Carrier

United Technologies

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Packaged Rooftop Cooling Only Units and Heat Pumps

48/50UA-UH 135-205

Original document

CONTENTS

"NOTES FOR 48 SERIES UNITS FITTED WITH A GAS BURNER

IMPORTANT: T*he appliance must be installed in accordance with local safety codes and regulations and is intended for outdoor use only.*
Please read the manufacturer's instructions carefully before starting this unit.

CAUTION: **Before installation, check that the local distribution conditions, type of gas and available pressure, and** *the power supply and adjustments of the appliance are correct."*

The drawings in this document are for illustrative purposes only and is not part of any offer for sale or contract.

1 - INTRODUCTION

Prior to the initial start-up of the 48/50 UA-UH 135-205 units, the people involved should be thoroughly familiar with these instructions and the specific project data for the installation site. The 48/50 UA-UH 135-205 packaged rooftop units are designed to provide a very high level of safety and reliability making installation, start-up, operation and maintenance easier and more secure. They will provide safe and reliable service when operated within their application range.

The procedures in this manual are arranged in the sequence required for machine installation, start-up, operation and maintenance.

Be sure you understand and follow the procedures and safety precautions contained in the instructions supplied with the machine, as well as those listed in this guide, such as: protective clothing such as gloves, safety glasses, safety shoes and appropriate tools, and suitable qualifications (electrical, air conditioning, local legislation).

To find out, if these products comply with European directives (machine safety, low voltage, electromagnetic compatibility, equipment under pressure, etc.) check the declarations of conformity for these products.

1.1 - Check equipment received

- Inspect the unit for damage or missing parts. If damage is detected, or if shipment is incomplete, immediately file a claim with the shipping company.
- Confirm that the unit received is the one ordered. Compare the name plate data with the order.
- The name plate is attached to the unit on the outside on one of the unit sides
- The unit name plate must include the following information:
  - Model number - size
  - CE marking
  - Serial number
  - Year of manufacture and pressure and leak tightness test date
  - Refrigerant used
  - Refrigerant charge per circuit
  - PS: Min./max. allowable pressure (high and low pressure side) - see chapter 11
  - TS: Min./max. allowable temperature (high and low pressure side) - see chapter 11
  - Pressure switch cut-out pressure
  - Unit leak test pressure
  - Voltage, frequency, number of phases
  - Maximum current drawn
  - Maximum power input
  - Unit net weight
- Confirm that all accessories ordered for on-site installation have been delivered, are complete and undamaged.

The unit must be checked periodically during its whole operating life for possible damage of the insulation (thermal, acoustic) to ensure that no shocks (handling accessories, tools, etc.) have damaged it. If necessary, the damaged insulation parts must be repaired or replaced. See also chapter "Maintenance".

1.2 - Installation safety considerations

Moving and installation of the rooftop unit 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 does not accept any responsibility if these instructions are not observed. Transport and lifting must be carried out by qualified personnel. The rooftop unit should be lifted with lifting bars supplied by Carrier. Lifting must be carried out in accordance with local regulations and with the help of certified lifting aids.

After the unit has been received, and before it is started up, it must be inspected for damage. Check that the refrigerant circuits are intact, especially that no components or pipes have shifted or been damaged (e.g. following a shock). If in doubt, carry out a leak tightness check. If damage is detected upon receipt, immediately file a claim with the shipping company or repair.

The unit must be installed in a place that is not accessible to the public or protected against access by non-authorised persons.

The unit should not be installed in an explosive atmosphere.

Do not remove the skid or the packaging until the unit is in its final position. These units can be moved with a fork lift truck, as long as the forks are positioned in the right place and direction on the pallet of the unit.

The units can also be lifted with slings, using only the designated lifting points marked on the unit (labels on the chassis and a label with all unit handling instructions are attached to the unit). Lifting under the cross beams is prohibited. This applies to transport as well as storage.

Use slings with the correct capacity, and always follow the lifting instructions on the certified drawings supplied for the unit.

This unit is designed for ducted installation (indoor air discharge). If ducts are not used the installer must place a protection grille in the discharge.

Safety is only guaranteed, if these instructions are carefully followed. If this is not the case, there is a risk of material deterioration and injuries to personnel.

These units are not designed to be lifted from above.

All precautions concerning handling of refrigerant must be observed in accordance with local regulations.

Accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation or explosions.

Inhalation of high concentrations of vapour is harmful and may cause heart irregularities, unconsciousness, or death. Vapour is heavier than air and reduces the amount of oxygen available for breathing. These products cause eye and skin irritation. Decomposition products can be hazardous.

1.3 - Equipment and components under pressure

These products incorporate equipment or components under pressure, manufactured by Carrier or other manufacturers.

We recommend that you consult your appropriate national trade association or the owner of the equipment or components under pressure (declaration, re-qualification, retesting, etc.). The characteristics of this equipment/these components are given on the nameplate or in the required documentation, supplied with the products.

Do not introduce high static and dynamic pressure compared with the existing operating pressures - either service or test pressures in the refrigerant circuit.

1.4 - Maintenance safety considerations

Engineers working on the electric or refrigeration or gas heating components must be authorised, trained and fully qualified to do so (e.g. electricians trained and qualified in accordance with IEC 60364 Classification BA4).

All refrigerant circuit work must be carried out by a trained person, fully qualified to work on these units. He must have been trained and be familiar with the equipment and the installation. All welding operations must be carried out by qualified specialists.

These units use high-pressure R-410A refrigerant (the unit operating pressure is above 40 bar). Special equipment must be used when working on the refrigerant circuit (pressure gauge, charge transfer, etc.).

Any manipulation of a refrigerant recovery valve must be carried out by a qualified and authorised engineer, observing applicable standards (e.g. during refrigerant removal). The unit must be switched off while this is done.

During any handling, maintenance and service operations the engineers working on the unit must be equipped with safety gloves, glasses, shoes and protective clothing.

Never work on a unit that is still energised. Never work on any of the electrical components, until the general power supply to the unit has been cut.

If any maintenance operations are carried out on the unit, lock the power supply circuit in the open position and secure the machine upstream with a padlock.

If the work is interrupted, always ensure that all circuits are still deenergised before resuming the work.

ATTENTION: Even if the unit has been switched off, the power circuit remains energised, unless the unit or circuit disconnect switch is open. Refer to the wiring diagram for further details. Attach appropriate safety labels.

If any work is carried out in the fan area, specifically if the grilles or casings have to be removed, cut the power supply to the fans to prevent their operation.

OPERATING CHECKS:

- ***IMPORTANT INFORMATION REGARDING THE REFRIGERANT USED:***
  This product contains fluorinated greenhouse gas covered by the Kyoto protocol.
  Refrigerant type: R-410A
  Global Warming Potential (GWP): 2088

CAUTION:

1. Any intervention on the refrigerant circuit of this product should be performed in accordance with the applicable legislation. In the EU, the regulation is called F-Gas, N°517/2014.
2. Ensure that the refrigerant is never released to the atmosphere during installation, maintenance or equipment disposal.
3. The deliberate gas release into the atmosphere is not allowed.
4. If a refrigerant leak is detected, ensure that it is stopped and repaired as quickly as possible.
5. Only a qualified and certified personnel can perform installation operations, maintenance, refrigerant circuit leak test as well as the equipment disposal and the refrigerant recovering.
6. The gas recovery for recycling, regeneration or destruction is at customer charge.
7. Periodic leak tests have to be carried out by the customer or by third parties. The EU regulation set the periodicity here after:

System WITHOUT leakage detection		No check	12 months	6 months	3 months
System WITH leakage detection		No check	24 months	12 months	6 months
Refrigerant charge/circuit (CO_2 equivalent)		< 5 tons	5 ≤ charge < 50 tons	50 ≤ charge < 500 tons	charge > 500 tons*
Refrigerant charge (kg)	R134a (GWP 1430)	charge < 3.5 kg	3.5 ≤ charge < 34.9 kg	34.9 ≤ charge < 349.7 kg	charge > 349.7 kg
	R407C (GWP 1774)	charge < 2.8 kg	2.8 ≤ charge < 28.2 kg	28.2 ≤ charge < 281.9 kg	charge > 281.9 kg
	R410A (GWP 2088)	charge < 2.4 kg	2.4 ≤ charge < 23.9 kg	23.9 ≤ charge < 239.5 kg	charge > 239.5 kg
	HFO's : R12	no requirement			

**** From 01/01/2017, units must be equipped with a leakage detection system***

8. A logbook must be established for equipments subject to periodic leak tests. It should contain the quantity and the type of fluid present within the installation (added and recovered), the quantity of recycled fluid, regenerated or destroyed, the date and output of the leak test, the designation of the operator and its belonging company, etc.

9. Contact your local dealer or installer if you have any questions.

Protection device checks:

- ***If no national regulations exist, check the protection devices on site in accordance with standard EN378: once a year for the high-pressure switches.***

"CAUTION: If the test leads to replacing the pressure switch, it is necessary to recover the refrigerant charge, these pressure switches are not installed on automatic valves (Schraeder type)."

At least once a year thoroughly inspect the protection devices. If the machine operates in a corrosive environment, inspect the protection devices more frequently.

Regularly carry out leak tests and immediately repair any leaks.

Ensure regularly that the vibration levels remain acceptable and close to those at the initial unit start-up.

Before opening a refrigerant circuit, transfer the refrigerant to bottles specifically provided for this purpose and consult the pressure gauges.

Change the refrigerant after an equipment failure, following a procedure such as the one described in NF E29-795 or carry out a refrigerant analysis in a specialist laboratory.

If the refrigerant circuit remains open for longer than a day after an intervention (such as a component replacement), the openings must be plugged and the circuit must be charged with nitrogen (inertia principle). The objective is to prevent penetration of atmospheric humidity and the resulting corrosion on the internal walls and on non-protected steel surfaces.

1.5 - Repair safety considerations

All installation parts must be maintained by the personnel in charge, in order to avoid deterioration and injury. Faults and leaks must be repaired immediately. The authorized technician must have the responsibility to repair the fault immediately. After each repair of the unit, check the operation of the protection devices and create a report of the parameter operation at 100%.

Comply with the regulations and recommendations in unit and HVAC installation safety standards, such as: EN 378, ISO 5149, etc.

Never use air or a gas containing oxygen during leak tests to purge lines or to pressurise a machine. Pressurised air mixtures or gases containing oxygen can be the cause of an explosion. Oxygen reacts violently with oil and grease.

Only use dry nitrogen for leak tests, possibly with an appropriate tracer gas.

If the recommendations above are not observed, this can have serious or even fatal consequences and damage the installation.

Never exceed the specified maximum operating pressures. Verify the allowable maximum high- and low-side test pressures by checking the instructions in this manual and the pressures given on the unit name plate.

Do not unweld or flamecut the refrigerant lines or any refrigerant circuit component until all refrigerant (liquid and vapour) and the oil have been removed from the unit. Traces of vapour should be displaced with dry nitrogen. Refrigerant in contact with an open flame can produce toxic gases.

The necessary protection equipment must be available, and appropriate fire extinguishers for the system and the refrigerant type used must be within easy reach.

Do not siphon refrigerant. Avoid spilling liquid refrigerant on skin or splashing it into the eyes. Use safety goggles and safety gloves. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult a doctor.

Never apply an open flame (blowlamp) or overheated steam (high-pressure cleaner) to the refrigerant circuit. Dangerous overpressure can result.

During refrigerant removal and storage operations follow applicable regulations. These regulations, permitting conditioning and recovery of halogenated hydrocarbons under optimum quality conditions for the products and optimum safety conditions for people, property and the environment are described in standard NF E29-795.

Refer to the certified dimensional drawings for the units.

It is dangerous and illegal to re-use disposable (non-returnable) cylinders or attempt to refill them. When cylinders are empty, evacuate the remaining gas pressure, and move them to a designated place for recovery. Do not incinerate.

Do not attempt to remove refrigerant circuit components or fittings, while the machine is under pressure or while it is running. Be sure pressure is at 0 kPa and that the unit has been shut-down and de-energised before removing components or opening a circuit.

Do not attempt to repair or recondition any safety devices when corrosion or build-up of foreign material (rust, dirt, scale, etc.) is found within the valve body or mechanism. If necessary, replace the device.

ATTENTION: No part of the unit must be used as a walkway, rack or support. Periodically check and repair or if necessary replace any component or piping that shows signs of damage.

Do not step on refrigerant lines. The lines can break under the weight and release refrigerant, causing personal injury.

Do not climb on a machine. Use a platform, or staging to work at higher levels.

Use mechanical lifting equipment (crane, hoist, winch, etc.) to lift or move heavy components. For lighter components, use lifting equipment when there is a risk of slipping or losing your balance.

Use only original replacement parts for any repair or component replacement. Consult the list of replacement parts that corresponds to the specification of the original equipment.

Periodically inspect all valves, fittings and pipes of the refrigerant and hydronic circuits to ensure that they do not show any corrosion or any signs of leaks.

It is recommended to wear ear defenders, when working near the unit and the unit is in operation.

Always ensure you are using the correct refrigerant type before recharging the unit.

Charging any refrigerant other than the original charge type (R-410A) will impair machine operation and can even lead to a destruction of the compressors. The compressors operate with R-410A and are charged with a synthetic polyolester oil.

Before any intervention on the refrigerant circuit, the complete refrigerant charge must be recovered.

2 - MOVING AND SITING THE UNIT

2.1 - Moving

See chapter 1.2 - "Installation safety considerations".

Moving the plastic cover will let the dirt and particulates enter to the unit from openings. Do not move the protection cover unless you complete the installation of the unit.

The rooftop unit is transported on a wooden pallet. Before offloading, remove fasteners and separate the unit from pallet.

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.

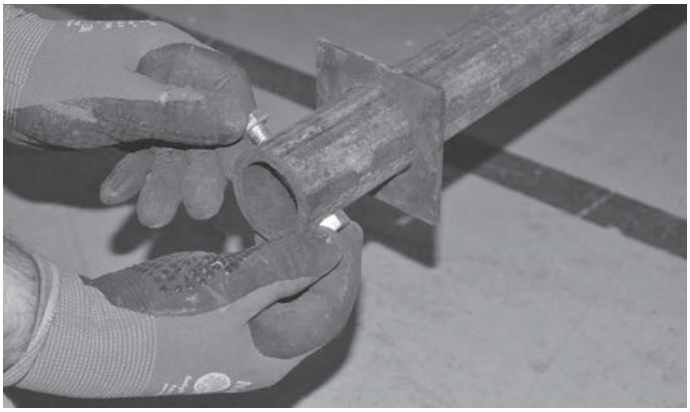
For hoisting please ensure that the weight is evenly distributed.

The lifting bars supplied are for single use and certified in accordance with Machinery Directive 2006/42/ EC, annex II-A. selection.

For fastening of the Lifting Bars:

- *Remove the bolt and the locking plate on one side of the lifting pipe.*

Fig. 1 – Fastening the lifting bars - 1



- *Slide the lifting bar into the hole in the subframe intended for that purpose.*

Fig. 2 - Fastening the lifting bars - 2

- *After inserting the lifting bar, re-insert the bolt and locking plate in the correct position.*

Fig. 3 - Fastening the lifting bars - 3

- ***Position the lifting cables on 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 ensure that the weight is evenly distributed and that all previous steps are carried out correctly.

2.2 - Siting the unit

Always refer to the chapter "Dimensions and clearances" to confirm that there is adequate space for all connections and service operations. For the centre of gravity coordinates, the position of the unit mounting holes, and the weight distribution points, refer to the certified dimensional drawing supplied with the unit.

Typical applications of these units do not require earthquake resistance. Earthquake resistance has not been verified.

CAUTION: Only use slings at the designated lifting points which are marked on the unit.

Before siting the unit check that:

the permitted loading at the site is adequate or that appropriate strenghtening measures have been taken.

the unit is installed level on an even surface (maximum tolerance is 5 mm in both axes).

there is adequate space above the unit for air flow and to ensure access to the components (see dimensional drawings).

the number of support points is adequate and that they are in the right places.

- the location is not subject to flooding.
- if heavy snowfall is likely and long periods of sub-zero temperatures are normal, provision has to be made to prevent snow accumulating by raising the unit above the height of drifts normally experienced. Baffles may be necessary to deflect strong winds. They must not restrict air flow into the unit.
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CAUTION: Before lifting the unit, check that all casing panels are securely fixed in place. Lift and set down the unit with great care. Tilting and jarring can damage the unit and impair unit operation.

If units are hoisted with rigging, it is advisable to protect coils against crushing while a unit is being moved. Use struts or a lifting beam to spread the slings above the unit. Do not tilt a unit more than 15°.

WARNING: Never push or lever on any of the enclosure panels of the unit. Only the base of the unit frame is designed to withstand such stresses.

2.3 - Checks before system start-up

Before the start-up of the refrigeration system, the complete installation, including the refrigeration system must be verified against installation drawings, dimensional drawings, system piping and instrumentation diagrams and the wiring diagrams.

Follow national regulations for these checks. If the national regulation does not specify any details, refer to standard EN 378-2 as follows: External visual installation checks:

- Compare the complete installation with the refrigeration system and power circuit diagrams.
- Check that all components comply with the design specifications.
- Check that all protection documents and equipment provided by the manufacturer (dimensional drawings, P&ID, declarations etc.) to comply with the regulations are present.
- Verify that the environmental safety and protection and devices and arrangements provided by the manufacturer to comply with the regulations are in place.
- Verify that all documents for pressure containers, certificates, name plates, files, instruction manuals provided by the manufacturer to comply with the regulations are present.
- Verify the free passage of access and safety routes.
- Verify the instructions and directives to prevent the deliberate removal of refrigerant gases.
- Verify the installation of connections.
- Verify the supports and fixing elements (materials, routing and connection).
- Verify the quality of welds and other joints.
- Check the protection against mechanical damage.
- Check the protection against heat.
- Check the protection of moving parts.
- Verify the accessibility for maintenance or repair and to check the piping.
- Verify the status of the valves.
- Verify the quality of the thermal insulation and of the vapour barriers.
- Ensure that the ventilation in the machine room is sufficient.
- Check the refrigerant detectors.

3 - INSTALLATION

3.1 - Unit base frame

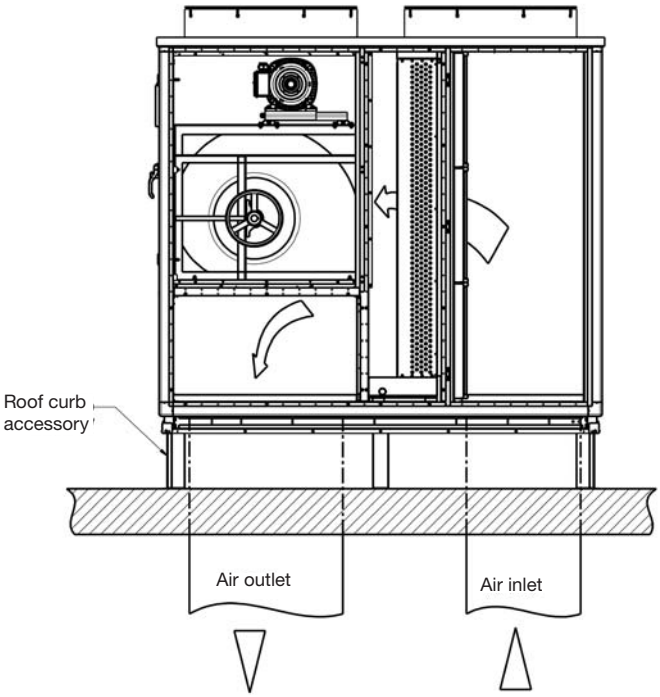
This unit is for connection to a ducted air system only. It should not be used without ductwork connected to the air outlet or discharge side of the unit. It is possible to provide fresh air to the unit air inlet side without the use of ductwork via an optional kit containing a louvre system, and protective hood and grilles. Consult the unit supplier or distributor for more information.
Due to the size and weight of the units the base frame must be on a support which fulfils the following requirements:

- The surface area must be sufficient for distributing the unit weight over the building structure.
- Sufficient drainholes should be provided to avoid the accumulation of rain water.
- The unit should be firmly fixed to the floor.
- The structure should be capable of supporting the unit weight during installation and operation.

- The standard unit leaves the factory with the air discharge and return in the lower section (see Fig. 4) and the corresponding holes on the roof must be made.

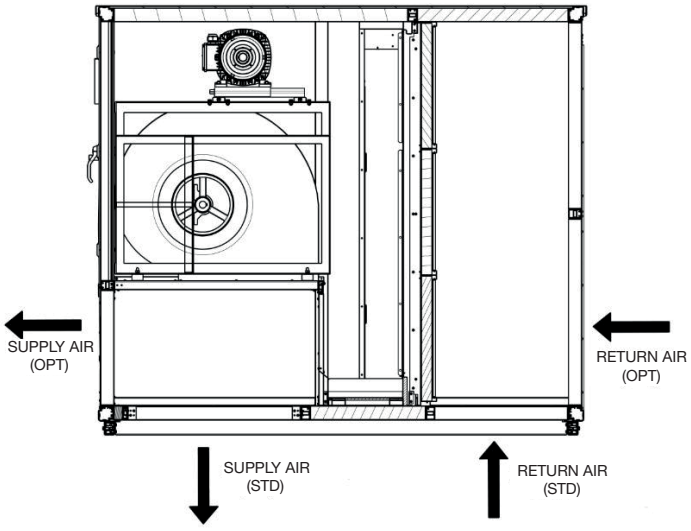
Refer to the certified dimensional drawings for the discharge and return openings.

Fig. 4 – Roofcurb accessory - standard vertical discharge and return



The unit air discharge and return can be horizontal as an option (see Fig. 5). In this case, the unit must have been ordered by considering required duct configurations.

Fig. 5 – Duct configuration standard/optional



It is necessary to use adequate sealants and joints to ensure correct fitting and water-tightness between the ducts and the support so that air and moisture do not enter the building.

WARNING: Do not drill any holes in the indoor coil area as this might damage the condensate drain pan.

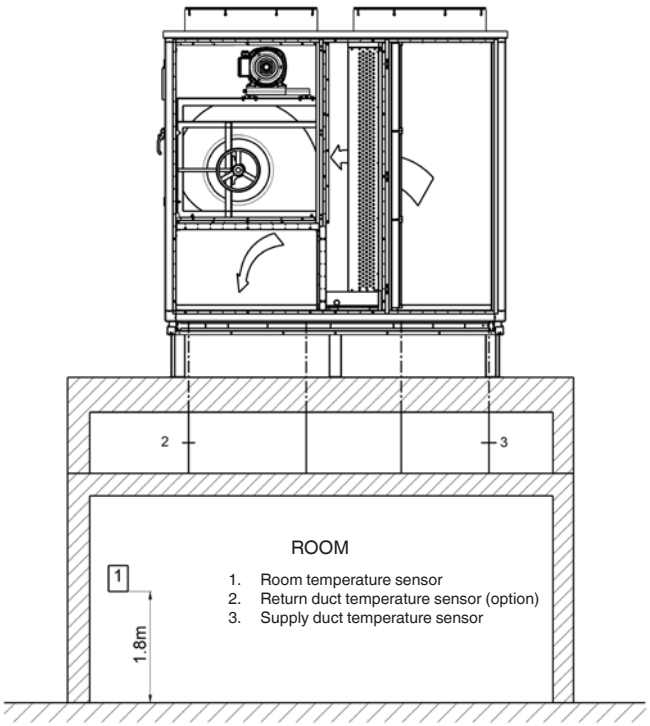
IMPORTANT: The unit should be correctly levelled to avoid drainage problems.

3.2 - Sensor connection and location

The room temperature sensor and supply temperature sensor are located in the control box together with their connectors. Please refer to the wiring diagrams for the required connections and suitable cable diameter. Criteria for selecting sensor locations will vary with system and building specifics. Recommended sensor locations are shown in Fig. 6.

NOTE: The return duct sensor or the room temperature sensor can be used.

Fig. 6 - Recommended sensor location



3.3 - Ductwork

Determine the ductwork dimensions according to the air flow to be carried, and the available static unit pressure. The different air flows and static pressures that each unit can supply, are shown in the fan performance tables.

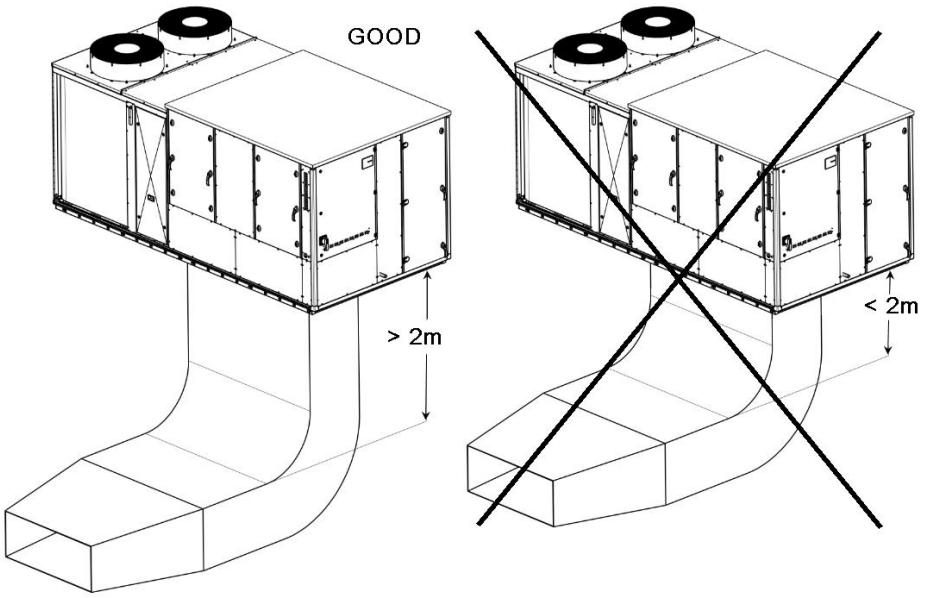
It is recommended to observe the following considerations:

- Whatever type of ductwork is used, it should not be made of materials which are flammable, or which give off toxic gases in the event of a fire. The internal surfaces should be smooth, and not contaminate the air which passes through. It is recommended to use sheet metal ducts which are adequately insulated to avoid condensation and thermal leakage.
- At the points where the ducts join the unit, it is recommended to use flexible connections which absorb vibrations, prevent noise inside the ductwork and allow access to the unit.
- Bends near the unit outlet should be avoided as much as possible. If unavoidable, they should be as slight as possible, and internal deflectors should be used when the duct has large dimensions.

Below are some obligations for ductwork:
All ducts should have radial bends. It is highly recommended that no sheets of ductwork have right angle bend.
If duct is directed towards right/left of supply air outlet or there is any change in duct diameter, the ductwork should go downward for at least 2m before any bend or diameter change (see Fig. 7a). If no change in diameter or direction is involved, it is not obliged.

NOTE: All duct sizing and design work should be carried out by qualified technicians.

Fig. 7a - Examples for good and bad connections:



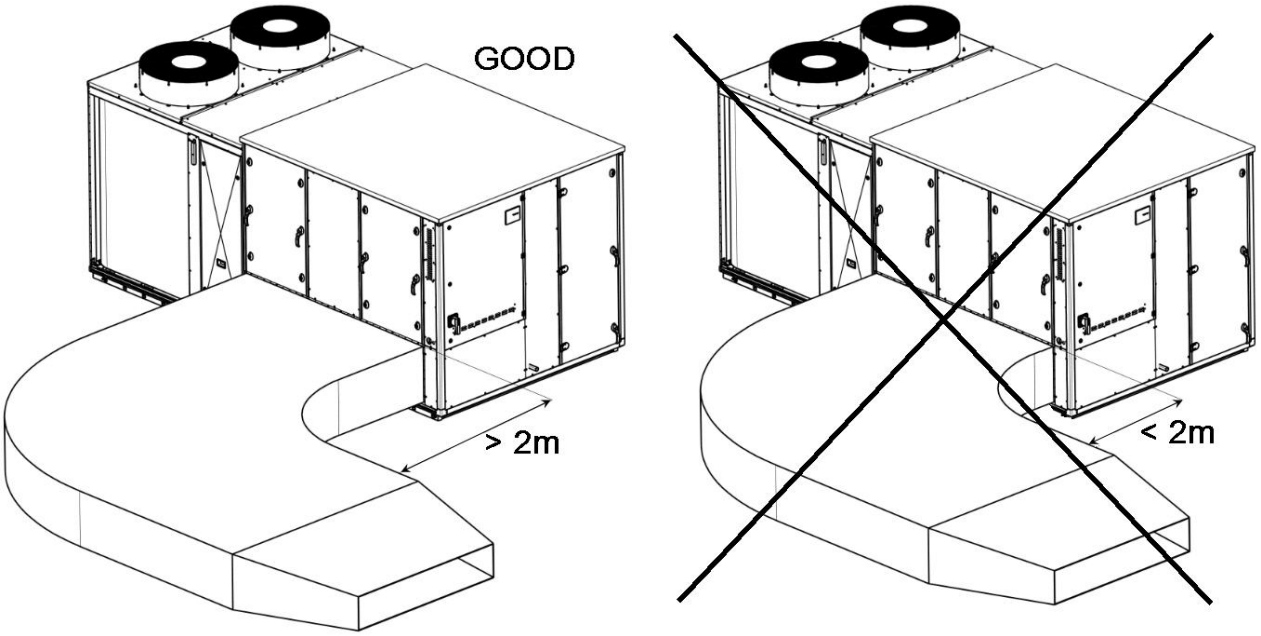
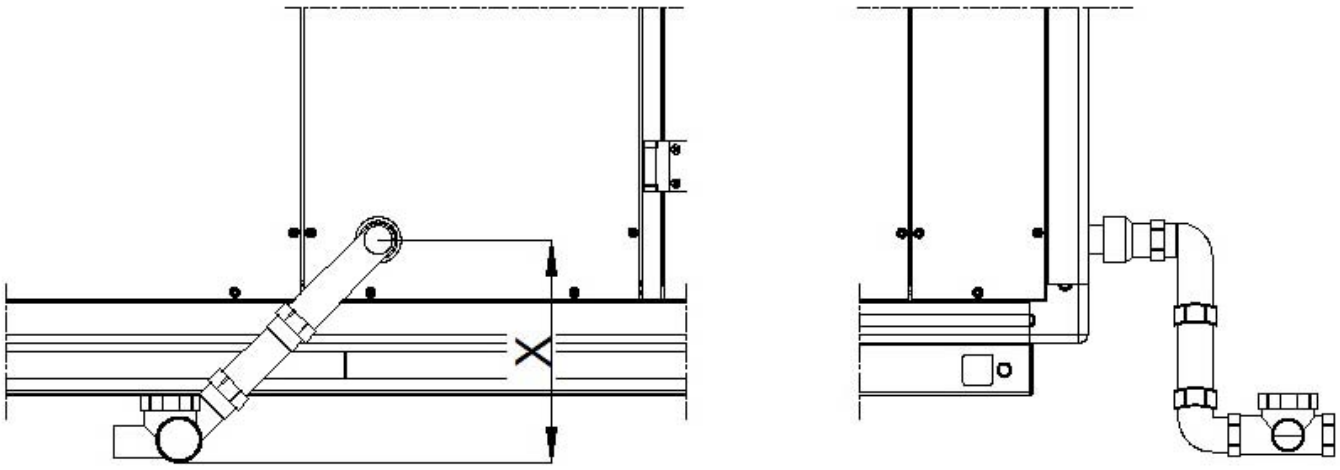


Fig. 7b - Some bad examples on site

3.4 - Condensate and rainwater drainage

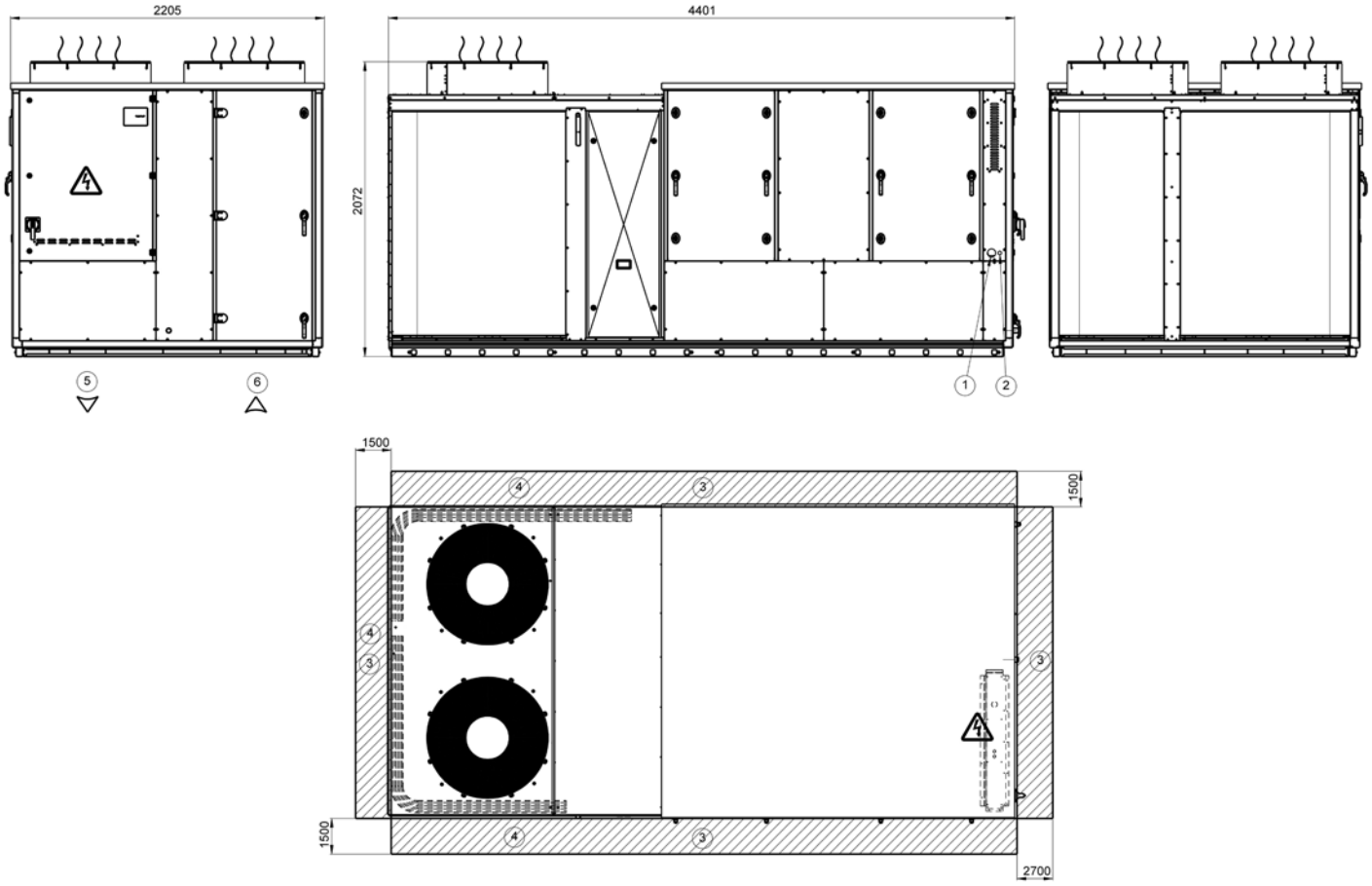
The units incorporate drillholes in the base near the outdoor coils to drain rainwater and condensation. The indoor heat exchanger area incorporates a condensate pan with an outside drain pipe diameter of 34mm and a negative drainage siphon as in Fig. 8. Min. recommended value of X is 180 mm.

Fig. 8 - Condensate drain pipe details



4 - DIMENSIONS, CLEARANCES, mm

50UA-UH 135



Legend

Control box

(1) Power cable entry

(2) Control cable entry

(3) Service clearances required

(4) Air flow clearances required

(5) Supply air

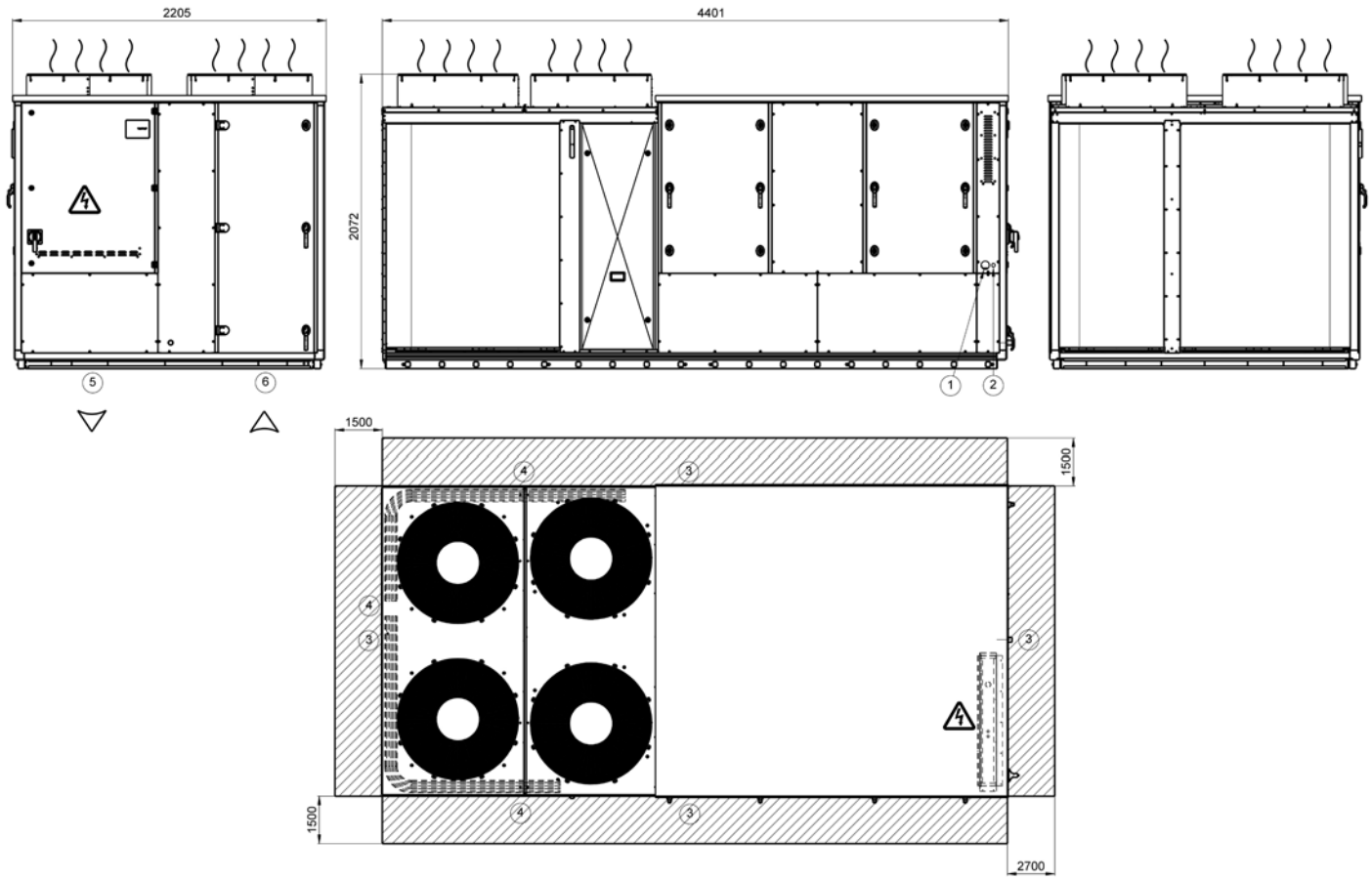
(6) Return air

Air outlet, do not obstruct

When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

50UA-UH 160



Legend

Control box

① Power cable entry

② Control cable entry

③ Service clearances required

④ Air flow clearances required

⑤ Supply air

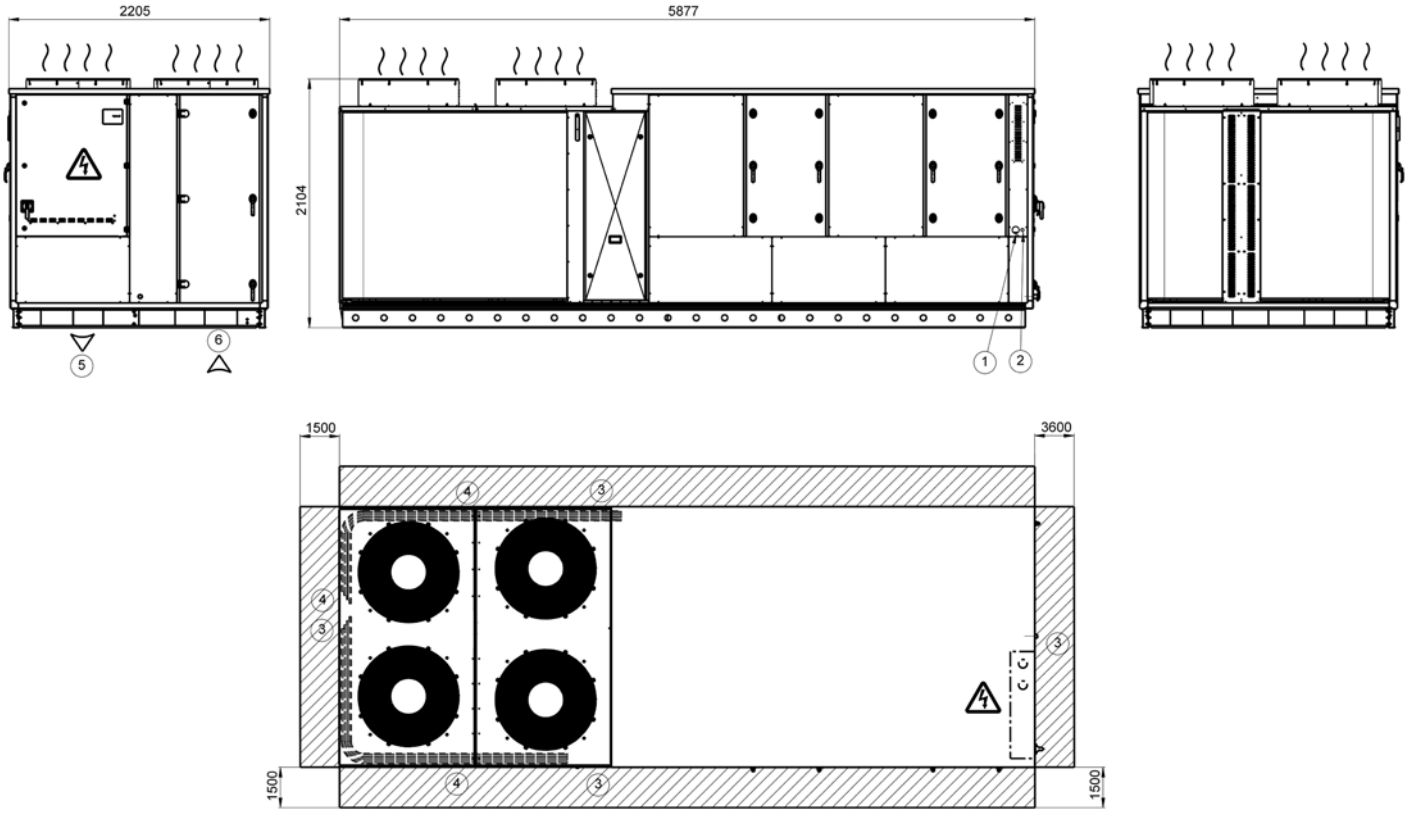
⑥ Return air

Air outlet, do not obstruct

When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

50UA-UH 180



Legend

Control box

① Power cable entry

② Control cable entry

③ Service clearances required

④ Air flow clearances required

⑤ Supply air

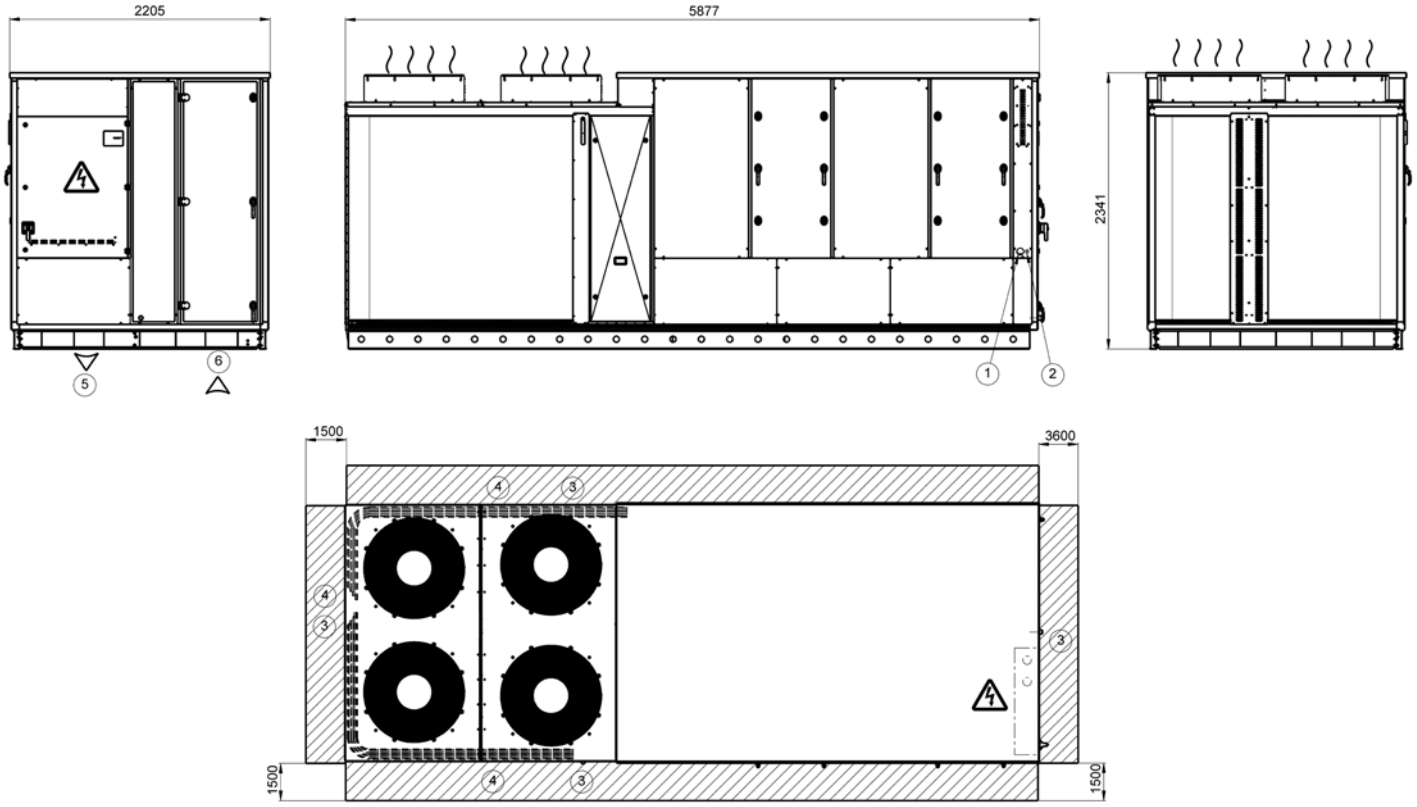
⑥ Return air

Air outlet, do not obstruct

When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

50UA-UH 205



Legend

Control box

① Power cable entry

② Control cable entry

③ Service clearances required

④ Air flow clearances required

⑤ Supply air

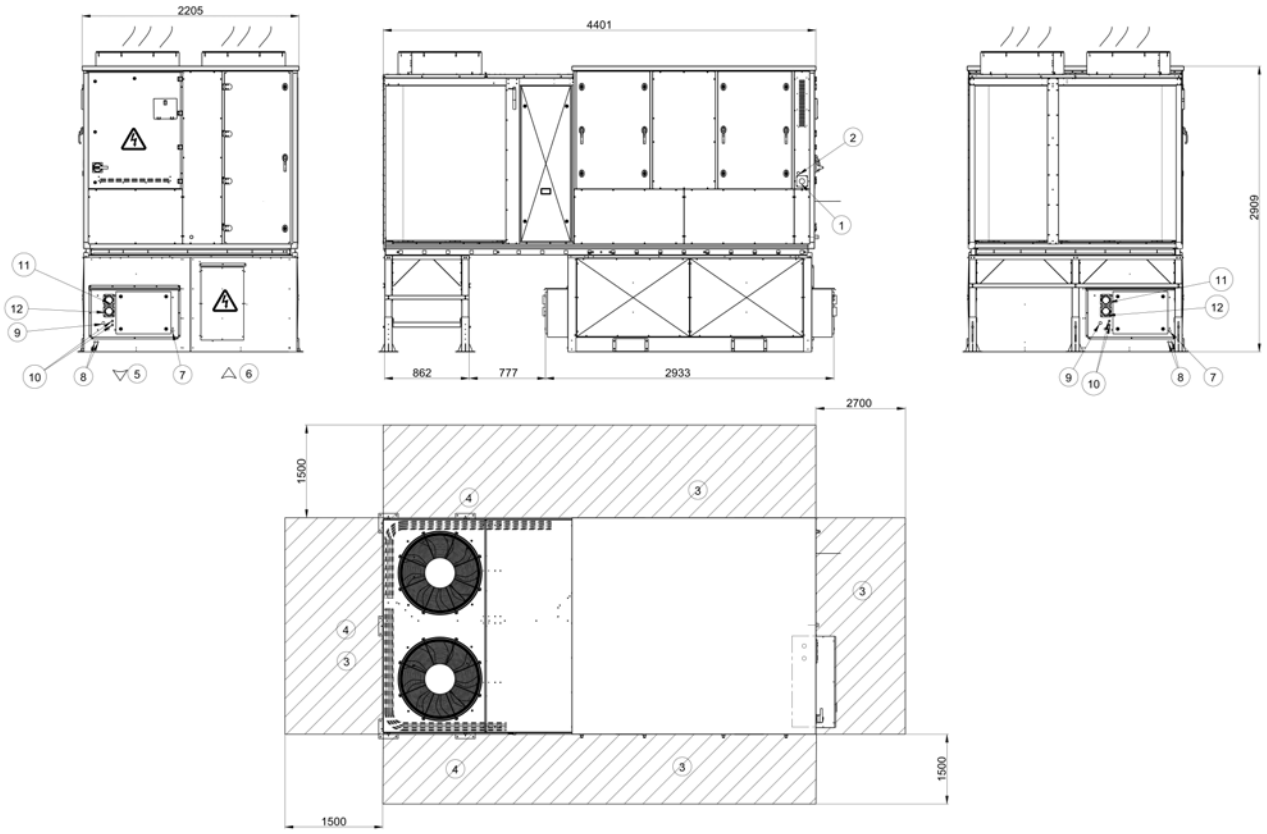
⑥ Return air

Air outlet, do not obstruct

When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

48UA-UH 135



Legend

Control box

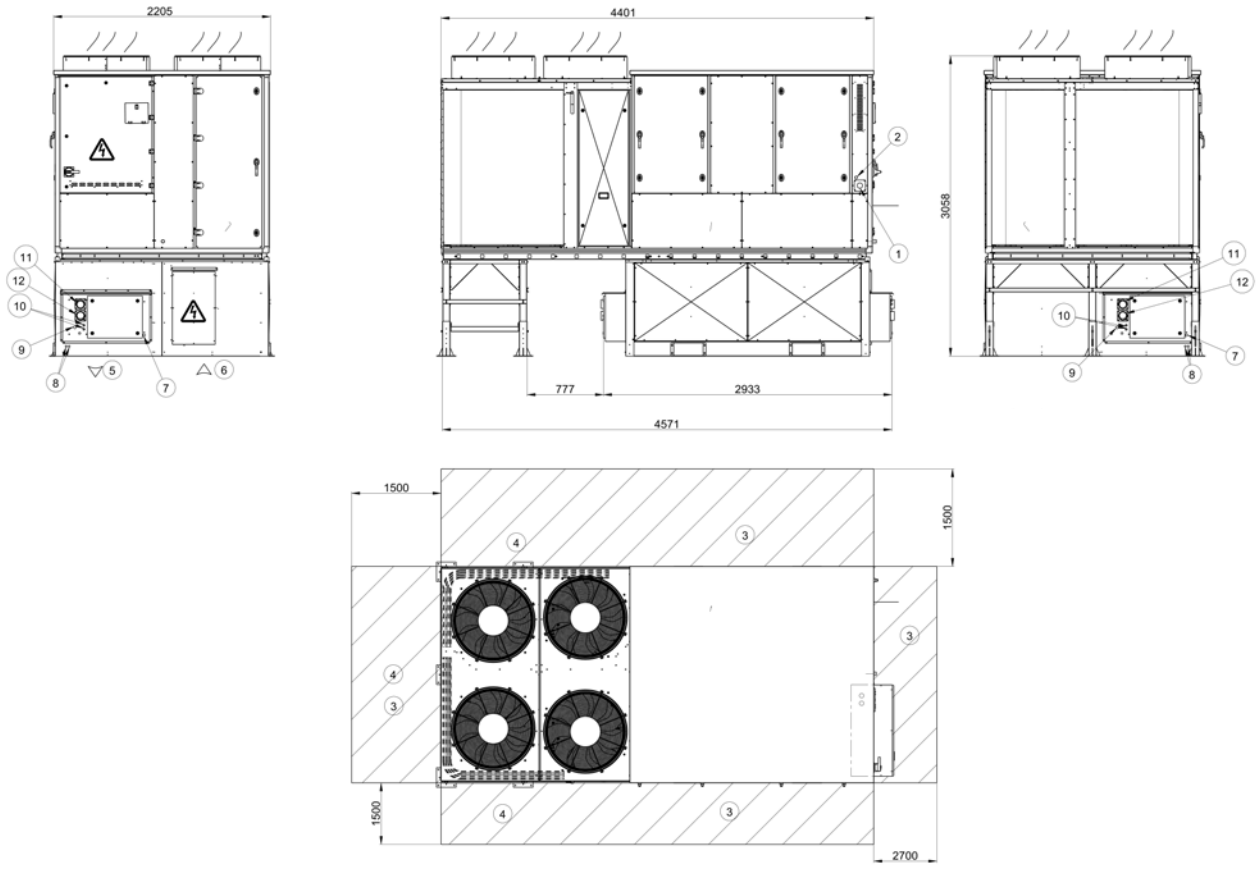
① Power cable entry
② Control cable entry
③ Service clearances required
④ Air flow clearances required
⑤ Supply air
⑥ Return air
⑦ Condansate drain
⑧ Cable passage fitting hole
⑨ Gas connection
⑩ Electrical connections
⑪ Fames Exhaust Ø80
⑫ Air intake Ø80

Air outlet, do not obstruct

When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

48UA-UH 160



Legend

Control box

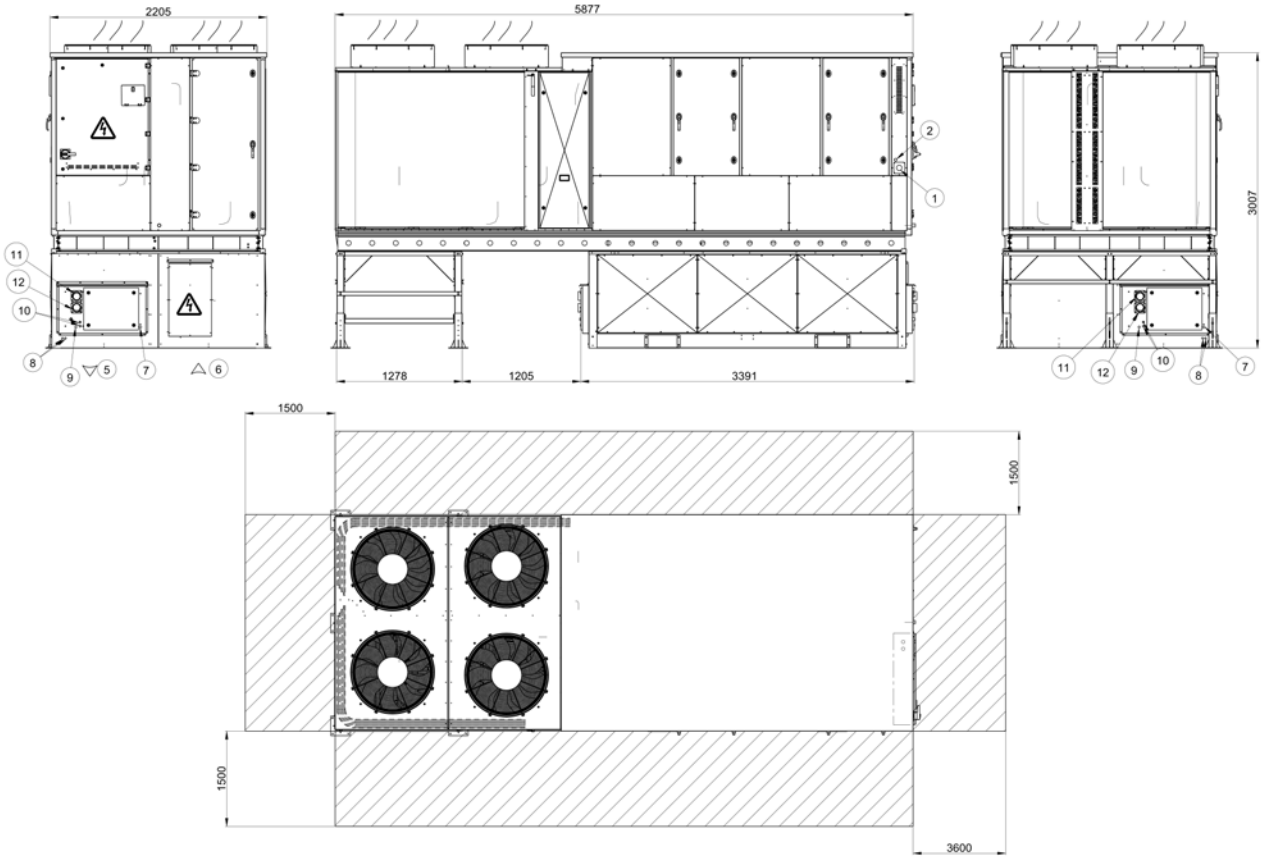
1. Power cable entry
2. Control cable entry
3. Service clearances required
4. Air flow clearances required
5. Supply air
6. Return air
7. Condansate drain
8. Cable passage fitting hole
9. Gas connection
10. Electrical connections
11. Fames Exhaust Ø80
12. Air intake Ø80

Air outlet, do not obstruct

When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

48UA-UH 180



Legend

Control box

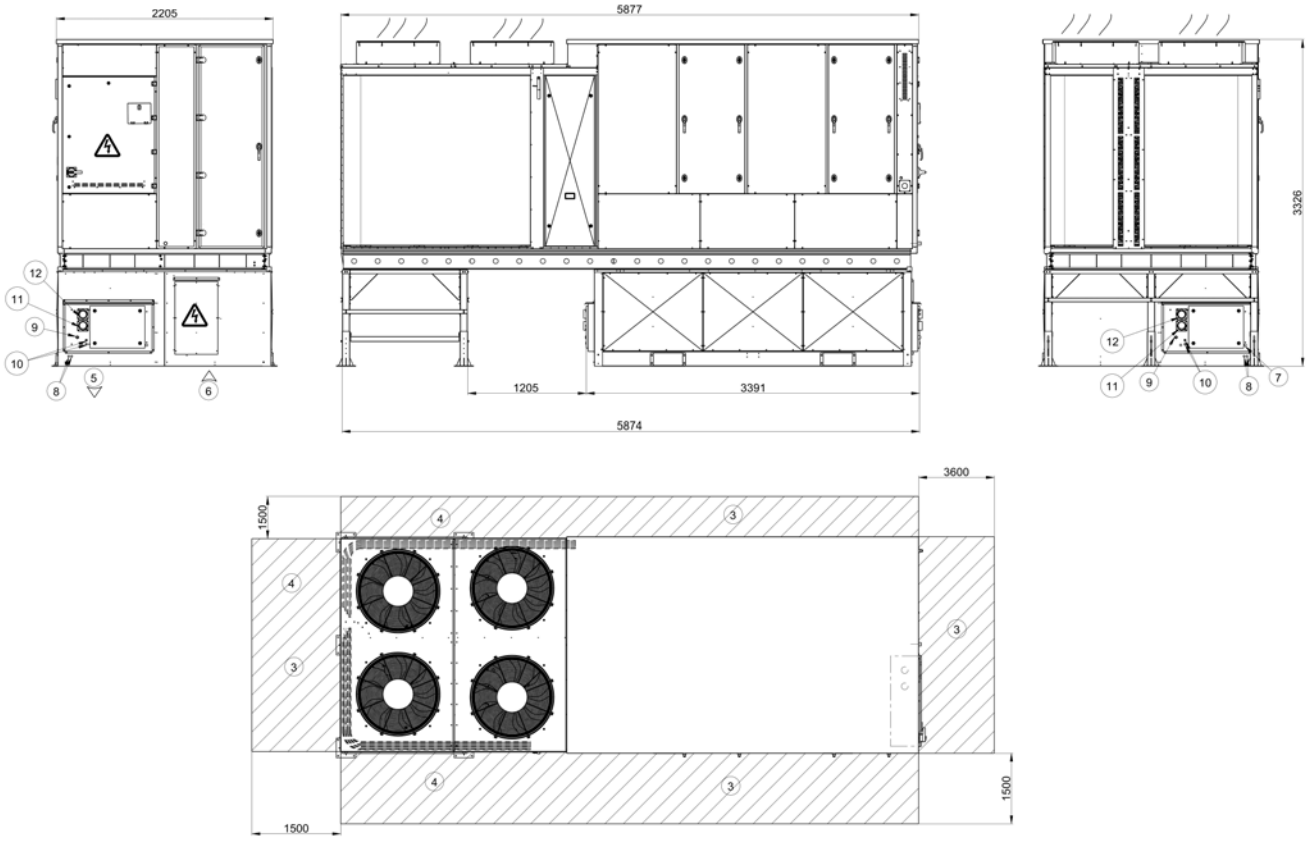
1. Power cable entry
2. Control cable entry
3. Service clearances required
4. Air flow clearances required
5. Supply air
6. Return air
7. Condansate drain
8. Cable passage fitting hole
9. Gas connection
10. Electrical connections
11. Fames Exhaust Ø80
12. Air intake Ø80

Air outlet, do not obstruct

When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

48UA-UH 205



Legend

Control box

1. Power cable entry
2. Control cable entry
3. Service clearances required
4. Air flow clearances required
5. Supply air
6. Return air
7. Condansate drain
8. Cable passage fitting hole
9. Gas connection
10. Electrical connections
11. Fames Exhaust Ø80
12. Air intake Ø80

Air outlet, do not obstruct

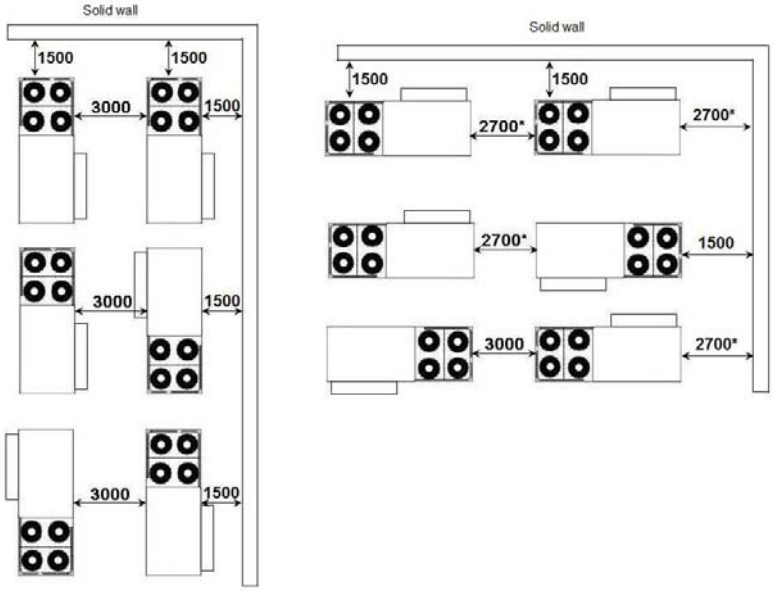
When designing an installation, always use up-to-date drawings, available from your local Carrier office.

Please refer to the certified dimensional drawings for the units with options such as economizer, power exhaust, air return fan, etc.

Multiple rooftop installation

**** The spacing will be 3600 mm instead of 2700 mm, if one of the unit is size 180 or size 205***

Note: If the walls are higher than 3 m, contact the factory.



5 - PHYSICAL DATA

5.1 - Physical data 48/50UA units

48/50UA			135	160	180	205
Operating Weight*		kg	2175	2250	2870	3260
Sound levels						
Sound power level 10-12 W**		dB(A)	92	93.5	93.8	94
Sound pressure level at 10 m***		dB(A)	60	61	61	62
Compressor type			Hermetic Scroll			
Circuit A			2	2	2	2
Circuit B			2	2	2	2
No. of capacity steps			4	4	4	4
Oil charge / type			POE 160SZ			
	Circuit A	kg	6.6	6.6	7.2	13.4
	Circuit B	kg	6.6	6.6	7.2	13.4
Refrigerant charge			R410A			
	Circuit A	kg	23	25.5	32.5	35.5
	Circuit B	kg	23	25.5	32.5	35.5
Control Type			TOUCH PILOT			
Min. Capacity		%	25	25	25	21
Indoor Coil			Grooved copper tubes, aluminium fins			
Face Area		m^2	3.37	3.37	4.5	5.54
Rows... Fin spacing			5 ... 1,7	5 ... 1,7	5 ... 1,6	5 ... 1,6
Outdoor Coil			Grooved copper tubes, aluminium fins			
Face Area		m^2	7.4	7.4	9.3	10.2
Rows... Fin spacing			4 ... 1,6	4 ... 1,6	4 ... 1,6	4 ... 1,6
Indoor Fan			Centrifugal			
Quantity			2	2	3	3
Nominal airflow						
		l/s	6820	7170	9080	9170
		m^3/h	24600	25800	32700	33000
Fan Speed		r/s	11.83	12.10	12.10	12.10
Nominal power input		kW	2 x 5.5	2 x 5.5	3 x 5.5	3 x 5.5
Nominal external static pressure		Pa	300	300	350	350
Outdoor Fan			Axial Flying Bird 4 fans with rotating shroud			
Quantity			2	4	4	4
Total Air Flow						
		l/s	10100	16440	18520	18940
		m^3/h	36400	59200	66700	68200
Fan Speed (high speed)		r/s	16.17	16.17	16.17	16.17
Motor power input (each)		kW	1.76	1.76	1.76	1.76
Air Filter			G4			
Quantity			9	9	12	12
Width x Height		mm	750 x 560	750 x 560	750 x 560	750 x 665
Thickness		mm	50	50	50	50

* Weight shown is a guideline only.
** In accordance with ISO 9614-1. The values have been rounded and are for information only.
*** For information, calculated from the sound power level Lw(A).

5.2 - Physical data 48/50UH units

48/50 UH			135	160	180	205
Operating Weight*		kg	2190	2265	2890	3280
Sound levels						
Sound power level 10-12 W**		dB(A)	92	93.5	93.8	94
Sound pressure level at 10 m***		dB(A)	60	61	61	62
Compressor type			Hermetic Scroll			
Circuit A			2	2	2	2
Circuit B			2	2	2	2
No. of capacity steps			4	4	4	4
Oil charge / type			POE 160SZ			
	Circuit A	kg	6.6	6.6	7.2	13.4
	Circuit B	kg	6.6	6.6	7.2	13.4
Refrigerant charge			R410A			
	Circuit A	kg	21.5	24	31	34
	Circuit B	kg	21.5	24	31	34
Control Type			TOUCH PILOT			
Min. Capacity		%	25	25	25	21
Indoor Coil			Grooved copper tubes, aluminium fins			
Face Area		m^2	3.37	3.37	4.5	5.54
Rows... Fin spacing			5 ... 1,7	5 ... 1,7	5 ... 1,6	5 ... 1,6
Outdoor Coil			Grooved copper tubes, aluminium fins			
Face Area		m^2	7.4	7.4	9.3	10.2
Rows... Fin spacing			4 ... 1,6	4 ... 1,6	4 ... 1,6	4 ... 1,6
Indoor Fan			Centrifugal			
Quantity			2	2	3	3
Nominal airflow						
		l/s	6820	7170	9080	9170
		m^3/h	24600	25800	32700	33000
Fan Speed		r/s	11.83	12.10	12.10	12.10
Nominal power input		kW	2 x 5.5	2 x 5.5	3 x 5.5	3 x 5.5
Nominal external static pressure		Pa	300	300	350	350
Outdoor Fan			Axial Flying Bird 4 fans with rotating shroud			
Quantity			2	4	4	4
Total Air Flow						
		l/s	10100	16440	18520	18940
		m^3/h	36400	59200	66700	68200
Fan Speed (high speed)		r/s	16.17	16.17	16.17	16.17
Motor power input (each)		kW	1.76	1.76	1.76	1.76
Air Filter			G4			
Quantity			9	9	12	12
Width x Height		mm	750 x 560	750 x 560	750 x 560	750 x 665
Thickness		mm	50	50	50	50

* Weight shown is a guideline only.
** In accordance with ISO 9614-1. The values have been rounded and are for information only.
*** For information, calculated from the sound power level Lw(A).

5.3 - Gas heater data 48UA/UH units

Gas Heaters			PCH080+PCH080	PCH080+PCH080
Type			OPT 210	OPT 210
Net Heat Input (Min / Max)		kW	32.8 / 164	32.8 / 164
Heat Output (Min / Max)		kW	35.6 160	35.6 / 160
Efficiency		%	108 / 98	108 / 98
Natural Gas (G20) rate*		l/s	0.97 4.82	0.97 / 4.82
		m^3/h	3.48 / 17.36	3.48 / 17.36
Capacity steps			Modulating	Modulating
Weight****		kg	196	196
Power input (230 V-1 ph-50 Hz)**		kW	0,25	0,25
Gas connection		GAS	UNI/ISO 228/1-G 3/4"	UNI/ISO 228/1-G 3/4"

* Natural gas G20 net calorific value 34.02 MJ/m3 @ 15°C, 1013.25 mbar
** Weight and power input values are valid for the heating modules

6 - ELECTRICAL DATA

6.1 - Electrical data 48/50UA units

48/50UA†		135	160	180	205
Power circuit					
Nominal power supply	V-ph-Hz	400-3-50			
Voltage range	V	360-440			
Control circuit supply		24 V, via internal transformer			
Maximum start-up current*	A	246	273	336	361
Unit power factor at maximum capacity**		0.82	0.84	0.82	0.85
Maximum unit power input**	kW	69.14	80.74	94.95	106.87
Nominal unit current draw***	A	82.12	93.50	106.49	116.27
Maximum unit current draw****	A	121.40	138.50	167.00	182.30
Customer-side unit power reserve	kW	Customer reserve at the 24 V control power circuit			

6.2 - Electrical data 48/50UH units

48/50UH†		135	160	180	205
Power circuit					
Nominal power supply	V-ph-Hz	400-3-50			
Voltage range	V	360-440			
Control circuit supply		24 V, via internal transformer			
Maximum start-up current*	A	246	273	336	361
Unit power factor at maximum capacity**		0.82	0.84	0.82	0.85
Maximum unit power input**	kW	69.14	80.74	94.95	106.87
Nominal unit current draw***	A	82.53	92.03	105.68	114.77
Maximum unit current draw****	A	121.40	138.50	167.00	182.30
Customer-side unit power reserve	kW	Customer reserve at the 24 V control power circuit			

* Maximum instantaneous start-up current at operating limit values (maximum operating current of the smallest compressor(s) + fan current + locked rotor current of the largest compressor).
** Power input, compressors and fans, at the their operating limits and nominal voltage of 400 V (data given on the unit nameplate).
*** Standardised Eurovent conditions: indoor air wet bulb 19°C, outside air temperature 35°C with standard fan performance.
**** Maximum unit operating current at maximum unit power input and 400 V (values given on the unit nameplate).
† Standard unit (without any options and accessories).

Electrical data notes and operating conditions

- 48/50UA-UH 135-205 units have a single power connection point located at the main switch.
- **The control box includes the following standard features:**
  - a main disconnect switch,
  - starter and motor protection devices for each compressor, fans and electric heater option,
  - the control devices.
- **Field connections:**
  - All connections to the system and the electrical installations must be in full accordance with all applicable local codes.
  - The Carrier 48/50UA-UH 135-205 units are designed and built to ensure confor-mance with these codes.
    The recommendations of European standard EN 60204-1 (machine safety - electrical machine components. part 1: general regulations - corresponds to IEC 6020461) are specifically taken into account, when designing the electrical equipment.

Notes:
- Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives. Conformance with EN 60204 is the best means of ensuring compliance with the Machines Directive §1.5.1.
- Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.

1. The operating environment is specified below:
a) Environment - Environment as classified in EN 60721 (corresponds to IEC 60721):
   - outdoor installation (IP43),
   - ambient temperature range: -20°C to +52°C,
   - altitude: ≤ 2000 m,
b) Competence of personnel. class BA4 (trained personnel - IEC 60364)
2. Power supply frequency variation: ± 2 Hz.
3. The neutral (N) conductor must not be connected directly to the unit (if necessary use a transformer).
4. Overcurrent protection of the power supply conductors is not provided with the unit.
5. The factory-installed disconnect switch(es)/circuit breaker(s) is(are) of a type suitable for power interruption in accordance with EN 60947.
6. The units are designed for connection to TN networks (IEC 60364). For IT networks the earth connection must not be at the network earth. Provide a local earth, consult competent local organisations to complete the electrical installation.

CAUTION:
If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.

7- APPLICATION DATA

7.1 – Belt tension

On delivery, the drive belts are new and correctly tensioned. After the belts have run-in, stop the belt drive and check the belt tension. Running the belts under full load for an extended period of time will seat the V-belts into the sheave grooves. V-belt tension will drop after the initial run-in and seating process. This is normal. Adjust the belt tension as necessary.

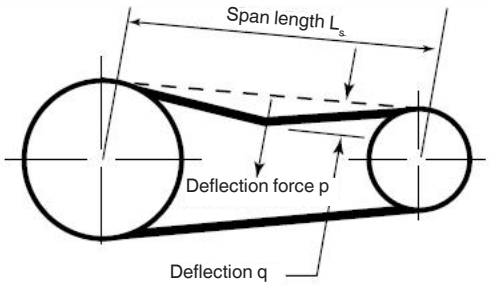
Since tension in V-belts will drop after the initial run-in and seating process, failure to check and re-tension the belt will result in low belt tension and belt slippage. This slippage will result in premature belt failure. Before adjusting the tension, make sure that the pulleys are correctly aligned.

Belt tension adjustment (Fig. 9)

1. Measure the span length (L_s).
2. Measure the deflection force (p) from the middle of the span in order to have a deflection (q) of 1 mm per 100 mm of span length from its normal position.
3. The measured deflection force should be between 19 N and 28 N. If it is less than 19 N, tighten the belt. If it is more than 28 N, loosen the belt.

See chapter 7.8 for further information on indoor fan air flow adjustment.

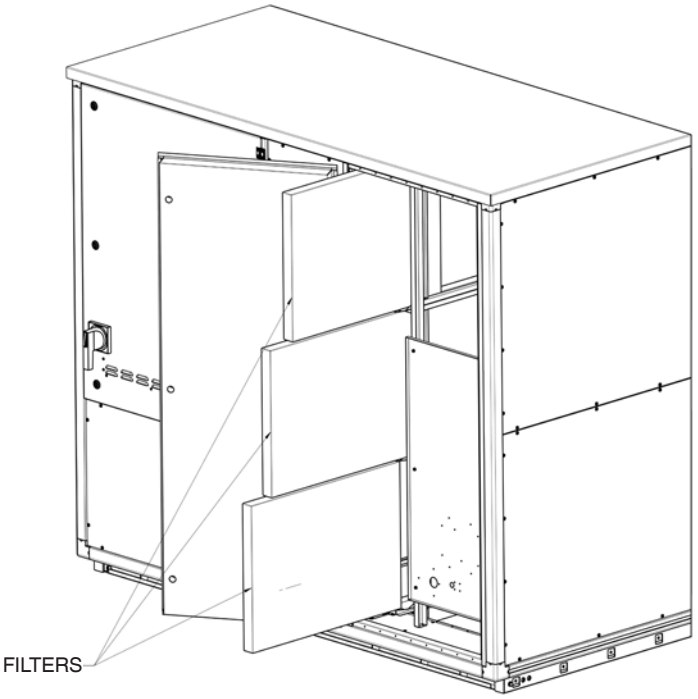
Fig. 9 - Belt tension



7.2 – Air filter replacement

Open the filter access panel, then remove and replace the filters by sliding them from the rails. Check the filter fire classification according to local regulations.

Fig. 10 – Filter replacement



7.3 - Fan performances, 48/50UA-UH 135-160

48/50UA-UH 135-160 Standard static

Airflow (l/s)	External Static Pressure (Pa)																			
	140		175		210		245		280		315		350		385		420		455	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
5000	504	2.557	535	2.826	565	3.104	595	3.393	624	3.690	660	4.082	680	4.306	706	4.623	732	4.948	758	5.276
5400	524	3.029	553	3.310	582	3.603	610	3.902	638	4.214	665	4.533	691	4.859	717	5.191	742	5.529	767	5.874
5800	544	3.551	572	3.846	599	4.150	626	4.464	652	4.788	678	5.121	703	5.461	728	5.805	752	6.159	776	6.518
6200	566	4.155	592	4.462	618	4.781	643	5.109	668	5.446	693	6.004	717	6.143	741	6.504	765	6.870	788	7.243
6600	589	4.828	614	5.149	638	5.479	662	5.822	686	6.171	709	6.528	732	6.894	755	7.267	778	7.647	800	8.034
7000	613	5.583	636	5.916	659	6.261	682	6.615	704	6.979	727	7.349	749	7.727	771	8.114	793	8.508	814	8.907
7400	636	6.414	658	6.761	680	7.120	702	7.486	724	7.864	745	8.246	766	8.638	787	9.037	808	9.443	829	9.856
7800	661	7.337	682	7.699	702	8.072	723	8.452	744	8.839	764	9.238	785	9.642	805	10.055	825	10.473	845	10.900
8200	685	8.348	705	8.723	725	9.108	745	9.500	764	9.904	784	10.312	804	10.730	823	11.155	842	11.587	861	12.026
8600	710	9.457	729	9.847	748	10.246	767	10.652	786	11.068	805	11.490	824	11.920	842	12.359	861	12.805	879	13.256
9000	735	10.662	754	11.065	772	11.478	790	11.899	808	12.326	826	12.763	844	13.206	862	13.657	879	14.115	897	14.580
9400	761	11.974	778	12.394	796	12.819	813	13.254	831	13.695	848	14.146	865	14.602	882	15.067	899	15.537	916	16.016

48/50UA-UH 135-160 High static-1

Airflow (l/s)	External Static Pressure (Pa)																			
	350		410		470		530		590		650		710		770		830		890	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
5000	680	4.241	725	4.780	769	5.338	810	5.910	850	6.496	888	7.093	925	7.703	961	8.321	996	8.951	1029	9.590
5400	691	4.785	735	5.350	777	5.933	818	6.531	857	7.142	895	7.768	931	8.405	966	9.053	1000	9.711	1033	10.381
5800	703	5.378	745	5.966	786	6.573	826	7.196	864	7.833	901	8.486	936	9.149	971	9.825	1005	10.511	1038	11.209
6200	717	6.050	758	6.661	797	7.293	836	7.940	873	8.602	909	9.281	944	9.972	978	10.674	1011	11.388	1043	12.111
6600	732	6.789	771	7.424	809	8.077	846	8.749	883	9.437	918	10.139	952	10.853	985	11.583	1018	12.322	1049	13.073
7000	749	7.610	786	7.751	823	8.944	859	9.637	894	10.348	928	11.076	961	11.815	994	12.569	1026	13.334	1057	14.112
7400	766	8.507	802	9.186	837	9.883	872	10.602	906	11.334	939	12.085	971	12.848	1003	13.627	1034	14.417	1065	15.219
7800	785	9.495	819	10.195	853	10.916	886	11.655	919	12.411	951	13.182	983	13.971	1014	14.773	1044	15.589	1074	16.414
8200	804	10.567	837	11.290	869	12.032	901	12.792	933	13.571	964	14.366	995	15.175	1025	16.000	1055	16.840	1084	17.691
8600	824	11.739	855	12.483	887	13.248	918	14.029	948	14.831	978	15.647	1008	16.479	1037	17.328	1066	18.188	1095	19.065
9000	844	13.006	874	13.771	905	14.557	935	15.361	964	16.182	993	17.021	1022	17.877	1051	18.746	1079	19.630	1106	20.527
9400	865	14.380	894	15.168	924	15.975	952	16.800	981	17.644	1009	18.504	1037	19.381	1065	20.274	1092	21.180	1119	22.101

Undersized drive

Oversized drive

48/50 UA/UH 135-160 High static-2

l/s	Unit External Static Pressure (Pa)																			
	650		710		770		830		890		925		960		995		1030		1065	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
5.000	888	7,093	925	7,703	961	8,321	996	8,951	1029	9,590	1048	9,967	1067	10,348	1085	10,732	1103	11,118	1121	11,506
5.400	895	7,768	931	8,405	966	9,053	1000	9,711	1033	10,381	1052	10,774	1071	11,171	1089	11,574	1107	11,976	1125	12,383
5.800	901	8,486	936	9,149	971	9,825	1005	10,511	1038	11,209	1056	11,618	1075	12,032	1093	12,450	1111	12,871	1128	13,294
6.200	909	9,281	944	9,972	978	10,674	1011	11,388	1043	12,111	1062	12,538	1080	12,969	1098	13,403	1115	13,840	1133	14,280
6.600	918	10,139	952	10,853	985	11,583	1018	12,322	1049	13,073	1068	13,517	1085	13,964	1103	14,412	1121	14,866	1138	15,321
7.000	928	11,076	961	11,815	994	12,569	1026	13,334	1057	14,112	1075	14,570	1092	15,033	1110	15,498	1127	15,968	1144	16,440
7.400	939	12,085	971	12,848	1003	13,627	1034	14,417	1065	15,219	1082	15,693	1100	16,170	1117	16,651	1133	17,135	1150	17,623
7.800	951	13,182	983	13,971	1014	14,773	1044	15,589	1074	16,414	1091	16,902	1108	17,395	1125	17,891	1141	18,390	1158	18,893
8.200	964	14,366	995	15,175	1025	16,000	1055	16,840	1084	17,691	1100	18,193	1117	18,700	1133	19,209	1150	19,723	1166	20,241
8.600	978	15,647	1008	16,479	1037	17,328	1066	18,188	1095	19,065	1111	19,581	1.127	20,099	1143	20,625	1159	21,152	1175	21,685
9.000	993	17,021	1022	17,877	1051	18,746	1079	19,630	1106	20,527	1122	21,057	1138	21,590	1154	22,129	1169	22,671	1185	23,217
9.400	1009	18,504	1037	19,381	1065	20,274	1092	21,180	1119	22,101	1135	22,643	1150	23,189	1165	23,740	1181	24,296	1196	24,856

Out of fan scope

7.3.1 - Fan RPM at Motor Pulley Settings - Unit 50UA-UH 135-160*

FAN RPM AT MOTOR PULLEY SETTINGS - Unit 48/50UH-UA165-160*

Drive	MOTOR PULLEY TURNS OPEN										
	0	*1/2*	*1*	*1-1/2*	*2*	*2-1/2*	*3*	*3-1/2*	*4*	*4-1/2*	*5*
Standard	816	800	784	771	757	742	**726**	710	694	678	662
HS1	**1021**	1001	981	965	948	928	908	889	869	849	829
HS2	**1135**	1119	1103	1087	1071	1055	1038	1022	1006	990	974

*Approximate fan rpm shown.
Note: Factory settings are shaded. The factory setting for the standard drive is 3-1/2 turns open (710 rpm) for size and 3 turns open (826 rpm) for size 60.

7.4 - Fan performances, 48/50 UA-UH 180

48/50UH-UA 180 Standard static

Airflow (l/s)	External Static Pressure (Pa)																			
	140		175		210		245		280		315		350		385		420		455	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7000	519	3.822	551	4.237	582	4.668	613	5.113	642	5.569	670	6.036	698	6.510	725	6.992	751	7.485	776	7.985
7400	534	4.325	565	4.759	595	5.205	624	5.664	652	6.139	680	6.621	707	7.113	733	7.614	758	8.125	783	8.644
7800	549	4.844	579	5.289	607	5.753	636	6.227	663	6.716	690	7.213	716	7.724	742	8.243	766	8.769	791	9.302
8200	564	5.399	592	5.863	620	6.341	647	6.830	674	7.334	700	7.845	726	8.371	751	8.905	775	9.449	799	10.001
8600	580	6.050	607	6.529	634	7.022	662	7.529	686	8.048	712	8.577	736	9.118	761	9.670	784	10.229	808	10.799
9000	596	6.713	622	7.209	648	7.717	674	8.235	698	8.769	723	9.317	747	9.872	771	10.438	794	11.012	816	11.597
9400	612	7.422	637	7.930	662	8.452	687	8.989	711	9.537	735	10.100	758	10.670	781	11.251	804	11.840	826	12.439
9800	630	8.257	654	8.783	678	9.320	702	9.872	725	10.438	748	11.016	771	11.601	793	12.200	816	12.807	837	13.421
10200	646	9.085	670	9.626	693	10.181	716	10.747	739	11.325	761	11.917	783	12.517	805	13.131	827	13.752	848	14.385
10600	663	9.982	686	10.538	709	11.108	731	11.689	753	12.281	775	12.888	796	13.506	816	14.131	838	14.768	859	15.415
11000	681	10.994	703	11.564	725	12.149	746	12.748	768	13.359	789	13.977	810	14.609	830	15.253	851	15.908	871	16.570
11400	699	12.024	720	12.612	741	13.212	762	13.822	783	14.448	803	15.084	824	15.731	844	16.390	863	17.055	883	17.736

48/50UH-UA 180 High static-1

Airflow (l/s)	External Static Pressure (Pa)																			
	350		410		470		530		590		650		710		770		830		890	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7000	698	6.411	743	7.234	786	8.078	828	8.947	867	9.831	905	10.736	942	11.656	977	12.591	1011	13.540	1045	14.507
7400	707	7.005	751	7.857	794	8.733	834	9.631	873	10.548	911	11.486	947	12.439	982	13.406	1016	14.391	1049	15.387
7800	716	7.607	759	8.487	801	9.389	841	10.316	880	11.261	917	12.229	953	13.210	987	14.210	1021	15.224	1053	16.253
8200	726	8.244	768	9.150	809	10.102	848	11.037	886	12.011	923	13.007	958	14.018	992	15.047	1026	16.090	1058	17.151
8600	736	8.979	778	9.918	817	10.878	856	11.863	893	12.866	929	13.891	964	14.934	998	15.996	1031	17.071	1063	18.162
9000	747	9.722	787	10.682	826	11.671	864	12.681	901	13.714	936	14.768	971	15.840	1004	16.927	1037	18.035	1069	19.154
9400	758	10.508	797	11.493	836	12.507	873	13.547	909	14.605	943	15.688	977	16.785	1011	17.905	1043	19.038	1074	20.187
9800	771	11.424	809	12.439	846	13.482	883	14.547	918	15.637	952	16.745	986	17.876	1018	19.024	1050	20.190	1081	21.371
10200	783	12.326	820	13.366	857	14.435	892	15.528	927	16.644	960	17.778	993	18.937	1025	20.111	1057	21.302	1087	22.512
10600	796	13.301	832	14.366	868	15.456	902	16.575	936	17.716	969	18.879	1002	20.063	1033	21.266	1064	22.487	1094	23.725
11000	810	14.387	845	15.481	879	16.601	913	17.745	946	18.912	979	20.103	1010	21.317	1042	22.548	1072	23.798	1102	25.066
11400	824	15.492	858	16.608	892	17.752	925	18.922	957	20.118	989	21.335	1019	22.574	1050	23.831	1080	25.109	1110	26.402

Undersized drive
Oversized drive

48/50 UA/UH 180 High static-2

l/s	Unit External Static Pressure (Pa)																							
	770		830		890		950		1005		1030		1055		1080		1105		1130		1155		1180	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7.000	977	12,591	1011	13,540	1045	14,507	1077	15,503	1105	16,412	1118	16,832	1131	17,253	1143	17,673	1156	18,097	1168	18,524	1180	18,951	1192	19,382
7.400	982	13,406	1016	14,391	1049	15,387	1081	16,383	1109	17,321	1122	17,752	1135	18,187	1147	18,622	1159	19,060	1172	19,498	1184	19,940	1196	20,382
7.800	987	14,210	1021	15,224	1053	16,253	1085	17,296	1113	18,263	1126	18,709	1139	19,154	1151	19,603	1163	20,053	1175	20,505	1187	20,962	1199	21,418
8.200	992	15,047	1026	16,090	1058	17,151	1090	18,245	1118	19,241	1130	19,698	1143	20,158	1155	20,618	1167	21,081	1179	21,549	1191	22,016	1203	22,487
8.600	998	15,996	1031	17,071	1063	18,162	1094	19,248	1122	20,274	1135	20,741	1147	21,215	1159	21,690	1172	22,164	1184	22,642	1195	23,124	1207	23,610
9.000	1004	16,927	1037	18,035	1069	19,154	1100	20,288	1127	21,342	1140	21,827	1152	22,309	1164	22,798	1176	23,287	1188	23,780	1200	24,272	1211	24,769
9.400	1011	17,905	1043	19,038	1074	20,187	1105	21,375	1132	22,454	1144	22,950	1157	23,447	1169	23,950	1181	24,450	1192	24,957	1204	25,461	1216	25,971
9.800	1018	19,024	1050	20,190	1081	21,371	1111	22,541	1138	23,653	1150	24,160	1163	24,671	1174	25,182	1186	25,696	1198	26,214	1210	26,736	1221	27,257
10.200	1025	20,111	1057	21,302	1087	22,512	1117	23,736	1144	24,874	1156	25,395	1168	25,917	1180	26,442	1192	26,971	1203	27,500	1215	28,032	1226	28,568
10.600	1033	21,266	1064	22,487	1094	23,725	1124	25,004	1150	26,167	1162	26,699	1174	27,235	1186	27,771	1198	28,311	1209	28,855	1220	29,398	1232	28,847
11.000	1042	22,548	1072	23,798	1102	25,066	1131	26,323	1157	27,511	1169	28,054	1181	28,601	1192	29,152	1204	29,706	1215	30,260	1226	30,818	1238	31,376
11.400	1050	23,831	1080	25,109	1110	26,402	1138	27,714	1164	28,931	1176	29,485	1188	30,046	1199	30,608	1210	31,173	1222	31,738	1233	32,310	1244	32,879

Out of fan scope

7.4.1 - Fan RPM at Motor Pulley Settings, Unit 50UA-UH 180*

FAN RPM AT MOTOR PULLEY SETTINGS - Unit 48/50UH-UA180*

Drive	MOTOR PULLEY TURNS OPEN										
	0	*1/2*	*1*	*1-1/2*	*2*	*2-1/2*	*3*	*3-1/2*	*4*	*4-1/2*	*5*
Standard	816	800	784	771	757	742	**726**	710	694	678	662
HS1	**1021**	1001	981	965	948	928	908	889	869	849	829
HS2	**1195**	1178	1161	1144	1127	1111	1094	1077	1060	1043	1026

*Approximate fan rpm shown.
NOTE: Factory settings are shaded

7.5 - Fan performances, 48/50UA-UH 205

48/50UH-UA 205 Standard static

Airflow (l/s)	External Static Pressure (Pa)																			
	140		175		210		245		280		315		350		385		420		455	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7000	497	3.546	529	3.950	561	4.373	592	4.807	622	5.256	651	5.712	679	6.183	706	6.661	733	7.147	759	7.643
7400	510	4.002	541	4.425	572	4.859	602	5.311	631	5.771	659	6.245	686	6.731	713	7.227	739	7.731	764	8.243
7800	523	4.473	553	4.907	583	5.355	611	5.819	640	6.297	667	6.786	694	7.286	720	7.798	745	8.316	770	8.842
8200	537	4.980	566	5.425	594	5.889	622	6.367	649	6.860	676	7.364	702	7.875	727	8.401	752	8.934	776	9.478
8600	552	5.576	579	6.039	607	6.518	633	7.010	660	7.514	686	8.033	711	8.563	736	9.103	760	9.655	784	10.214
9000	566	6.183	593	6.657	619	7.150	645	7.658	671	8.176	696	8.710	720	9.254	744	9.806	768	10.372	791	10.946
9400	581	6.834	607	7.323	632	7.827	657	8.349	682	8.883	706	9.427	730	9.986	754	10.552	777	11.134	799	11.722
9800	597	7.592	622	8.096	646	8.618	671	9.151	694	9.699	718	10.258	741	10.832	764	11.417	786	12.009	809	12.616
10200	613	8.357	637	8.875	660	9.409	684	9.957	707	10.519	730	11.093	752	11.678	774	12.278	796	12.884	818	13.502
10600	629	9.170	652	9.703	674	10.251	697	10.814	719	11.387	742	11.976	763	12.575	785	13.186	806	13.808	828	14.440
11000	646	10.111	668	10.659	690	11.222	712	11.799	733	12.388	755	12.991	776	13.605	797	14.231	818	14.867	838	15.514
11400	662	11.034	683	11.597	704	12.175	725	12.763	746	13.366	767	13.984	788	14.609	808	15.249	829	15.900	849	16.559

48/50UH-UA 205 High static-1

Airflow (l/s)	External Static Pressure (Pa)																			
	350		410		470		530		590		650		710		770		830		890	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7000	679	6.089	725	6.900	769	7.737	811	8.596	852	9.476	890	10.370	927	11.283	963	12.214	998	13.159	1031	14.119
7400	686	6.629	731	7.473	775	8.338	816	9.226	856	10.135	894	11.062	931	12.008	967	12.968	1001	13.946	1034	14.938
7800	694	7.176	738	8.041	780	8.936	821	9.852	860	10.787	898	11.743	935	12.718	970	13.706	1004	14.713	1037	15.735
8200	702	7.755	745	8.650	787	9.566	828	10.512	865	11.475	903	12.457	939	13.460	974	14.478	1007	15.514	1040	16.564
8600	711	8.433	753	9.353	794	10.298	833	11.269	871	12.261	908	13.275	943	14.308	978	15.355	1012	16.423	1044	17.506
9000	720	9.113	761	10.055	801	11.026	840	12.022	877	13.040	913	14.080	948	15.141	983	16.217	1016	17.314	1048	18.423
9400	730	9.834	770	10.801	809	11.794	847	12.815	883	13.862	919	14.927	954	16.014	987	17.119	1019	18.241	1052	19.379
9800	741	10.667	780	11.660	818	12.681	855	13.728	891	14.800	926	15.894	960	17.010	993	18.144	1026	19.296	1057	20.462
10200	752	11.501	790	12.515	828	13.562	863	14.634	899	15.731	933	16.851	966	17.992	999	19.151	1031	20.328	1062	21.523
10600	763	12.384	800	13.424	837	14.489	872	15.586	906	16.706	940	17.850	973	19.017	1005	20.205	1037	21.407	1068	22.632
11000	776	13.399	812	14.460	847	15.554	882	16.673	915	17.821	949	18.991	981	20.183	1013	21.396	1044	22.632	1074	23.881
11400	788	14.387	823	15.474	857	16.590	891	17.734	924	18.904	956	20.100	988	21.317	1019	22.552	1050	23.812	1080	25.087

Undersized drive

Oversized drive

48/50 UA/UH 205 High static-2

l/s	Unit External Static Pressure (Pa)																			
	830		890		920		960		1000		1040		1080		1120		1160		1200	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7.000	998	13,159	1.031	14,119	1.048	14,619	1.069	15,275	1090	15,934	1111	16,597	1131	17,267	1.151	17,944	1.171	18,625	1.190	19,314
7.400	1001	13,946	1034	14,938	1051	15,423	1072	16,093	1093	16,774	1113	17,459	1134	18,151	1.154	18,850	1.173	19,549	1.192	20,259
7.800	1004	14,713	1037	15,735	1053	16,253	1075	16,948	1096	17,647	1116	18,354	1136	19,064	1.156	19,781	1.175	20,505	1.195	21,233
8.200	1007	15,514	1040	16,564	1056	17,115	1078	17,829	1098	18,549	1119	19,277	1.139	20,009	1.158	20,748	1.178	21,491	1.197	22,240
8.600	1012	16,423	1044	17,506	1060	18,031	1081	18,767	1102	19,506	1122	20,252	1142	21,005	1.161	21,766	1.181	22,530	1.200	23,298
9.000	1016	17,314	1048	18,423	1064	18,984	1085	19,737	1105	20,498	1125	21,266	1145	22,038	1.164	22,816	1.184	23,602	1.203	24,392
9.400	1019	18,241	1052	19,379	1068	19,976	1089	20,752	1109	21,530	1129	22,316	1148	23,110	1.168	23,907	1.187	24,714	1.206	25,522
9.800	1026	19,296	1057	20,462	1073	21,031	1093	21,824	1113	22,624	1133	23,428	1152	24,240	1.172	25,058	1.191	25,884	1.209	26,714
10.200	1031	20,328	1062	21,523	1078	22,128	1098	22,939	1118	23,758	1137	24,584	1.157	25,417	1.176	26,254	1.194	27,098	1.213	27,945
10.600	1037	21,407	1068	22,632	1083	23,273	1103	24,102	1122	24,939	1.142	25,783	1.161	26,634	1.180	27,493	1.198	28,355	1.217	29,224
11.000	1044	22,632	1074	23,881	1089	24,486	1.109	25,337	1.128	26,192	1.147	27,054	1.166	27,924	1.185	28,800	1.203	29,684	1.221	30,571
11.400	1050	23,812	1080	25,087	1095	25,732	1.114	26,598	1.133	27,471	1.152	28,355	1.171	29,242	1.189	30,137	1.208	29,948	1.226	31,944

Out of fan scope

7.5.1 - Fan RPM at Motor Pulley Settings, Unit 50UA-UH 205*

FAN RPM AT MOTOR PULLEY SETTINGS - Unit 48/50UH-UA205*

Drive	MOTOR PULLEY TURNS OPEN										
	0	*1/2*	*1*	*1-1/2*	*2*	*2-1/2*	*3*	*3-1/2*	*4*	*4-1/2*	*5*
Standard	816	800	784	771	757	742	**726**	710	694	678	662
HS1	**1021**	1001	981	965	948	928	908	889	869	849	829
HS2	**1195**	1178	1161	1144	1127	1111	1094	1077	1060	1043	1026

*Approximate fan rpm shown.

Note: Factory setting values given as bold

7.6 Pressure Drops, Options (Pa)

48/50 UA/UH 135 and 160

Unit Air flow rate	l/s	5.400	5.800	6.200	6.600	7.000	7.400	7.800	8.200	8.600	9.000
	m^3/h	19.440	20.880	22.320	23.760	25.200	26.640	28.080	29.520	30.960	32.400
Opt 174 - Electric heater		73	79	85	90	96	102	108	113	119	125
Opt 175 - Electric heater		73	79	85	90	96	102	108	113	119	125
Opt 176 - Electric heater		73	79	85	90	96	102	108	113	119	125
Opt 180 - Hot water coil		40	45	51	56	63	69	76	83	90	98
Opt 181 - Hot water coil		68	77	86	95	105	115	126	137	148	160
Opt 210- Natural gas		70	79	85	96	108	117	130	143	152	163
Opt 40 - Manual damper		31	36	41	46	53	60	68	77	87	97
Opt 35,36,156,157 - Economizer		31	36	41	46	53	60	68	77	87	97
Opt 145 - G4 filter M1		0	0	0	0	0	0	0	0	0	0
Opt 147 - F7 filter M1		39	42	46	49	53	56	59	62	65	68
Opt 158 - G4+F7 filter M1		85	93	101	109	118	127	136	145	155	164
Opt 159 - M6+F7 filter M1		121	132	143	154	166	177	189	201	212	224
ERM Fresh Air Flow Rate	**l/s**	**500**	**1.100**	**1.700**	**2.300**	**2.900**	**3.500**	**4.100**	**4.700**	**5.300**	**5.900**
	m^3/h	**1.800**	**3.960**	**6.120**	**8.280**	**10.440**	**12.600**	**14.760**	**16.920**	**19.080**	**21.240**
Opt 173 - Fresh air filter in ERM 13 C/S		8	18	30	43	59	78	-	-	-	-
Opt 160 - Fresh air filter in ERM 20 C/S		6	15	24	35	47	61	76	94	115	139
Opt 173 - Heat wheel in ERM 13 C		21	47	75	104	134	166	199	-	-	-
Opt 160 - Heat wheel in ERM 20 C		14	32	50	69	89	109	130	151	174	196
Opt 173 - Heat wheel in ERM 13 S		23	51	81	112	145	179	214	-	-	-
Opt 160 - Heat wheel in ERM 20 S		15	34	54	75	96	117	140	163	187	211
Total Opt 173 - ERM 13 C		29	65	105	147	193	244	-	-	-	-
Total Opt 160 - ERM 20 C		20	47	74	104	136	170	206	245	289	335
Total Opt 173 - ERM 13 S		31	69	111	155	204	257	-	-	-	-
Total Opt 160 - ERM 20 S		21	49	78	110	143	178	216	257	302	350

48/50 UA/UH 180

Unit Air flow rate	l/s	7.200	7.650	8.100	8.550	9.000	9.450	9.900	10.350	10.800	11.250
	m^3/h	25.920	27.540	29.160	30.780	32.400	34.020	35.640	37.260	38.880	40.500
Opt 177 - Electric heater		71	76	80	85	90	94	99	104	108	113
Opt 178 - Electric heater		71	76	80	85	90	94	99	104	108	113
Opt 179 - Electric heater		71	76	80	85	90	94	99	104	108	113
Opt 182 - Hot water coil		37	41	46	50	55	60	65	70	75	81
Opt 183 - Hot water coil		70	78	85	93	101	110	118	126	135	143
Opt 211- Natural gas		84	93	102	110	123	132	144	153	166	174
Opt 40 - Manual damper		34	38	42	47	52	58	65	72	80	88
Opt 35,36,156,157 - Economizer		34	38	42	47	52	58	65	72	80	88
Opt 145 - G4 filter M1		0	0	0	0	0	0	0	0	0	0
Opt 147 - F7 filter M1		39	42	45	48	50	53	56	59	61	64
Opt 158 - G4+F7 filter M1		85	91	98	105	113	120	127	135	143	151
Opt 159 - M6+F7 filter M1		121	131	140	149	159	168	178	188	198	208
ERM Fresh Air Flow Rate	**l/s**	**500**	**1.300**	**2.100**	**2.900**	**3.700**	**4.500**	**5.300**	**6.100**	**6.900**	**7.700**
	m^3/h	**1.800**	**4.680**	**7.560**	**10.440**	**13.320**	**16.200**	**19.080**	**21.960**	**24.840**	**27.720**
Opt 173 - Fresh air filter in ERM 18 C/S		6	18	31	47	66	88	115	-	-	-
Opt 160 - Fresh air filter in ERM 26 C/S		4	11	19	28	38	49	61	75	91	109
Opt 173 - Heat wheel in ERM 18 C		14	38	63	89	116	144	174	-	-	-
Opt 160 - Heat wheel in ERM 26 C		-	28	46	65	84	104	124	145	167	189
Opt 173 - Heat wheel in ERM 18 S		15	41	68	96	125	155	187			
Opt 160 - Heat wheel in ERM 26 S		-	30	50	70	90	112	134	156	180	204
Total Opt 173 - ERM 18 C		20	56	94	136	182	232	289	-	-	-
Total Opt 160 - ERM 26 C		-	39	65	93	122	153	185	220	258	298
Total Opt 173 - ERM 18 S		21	59	99	143	191	243	302	-	-	-
Total Opt 160 - ERM 26 S		-	41	69	98	128	161	195	231	271	313

Unit Air flow rate	**l/s**	**7.200**	**7.650**	**8.100**	**8.550**	**9.000**	**9.450**	**9.900**	**10.350**	**10.800**	**11.250**
	m^3/h	**25.920**	**27.540**	**29.160**	**30.780**	**32.400**	**34.020**	**35.640**	**37.260**	**38.880**	**40.500**
Opt 177 - Electric heater		71	76	80	85	90	94	99	104	108	113
Opt 178 - Electric heater		71	76	80	85	90	94	99	104	108	113
Opt 179 - Electric heater		71	76	80	85	90	94	99	104	108	113
Opt 182 - Hot water coil		37	41	46	50	55	60	65	70	75	81
Opt 183 - Hot water coil		70	78	85	93	101	110	118	126	135	143
Opt 211- Natural gas		84	93	102	110	123	132	144	153	166	174
Opt 40 - Manual damper		34	38	42	47	52	58	65	72	80	88
Opt 35,36,156,157 - Economizer		34	38	42	47	52	58	65	72	80	88
Opt 145 - G4 filter M1		0	0	0	0	0	0	0	0	0	0
Opt 147 - F7 filter M1		31	34	36	39	41	44	46	49	51	53
Opt 158 - G4+F7 filter M1		68	74	79	85	90	96	102	108	114	120
Opt 159 - M6+F7 filter M1		99	106	114	121	129	137	145	153	161	169
ERM Fresh Air Flow Rate	**l/s**	**500**	**1.300**	**2.100**	**2.900**	**3.700**	**4.500**	**5.300**	**6.100**	**6.900**	**7.700**
	m^3/h	**1.800**	**4.680**	**7.560**	**10.440**	**13.320**	**16.200**	**19.080**	**21.960**	**24.840**	**27.720**
Opt 173 - Fresh air filter in ERM 18 C/S		6	18	31	47	66	88	115	-	-	-
Opt 160 - Fresh air filter in ERM 26 C/S		4	11	19	28	38	49	61	75	91	109
Opt 173 - Heat wheel in ERM 18 C		14	38	63	89	116	144	174	-	-	-
Opt 160 - Heat wheel in ERM 26 C		-	28	46	65	84	104	124	145	167	189
Opt 173 - Heat wheel in ERM 18 S		15	41	68	96	125	155	187			
Opt 160 - Heat wheel in ERM 26 S		-	30	50	70	90	112	134	156	180	204
Total Opt 173 - ERM 18 C		20	56	94	136	182	232	289	-	-	-
Total Opt 160 - ERM 26 C		-	39	65	93	122	153	185	220	258	298
Total Opt 173 - ERM 18 S		21	59	99	143	191	243	302	-	-	-
Total Opt 160 - ERM 26 S		-	41	69	98	128	161	195	231	271	313

7.7 - Air flow limits, l/s

50UA/UH	Cooling/heating	
	Minimum	Maximum
135	5456	8184
160	5736	8604
180	7264	10896
205	7336	11004

7.8 - Indoor fan air flow adjustment

The drive is factory set in accordance with the standard fan performance tables.

When indoor pressure and air flow requirements differ from nominal ratings, the motor pulley can be adjusted for different available static pressure values (see fan performance tables).

To change the fan speed:
1. Move the motor along its track in order to remove the belt.
2. Loosen the pulley setscrews and rotate as necessary.
3. Tighten the setscrews.
4. Replace the belt(s) in the channel of the pulley.
5. Tighten the belt(s), using the tension screw nut and washer. See maintenance section and Fig. 11.

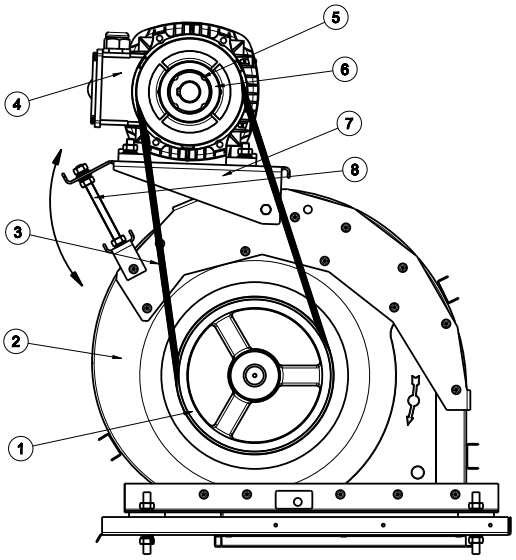
To align fan and motor pulleys:
1. Loosen fan pulley setscrews. Slide fan pulley along the pulley shaft and align with the motor using a ruler, making sure that it is parallel to the belt.
2. Tighten the fan pulley setscrews.

To adjust the belt tension, loosen the motor mounting plate bolts and slide the motor mounting plate until the belts are tensioned as shown in Fig. 9. Please refer to chapter 7.1 for the belt tension.

Fan and motor pulleys can be aligned as shown in Fig. 12. If the unit is equipped with adjustable pulleys, the pulley ratio and operating point can be adjusted by loosening the setscrew, arranging the moving part of the pulley to the appropriate position and then fixing the setscrew.

See fan performance tables for adjustments.

Fig. 11 - Fan speed adjustment



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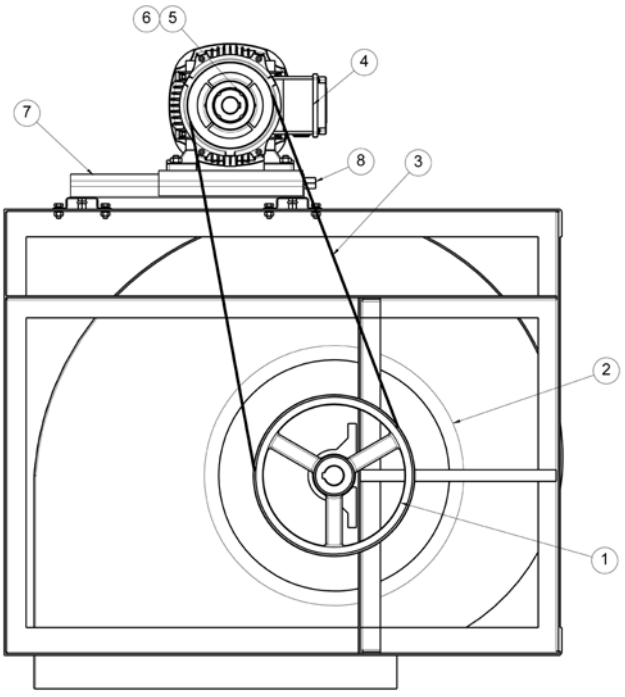
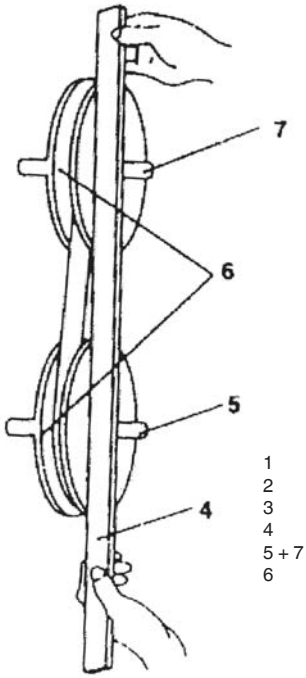
48/50 UA-UH 135-205 standard - HS1

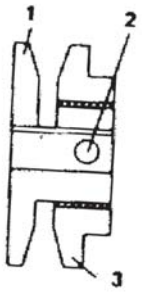


1 Fan pulley
2 Fan scroll
3 Belt
4 Motor
5 Setscrew
6 Motor pulley
7 Motor plate
8 Tensioning screw

NOTE: Drive HS1 is for units with high static pressure

Fig. 12 - To align fan and motor pulleys





1	Fixed flange
2	Setscrew
3	Movable flange
4	Straight-edge must be parallel with belt
5 + 7	Motor and fan shafts must be parallel
6	Pulleys

8 - ELECTRICAL CONNECTIONS

WARNING: To prevent electrical shock or equipment damage, make sure disconnects are open before electrical connections are made. If this action is not taken, personal injury may occur.

Field wiring must comply with all applicable codes. Take special care when making the earth connection with the main earth bar inside the control box.

8.1 - Control box

Please refer to the certified dimensional drawings, supplied with the unit.

8.2 - Power supply

The power supply must conform to the specification on the unit nameplate. The supply voltage must be within the range given in the electrical data table. For connections refer to the wiring diagrams and the certified dimensional drawings.

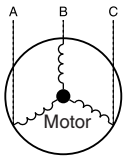
WARNING: Operation of the unit with an improper supply voltage or excessive phase imbalance constitutes abuse which will invalidate the Carrier warranty. If the phase imbalance exceeds 2% for voltage, or 10% for current, contact your local electricity supply at once and ensure that the unit is not switched on until corrective measures have been taken.

8.3 - Voltage phase imbalance (%)

Never operate a unit if the voltage imbalance exceeds 2%. The following formula must be used to determine the percentage of voltage imbalance. Voltage imbalance % =

$$\frac{\text{Largest deviation from average voltage}}{\text{Average voltage}}$$

Example:
Nominal supply: 400-3-50



AB = 404 V
BC = 399 V
AC = 394 V

$$\text{Average voltage} = \frac{404 + 399 + 394}{3} = 399 = 400 \text{ V}$$

Determine maximum deviation from average voltage:

AB = 404 - 400 = 4
BC = 400 - 399 = 1
AC = 400 - 394 = 6

Largest deviation is 6 volts. Percentage voltage imbalance is therefore:

$$\frac{6}{400} \times 100 = 1.5\%$$

This is less than the permissible 2% and is therefore acceptable.

8.4 - Recommended wire sections

Wire sizing is the responsibility of the installer, and depends on the characteristics and regulations applicable to each installation site. The following is only to be used as a guide-line, and does not make Carrier in any way liable. After wire sizing has been completed, using the certified dimensional drawing, the installer must ensure easy connection and define any modifications necessary on site. The connections provided as standard for the field-supplied power entry cables to the general disconnect/isolator switch are designed for the number and type of wires, listed in the table below.

The calculations are based on the maximum machine current (see electrical data tables) and the standard installation practises, in accordance with IEC 60364, table 52C.

- The calculation is based on PVC Cu.
- A maximum ambient temperature of 46°C has been taken into consideration.

IMPORTANT: Main power cables (L1 - L2 - L3) on the main switch block can be connected without phase order check. If the phase order is wrong, Touch Pilot will not operate the unit. Order of 3 phases should be changed until the unit starts to operate.

WARNING: Phase order relay is used as standard equipment in the electrical panel. Even if the unit doesn't operate due to phase order error, electricity is still on in the panel

- The given wire length limits the voltage drop to < 5% (length L in metres - see table below).

FLA	S min. (mm²) by phase	Cable type	L (m)
36	1 x6	PVCCu	65
50	1 x10	PVCCu	80
66	1 x16	PVCCu	95
84	1 x25	PVCCu	115
104	1 x35	PVCCu	130
123	1 x50	PVCCu	160
155	1 x70	PVCCu	175
192	1 x95	PVCCu	195
235	1 x120	PVCCu	160
285	1 x150	PVCCu	175
350	1 x185	PVCCu	195

FLA - Full load current, A

Power and control cable entry
For the cable entry refer to the certified dimensional drawing for the unit.

8.5 - Field control wiring

Refer to the Touch Pilot Controls IOM and the certified wiring diagram supplied with the unit for the field control wiring of the following features:
- Remote on/off switch
- Demand limit external switch
- Remote setpoint
- Alarm, alert and operation report

8.6 - Power supply

ATTENTION: After the unit has been commissioned, the power supply must only be disconnected for quick maintenance operations (one day maximum). For longer maintenance operations or when the unit is taken out of service the power supply must be maintained to ensure supply to the heaters (compressor oil crankcase heaters for unit frost protection).

After all possible options have been connected, the transformer ensures the availability of a usable 24 VA or 1 A power reserve for the control circuit on site.

9 - START-UP

9.1 - Preliminary checks

Never be tempted to start the rooftop unit without reading fully, and understanding, the operating instructions and without having carried out the following pre-start checks:
- Ensure that all electrical connections are properly tightened.
- Ensure that the unit is level and well-supported.
- Check the condition of the ductwork in case damage has occurred during installation.
- The air filter should be clean and in place.
- All the panels should be fitted and firmly secured with the corresponding screws.
- Make sure that there is sufficient space for servicing and maintenance purposes.
- Check the drain connections.
- Ensure that there are no refrigerant leaks.
- Confirm that the electrical power source agrees with the unit nameplate rating.
- Make sure that compressors float freely on the rubber isolators.

WARNING: The compressors are mounted on vibration isolators. Do not loosen or remove the support mounting bolts.

- Check if the phase rotation is in the right order for supply air fan, outdoor air fan and compressors.

9.2 - Actual start-up

IMPORTANT:
- ***Commissioning and start-up of the unit must be supervised by a qualified refrigeration engineer.***
- ***Start-up and operating tests must be carried out with a thermal load applied and the correct air flow rate circulating through the indoor coil.***
- ***All setpoint adjustments and control tests must be carried out before the unit is started up.***
- ***Please refer to the Touch Pilot control manual.***

The unit should be started up in Local ON mode.

Ensure that all safety devices are satisfied, especially the high pressure switches.

Actual start-up should only be done under the supervision of a qualified refrigeration mechanic.

9.3 - Defrost cycle

When the outdoor temperature is sufficiently low, and depending on the atmospheric humidity, the water condensing on the outdoor coil freezes and this impedes correct air flow and heat exchange rate. It is necessary to remove the ice by melting it. This will be done by changing over the reversing valve on the solenoid coil. This reverses the system cycle and injects hot gas into the outdoor heat exchanger.

Defrost will be completed when the outdoor coil reaches the defrost temperature setpoint or after a predetermined period of time from the start of the cycle.

10 - MAJOR SYSTEM COMPONENTS

10.1 - Compressors

48/50UA-UH135-205 units use hermetic scroll compressors.

Each compressor is equipped with a crankcase oil heater, as standard for all units.

Each compressor sub-function is equipped with:
- Anti-vibration mountings between the unit chassis and the chassis of the compressor sub-function.
- A single pressure safety switch at the discharge.

"Compressors are fixed only for transportation. Fixing parts must be removed when unit installation is completed."

10.2 - Lubricant

The compressors installed in these units have a specific oil charge, indicated on the name plate of each compressor.

The oil level check must be done with the unit switched off, when then suction and discharge pressures are equalised. The oil level must be visible and above the middle of the sight-glass in the oil equalisation line. If this is not the case, there is an oil leak in the circuit. Search and repair the leak, then recharge oil, so that it reaches a level between the middle and three quarters of the sight-glass (unit in vacuum).

ATTENTION: Too much oil in the circuit can cause a unit defect. Please refer to the oil content in the physical data table.

NOTE: Use only oils which have been approved for the compressors. Never use oils which have been exposed to air.

Carrier ERCD reference: 7754024.

CAUTION: R-22 oils are absolutely not compatible with R-410A oils and vice versa.

10.3 - Condensers

The 48/50UA-UH135-205 coils are condensers/evaporators with internally grooved copper tubes with aluminum fins. To prevent ice formation at the bottom of the coils in 48/50UA-UH135-205 units, electric heaters are installed under the sheet metal base. They are switched on based on the outside temperature and during defrost cycle.

10.4 - Outdoor fans

The fans are axial Flying Bird fans equipped with rotating shroud and made of composite recyclable material. The motors are three-phase, with permanently lubricated bearings and insulation class F. See tables below.

10.5 -Indoor fans

The fans are forward-curved centrifugal fans equipped with adjustable motor pulleys. . The motors are three-phase, with efficiency class IE3 and insulation class F.

According to the Regulation No. 327/2011 implementing Directive 2009/125/EC with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW.

Product/option		**48/50UA-UH 135-205**
Global fan efficiency	%	38
Measurement category		A
Efficiency category		Static
Energy efficiency target N(2015)		N(2015) 40
Efficiency level at the optimal energy efficiency point		42.3
Variable frequency drive		No
Year of manufacture		See label on unit
Fan manufacturer		Simonin
Motor manufacturer		A.O. Smith/Regal Beloit
Fan reference		00PSG000000100A
Motor reference		00PPG000464600A
Nominal motor capacity	kW	2.09
Flow rate	m^3/s	4.07
Pressure	Pa	195
Speed	rpm	966
Specific ratio		1.002
Product disassembly, recycling or disposal at end of life		See service manual
Information about minimising environmental impact		See service manual

According to the Regulation No. 640/2009 and amendment 4/2014 implementing Directive 2005/32/EC with regard to ecodesign requirements for electric motors.

Product/option		48/50UA-UH 135-205
Motor type		Dual-speed asynchronous
Number of poles		6
Nominal input frequency	Hz	50
Nominal voltage	V	400
Number of phases		3
Motor included in the application domain of the regulation 640/2009 and amendment 4/2014		No
Sales leaflet for exemption		Article 2.1
Ambient air temperature for which the motor is specifically designed	°C	68.5

10.6 - Electronic expansion valve (EXV)

The EXV is equipped with a stepper motor (2625 + 160 /- 0 steps) that is controlled via the SIOB board.

10.7 - Moisture indicator

Located on the liquid line, the moisture indicator may be used to charge the unit and to indicate if there is moisture in the circuit. The presence of moisture changes the colour of the indicator paper in the sight-glass.

10.8 - Filter drier

This is a one-piece, brazed filter drier, located in the liquid line. The role of the filter drier is to keep the circuit clean and moisture-free. The moisture indicator shows when it is necessary to change the filter drier. A difference in temperature between the filter inlet and outlet shows that the element is dirty.

10.9 - Refrigerant

48/50UA-UH135-205 units operate with refrigerant R-410A.

10.10 - Four-way valve (48/50UH135-205 heat pumps)

This permits reversal of the cycle for operation in cooling and heating mode and during defrost cycles.

10.11 - Sensors

The units use thermistors to measure the temperature, and pressure transducers to control and regulate system opera-tion (see Touch Pilot Control IOM for a more detailed explanation).

10.12 - High-pressure safety switch

Refrigerant side		High pressure	Low pressure
Allowable pressure, min./max. (PS)	kPa	-100/4420	-11/3000
Allowable temperature, min./max. (TS)	°C	-20/68	-20/51
Pressure switch setting	kPa	4420	
Unit leak test pressure	kPa	3300	

48/50UA-UH135-205 units are equipped with automatically reset high-pressure safety switches, calibrated to 4420 kPa relative pressure (unit alarm is manually reset).

WARNING: Alteration of factory settings other than the design setpoint, without manufacturer's authorisation, may void the warranty.

11 - OPERATING LIMITS

These units have been designed to operate within the following limits (the pressure values are given as relative pressure):

Cooling operation

Zone	Air temperature	
	Dry bulb	Wet bulb
Indoor		
Maximum	+35°C	+23°C
Minimum	+18°C	+13°C
Outdoor		
Maximum	+52°C	-
Minimum	+10°C	-

Heat pump operation

Zone	Air temperature	
	Dry bulb	Wet bulb
Indoor		
Maximum	+27°C	
Minimum	+10°C	
Outdoor		
Maximum	+22°C	+18°C
Minimum	-10°C	-11°C

No compressor running and Free Cooling mode	
Minimum outdoor air temperature	-20°C
No compressor running and electric heaters only mode	
Minimum outdoor air temperature	-20°C
No compressor running Hot water coil only mode	
Minimum outdoor air temperature	-20°C
No compressor running and gas burner only mode	
Minimum outdoor air temperature	-20°C
Storage	between -20°C and +52°C

12- GAS HEATING (48UA/UH ONLY)

IMPORTANT: Inadequate installation, adjustment, information, servicing or maintenance can cause damage, injury to staff or loss of life.

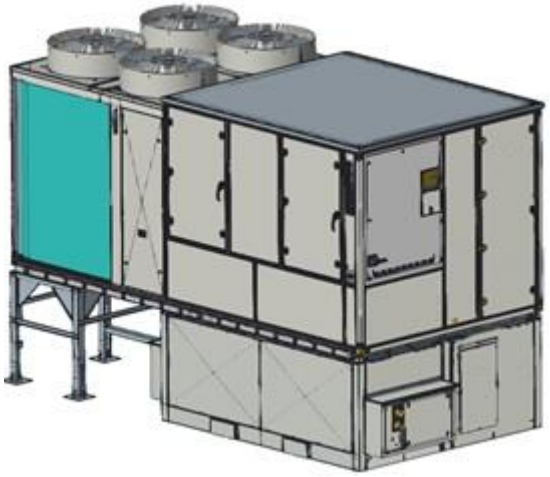
Any unauthorized modifications or adjustments to the appliance are likely to invalidate the Certification, any warranty or guarantee and may also infringe on current Statutory requirements.

Petrol, or other inflammable, fume-emitting products and liquids of any other application must not be stored or use in the vicinity of units.

After removing panels from the unit, keep them in a safe place to prevent them dropping from the roof

12.1- Introduction

The gas heating system is designed in accordance with the standards in force in compliance with the Gas Directive 2009/142/EC to be used inside a vertical roofcurb to be located under the rooftop unit as an environment friendly alternative to the hot water coil or electric heating options.



12.1.1 Heat Exchanger

Furnace and air/flue exchanger are entirely manufactured with stainless steel (with low carbon content) AISI 441 which assures maximum reliability and long life cycle.
The new cylinder shaped furnace and the air/flue exchangers, whose tube bundle is custom designed, guarantee performance that place PCH/new modules among the leading units for heat efficiency

12.1.2 Premix burner

The burner is entirely made of AISI 430 steel and undergoes specific engineering processing that guarantees top reliability and high thermal-mechanical performance.

12.1.3Electronic card with display

The microprocessor-based electronic card regulates continuous modulation of heat output and controls both the electrical fan for air/gas mixing and the gas valve. There is also a safety thermostat with manual reset

12.2 Preliminary checks before start-up

NOTES:

Any work on the gas system must be carried out by qualified personnel.

This unit must be installed in accordance with local safety codes and regulations and can only be used in outdoor conditions.

Please read carefully the manufacturer's instructions before starting a unit.

Before commissioning a unit with gas burner, it is mandatory to ensure that the gas distribution system (type of gas, available pressure..) is compatible with the gas type, electrical supplies, adjustment and settings of the unit.

Check access and clearance around the unit. (Refer to the certified dimensional drawings)

- Combustion air inlet and burnt gas exhausts must not be obstructed in any way.

12.3 Safety instructions

12.3.1 Fuel

Before starting up the heater, make sure that:

- The gas mains supply data is compatible with the data stated on the nameplate
- The combustion air intake ducts (when fitted) and the fume exhaust pipes are those specified by the manufacturer
- The combustion air is supplied in such a way as to avoid even partial obstructions of the intake grille (caused by leaves etc.)
- The fuel intake internal and external seal is checked during the testing stage, as required by applicable standards
- The heater is supplied with the same type of fuel it has been designed for
- The system is correctly sized for such flow rate and is fitted with all safety and monitoring devices required by applicable standards
- The inside of the gas pipes and air distribution ducts for ducted heaters has been thoroughly cleaned
- The fuel flow rate is suitable for the power required by the heater
- The fuel supply pressure is between the range specified on the nameplate.

12.3.2 Gas leaks

If you smell gas:

- Do not operate electrical switches, telephones or any other object or device that could produce sparks
- Close the gas valves
- Call for qualified staff

12.4 Installation of the gas heating module

The gas heating module is supplied separately from the rooftop unit inside a vertical roofcurb, available with two of same gas heating models working in parallel with modulating capacity for natural gas.
Refer to the certified drawings and wiring diagrams for the mechanical and electrical connections. The following table shows available gas heating models for each rooftop size.

Unit	Model	Heat Output (Min / Max)
48UA/UH 135-160	PCH080+PCH080	35.6 / 160 kW
48UA/UH 180-205	PCH105+PCH105	45.6 / 194.4 kW

The detailed technical data of each gas heating model is given in the table below;

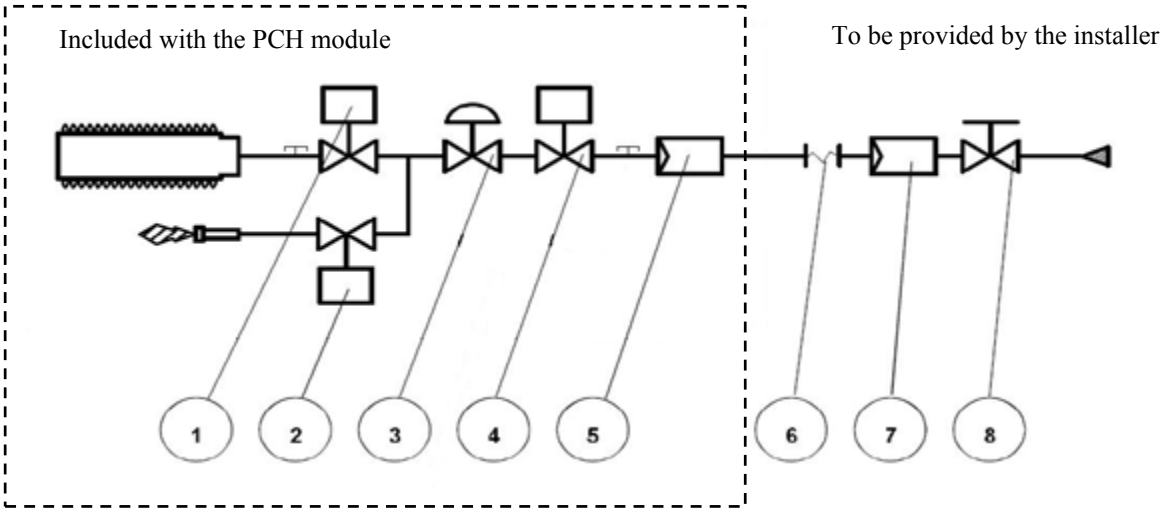
MODEL		PCH080		PCH105	
Type of equipment		B23P-B53P-C13-C43-C53-C63-C83			
EC certification	PIN.	0694CP1457			
NOx Class	Val	5			
		Heater Performance			
		min	max	min	max
Heat input (Hi)	kW	16.4	82.0	21.0	100.0
Heat output	kW	17.8	80.0	22.8	97.2
Efficiency (net C.V.)	%	108,3	97,6	108.4	97,2
Efficiency (Gross C.V.)	%	97,6	87,9	97.7	87.5
Flue loss with burner on (Hi)	%	0.3	2.4	0.2	2.8
Flue loss with burner off (Hi)	%	< 0.1		< 0.1	
Losses in enclosure (1)		0%		0%	
Max.Condensation (2)	l/h	3.3		2.7	
		Flue gas emissions			
Carbon monoxide - CO - (0% of O_2) (3)	ppm	< 5		< 5	
Nitrogen oxides - NOx - (0% of O_2) (4)	mg/kWh	32		41	
Available pressure at flue	Pa	120		120	
		Electrical Data			
Power supply	V	230 Vac - 50Hz single-phase			
Power input	W	40	123	20	130
		Connections			
Size gas connection		UNI/ISO 228/1-G 3/4"		UNI/ISO 228/1-G 3/4"	
Size intake/exhaust pipes	mm	80/80		80/80	
		Air side			
Maximum applicable pressure	Pa	1200		1200	
		Weight			
Net weight	kg	98		118	

(1) Enclosure losses match those of the machine housing the PCH
(2) Max.. condensation produced acquired from testing at 30% of Qn
(3) Value referenced to cat. H (G20)
(4) Weighted value to EN1020 ref. to class H (G20), referred to Hi (L.C.V.)

12.5 Commissioning
12.5.1 Gas connection

- The gas supply must be done according to local safety codes and regulations.
- In any case the diameter of pipe-work connected must not be smaller than the diameter of the connection on the PCH module.
- Make sure that a shut-off isolation valve has been installed before each PCH module. The isolation valve must be connected to the main gas inlet supply pipe as close as possible to the appliance. For safety and accessibility reasons the isolation valve must not be fitted within the appliance gas valve compartment.
- Make sure that the gas service includes a filter and has been tested and purged in accordance with prescribed practice prior to commissioning and taking the appliance into service.
- Gas service pipes shall not be routed through any heated or fresh air ducts.
- Gas connection : ISO 228-1 G 3/4 “. Refer to the certified drawings for the gas connection
- It is strictly prohibited to supply gas to the circuit with pressure higher than 60mbar. Such pressures could cause the valve to break.

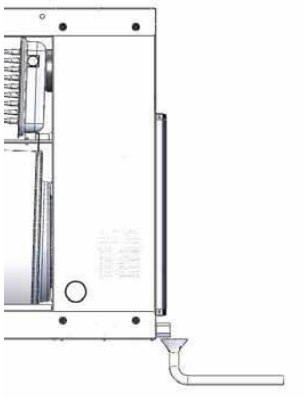
Each PCH module includes the following elements as shown below .



KEY
1 Main burner gas solenoid valve
2 Pilot burner gas solenoid valve
3 Pressure stabiliser
4 Safety gas solenoid valve
5 Gas filter (small section)
6 Anti-vibration joint
7 Gas filter (large section)
8 Isolation valve (gas valve)

12.5.2 Condensate drain

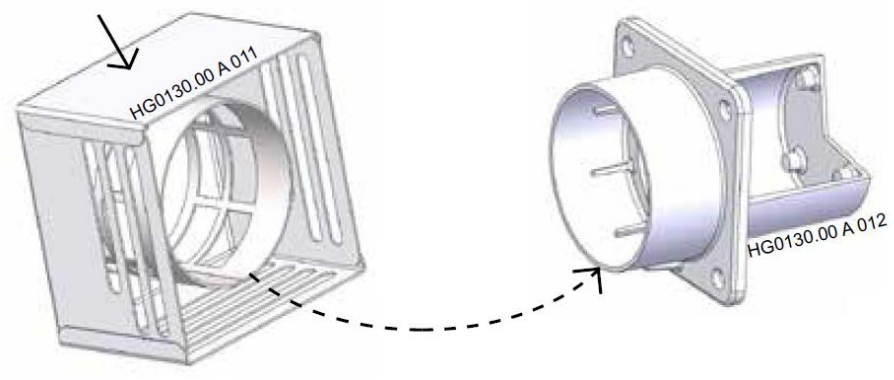
- The condensate drain must be realized according to the local safety codes and regulations.
- Special attention must be paid to the condensate drain; an incorrectly installed drain, in fact, could jeopardize the correct operation of the equipment.
- Recommended drain needs to be connected to pipes, an open type connection (socket pipe), similar to the one illustrated in picture below must be installed to prevent ice forming in the pipe from blocked condensate drainage, and the ensuing build-up of condensate in the exchanger.
- Make sure that condensate drain has been connected for each PCH module. Refer to the certified drawings for the condensate drain



12.5.3 Flue outlet and combustion air inlet connection

- The flue design and connection must be done by the installer according to the local safety codes and regulations.
- For the flue, certified pipes and terminals must be used, taking into account that the modules are of a PCH condensing type
- The horizontal sections of flue must be installed with a slightly incline (1°- 3°) towards the heater, in order to prevent the build of condensation in the exhaust
- B23 type connection is recommended, fit to the combustion air inlet the stainless steel terminal supplied. Correctly position this terminal in which the "blanked off" side must ALWAYS face upwards as shown below in order to ensure no water can directly enter the inside of the heater
- Make sure that air inlet and flue outlet connections have been done for each PCH module. Refer to the certified drawings for air inlet and flue outlet

The "blanked off" side must ALWAYS face upwards



12.5.4 Checks to be carried out before starting up the gas burner

The PCH heater unit is supplied with settings entered and tested for the gas specified on the nameplate. Before turning on the PCH unit, check the following:

1- Check that the gas used is the right type for the unit to be used.
2- Check that there is a shut-off isolation valve fitted at the gas inlet of the unit.
3- Isolate the appliance from the electrical mains supply and turn off the gas supply to the appliance at the isolation valve.
4- The whole of the gas service installation including the meter must be inspected, tested for soundness and purged in accordance with appropriate requirements.

NOTE: The soundness of gas burner pipework has been checked. However during installation, connections may have been loosened. Check the soundness of the appliance pipework using a suitable gas leak detection solution. If any leaks are found they must be rectified immediately.

CAUTION: Never use a flame for checking gas soundness.

5- Check, with the pressure intake "IN" on the gas valve, that the pressure entering the valve corresponds to that required for the type of gas being used;
6- Check that electrical connections match wiring diagrams attached to the unit;
7- Check that efficient earthing connections have been completed, carried out as specified by current safety regulations;
8- Turn on the gas and electrical supplies.
9- Operate the appliance via the touchpilot control at the maximum rate: Refer to the start up procedures in SETTING UP TOUCHPILOT CONTROL section Increase the set temperature (room set point temperature) to a temperature higher than the actual room temperature.
10- At first RDY apperars and when ON appears on the LCD display of PCH heater, the heater starts the ignition cycle.

NOTE: Frequently, when turned on for the first time, the pilot burner cannot ignite because there is air in the gas hose. This will lock out the equipment. You will need to reset the equipment and repeat the operation until it ignites.

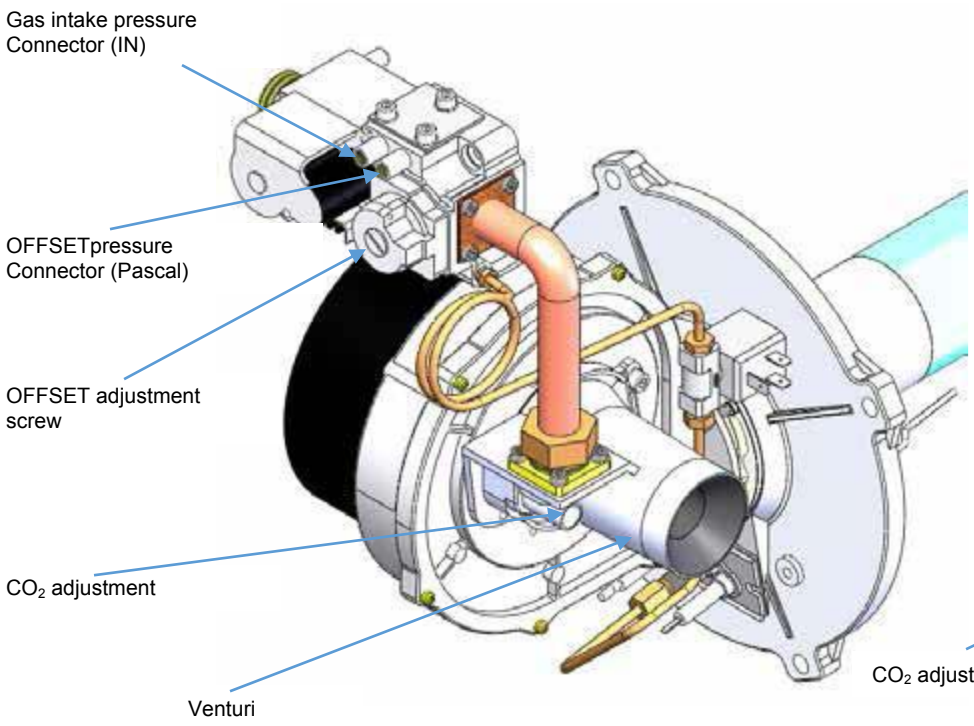
12.6 Combustion Analysis

The PCH heater is fitted with a burner that completely premixes air and gas. The air/gas mixing occurs inside the impeller on the motor-ventilator. The air taken into the impeller through the venturi tube, calibrated, creates a vacuum. The vacuum in the venturi is rebalanced by the gas valve, which is pneumatically controlled. The air pressure - gas pressure ratio is 1:1. This ratio can be corrected by turning the offset adjustment screw (on the gas valve). The heater is supplied with the offset regulated and the screw sealed. A second adjustment can be done with the screw on the venturi, which regulates the value of maximum gas capacity and determines the amount of carbon dioxide (CO_2) in the fumes. This adjustment is also made at the factory. The screw is not sealed to permit conversion to another type of gas, if desired. To adjust the level of CO_2;
Wait until the heater is on. Check that the heater is at maximum power. Use the LCD display of PCH heater to reach the REG menu, then use the Hi and Lo commands to force operation at maximum or minimum capacity.
At maximum power, check again that the input pressure in the valve corresponds to that required; adjust if required.
Perform the combustion analysis for each module to verify that the level of CO_2 corresponds to figures in the table given below
If the measured value is different, turn the adjustment screw on the venturi. Unscrewing the screw will raise the level of CO_2, screwing it down will lower the level.
Place the heater on minimum capacity, and verify that the level of CO_2 corresponds to figures in the table given below
If the figures do not match, turn the offset screw (screw down to raise and unscrew to lower) to adjust the level of CO_2 and repeat the procedure.

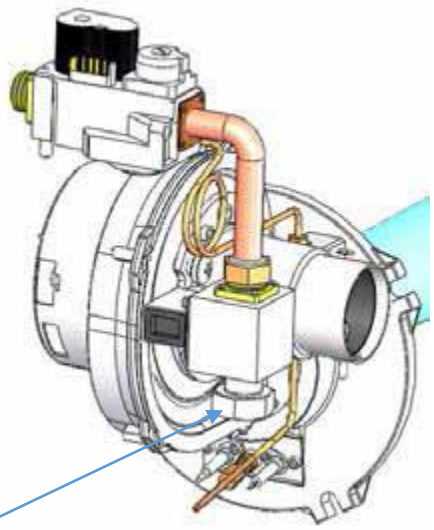
TYPE OF GAS G20					
TYPE OF EQUIPMENT		**PCH080**		**PCH105**	
Thermal		min	max	min	max
Category		according to the country of destination			
Air supply pressure	mbar	20 [min 17- max25] *			
Ø Pilot nozzle	mm	0.7			
Gas consumption (15°C -1013 mbar)	m3/h	1.74	8.68	1.90	10.58
Carbon dioxide - CO_2 content	%	8.7	9.1	8.5	9.1
Fumes temperature	°C	26.5	70.0	28.0	80.0
Fume mass flow rate (max)	kg/h	135		165	
Gas orifice plate	mm	12.2		15.8	
Air orifice plate	mm	Not required	Not required	Not required	Not required

* For Hungary, the air supply pressure is 25 mbar

PCH 080

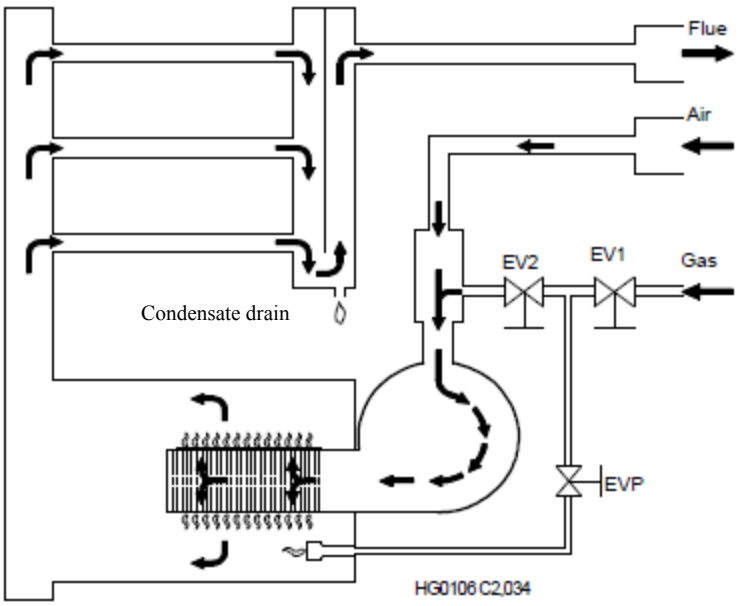


PCH 105

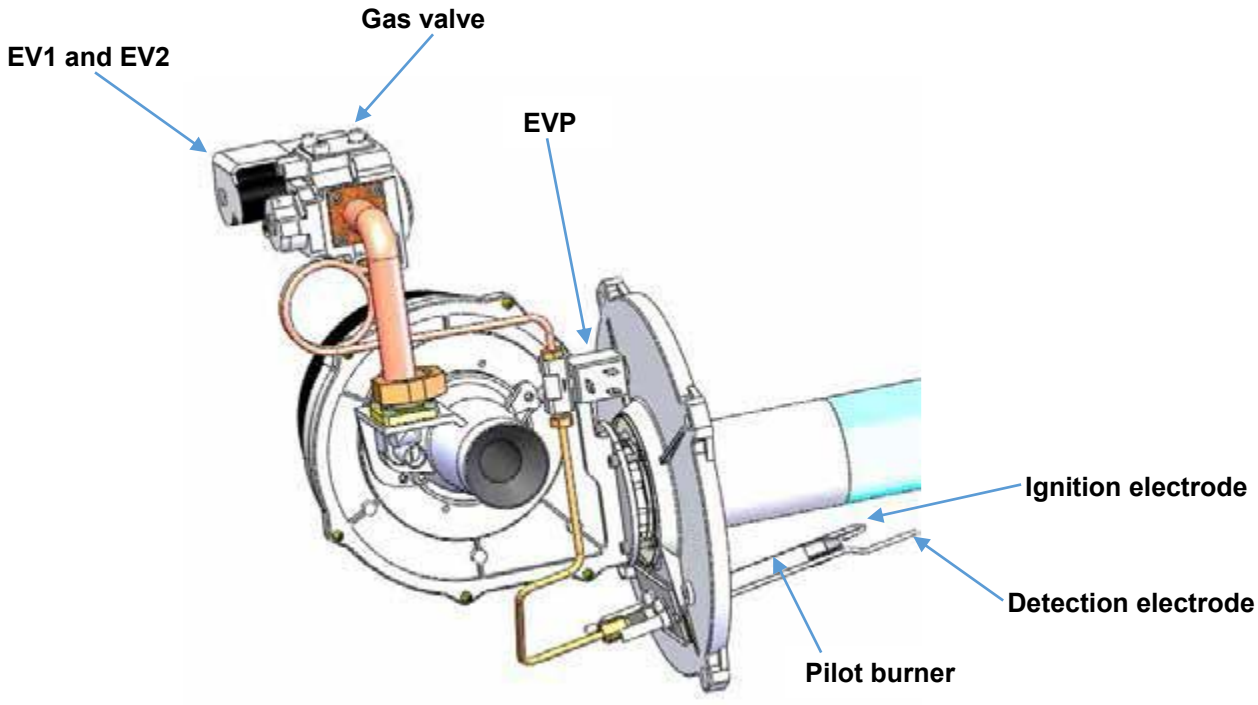


12.7 Operating sequence

If there is a call for heating, the operating sequence is as follows:
The equipment will immediately start the ventilating burner by pre-cleaning the combustion chamber for a preset length of time. After the pre-cleaning phase, the ignition phase starts: the equipment opens solenoid valve EV1 and, in parallel, solenoid valve EVP which supplies gas to the pilot burner. After detecting the pilot flame, the equipment opens the main gas valve EV2 to supply gas to the main burner. After a time of dual functioning of the two burners (pilot and main), the modulation PCB removes gas from the EVP valve and turns off the pilot burner. A single electrode detects the flame both for the pilot burner and the main burner. The ignition program lights the burner to obtain an intermediate level heat output, which corresponds to about 30% of the maximum output. Once the flame is stabilised for a few seconds at ignition power, the burner begins to modulate its output to reach maximum output, if required, in a variable length of time programmed into the modulation PCB.
During operation, the modulation PCB will regulate the heat output of the burner proportionally to the voltage (0-10 Vdc) coming from Touchpilot control based on heat demand.



When the heating demand is satisfied, signalled in a voltage lower than the preset limit (0.5 Vdc), the modulation PCB turns off the burner; the fan continues to ventilate the combustion chamber, post-wash, for a preset length of time. Opening the ON/OFF contact always causes the burner to stop without causing a fault.



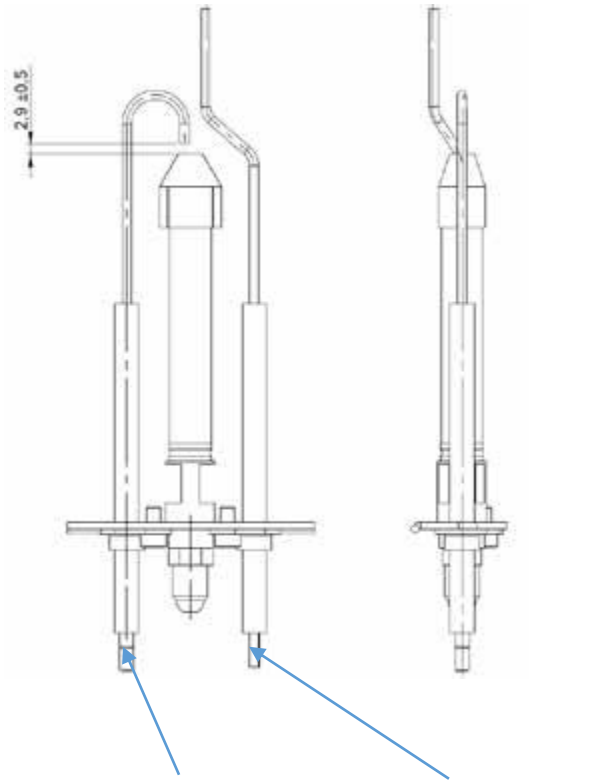
Important Note: The supply fan must be always ON before starting the heater and must be maintained ON for longer than three minutes after stopping the heater. This condition is always satisfied by the touchpilot control.

12.8 Maintenance operations
To keep the machine in efficient condition and guarantee a long lifetime of the heater, it is advisable to run some inspections every year, before turning it on for the season:

1) check the status of the start-up electrodes, detection electrodes and pilot flame;
2) check the status of fume exhaust and air intake ducts and terminals;
3) check the status of the venturi;
4) check and clean the exchanger and burner are clean;
5) check and clean the water trap
6) check the intake pressure at the gas valve;
7) check the function of the flame monitoring equipment;
8) check the safety thermostat(s);
9) check the ionization current.

NOTE: Operations at points 1, 2, 3, 4 and 5 must be performed after powering off the heater and closed the isolation shut-off valve. Operations at point 6, 7, 8 and 9 must be carried out with the heater on.

12.8.1 Inspection of electrodes
Dismantle the complete pilot flame and use a jet of compressed air to clean the mesh and nozzle. Check the integrity of the ceramic and use sandpaper to remove any oxidation on the metal parts of the electrodes. Check the correct position of the electrodes (see drawing below). It is important that the detection electrode is at a tangent to the head of the pilot and not inside it. The start-up electrode must discharge onto the mesh of the pilot burner



12.8.2 Inspection of fume exhaust and air intake ducts
Visually inspect where possible or examine with specific tools to learn the status of the ducts. Remove dust that forms on the air intake terminal.
12.8.3 Inspection and cleaning of the venturi
Remove any dirt at the mouth of the venturi with a brush, and be careful to not let it fall inside the piece.
12.8.4 Inspection and cleaning of the exchanger and burner
Perfect combustion in PCH heaters prevents dirt, which is normally caused by bad combustion. It is advisable, therefore, to not clean the exchanger and burner unless there are exceptional circumstances. An accumulation of dirt inside the exchanger could be revealed by a sizeable variation in the gas capacity that is not caused by improper functioning of the gas valve. Should it become necessary to clean the burner and/or exchanger, all of the gaskets mounted between the burner and the exchanger must be replaced.
12.8.5 Inspection and cleaning of the water trap
Clean the trap every year, and check the connections. Make sure there are no traces of metallic residue. If metallic residue has formed, increase the number of inspections.

12.8.6 Inspection of intake gas pressure
Verify that the intake pressure at the valve corresponds to the value required for the type of gas that you are using. This inspection must be done with the heater on at maximum heat output.
12.8.7 Inspection of flame monitoring equipment
With the heater operating, close the gas shut-off valve and check that the machine is locked out; this is indicated on the LCD display on the CPU PCB on the machine with code F10. Reopen the gas shut-off valve, reset the lockout and wait for the heater to restart.
12.8.8 Inspection of the safety thermostat(s);
This procedure must be done with the heater operational and the burner on. Open the set of thermostats with an insulated tool [230 V], remove the fast-on from the safety thermostat, wait for the F20 lockout signal to appear on the LCD display on the CPU PCB on the machine. Close the set of thermostats again, then reset the lockout.
12.8.9 Inspection of the ionization current
This procedure can be done directly from the LCD display by entering the I/O menu. The IOn parameter indicates the value of the ionization current, and the reading is as follows:

- 100, indicates that the value is more than 2 microAmperes, which is plenty for the equipment to function;
- from 0 to 100, indicates a value from 0 to 2 microAmperes; for example, 35 corresponds to 0.7 microAmperes, which is the minimum threshold detectable for the flame monitoring equipment.
- The value of the ionisation current must not be below 2 micro-Amperes. Lower values indicate: the detection electrode in a bad position, an rusted electrode or one about to fail.

12.9 Control of PCH heater

The PCH heater is fitted as standard with a multifunction LCD panel located inside the burner housing, which is used to control, configure and diagnose all operating parameters of the equipment. The instrument panel is fitted with a red 3 digit LCD display and four function keys: ↑ , ↓ , ESC and ENTER; the display allows the user to view the heater operating mode and its faults. It allows our service centre to change the main operating parameters.

12.9.1 Viewing the machine status
The machine status is shown on the display by the following wordings:
rdy : the machine is on without burner flame, it is waiting for the ON control and/or the heat demand
On : the machine is on with burner flame or is in the ignition phase;
OFF : the machine is turned off by the control on the LCD. Any heat demands will be ignored. To light the burner, the LCD must show "operation ON";
Fxx Fault detected. During normal operation, the display will show the writing **On** if the burner is on; **rdy** when the heater is being switched off or the room temperature has been reached.

12.9.2 List of faults and reset
The modulation PCB allows the operator to identify more than thirty different causes of faults. This makes it possible to manage each event very precisely. To reset the lockout, press both arrows simultaneously for a few seconds.
A complete list of faults, possible causes and possible solutions is shown below.

FAULT	DESCRIPTION	CAUSE	REMEDY
Lockouts caused by Flame - Related to the TER equipment			
F10	Failure to ignite flame after 4 attempts performed by the equipment.	• Phase and neutral reversed. • Earth wire not connected.	Manual reset
F11	Ill-timed flame (Flame detection before the ignition of the piot group)	• Phase-phase connection without neutral. • Start-up electrode failed or badly positioned • Detection electrode failed or badly positioned	
F12	Failure of ignition; not visible. The count, displayed in the historical list, indicates whether the heater has had problems with ignition.	• Detection electrode that moves or disperses to the earthing system when hot. • Condensate detection electrode defective or in contact with the ground • Low CO2 value	
F13	The TER equipment does not accept the reset command from CPU-SMART	TER has finished its 5 reset attempts in the period of 15 minutes.	Wait 15 minutes or use reset button on equipment
F14	Lack of communication between TER equipment and CPU for more than 60 seconds	TER equipment or CPU-SMART PCB broken	Auto-reset
F15	The CPU-SMART PCB sent the ignition signal to the equipment. After 300 seconds, the equipment has not yet lit the flame.	Safety thermostat blocking start up	Check contact closing
		• No mains gas pressure • Live and neutral reversed. • No or faulty earth terminals • TER equipment broken	Manual reset
F16	Generic equipment block	TER equipment broken	Manual reset
F17	Internal malfunction of TER equipment that does not accept reset command from CPU-SMART	TER equipment broken	Manual reset of equipment
Lockouts caused by temperature (safety blocks)			
F20	Activation of safety thermostat STB	• Excess air temperature due to lack of air circulation • Safety thermostat broken or not connected	Manual reset
F21	Input ID1 open caused by: NOT USED - Jumped	ID1 - IDC1 jumper missing	Manual reset of CPU-SMART
FAN lockout - burner ventilator			
F30	Fan speed too low in start up phase - VAG	Burner fan broken. FAN electrical cables broken or not connected	Manual reset
F31	Fan speed too high in start up phase - VAG		
F32	Fan speed, during operation, out of minimum and maximum set parameters - VAG		Manual reset, auto- reset after 5 minutes
NTC probes broken or missing			
F41	Probe NTC1 error, air intake temperature	Absence of signal from probe or broken probe	Auto-reset
Over-temperature			
F51	Temperature of the air intake probe NTC1>TH1	• The minimum heat output of the PCH heater module is over-dimensioned compared to the heat output required by the environment. • Check the TH1 parameter - air intake set point.	Auto-reset if NTC1< TH1-15
Check ModBus communication			
F60	Communication error between CPU-SMART PCB and ModBus network, SmartControl or SMART.NET	• ModBus network is disconnected. • The address of the PCB is wrong and/or not configured in the ModBus network.	Auto-reset
Lack of voltage			
F75	No voltage during operation cycle (excluding stand-by); the fault is not visible on remote control but only counted.	No voltage during operation	Auto-reset
Internal malfunction of CPU-SMART PCB			
F00	Internal malfunction of CPU-SMART PCB	Perform a manual reset of the PCB; replace the CPU-SMART if the problem persists.	Manual reset

IMPORTANT –

Following any operation on the appliance which has necessitated removal and replacement of any parts, the appliance shall be re-commissioned in accordance with the commissioning section of these instructions.

13. OPTIONS

13.1 - Electric heaters

Shielded electric resistance heaters are fully factory-wired and tested. Each stage is protected against overloads by two thermal protectors. The low-limit protector with automatic reset is located above the resistance heaters while the high-limit protector with manual reset is located in the heater control box. This high-temperature limit control offers overload protection and is set to 90°C. It is located less than 150 mm after electric heaters. Refer to the certified drawings and wiring diagrams for the electric heaters and to the Touch Pilot Control IOM for further information.

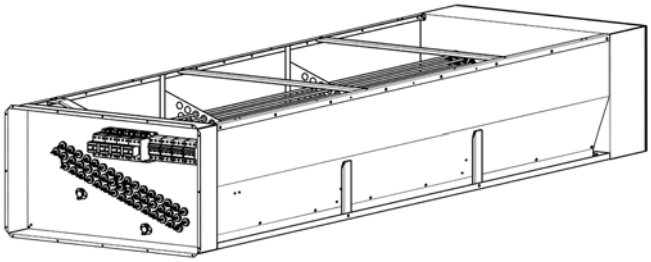
The electric heater data is as follows:

The air flow limits are the min. and max. values given in the table below:

50UA/UH	Electric heater air flows, l/s	
	Minimum	Maximum
135	5456	8184
160	5736	8604
180	7264	10896
205	7336	11004

50UA/UH	Nominal power supply, V-ph-Hz	Electric heater	Nominal heat output, kW	Minimum/maximum heat output, kW	Rated current, A	No. of steps
135 (4-stages heating)	400-3-50	Opt 174	45.0	9.0 / 45.0	65.0	4
		Opt 175	72.0	18.0 / 72.0	103.9	4
		Opt 176	108.0	27.0 / 108.0	155.8	4
160 (4-stages heating)	400-3-50	Opt 174	45.0	9.0 / 45.0	65.0	4
		Opt 175	72.0	18.0 / 72.0	103.9	4
		Opt 176	108.0	27.0 / 108.0	155.8	4
180 (4-stages heating)	400-3-50	Opt 177	54.0	9.0 / 54.0	77.9	4
		Opt 178	90.0	18.0 / 90.0	130.0	4
		Opt 179	144.0	36.0 / 144.0	207.8	4
205 (4-stages heating)	400-3-50	Opt 177	54.0	9.0 / 54.0	77.9	4
		Opt 178	90.0	18.0 / 90.0	130.0	4
		Opt 179	144.0	36.0 / 144.0	207.8	4

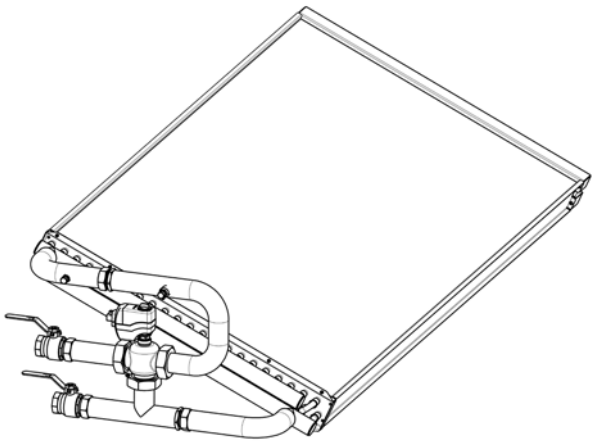
Fig. 13 - Electric heater option



13.2 - Hot-water coil

The hot-water coils offer a fully modulating proportional three-way valve as standard, with supply air temperature-based control. They also include two isolating shut-off valves and are factory-fitted, wired and fully factory-tested. Frost protection is provided by a low-temperature sensor and the coils are equipped with a purge system. Refer to the certified drawings and wiring diagrams for the water and electrical connections of the hot-water coil and to the Touch Pilot Control IOM for further information.

Fig. 14 - Hot-water coil option



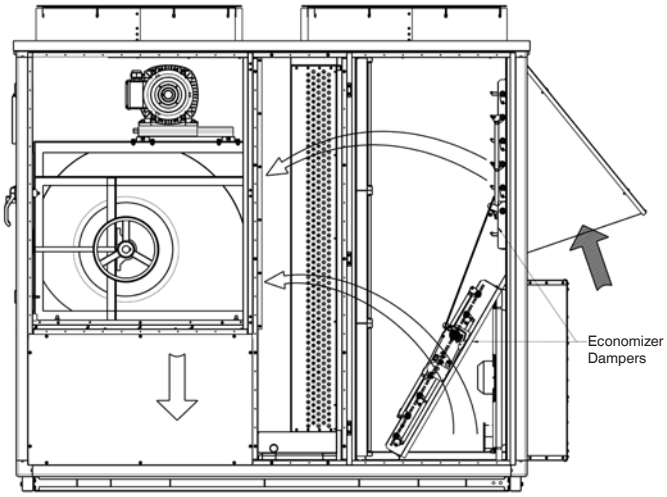
13.3 - Economizer options (thermostatic or enthalpic)

When the outdoor conditions are maintained based on temperature or enthalpy (depending on the option fitted), free cooling can be provided using fresh air. The economizer is factory-fitted and tested before leaving the factory (see Fig. 15).

The return air damper is operated by a 24 V actuator, and the fresh air damper is mechanically linked to this damper to open or close at opposite angles. During start-up, the return air damper is fully open, while the fresh air damper is fully closed.

The option also includes a factory-fitted fresh air hood that is folded during transportation to limit risks of damage and must be unfolded on site. Please refer to the certified drawings and wiring diagrams for the mechanical and electrical connections of the economizer and to the Touch Pilot Control IOM for further information.

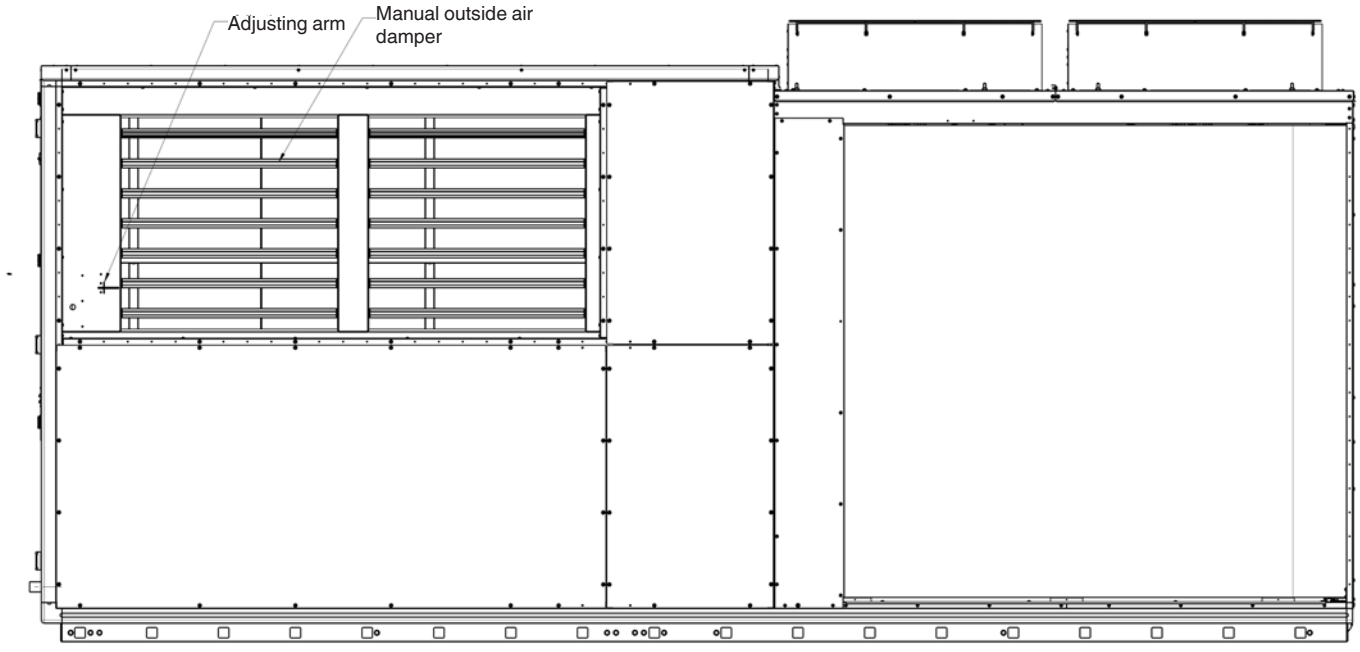
Fig. 15 – Economizer option



13.4 - Manual outside air damper

Damper with direct link driven blades, can be preset to admit up to 40% outside air into the return-air compartment. To adjust, loosen the securing screw and rotate the arm of the damper blades to the desired setting. Then retighten the screw to secure the damper blades (see Fig.16). It also includes a factory-fitted fresh air hood.

Fig. 16 –Manual outsider air damper option without fresh air hood



13.5 - Economizer with CO_2 sensor options (thermostatic or enthalpic)

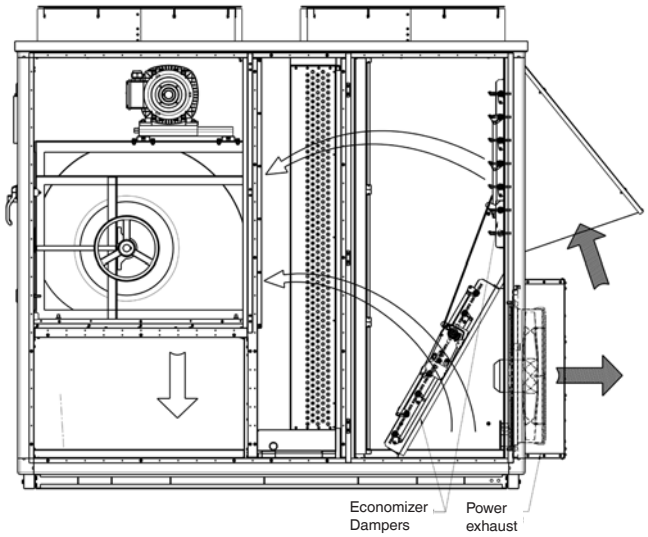
The indoor air quality is controlled by the Touch Pilot control via the input from the CO_2 sensor, adjusting the economizer. Please refer to the Touch Pilot IOM for the control logic. The room air CO_2 sensor, together with the connector, is in the control box. Please refer to the wiring diagrams for the required connection and correct cable diameter selection criteria. Sensor locations vary with system and building specifics.

13.6 - Power exhaust option

When a large amount of fresh air is introduced into the zone, power exhaust fans can be used to exhaust excessive air.

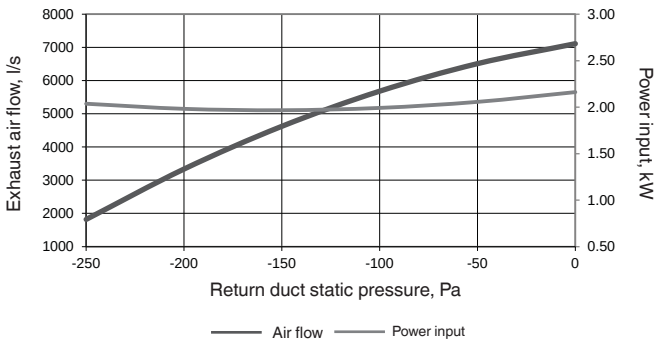
The exhaust fan runs when the outside air dampers are at least 50% open (adjustable value). It is overload protected. The exhaust fan is factory-fitted and tested before leaving the factory (see Fig. 17). Refer to the certified drawings and wiring diagrams for the mechanical and electrical connections of the power exhaust and to the Touch Pilot Control IOM for further information.

Fig. 17 – Power exhaust option

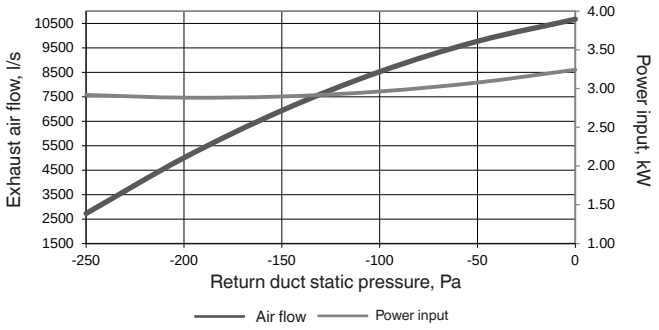


The power exhaust performance curves are shown below:

UA/UH 135 - 160 Power exhaust performance



UA/UH 180 - 205 Power exhaust performance



13.7 - Dirty filter detection option

Dirty filter detection is controlled from the Touch Pilot control via the input from the differential pressure switch, checking the pressure drop across the filter. The factory setting is 250 Pa and it is adjustable. If the pressure drop across the filter exceeds 250 Pa, there will be an alarm on the Touch Pilot control and the necessary actions will be taken. For mechanical and electrical connections of this option please refer to the certified drawings and wiring diagrams, and to the Touch Pilot Control IOM for further information.

13.8 - Supply air flow detection option

The supply air flow detection is controlled by the Touch Pilot control via the input from the differential pressure switch, checking the pressure drop between the return air side and the atmosphere. The factory setting is 20 Pa. If the pressure drop between the return air side and the atmosphere does not reach 20 Pa , there will be an alarm on the Touch Pilot control and the necessary actions will be taken. For mechanical and electrical connections of this option please refer to the certified drawings and wiring diagrams, and to the Touch Pilot Control IOM for further information.

13.9 - Smoke detector option

The smoke detector is factory- fitted in return air side. If smoke is detected, there will be an alarm on the Touch Pilot control and the necessary actions will be taken. For mechanical and electrical connections of this option please refer to the certified drawings and wiring diagrams, and to the Touch Pilot Control IOM for further information.

13.10 - Smoke detector + DAD option

The DAD is factory-fitted under the control board and its smoke detector is located in the return air side. If smoke is detected, there will be an alarm on the Touch Pilot control and the necessary actions will be taken. This smoke detection option complies with French regulations for public buildings. For mechanical and electrical connections of this option please refer to the certified drawings and wiring diagrams, and to the Touch Pilot Control IOM for further information.

13.11 - Fire thermostat option

The fire thermostat is factory-fitted in the return air stream and checks the return air temperature. The factory setting is 70°C and adjustable. If the return air temperature exceeds 70°C, there will be an alarm on the Touch Pilot control and the necessary actions will be taken. For mechanical and electrical connections of this option please refer to the certified drawings and wiring diagrams, and to the Touch Pilot Control IOM for further information.

13.12 - Duct connection

Fixation frame allows easy duct connection for inlet and outlet ducts when the roofcurb accessories are not selected. but this option is also required when the roofcurb accessories are selected.
The standard unit is bottom supply and return, but it is possible to select side supply or return as an option (See Fig. 5).

13.13 - Variable Air Volume

This option provides wide range of supply air flow and reduction in supply fan power consumption when needed. Variable Air Volume option includes two fixed-speed pulleys with variable frequency drive (VFD).
Variable frequency drives contain high voltage when connected to the rooftop unit mains. Installation, start-up and maintenance should only be performed by qualified personnel. Failure to comply could result in death or serious injury.

Frequency drive configuration is prepared to communicate with Touch Pilot control in the factory to be configured specifically for the customer machine. Touch Pilot is selecting the configuration for each unit depending on the fan and motor sizes. Do not attempt to make any change on VFD.

Airflow calibration shall be done during commissioning. Please refer to the Touch Pilot Control IOM for further information.

For mechanical and electrical connections of this option please refer to the certified drawings and wiring diagrams, and to the Touch Pilot Control IOM for further information

48/50UA/UH			135	160	180	205
Fan diameter		mm	508	508	508	508
Motor quantity			2	2	3	3
Nominal motor power		kW	7,5	7,5	7,5	7,5
Drive type			VFD Belt driven	VFD Belt driven	VFD Belt driven	VFD Belt driven
VFD nominal power		kW	15	15	22	22
Minimum airflow		l/s	5456	5736	7264	7336
		m^3/h	19642	20650	26150	26410
Maximum airflow		l/s	8184	8604	10896	11004
		m^3/h	29462	30974	39226	39614
Fan speed						
	minimum	rpm	272	272	287	287
	maximum	rpm	1135	1135	1195	1195

48/50 UA/UH 135-160 VAV option

l/s	Unit External Static Pressure (Pa)																							
	140		175		210		245		315		410		530		650		770		925		995		1065	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
5.000	504	2,596	535	2,869	565	3,152	595	3,444	660	4,144	725	4,928	810	6,093	888	7,313	961	8,578	1048	10,275	1085	11,064	1121	11,862
5.400	524	3,075	553	3,360	582	3,658	610	3,962	665	4,602	735	5,515	818	6,733	895	8,008	966	9,333	1052	11,107	1089	11,932	1125	12,766
5.800	544	3,605	572	3,904	599	4,214	626	4,532	678	5,199	745	6,150	826	7,418	901	8,749	971	10,129	1056	11,977	1093	12,835	1128	13,705
6.200	566	4,218	592	4,530	618	4,854	643	5,187	693	6,095	758	6,867	836	8,185	909	9,568	978	11,004	1062	12,926	1098	13,818	1133	14,722
6.600	589	4,902	614	5,228	638	5,563	662	5,911	709	6,627	771	7,653	846	9,019	918	10,453	985	11,941	1068	13,935	1103	14,858	1138	15,795
7.000	613	5,669	636	6,007	659	6,356	682	6,716	727	7,461	786	7,991	859	9,935	928	11,419	994	12,957	1075	15,021	1110	15,977	1144	16,948
7.400	636	6,512	658	6,865	680	7,229	702	7,600	745	8,372	802	9,470	872	10,930	939	12,459	1003	14,048	1082	16,179	1117	17,166	1150	18,168
7.800	661	7,449	682	7,816	702	8,195	723	8,581	764	9,379	819	10,510	886	12,015	951	13,590	1014	15,230	1091	17,425	1125	18,444	1158	19,477
8.200	685	8,475	705	8,856	725	9,247	745	9,645	784	10,469	837	11,639	901	13,188	964	14,810	1025	16,495	1100	18,755	1133	19,803	1166	20,867
8.600	710	9,602	729	9,997	748	10,402	767	10,815	805	11,666	855	12,869	918	14,463	978	16,131	1037	17,864	1111	20,186	1143	21,263	1175	22,356
9.000	735	10,824	754	11,234	772	11,654	790	12,080	826	12,957	874	14,197	935	15,836	993	17,547	1051	19,326	1122	21,708	1154	22,813	1185	23,935
9.400	761	12,157	778	12,584	796	13,015	813	13,456	848	14,362	894	15,637	952	17,320	1009	19,077	1065	20,901	1135	23,343	1165	24,474	1196	25,625

48/50 UA/UH 180 VAV option

l/s	Unit External Static Pressure (Pa)																									
	140		245		315		410		470		530		590		650		770		830		950		1055		1105		1180	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7.000	519	3,880	613	5,191	670	6,128	743	7,457	786	8,327	828	9,224	867	10,135	905	11,068	977	12,980	1011	13,959	1077	15,983	1.131	17,786	1.156	18,656	1.192	19,982
7.400	534	4,391	624	5,751	680	6,722	751	8,100	794	9,003	834	9,929	873	10,874	911	11,841	982	13,820	1016	14,836	1081	16,890	1.135	18,750	1.159	19,650	1.196	21,013
7.800	549	4,918	636	6,322	690	7,323	759	8,749	801	9,679	841	10,635	880	11,610	917	12,607	987	14,649	1021	15,695	1085	17,831	1.139	19,747	1.163	20,673	1.199	22,081
8.200	564	5,482	647	6,934	700	7,965	768	9,433	809	10,415	848	11,378	886	12,383	923	13,410	992	15,512	1026	16,587	1090	18,809	1.143	20,781	1.167	21,733	1.203	23,182
8.600	580	6,143	662	7,644	712	8,708	778	10,224	817	11,214	856	12,230	893	13,264	929	14,321	998	16,490	1031	17,599	1094	19,844	1.147	21,871	1.172	22,850	1.207	24,340
9.000	596	6,815	674	8,361	723	9,459	787	11,012	826	12,032	864	13,074	901	14,138	936	15,224	1004	17,450	1037	18,593	1100	20,915	1.152	22,999	1.176	24,007	1.211	25,535
9.400	612	7,536	687	9,126	735	10,254	797	11,849	836	12,894	873	13,966	909	15,056	943	16,173	1011	18,458	1043	19,627	1105	22,036	1.157	24,172	1.181	25,206	1.216	26,774
9.800	630	8,383	702	10,023	748	11,184	809	12,823	846	13,899	883	14,997	918	16,121	952	17,263	1018	19,612	1050	20,815	1111	23,238	1.163	25,434	1.186	26,491	1.221	28,100
10.200	646	9,224	716	10,911	761	12,099	820	13,779	857	14,881	892	16,009	927	17,159	960	18,328	1025	20,732	1057	21,961	1117	24,470	1.168	26,718	1.192	27,805	1.226	29,452
10.600	663	10,135	731	11,867	775	13,085	832	14,810	868	15,934	902	17,088	936	18,264	969	19,463	1033	21,924	1064	23,182	1.124	25,777	1.174	28,078	1.198	29,187	1.232	29,739
11.000	681	11,162	746	12,943	789	14,190	845	15,960	879	17,114	913	18,294	946	19,496	979	20,725	1042	23,246	1072	24,534	1.131	27,137	1.181	29,486	1.204	30,624	1.238	32,346
11.400	699	12,207	762	14,033	803	15,314	858	17,121	892	18,302	925	19,508	957	20,740	989	21,995	1050	24,568	1.080	25,886	1.138	28,571	1.188	30,976	1.210	32,137	1.244	33,896

13.13.1 - Fan performances 50UA-UH with Variable Air Volume supply fan (continued)

48/50 UA/UH 205 VAV option

l/s	Unit External Static Pressure (Pa)																							
	140		175		245		315		410		530		650		770		890		1040		1120		1200	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7.000	497	3,600	529	4,011	592	4,881	651	5,799	725	7,114	811	8,861	890	10,691	963	12,592	1031	14,556	1111	17,110	1151	18,499	1190	19,911
7.400	510	4,063	541	4,492	602	5,392	659	6,341	731	7,704	816	9,511	894	11,404	967	13,369	1034	15,400	1113	17,999	1154	19,433	1192	20,886
7.800	523	4,541	553	4,981	611	5,908	667	6,890	738	8,290	821	10,157	898	12,106	970	14,130	1037	16,222	1116	18,921	1156	20,393	1195	21,890
8.200	537	5,056	566	5,508	622	6,464	676	7,476	745	8,917	828	10,837	903	12,842	974	14,926	1040	17,077	1119	19,874	1158	21,390	1.197	22,928
8.600	552	5,661	579	6,132	633	7,117	686	8,156	753	9,642	833	11,617	908	13,686	978	15,829	1044	18,048	1122	20,878	1161	22,439	1.200	24,019
9.000	566	6,277	593	6,759	645	7,775	696	8,843	761	10,366	840	12,394	913	14,515	983	16,718	1048	18,992	1125	21,924	1164	23,522	1.203	25,146
9.400	581	6,938	607	7,435	657	8,477	706	9,571	770	11,136	847	13,212	919	15,389	987	17,648	1052	19,978	1129	23,007	1.168	24,646	1.206	26,311
9.800	597	7,707	622	8,219	671	9,291	718	10,415	780	12,021	855	14,153	926	16,386	993	18,705	1057	21,095	1133	24,153	1.172	25,833	1.209	27,540
10.200	613	8,484	637	9,011	684	10,109	730	11,262	790	12,902	863	15,086	933	17,372	999	19,743	1062	22,189	1.137	25,344	1.176	27,066	1.213	28,810
10.600	629	9,309	652	9,851	697	10,979	742	12,159	800	13,839	872	16,068	940	18,402	1005	20,830	1068	23,332	1.142	26,580	1.180	28,343	1.217	30,128
11.000	646	10,265	668	10,822	712	11,979	755	13,189	812	14,907	882	17,189	949	19,579	1013	22,058	1074	24,620	1.147	27,891	1.185	29,691	1.221	31,517
11.400	662	11,203	683	11,774	725	12,958	767	14,198	823	15,953	891	18,283	956	20,721	1019	23,249	1.080	25,863	1.152	29,232	1.189	31,069	1.226	32,932

Out of fan scope

13.14 Return air fan options

This option assists the supply air fan to overcome the return side pressure drop while running in series with the supply air fan.
Return air fans are inside a vertical roofcurb to be located under the rooftop unit and the exhaust damper is on the rooftop unit.
The exhaust damper can be manually or automatically adjusted, based on the fresh air options.
The return air fan is shipped loose, but submitted to functional tests before leaving the factory. (see Fig. 18)
The drive is factory-set in accordance with the return fan performance tables.
If indoor pressure and air flow requirements differ from the nominal ratings, the motor pulley can be adjusted for different available static pressure values (see chapter 7.8 "Indoor fan air flow adjustment").
Refer to the certified drawings and wiring diagrams for the mechanical and electrical connections of return air fan.
On the following page, you will find the "Return air fan performance" and "Fan speed at various motor pulley settings" tables
It is also possible to run with VAV option. In this case, airflow calibration shall be done during commissioning. Please refer to the Touchpilot Control IOM for further information

RETURN FAN VAV INFORMATION

Option No.		**205**	**206**
Fan diameter	mm	457	457
Motor quantity		2	3
Nominal motor power	kW	5,5	5,5
Drive type		VFD Belt driven	VFD Belt driven
VFD nominal power	kW	11	15
Fan speed			
minimum	rpm	242	242
maximum	rpm	1009	1009

Return Fan - Opt 196 & Opt 198 - High pressure - 135-160

l/s	Unit External Static Pressure (Pa)																			
	320		365		410		455		500		545		590		635		680		725	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
5200	713	4,385	748	4,732	783	5,087	816	5,448	849	5,814	882	6,189	913	6,566	944	6,951	974	7,340	1004	7,736
5500	725	4,882	759	5,243	792	5,611	825	5,984	857	6,366	888	6,753	919	7,144	949	7,543	979	7,946	1008	8,356
5800	738	5,424	771	5,797	803	6,179	835	6,569	866	6,962	896	7,363	926	7,769	956	8,181	985	8,598	1.013	9,020
6100	753	6,016	784	6,403	815	6,799	846	7,200	876	7,608	906	8,023	935	8,442	963	8,868	991	9,297	1.019	9,733
6400	768	6,659	798	7,060	828	7,468	858	7,883	887	8,304	916	8,733	944	9,167	972	9,605	999	10,050	1.026	10,499
6700	784	7,356	813	7,771	842	8,193	871	8,621	899	9,055	927	9,498	954	9,943	981	10,397	1008	10,854	1.034	11,317
7000	801	8,109	829	8,538	857	8,973	884	9,414	912	9,863	939	10,318	965	10,777	992	11,243	1.018	11,716	1.043	12,191
7300	818	8,920	845	9,362	872	9,812	899	10,266	925	10,728	952	11,196	977	11,669	1003	12,149	1.028	12,634	1.053	13,125
7600	836	9,793	862	10,248	888	10,711	914	11,180	940	11,655	965	12,138	990	12,625	1.015	13,116	1.040	13,615	1.064	14,118
7900	854	10,730	880	11,198	905	11,674	930	12,158	955	12,645	979	13,142	1.004	13,643	1.028	14,148	1.052	14,659	1.076	15,176
8200	873	11,732	898	12,214	922	12,706	946	13,200	971	13,703	994	14,211	1.018	14,726	1.042	15,246	1.065	15,770	1.088	16,301
8500	893	12,804	916	13,300	940	13,804	964	14,314	987	14,829	1.010	15,351	1.033	15,880	1.056	16,413	1.079	16,952	1.101	17,494
8800	912	13,946	935	14,456	958	14,973	981	15,498	1004	16,026	1026	16,562	1049	17,103	1071	17,651	1093	18,203	1115	18,760

Return Fan - Opt 197 & Opt 199 - High pressure - 180-205

l/s	Unit External Static Pressure (Pa)																			
	420		455		490		525		560		595		630		665		700		735	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7100	778	6,648	805	7,046	832	7,448	858	7,857	884	8,270	909	8,689	934	9,112	658	9,542	982	9,972	1006	10,409
7500	784	7,259	811	7,668	837	8,088	863	8,511	888	8,937	913	9,371	937	9,811	961	10,251	985	10,699	1008	11,150
7900	792	7,920	818	8,343	844	8,776	869	9,213	894	9,654	918	10,101	942	10,552	965	11,010	988	11,471	1.011	11,936
8300	801	8,630	826	9,070	851	9,517	875	9,968	900	10,423	923	10,884	947	11,349	970	11,821	992	12,296	1.015	12,778
8700	810	9,398	835	9,853	859	10,311	883	10,776	907	11,247	930	11,723	952	12,202	975	12,687	997	13,177	1.019	13,673
9100	821	10,223	845	10,692	868	11,164	891	11,642	914	12,128	937	12,618	959	13,110	981	13,610	1003	14,117	1.024	14,624
9500	832	11,108	855	11,590	878	12,079	901	12,572	923	13,068	945	13,572	967	14,082	988	14,596	1009	15,113	1.030	15,637
9900	844	12,058	866	12,555	889	13,054	910	13,561	932	14,075	954	14,592	975	15,113	996	15,641	1.017	16,176	1.037	16,710
10300	856	13,072	878	13,582	900	14,096	921	14,617	942	15,145	963	15,676	984	16,214	1005	16,752	1.025	17,301	1.045	17,850
10700	870	14,155	891	14,680	912	15,207	933	15,742	953	16,284	973	16,829	994	17,378	1.014	17,934	1.034	18,496	1.053	19,059
11100	883	15,309	904	15,847	924	16,389	944	16,938	965	17,493	984	18,052	1004	18,615	1024	19,185	1043	19,762	1062	20,338

Out of fan scope

FAN RPM AT MOTOR PULLEY SETTINGS - RETURN FAN*

	MOTOR PULLEY TURNS OPEN										
Option no	***0***	***1/2***	***1***	***1-1/2***	***2***	***2-1/2***	***3***	***3-1/2***	***4***	***4-1/2***	***5***
196/198	1.009	995	980	966	952	938	923	909	895	880	866
197/199	1.009	995	980	966	952	938	923	909	895	880	866

*Approximate fan rpm shown.

Note: Factory settings are shaded.

Return air fan performances

Return Fan - Opt 205 - VAV - 135-160

l/s	Unit External Static Pressure (Pa)													
	140		185		230		275		320		365		410	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
5200	564	3,173	602	3,495	640	3,829	677	4,170	713	4,521	748	4,879	783	5,244
5500	583	3,630	619	3,966	655	4,312	690	4,667	725	5,033	759	5,405	792	5,784
5800	602	4,134	637	4,485	671	4,845	705	5,215	738	5,592	771	5,977	803	6,371
6100	622	4,687	656	5,052	688	5,427	721	5,811	753	6,202	784	6,601	815	7,010
6400	643	5,294	675	5,674	706	6,063	737	6,459	768	6,865	798	7,279	828	7,699
6700	664	5,955	694	6,349	725	6,753	754	7,163	784	7,584	813	8,011	842	8,446
7000	685	6,673	715	7,082	743	7,500	772	7,925	801	8,360	829	8,802	857	9,251
7300	707	7,454	735	7,877	763	8,309	791	8,749	818	9,196	845	9,652	872	10,116
7600	729	8,295	756	8,732	783	9,179	810	9,635	836	10,096	862	10,565	888	11,043
7900	751	9,200	777	9,654	803	10,116	829	10,584	854	11,062	880	11,545	905	12,035
8200	774	10,176	799	10,644	824	11,120	849	11,605	873	12,095	898	12,592	922	13,099
8500	797	11,221	821	11,706	845	12,196	869	12,693	893	13,200	916	13,712	940	14,230
8800	819	12,340	843	12,837	866	13,344	889	13,856	912	14,377	935	14,903	958	15,436

l/s	Unit External Static Pressure (Pa)													
	455		500		545		590		635		680		725	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
5200	816	5,616	849	5,993	882	6,380	913	6,769	944	7,166	974	7,567	1004	7,975
5500	825	6,169	857	6,563	888	6,961	919	7,365	949	7,776	979	8,191	1008	8,614
5800	835	6,772	866	7,178	896	7,591	926	8,009	956	8,434	985	8,864	1.013	9,299
6100	846	7,423	876	7,843	906	8,271	935	8,703	963	9,143	991	9,585	1.019	10,034
6400	858	8,127	887	8,561	916	9,003	944	9,450	972	9,902	999	10,361	1.026	10,824
6700	871	8,888	899	9,335	927	9,791	954	10,250	981	10,718	1008	11,189	1.034	11,667
7000	884	9,705	912	10,168	939	10,637	965	11,110	992	11,590	1.018	12,078	1.043	12,568
7300	899	10,584	925	11,060	952	11,542	977	12,030	1003	12,525	1.028	13,025	1.053	13,531
7600	914	11,526	940	12,016	965	12,513	990	13,015	1.015	13,522	1.040	14,036	1.064	14,555
7900	930	12,535	955	13,037	979	13,548	1.004	14,065	1.028	14,586	1.052	15,112	1.076	15,645
8200	946	13,608	971	14,127	994	14,651	1.018	15,182	1.042	15,717	1.065	16,258	1.088	16,806
8500	964	14,757	987	15,287	1.010	15,826	1.033	16,371	1.056	16,921	1.079	17,476	1.101	18,036
8800	981	15,977	1004	16,522	1026	17,075	1049	17,632	1071	18,196	1093	18,766	1115	19,340

Return Fan - Opt 206 - VAV - 180-205

l/s	Unit External Static Pressure (Pa)													
	140		210		280		350		420		455		490	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7100	536	3,827	600	4,537	662	5,279	721	6,053	778	6,853	805	7,264	832	7,679
7500	551	4,342	613	5,077	672	5,852	729	6,652	784	7,484	811	7,906	837	8,338
7900	568	4,908	626	5,672	684	6,471	739	7,304	792	8,165	818	8,601	844	9,048
8300	585	5,524	641	6,320	696	7,149	749	8,010	801	8,896	826	9,350	851	9,812
8700	602	6,201	656	7,026	709	7,884	760	8,774	810	9,689	835	10,158	859	10,630
9100	620	6,936	672	7,790	723	8,677	772	9,595	821	10,540	845	11,022	868	11,509
9500	638	7,733	688	8,615	737	9,531	785	10,478	832	11,451	855	11,948	878	12,453
9900	657	8,594	705	9,505	752	10,453	741	9,033	844	12,431	866	12,943	889	13,458
10300	676	9,520	722	10,464	767	11,440	812	12,446	856	13,476	878	14,002	900	14,532
10700	695	10,518	739	11,494	783	12,500	827	13,534	870	14,593	891	15,134	912	15,678
11100	714	11,588	757	12,593	800	13,631	842	14,694	883	15,782	904	16,337	924	16,896

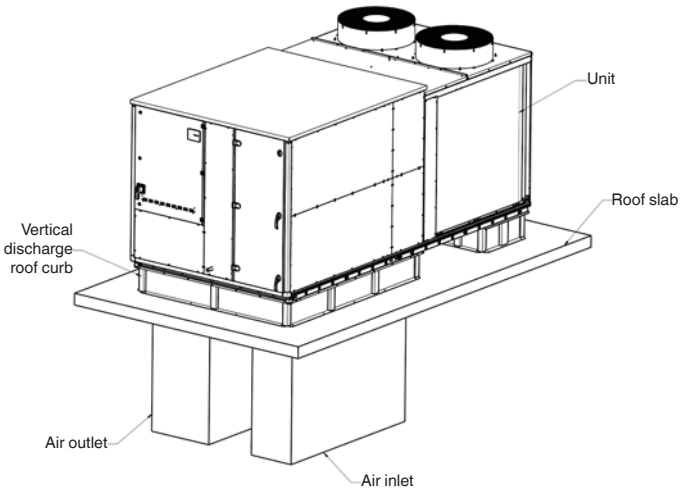
l/s	Unit External Static Pressure (Pa)													
	525		560		595		630		665		700		735	
	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW	rpm	kW
7100	858	8,100	884	8,525	909	8,958	934	9,394	958	9,837	982	10,280	1006	10,730
7500	863	8,774	888	9,214	913	9,660	937	10,114	961	10,568	985	11,030	1008	11,494
7900	869	9,498	894	9,952	918	10,413	942	10,878	965	11,350	988	11,826	1.011	12,305
8300	875	10,276	900	10,745	923	11,221	947	11,700	970	12,186	992	12,676	1.015	13,174
8700	883	11,109	907	11,595	930	12,085	952	12,579	975	13,080	997	13,584	1.019	14,096
9100	891	12,002	914	12,503	937	13,008	959	13,516	981	14,031	1003	14,554	1.024	15,076
9500	901	12,961	923	13,473	945	13,991	967	14,518	988	15,047	1009	15,580	1.030	16,121
9900	910	13,981	932	14,510	954	15,044	975	15,580	996	16,125	1.017	16,676	1.037	17,227
10300	921	15,069	942	15,613	963	16,161	984	16,716	1005	17,270	1.025	17,836	1.045	18,402
10700	933	16,229	953	16,788	973	17,350	994	17,915	1.014	18,488	1.034	19,068	1.053	19,649
11100	944	17,461	965	18,034	984	18,611	1004	19,191	1024	19,778	1043	20,373	1062	20,967

Out of fan scope

14.1 - ROOFCURB

This accessory is used to improve unit installation and facilitate vertical connection of the air discharge and return ducts. Please refer to roofcurb installation instructions for further information.

Fig. 19 - Roofcurb



15 - STANDARD MAINTENANCE

Air conditioning equipment must be maintained by professional technicians, whilst routine checks can be carried out locally by specialised technicians.

All refrigerant charging, removal and draining operations must be carried out by a qualified technician and with the correct material for the unit. Any inappropriate handling can lead to uncontrolled fluid or pressure leaks.

WARNING: Before doing any work on the machine ensure that the power is switched off. If a refrigerant circuit is opened, it must be evacuated, recharged and tested for leaks. Before any operation on a refrigerant circuit, it is necessary to remove the complete refrigerant charge from the unit with a refrigerant charge recovery group.

In order to obtain maximum performance from the unit special attention should be paid to the following points:

- **Electrical connections:** The supply voltage should be within the limits permitted by the compressor.

  Ensure that no faulty contacts exist in the terminal blocks, contactor boards, etc. Make sure that all the electrical connections are properly tightened, and that all the electrical components (contactors, relays, etc) are firmly secured to the corresponding rails.

  Pay special attention to the condition of the connecting cables between the control elements and the control box, and to that of the unit power supply cable. Check the starting and running consumptions are within the limits specified in the corresponding technical information.
- **Drainage:** Frequently check that the drain is not obstructed, and that the condensate pan is clean and level.
- **Inlet filter:** This should be cleaned periodically. The frequency depends on the purity of the entering air. The dirty filter option can be used to find out when the filter needs to be changed. A set of filters can be ordered as a spare part.
- **Refrigerant circuit:** Ensure that there is no leakage of refrigerant or oil from the compressor. Check that the high and low side operating pressures are normal. Make sure that the coils are not dirty. Check for unusual compressor noise.
- **Controls:** Check the operation of all relays, high and low pressure transducers and the high-pressure switch, etc. Use the quick test function of the Touch Pilot control.

15.1 - Maintenance programme

All maintenance operations must be carried out by technicians who have been trained on Carrier products, observing all Carrier quality and safety standards.

15.2 - Maintenance instructions

During the unit operating life the service checks and tests must be carried out in accordance with applicable national regulations.

If there are no similar criteria in local regulations, the information on checks during operation in annex C of standard EN 378-2 can be used.

External visual checks: annex A and B of standard EN 378-2.

Corrosion checks: annex D of standard EN 378-2. These controls must be carried out:

- After an intervention that is likely to affect the resistance or a change in use or change of high-pressure refrigerant, or after a shut down of more than two years. Components that do not comply, must be changed. Test pressures above the respective component design pressure must not be applied (annex B and D).
- After repair or significant modifications or significant system or component extension (annex B)
- After re-installation at another site (annexes A, B and D)
- After repair following a refrigerant leak (annex D). The frequency of refrigerant leak detection can vary from once per year for systems with less than 1% leak rate per year to once a day for systems with a leak rate of 35% per year or more. The frequency is in proportion with the leak rate.

NOTE: High leak rates are not acceptable. The necessary steps must be taken to eliminate any leak detected.

NOTE 2: Fixed refrigerant detectors are not leak detectors, as they cannot locate the leak.

15.3 - Level 1 maintenance

See note in chapter 15.5. Simple procedures, can be carried out by the user on a weekly basis:

- Visual inspection for oil traces (sign of a refrigerant leak),
- Coil cleaning - see chapter 'Indoor/outdoor coils- level 1',
- Check for removed protection devices, and badly closed doors/covers,
- Check the unit alarm report when the unit does not work (see report in the Touch Pilot control manual),
- General visual inspection for any signs of deterioration,
- Verify the charge in the sight-glass,
- Check that the temperature difference between the heat exchanger inlet and outlet is correct.
- Verify the unit operating parameters at 100% full load against the ones found during start-up.

15.4 - Level 2 maintenance

See note in chapter 15.5. This level requires specific know-how in the electrical, hydronic and mechanical fields. It is possible that these skills are available locally: existence of a maintenance service, industrial site, specialised subcontractor.

The frequency of this maintenance level can be monthly or annually depending on the verification type.

In these conditions, the following maintenance operations are recommended.

Carry out all level 1 operations, then:

Electrical checks

- At least once a year tighten the power circuit electrical connections (see table with tightening torques).
- Check and retighten all control/command connections, if required (see table with tightening torques).
- Remove the dust and clean the interior of the control boxes, if required.
- Check the status of the fuses, contactors, disconnect switches and capacitors.
- Replace the fuses every 3 years or every 15000 hours (age-hardening).
- Check the presence and the condition of the electrical protection devices.
- Check the correct operation of all heaters.
- Check that no water has penetrated into the control box.

Mechanical checks

- Check the tightening of the fan tower, fan, compressor and control box fixing bolts.
- Fan bearings should be lubricated every six months. For higher temperatures and/or increased contamination, the lubrication interval should be adjusted as required.
  Grease Quantity: Press grease into bearing until fresh grease is escaping.

Refrigerant circuit

- Fully clean the condensers with a low-pressure jet and a bio-degradable cleaner (counter-current cleaning - see chapter 'Indoor/outdoor coils - level 2).
- Check the unit operating parameters at 100% full load and compare them with previous values.
- Verify the tightening of the bulb with capillary tube of the thermostatic expansion valve. The bulb is best mounted in a position corresponding to 4 o'clock or 8 o'clock.
- Carry out an oil contamination test. Replace the oil, if necessary. Carrier ERCD reference: 7754024.
- Check the operation of the high-pressure switches. Replace them if there is a fault.
- Check the fouling of the filter drier in cooling mode. Replace it if necessary.
- Keep and maintain a maintenance sheet, attached to each HVAC unit.

All these operations require strict observation of adequate safety measures: individual protection garments, compliance with all industry regulations, compliance with applicable local regulations and using common sense.

15.5 - Level 3 (or higher) maintenance

See note in chapter 15.5. The maintenance at this level requires specific skills/approval/tools and know-how and only the manufacturer, his representative or authorised agent are permitted to carry out these operations. These maintenance operations concern for example:

- A major component replacement (compressor, coils),
- Any intervention on the refrigerant circuit (handling refrigerant),

- Changing of parameters set at the factory (application change),
- Removal or dismantling of the HVAC unit,
- Any intervention due to a missed established maintenance operation,
- Any intervention covered by the warranty.
- one to two leak checks per year with a certified leak detector and carried out by a qualified person.

To reduce waste, the refrigerant and the oil must be transferred in accordance with applicable regulations, using methods that limit refrigerant leaks and pressure drops and with materials that are suitable for the products.

Any detected leaks must be repaired immediately.

The compressor oil that is recovered during maintenance contains refrigerant and must be treated accordingly.

Refrigerant under pressure must not be purged to the open air.

If a refrigerant circuit is opened, plug all openings, if the operation takes up to one day, or for longer periods charge the circuit with nitrogen.

NOTE: Any deviation or non-observation of these maintenance criteria will render the guarantee conditions for the HVAC unit nul and void, and the manufacturer, Carrier, will no longer be held responsible.

15.6 - Tightening torques for main electrical connections

Component screw type	Designation in the unit	Value (Nm)
Screw on disconnect switch (QS101)		
3KD3030... (Size2, 100A)	L1/L2/L3	15...22
3KD3230... (Size2, 125A)	L1/L2/L3	15...22
3KD3430... (Size2, 160A)	L1/L2/L3	15...22
3KD3630... (Size2, 200A)	L1/L2/L3	15...22
3KD3830... (Size3, 250A)	L1/L2/L3	30...44
3KD4030... (Size3, 315A)	L1/L2/L3	30...44
3KD4230... (Size3, 400A)	L1/L2/L3	30...44
Screw PE	PE	4
Tunnel terminal screw, fuse(3NP11..)	FU_	11
Tunnel terminal screw, control power transformer	TC	2
Compressor phase&earth connection		3
Power Contactors For Switching Motors		
Contactor 3RT 10 1..		0.8...1.2
Contactor 3RT 10 2..		2...2.5
Contactor 3RT 10 3..		3...4.5
Contactor 3RT 10 4..		4...6
Contactor 3RT 20 1..		0.8...1.2
Contactor 3RT 20 2..	KM_	2...2.5
Circuit Breakers		
Disconnect 3RV 10 1..		0.8...1.2
Disconnect 3RV 10 2..		2...2.5
Disconnect 3RV 10 3..		3...4.5
Disconnect 3RV 10 4..		4...6
Disconnect 3RV 20 1..		0.8...1.2
Disconnect 3RV 20 2..	QF_/QM_	2...2.5
Thermal Overload Relays		
Thermal Relays 3RU 11 1..		0.8...1.2
Thermal Relays 3RU 11 2..		2...2.5
Thermal Relays 3RU 11 3..		3...4.5
Thermal Relays 3RU 11 4..	FR_	4...6
Phase Order Relay	MKC_	0.5

15.7 - Tightening torques for the main bolts and screws

Screw type	Used for	Unit type	Value (Nm)
Compressor bolt	Compressor mounting	135-160-180	15
Compressor nut	Compressor mounting	205	55
M8 nut	Tandem Compressor grommet fixing	135-160-180	15
M10 nut	Tandem Compressor grommet fixing	205	44
Oil nut 1"3/4	Oil equalization line	All	100
Oil nut 2"1/4	Oil equalization line	All	145
Taptite Screw M8	Fan motor fixing	All	13
M8 screw	Fan scroll fixing	All	18
Metal screw	Sheet metal plates	All	4.2

15.8 - Indoor/outdoor coils

We recommend, that finned coils are inspected regularly to check the degree of fouling. This depends on the environment where the unit is installed, and will be worse in urban and industrial installations and near trees that shed their leaves.

For coil cleaning, two maintenance levels are used:

Level 1

- If the coils are fouled, clean them gently in a vertical direction, using a brush.
- Only work on coils with the fans switched off.
- For this type of operation switch off the HVAC unit if service considerations allow this.
- Clean coils guarantee optimal operation of your HVAC unit. This cleaning is necessary when the coils begin to become fouled. The frequency of cleaning depends on the season and location of the HVAC unit (ventilated, wooded, dusty area, etc.).

Level 2

Clean the coil, using appropriate products.
We recommend TOTALINE products for coil cleaning:
Part No. P902 DT 05EE: traditional cleaning method
Part No. P902 CL 05EE: cleaning and degreasing.

The two cleaning products can be used for any of the following coil finishes: Cu/Cu, Cu/Al, Cu/Al with Polual, Blygold and/or Heresite protection.

These products have a neutral pH value, do not contain phosphates, are not harmful to the human body, and can be disposed of through the public drainage system.

Depending on the degree of fouling both products can be used diluted or undiluted.

For normal maintenance routines we recommend using 1 kg of the concentrated product, diluted to 10%, to treat a coil surface of 2 m^2. This process can either be carried out using a high-pressure spray gun in the low-pressure position.

With pressurised cleaning methods care should be taken not to damage the coil fins. The spraying of the coil must be done:

- in the direction of the fins
- in the opposite direction of the air flow direction
- with a large diffuser (25-30°)
- at a minimum distance of 300 mm from the coil.

It is not necessary to rinse the coil, as the products used are pH neutral. To ensure that the coil is perfectly clean, we recommend rinsing with a low water flow rate. The pH value of the water used should be between 7 and 8.

WARNING: Never use pressurised water without a large diffuser. Do not use high-pressure cleaners for Cu/Cu and Cu/Al coils.

Concentrated and/or rotating water jets are strictly forbidden. Never use a fluid with a temperature above 45°C to clean the air heat exchangers.

Correct and frequent cleaning (approximately every three months) will prevent 2/3 of the corrosion problems.

Protect the control box during cleaning operations.

15.9 - Refrigerant volume

The unit must be operated in cooling mode to find out, if the unit charge is correct, by checking the actual subcooling. Following a small refrigerant leak a loss of refrigerant, compared to the initial charge will be noticeable in the cooling mode and affect the subcooling value obtained at the air heat exchanger (condenser) outlet, but it will not be noticeable in the heating mode.

IMPORTANT: It is therefore not possible to optimise the refrigerant charge in the heating mode after a leak. The unit must be operated in the cooling mode to check, if anadditional charge is required.

15.10 - Characteristics of R-410A

Saturated temperatures (°C) based on the relative pressure (in kPa)			
Saturated temperature, °C	Relative pressure, kPa	Saturated temperature, °C	Relative pressure, kPa
-20	297	25	1552
-19	312	26	1596
-18	328	27	1641
-17	345	28	1687
-16	361	29	1734
-15	379	30	1781
-14	397	31	1830
-13	415	32	1880
-12	434	33	1930
-11	453	34	1981
-10	473	35	2034
-9	493	36	2087
-8	514	37	2142
-7	535	38	2197
-6	557	39	2253
-5	579	40	2311
-4	602	41	2369
-3	626	42	2429
-2	650	43	2490
-1	674	44	2551
0	700	45	2614
1	726	46	2678
2	752	47	2744
3	779	48	2810
4	807	49	2878
5	835	50	2947
6	864	51	3017
7	894	52	3088
8	924	53	3161
9	956	54	3234
10	987	55	3310
11	1020	56	3386
12	1053	57	3464
13	1087	58	3543
14	1121	59	3624
15	1156	60	3706
16	1192	61	3789
17	1229	62	3874
18	1267	63	3961
19	1305	64	4049
20	1344	65	4138
21	1384	66	4229
22	1425	67	4322
23	1467	68	4416
24	1509	69	4512
		70	4610

48/50UA-UH135-205 units use high-pressure R-410A refrigerant (the unit operating pressure is above 40 bar, the pressure at 35°C air temperature is 50% higher than for R-22). Special equipment must be used when working on the refrigerant circuit (pressure gauge, charge transfer, etc.).

15.11 - Servicing recommendations

- Before replacing any of the elements in the cooling circuit, ensure that the entire refrigerant charge is removed from both the high and low pressure sides of the unit.
- The control elements of the cooling system are highly sensitive. If they need to be replaced, care should be taken not to overheat them with blowlamps whilst soldering. A damp cloth should be wrapped around the component to be soldered, and the flame directed away from the component body.
- Silver alloy soldering rods should always be used.
- If the total unit gas charge has to be replaced, the quantity should be as given on the nameplate and the unit should be properly evacuated beforehand.
- During unit operation all panels should be in place, including the electrical box access panel.
- If it is necessary to cut the lines of the refrigerant circuit, tube cutters should always be used and never tools which produce burrs. All refrigerant circuit tubing should be of copper, specially made for refrigeration purposes.

15.12 - Final recommendations

The unit you have purchased has undergone strict quality control procedures before leaving the factory.

All components, including the control systems and electrical equipment, etc., are certified by our Quality Control Department, and tested under the harshest possible operating conditions in our laboratories. However, after leaving the factory, it is possible that one or more of these elements may be damaged due to causes beyond our control. In such an event, the user should not work on any of the internal components, or subject the unit to operating conditions which are not specified in this manual, since serious damage may result and the guarantee would be invalidated. Repair and maintenance work should always be left to the installer.

All recommendations concerning unit installation are intended to be as a guideline. The installer should carry out the installation according to the design conditions and should comply with all applicable regulations for air conditioning and refrigeration installations.

NOTE: The manufacturer does not accept responsibility for any malfunctions resulting from misuse of the equipment.

15.13 - Troubleshooting chart

A list of possible faults, as well as the probable cause and suggested solutions is shown in the table below. In the event of a unit malfunction it is recommended to disconnect the power supply and ascertain the cause.

Symptoms	Cause	Remedy
Unit does not start	No power supply	Connect power supply
	Main switch open	Close main unit disconnect switch
	Low line voltage	Check voltage and remedy the deficiency
	A protection has tripped	Reset
	Contactor stuck open	Check and if necessary replace contactor
	Compressor failure	Check and if necessary replace compressor
Unit starts and stops frequently	Defective compressor contactor	Check and if necessary replace contactor
	Defective compressor	Check and if necessary replace compressor
	Refrigerant losses	Check and add the necessary quantity
Unit continuously cuts out at low saturated suction temperature	**Cooling unit/heat pump**	
	Defective low pressure transducer	Check and if necessary replace low pressure transducer
	Refrigerant losses	Check and add the necessary quantity
	Indoor/outdoor fan does not operate	Check fan motor
Unit continuously cuts out at saturated discharge temperature	**Cooling unit/heat pump**	
	Defective high pressure transducer	Check and if necessary replace pressure transducer
	Blocked filter drier	Check and if necessary replace filter
	Indoor/outdoor fan does not operate	Check fan motor
Abnormal system noise	Noisy compressor	Check and change if necessary
	Badly fitting panels	Install correctly
Compressor loses oil	Leak in system	Repair leak
Water loss	Defective drainage connections	Check and tighten if necessary

IMPORTANT: Following any operation on the appliance which has necessitated removal and replacement of any parts, the appliance shall be recommissioned in accordance with the Commissioning section of these instructions.

16 - START-UP CHECKLIST FOR 48/50UA-UH135-205 ROOFTOP UNITS (USE FOR JOB FILE)

Preliminary information

Job name: .....
Location: .....
Installing contractor: .....
Distributor: .....
Start-up preformed by: ..... Date: .....

Equipment

Model 48/50UA-UH135-205 : ..... S/N .....

Compressors

Circuit A	**Circuit B**
1. Model No.	1. Model No. .....
Serial No.	Serial No. .....
2. Model No.	2. Model No. .....
Serial No.	Serial No. .....

Additional options and accessories .....
.....

Preliminary equipment check

Is there any shipping damage? ..... If so, where? .....
.....
Will this damage prevent unit start-up? .....

☐ Unit is level in its installation
☐ Power supply agrees with the unit name plate
☐ Electrical circuit wiring has been sized and installed properly
☐ Unit ground wire has been connected
☐ Electrical circuit protection has been sized and installed properly
☐ All terminals are tight
☐ All cables and thermistors have been inspected for crossed wires

Unit start-up

☐ Oil level is correct
☐ Compressor crankcase heaters have been energised for 12 hours
☐ Unit has been leak checked (including fittings)
☐ Locate, repair, and report any refrigerant leaks
.....
.....
.....

Check voltage imbalance: AB ..... AC..... BC.....
Average voltage = ... (see installation instructions)
Maximum deviation = ... (see installation instructions)
Voltage imbalance = ... (see installation instructions)

☐ Voltage imbalance is less than 2%

WARNING: Do not start unitr if voltage imbalance is greater than 2%. Contact local power company for assistance.

☐ All incoming power voltage is within rated voltage range

Carry out the QUICK TEST function (see 48/50UA-UH135-205 Touch Pilot control manual):

Re-enter the setpoints (see controls section)

To start up the unit

Once all checks have been made, start the unit in the "LOCAL ON" position.

Unit starts and operates properly

Temperatures and pressures

WARNING: Once the machine has been operating at 100% full load for a while and the temperatures and pressures have stabilized, record the following:

Entering air temperature .....
Leaving air temperature .....
Ambient temperature .....
Circuit A suction pressure .....
Circuit B suction pressure.....
Circuit A discharge pressure .....
Circuit B discharge pressure.....
Circuit A suction temperature .....
Circuit B suction temperature.....
Circuit A discharge temperature .....
Circuit B discharge temperature.....
Circuit A liquid line temperature .....
Circuit B liquid line temperature.....

ACCESSORIES

.....
.....

17 - GAS HEATING SECTION

Gas burner 1

Size:.....

Serial No.: .....
Pipe size: .....
Gas type: G .....
Line pressure: .....mbar
Flue temp.: .....°C CO2:.....% CO ppm:.....%

Gas burner 2

Size:.....
Serial No.: .....
Pipe size: .....
Gas type: G .....
Line pressure: .....mbar
Flue temp.: .....°C CO2:.....% CO ppm:.....%

NOTE: Complete this start-up list at the time of installation.

NOTE: Complete this start-up list at the time of installation.

Carrier
United Technologies

Order No.: 10117,02.2017. Supersedes order No.: 10117, 10.2015
The manufacturer reserves the right to change the specification without prior notice.
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