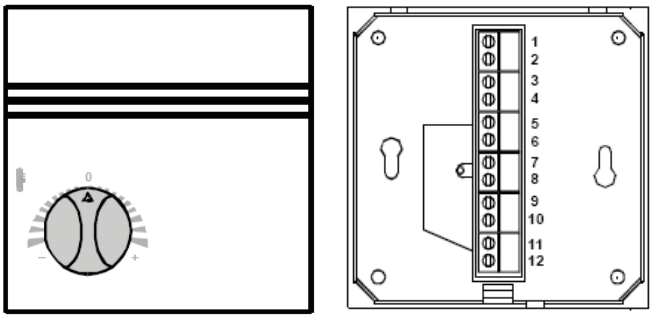
CAUTION: If the AHU includes an electric heater, the heater needs to have a separate power supply.

4.14 - Installation of external sensors included

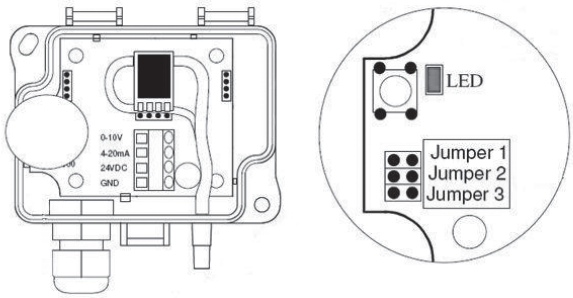
Outdoor air temperature sensor
The passive PT1000 sensor must be installed outside on a wall with north exposure. Ensure that the gland is at the bottom. This sensor (if required) is supplied separately and must be connected to the control panel after the unit has been installed. In the control diagram this sensor is shown as 23TT22 (TT6).



Room temperature sensor
The passive PT1000 sensor includes room temperature correction with regard to the required setpoint. The sensor must be positioned in the representative room and not be exposed to direct sunlight and not be near a local heat source. This sensor (if required) is supplied separately and must be connected to the control panel after the unit has been installed. In the control diagram this sensor is shown as 24TT4 (TT5).



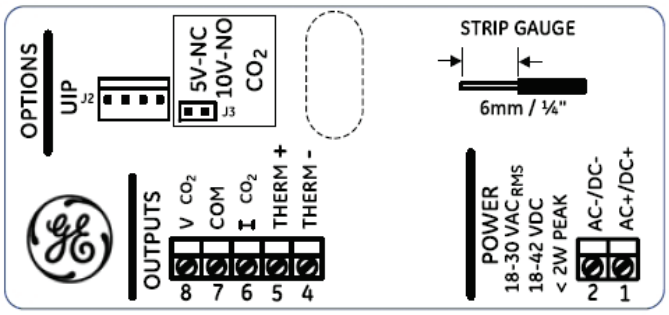
Duct pressure sensor
The active sensor (24 V) has a maximum measurement range of up to 2500 Pa and can be set to the desired range, using jumpers. Before the sensor is used, zero calibration must be carried out (keep the button in the sensor pressed for 4 seconds). It is recommended to set the response time to 4 seconds.



This sensor (if required) is supplied separately and must be connected to the control panel after the unit has been installed. In the control diagram this sensor is shown as 25DPT13 (PT3). The sensor cannot be placed in the outdoor air.

The "+" pressure measurement point must be in a representative and stable position in the supply air of the duct system (not directly after a damper, bend, branch or similar). The "–" pressure measurement point can measure atmospheric pressure in the room.

CO_2 sensor
The active sensor (24 V) must be placed in the correct room in a location that is representative of the CO_2 concentration in the room. Connect terminal 7 - 8 in the CO_2 sensor to the correct terminal at the terminal strip in the control panel.

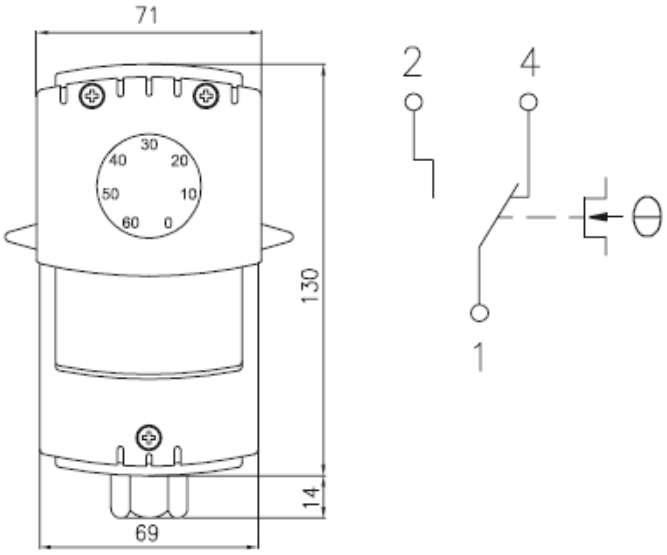


This sensor (if required) is supplied separately and must be connected to the control panel after the unit has been installed. In the control diagram this sensor is shown as 25QT23 (QT).

Thermostat, cooling coil with changeover function
The chilled-water coil can be set by the controller to operate as a cooling coil, or a heating coil, if warm water is available for this coil. The controller needs to know if warm or chilled water is available. The passive thermostat supplied for this purpose must be installed on a supply water pipe after this coil. Position the thermostat in a place in the piping system where continuous flow and a temperature for the medium can be guaranteed that is independent of the control damper position. If the sensor is installed in the wrong position in the water piping, the system will not work.

The followings standard settings are reqired.

- Cooling mode detection: if the measured water temperature is lower than the value set at the top dial, set this to 18°C. If the control demands cooling, the control damper will open, if the water temperature measured is below 18°C.
- Heating mode detection: if the measured water temperature is higher than the sum of the setting values at the bottom and top dials, set the value at the bottom dial to 10 K. If the control demands heating, the control damper will open, if the water temperature is 18 + 10 = 28°C.
- If the temperature is between the values above, the last mode detected applies.



Ensure that the gland is at the bottom.

This sensor (if required) is supplied separately and must be connected to the control panel after the unit has been installed. In the control diagram this sensor is shown as 26TA23 (TS1).

4.15 - Sensor replacement

- If sensors are replaced, ensure that the new sensor is the same type as the installed sensor and of a Carrier authorised replacement type.
- Before connecting the ducts and completing the other installation procedures ensure that all sensors are still accessible for maintenance in their final location. This can be achieved by installing inspection hatches in the ducts to be connected.

5 - MAINTENANCE CHECKLIST

5.1 - Checklist of check points and maintenance intervals

The checklist contains a general overview of a 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/ outdoor installation	Internal and external panels	Contamination/corrosion and damage				■	
	Internal panels					■	
	External panels				■		
		Joints				■	
	Roof covering (outdoor installation)	Seams and cracks (watertight)				■	
Doors/access covers	Hinges	Correct operation				■	
	Locks	Door closure (check bolt tightening)				■	
	Door seal	Cracks			■		
	Flexible connections	Cracks				■	
Dampers	Damper blades	Sealing				■	
		Bearings				■	
	Damper drive	Actuator			■		
Outdoor air intake	Air intake cover/grille	Check for obstruction/air velocity		■			
	Floor, condensate pan (if used)	Contamination/corrosion		■			
	Droplet eliminator (if used)	Contamination/corrosion		■			
Filters	Flat filter	Check pressure drop across filter, check for damage and check sealing	■				■
	Bag filter		■				■
	Carbon filter		■				■
	Electrostatic filter		■				■
	Pressure differential gauge	Operation				■	
	Pressure differential switch	Operation				■	
Heaters	Hot-water coil	Contamination/corrosion				■	
		Air vent the coil				■	
		Leakage				■	
	Glycol	Check glycol concentration				■	
	Frost protection thermostat	Operation				■	
	Electric heater	Contamination of heating coils				■	
		Loose wiring				■	
		Thermostat operation				■	
	Steam heater	Contamination/corrosion				■	
		Leakage				■	
Coolers	Chilled-water coil	Contamination/corrosion				■	
		Air vent the coil				■	
		Leakage				■	
	Condensate pan	Contamination/corrosion				■	
	Droplet eliminator (if used)	Contamination				■	
	Drain trap	Contamination and operation				■	
	Glycol	Check glycol concentration				■	
Heat recovery wheel	Rotor	Contamination				■	
	Seal	Cracks/position				■	
	Motor	Operation		■			
	Belt	Tension/wear		■			
	Electrical components	Operation				■	
	Fins	Contamination				■	
	Damper (if used)	Sealing				■	
		Bearings				■	
		Actuator			■		
	Condensate pan	Contamination/corrosion				■	
	Water trap	Contamination and operation				■	
Fan	Bearings (larger types)	Lubrication/wear			■		■
	Impeller	Contamination/corrosion				■	
	Motor (larger types)	Lubrication			■		■
	Belt	Wear/tension	■				
	Vibration dampers	Fixings				■	
	Flexible connections	Cracks				■	
	Pressure switch/sensor	Operation				■	
Silencer		Dirt deposit				■	
		Damage t top layer				■	
Controller	Alarms	Check alarm history	■				
Sensors	General	Chck operation of all sensors				■	
	Pressure sensors	Zero calibration				■	

6 - MAINTENANCE AND OPERATING INSTRUCTIONS

6.1 - General

The smooth inside and outside finish of the panels makes maintenance very simple.

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

All work must be carried out by sufficiently trained personnel.

All applicable personal safety devices must be used to ensure safe working conditions. Safety gloves and glasses must be worn for all maintenance operations. A respiratory protection mask must be worn when changing the filters.

No holes must be drilled into the AHU, to prevent leakage from the AHU, cooling coils and heating coils and damage to the wiring.

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 (pH neutral) 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 outdoor 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 with a UV-resistant and paintable kit. Repair damage as described for inside installation. Check the roof for leaks and if necessary, repair these.

6.3 - Doors and access covers

Check locks and hinges of all doors and access covers. Check that the bolt of the internal roller is still correctly tightened.

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

Lubrication of the dampers is not required. Remove excess contamination by cleaning with compressed air and possible cleaning with water and a mild household soap solution. Ensure that the damper blades run free in the casing.

6.7 - Outdoor air intake

The outdoor 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 outdoor air intake well and repair damage as described in point 6.2.1. Ensure that no moisture (droplets) is taken in. If there is still moisture, ensure that this is corrected by changing the outdoor air intake duct.

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. Filters must be replaced at the required intervals. The timing of the replacement depends on the 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.

A respiratory protection mask, type P2 and safety gloves must be worn when changing the filters. Open flames are forbidden while changing the filters to prevent setting fire to the filter medium. This is indicated by a sticker on the door or hatch.

! waarschuwing ! Vervuilde filters zijn brandbaar.	**! warning !** Polluted filters are inflammable.
! attention ! Les filtres encrassés peuvent être inflammables	**! Gefahr !** Verschmutzte Filter sind leicht entflammbar.
	200034907

6.9 - Heaters

6.9.1 - Hot-water coil

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.

Checking the heaters:
Check the operation of the frost protection thermostat and check the correct control sequence when the themostat trips.

For coils filled with glycol please check if the mixture has the correct glycol concentration (by weight).

While working on the heaters gloves must be worn that offer protection against temperatures of 70°C. The piping outside the air handling unit must be insulated. The water temperature in the pipes can be 120°C maximum.

The following sticker is shown to warn that there is a hot surface.

6.9.2 - Electric heater

Once a year check the air inlet and air outlet of the coil for contamination. If they are polluted, clean them with a vacuum cleaner.

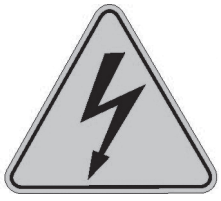
Safety gloves and safety glasses must be worn while working on the heater. The coil surface temperature can reach 600°C. If access to the heater is possible, a safety screen must protect the operator against direct contact.

CAUTION: The fan must always be running, before the electric heater is switched on to prevent overheating of the inside of the casing.

After the heater has been switched off, the fan must continue to run for at least five minutes to cool down the heater coils.

- The following label is attached to indicate a hot surface.

- The warning label for electrical voltage is attached to the inspection hatch.



- The earth warning label is attached to the inside of the heater and the inspection hatch.

- The warning label for the procedure to switch off the heater is located on the door or hatch of the fan assembly.

! waarschuwing ! Na het uitzetten van de elektrische verwarmer moet de ventilator nog minimaal 5 minuten draaien.	**! warning !** After switching off the electric heater the fan must continue to run for at least 5 minutes.
! attention ! Après la déconnexion de la résistance électrique, le ventilateur doit continuer à tourner pendant au moins 5 minutes	**! Gefahr !** Nach Abschalten der Elektroheizung muss der Ventilator noch mindestens 5 Minuten weiterlaufen.
	200034908

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. Check the coil and the connections for leaks. For coils filled with glycol please check if the mixture has the correct glycol concentration (by weight).

Check the fins of the droplet eliminator after the coil. Clean the siphon and check it for correct 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 therefore heavier. The rotor speed can be set to intermittent in the controller so that the wheel will rotate “x” times per time unit.

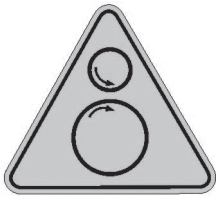
The rotor bearings are lubricated for life and do not require maintenance. The drive motor is accessible via an inspection cover.

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.

Check the droplet eliminator fins in the condensate pan (if installed).

6.13 - Recirculation damper

For maintenance of this damper refer to chapter 6.6.

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.***

Before switching off the fan always check if an electric heater is installed. If this is the case, the electric heater must always be switched off first. The fan must continue to run for at least five minutes to cool down the heater coils.

- The data for belt type, belt tension, number of belts, size and type of pulley is indicated on the fan housing.

6.14.2 - Bearings

The bearings of the smaller fan types cannot be lubricated. If the larger fans are of the re-lubricated type, 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 equipped with a grease nipple. The lubrication interval and type of lubricant are as above.

It is recommended to check the motor and fan bearings for excessive vibration. This can be a sign of bearing wear, but also of incorrect operation of the transmission or an unbalanced system.

The following points require extra attention:

- Check for vibration.
- Check the rotation direction.
- Avoid unnecessary stops and rapid start-ups of the fan,

6.14.3 - Transmission

After starting up the unit and after replacing the belts, the belt tension must 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;
- number of belts,
- smallest pulley diameter,
- 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 pulley 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.

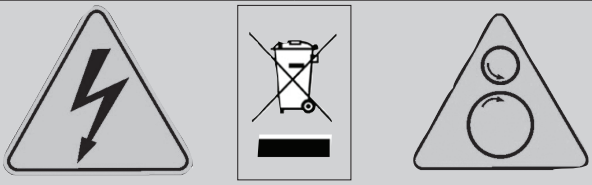
If the fan speed changes or if a motor with different power specifications and/or speed is installed, this must be discussed in advance with the manufacturer. The supplier must re-calculate the bearing load as well as the impeller load. If this is not done, irreparable damage to the fan may incur. The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

After changing the motor, transmission or frequency converter settings:

- Check the fan rotation direction.
- Check the power input.

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.



! waarschuwing ! Voor openen deuren, ventilator uitschakelen, spanningsloos maken en uit laten lopen (minimaal 2 minuten). **Transportbeugels** Verwijder transportbeugels voor opstarten ventilator.	**! warning !** Before opening the doors, switch off and deenergise the fan and allow it to run down (minium 2 minutes) **Transport brackets** Remove transport brackets before starting up the fan.
! attention ! Avant ouverture des portes, le ventilateur doit être déconnecté et avoir eu le temps, de s'arrêter completement (2 minutes minimum) **Fixations de transport** Retirer les fixations de transport avant la mise en route.	**! Gefahr !** Vor Öffnen der Türen den Ventilator abschalten, spannungslos machen und zum Stillstand kommen lassen (mindestens 2 Minuten warten). **Transportsicherungen** Transportsicherungen vor der Inbetriebnahme demontieren.
	200034906

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.

6.15 - Silencers

It is recommended to check the splitters of the silencers periodically for possible damage and loosening of the fibres, to prevent dirt deposits in the system.

6.16 - Control

The control must be checked daily for fault messages and alarms. These must be corrected immediately. After correcting the cause for a fault message or alarm, the AHU can be restarted with the reset button on the control panel.

Once a year check if the position of the control device agrees with the specified controller setting.

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