

BROCHURE

NA 12.65 D 05 - 2015

HCompact2 HA

Installation
Operation
Commissioning
Maintenance



Contents

1. Introduction.....	3
2. Operation limits.....	3
3. Technical characteristics (EN-14511-2013).....	4
4. Unit identification.....	5
5. Safety advice.....	5
6. Transport.....	6
7. Location and assembling.....	6
Location designation.....	6
Assembling.....	6
Sound level.....	7
Anchorage for silent-blocks.....	7
Minimum free space for commissioning and maintenance operations.....	7
8. Checking before commissioning.....	8
Electrical Connections.....	8
Checks at centrifugal fans.....	9
Interchangeable position of air supply.....	9
Interchangeable position of air return.....	10
Air ducts connections.....	10
Condensate drain connection.....	10
9. Safety elements.....	11
Low pressure pressostat.....	11
High pressure pressostat.....	11
Magnetothermals for line protection.....	11
Main door switch.....	11
Anti-fire safety.....	11
Safeties at the compressor.....	11
Automatic switch in the control circuit.....	11
Air flow control (optional).....	11
Clogged filter detector (optional).....	11
10. Options.....	12
Condensation pressure control.....	12
Electrical heater.....	12
Filters.....	13
11. Commissioning.....	14
Checks prior to commissioning.....	14
Operational checks.....	14
Possible problems at commissioning.....	14
12. Maintenance.....	15
13. Control and analysis of breakdowns.....	17



Horizontal package air conditioners



Cooling capacity: 12,5 to 35,9 kW
Heating capacity: 14,2 to 41,0 kW

1. INTRODUCTION

The **HCompact2 HA** heat pumps and cooling unit are packages air to air units, of horizontal compact construction, made for operation indoors. They are equipped with centrifugal fans, air coils, scroll compressor and electronic control with microprocessor, optimized components for the R-410A refrigerant.

Are appropriate for air conditioning applications in medium power in offices, commercial and industrial spaces where the facade aesthetics must be preserved.

- **HCompact2 RHA Series:** Air to air **cooling** autonomous units.
- **HCompact2 IHA Series:** Reversible air to air **heat pump** autonomous units.

After manufacturing, all units are charged with refrigerant and are tested at the factory, verifying the correct operation of all their components within the operating range for which they are intended.

The units comply with standards: EN 60-204 - EN 378-2, and directives: Machinery 2006/42 EC - EMC 2004/108/EC - LVD 2006/95 EC - PED 14/068 EC (Category 2).

Those in charge of the installation, start-up, use, and maintenance of the unit must know the instructions contained in this brochure and the specific technical characteristics of the installation place.

2. OPERATION LIMITS

Conditions air inlet		Cooling	Heating
Indoor coil	Minimum	14 °C WB	10 °C
	Maximum	22 °C WB	27 °C
Outdoor coil	Minimum	12 °C ①	-6 °C BH ②
	Maximum	48 °C	15 °C WB

① With control of operation condensation pressure up to -10°C.

② When the outdoor temperature usually reaches less than 5°C WB it is recommended installing a support element.



3. TECHNICAL CHARACTERISTICS (EN-14511-2013)

HCompact2 HA		55	65	80	90	120	160
Cooling capacities	Cooling capacity ① (kW)	12,5	15,3	20,1	21,5	27,1	35,9
	Power input ③ (kW)	5,2	6,6	7,4	8,5	11,0	15,4
	EER performance	2,38	2,30	2,70	2,53	2,47	2,33
Heating capacity	Heating capacity ② (kW)	14,2	16,9	21,1	23,1	30,5	41,0
	Power input ③ (kW)	4,8	5,7	6,4	7,4	9,3	13,3
	COP performance	2,93	2,96	3,29	3,13	3,28	3,10
Outdoor circuit fan	Nominal air flow (m ³ /h)	4.100	4.600	6.500	7.000	10.000	12.200
	Available static pressure (mm.w.c)	9	9	10	10	12	12
	Type	Centrifugal					
	Number	1					
	Motor output (kW)	1,1	1,5	1,5	2,2	2,2	3,0
	Power input (kW)	0,77	1,01	1,14	1,33	1,37	2,03
	Speed (r.p.m.)	1.125	1.207	828	859	589	630
Indoor circuit fan	Nominal air flow (m ³ /h)	2.500	3.100	4.000	4.600	6.000	7.000
	Available static pressure (mm.w.c)	5,0	5,0	6,2	6,2	6,2	7,5
	Type	Centrifugal					
	Number	1					
	Motor output (kW)	0,55	1,1	1,1	1,5	1,5	3,0
	Power input (kW)	0,35	0,63	0,67	0,94	1,20	1,94
	Speed (r.p.m.)	1.115	1.340	1.051	1.150	988	1.168
Compressor	Type	Scroll					
	Compressor number	1					
	Circuit number	1					
	Oil type	Copeland 3MAF 32cST, Danfoss POE 160SZ, ICI Emkarate RL 32CF, Mobil EAL Artic 22CC					
	Volume of oil (l)	1,6	1,6	1,6	3,0	3,3	3,3
Electrical characteristics	Electrical power supply	400 V / III ph / 50 Hz (±10%)					
	Power supply	3 Wires + Ground					
Maximum absorbed current	Compressor (A)	15,0	19,0	19,0	22,0	29,0	35,0
	Outdoor fan (A)	2,7	3,6	3,6	5,0	5,0	6,9
	Indoor fan (A)	1,6	2,7	2,7	3,6	3,6	6,9
	Control (A)	2,0	2,0	2,0	2,0	2,0	2,0
	Total (A)	21,3	27,3	27,3	32,6	39,6	50,8
Refrigerant	Type	R-410A					
	Global warming potential (GWP) ④	2.088					
	Charge (kg)	2,5	3,0	4,5	4,9	5,0	6,2
	Environment impact (t CO ₂ e)	5,2	6,3	9,4	10,2	10,4	12,9
Dimensions	Length (mm)	1.420	1.420	1.760	1.760	2.300	2.300
	Width (mm)	1.065	1.065	1.414	1.414	1.820	1.820
	Height (mm)	576	576	701	701	824	824
Weight	(kg)	245	253	332	375	472	521
Ø Condensate evacuation		3/4"					

① Cooling capacity calculated in accordance with the EN-14511-2013 standard given for indoor temperature conditions 27°C, 50% RH and 35°C outdoor temperature.

② Heating capacity calculated in accordance with the EN-14511-2013 standard given for indoor temperature conditions 20°C and 6°C WB outdoor temperature.

③ Total power input by compressor and motorised fans under nominal conditions calculated in accordance with the EN-14511-2013.

④ Climatic warming potential of a kilogram of fluorinated greenhouse gas in relation to a kilogram of carbon dioxide over a period of 100 years.

4. UNIT IDENTIFICATION

Check the condition of the equipment upon delivery.

Check that the details on the label, the packing and the data plate match the order.

If equipment has been damaged, or there is a shortfall in delivery, notify accordingly.

All units bear, legibly and indelibly, a data plate located in a prime space, as appears in the attached image. Check that this plate matches the correct model.



Important: The serial number must be used in all communications regarding the unit.

Ref. Product\Item Nbr		Designation\Description	
Order Nbr		Model	
An. Year	No Serie\Serial Nbr	No Product	
		Manufacturing Nbr	
Refrigerant	kW Absorbee\Input kW	Poids\Weight	
Refrigerant type		Weight in operation	
Refrigerant kg	Tension\Voltage	Temperature Maxi C	
	Line voltage		
BP Mini PSM/MOP	Intensité\Current A	IP	
Low pressure			
HP Maxi PSM/MOP	Int.. Kit Elect.	No CE	
High pressure	Electrical kit current		
		30, av JeanFalconnier 01350 CULOZ Tel : 33(0)4 79 42 42 42	
		 Made in Spain	

5. SAFETY ADVICE

To avoid any risk of accident during installation, commissioning or maintenance, it is obligatory to take into consideration the following specifications for the units: refrigerated circuits under pressure, refrigerant presence, electrical voltage presence and implantation place.

Because of all of this, only qualified and experienced personnel can perform maintenance tasks or unit repairs.



It is required to follow the recommendations and instructions in the maintenance brochures, the labels, and the specific instructions.

It is necessary to comply with the norms and regulations in effect. It is recommended to consult the competent authorities regarding the applicable regulations for users of units or components under pressure. The characteristics of these units or components are included on the plates of characteristics or in the regulatory documentation provided with the product.



The compressor and line surfaces can reach temperatures above 100°C causing burns to the body. In the same fashion, under certain conditions these surfaces can reach very cold temperatures that can cause freezing risks.



Use safety goggles and gloves on the job. Be careful with sharp parts or elements in the unit.



Caution: Before intervening in the unit, verify that the main power to the unit is cut off. An electric shock can cause personal damage.



Note: In order to recycle these units follow the stipulations of Directives (EC) No. 96/2002 and No. 108/2003 regarding electrical and electronic equipment and the management of the resulting waste.

Refrigerant leaks:

A periodical check must be performed for refrigerant gas leaks as per Regulation (CE) N°517/2014 over **certain greenhouse effect fluoride gases**. Please, consult the frequency of checks in chapter of "Maintenance".

These units work with refrigerant gas **R-410A**. This fluid is used up to a maximum service pressure of 42 bar.

Components of the R-410A	R-32	R-125
Chemical formula	CH2F2	CHF2CF3
Weight ratio	50%	50%
Unitary global warming potential (GWP)	675	3.500
Global warming potential (GWP)	2.088	

In case of a leak:

- Toxicity: According to ASHRAE 34, R-410A belongs to the A1/A1 group, i.e. with high safety both in the mix and also in the case of a leak.
- Although it is not toxic, in case of a leak to atmospheric pressure the liquid phase evaporates. The resulting vapours are heavier than air and can displace the technician local air. In case of an accidental discharge in a closed enclosure, fans must be used to eliminate said vapours.
- Although the R-410A is not flammable, when in contact with a flame or hot spot it can decompose in fluorhydric acid HF and fluophosgene COF₂ highly toxic and corrosive.
- To detect leaks, an electronic leak detector, an ultraviolet lamp or soapy water must be used. Flame detectors do not help.



Important: Immediately repair any refrigerant leak, using a recovery unit specific for R-410A that avoids a possible mixture of refrigerants and/or oils.

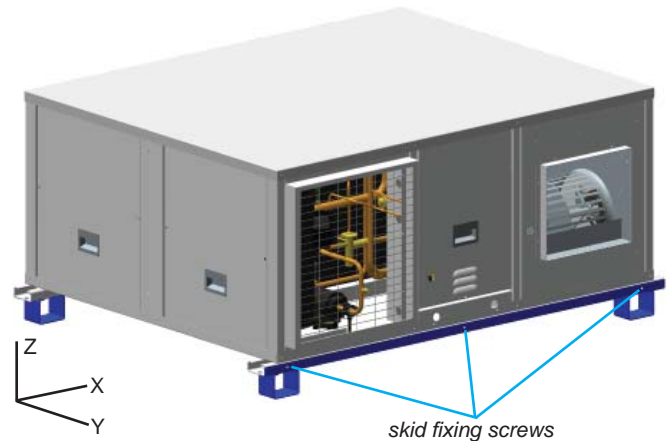
6. TRANSPORT

The unit must be handled with care to avoid transport damage. Thus we recommend:

- For transport in a container, one must be selected that has an easy load and unload to the installation location.
- Do not dispose of the skids nor the packaging materials until the machine is in its final location.
- The unit must be lifted and fixed with care and without inclination (maximum inclination 15°), since it could harm its operation. Please refer to the weight and the gravity centre coordinates of each model stated in the following table.
- The unit is designed to be transported safely by using a forklift truck. The forks of the forklift truck must ensure that the centre of gravity of the unit remains within the forks, because a misbalance in the transport may cause the unit to turn over and fall from the forklift truck. Check also that the length of the fork entries, so that the entire weight-bearing structure of the unit can be supported on the forklift truck. This also prevents the possible introduction of the truck's fork into functional parts of the unit that may cause damage to the unit. The standards and recommendations of the forklift truck must also be respected with regards to the maximum load, inclination of the panel, elevation of the load for transport, and, in particular, the maximum speed.
- Finally, the unit must be freed from the skids so that the inserts available for the silent-blocks can be accessed. Each skid is fixed to the crossbar using M4 screws.

Centre of gravity coordinates

HCompact2 HA	Weight (kg)	M0000 assembly			M1111 assembly		
		Centre of gravity (mm)			Centre of gravity (mm)		
		X	Y	Z	X	Y	Z
55	245	591	611	266	609	609	266
65	253	585	617	268	603	615	268
80	332	755	746	308	775	743	308
90	375	764	769	307	744	766	307
120	472	1.104	917	340	1.106	906	340
160	521	1.096	921	343	1.097	910	343



7. LOCATION AND ASSEMBLING

Location designation

Before moving the unit, make sure that all panels are fastened in place. Lift and lower with care.

When choosing the location, whatever may be the selected fashion, the following precautions have to be taken into consideration:

- It is mandatory to comply with norm UNE-EN 378-3 on Safety and Environmental Requirements. Part 3: "In situ" installation and protection to people.
- The area where the unit will be located must be perfectly accessible for cleaning and maintenance operations (check minimum free space for maintenance). Leave enough space for air circulation around the unit.
- It is necessary to check that the structure supports the unit's weight (please see weight in the centre of gravity table).

Assembling

- These units can be installed on the floor or on a brick frame or steel profile.
 - Foresee appropriate damping devices in these fixtures to ensure that noise and vibration transmission is avoided.

- In the event of assembling directly on silent-blocks to the ground, it is recommended that a template of the unit's footprint with the anchoring points of the silent-blocks be made.
- With the help of the crane or the forklift truck, the unit will be raised to a sufficient height that the silent-blocks can be screwed into its base. The 4 silent-blocks must remain oblique to the unit.
- M10 metric threads have been provided for their placement in the supports indicated in the following section "Anchorage for silent-blocks". A hex key 17 or Allen wrench 8 will be used for this operation based on the type of screw used.

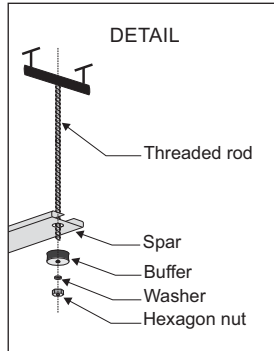
This image shows how the silent-block option that can be supplied for this unit is fixed to the unit.



- Check that the unit is perfectly levelled.

It can also be fixed to the ceiling using a threaded rod:

- Insert in the framework ceiling 4 threaded rods.
- Insert the rods through the holes in the unit base ($\varnothing 13$ mm).
- Place the antivibration mounts, insert a washer and turn the nuts until the unit is well secured.
- If there is enough space between the framework and the unit, a rubber or neoprene plate can be squeezed in.
- Check that the unit is perfectly levelled.



Since it is an unit designed to work indoors with ducted supply and return, both in the indoor and the outdoor circuits, the following aspects need to be considered as well:

- Ensure that the location of the supply and return grilles does not generate air recirculation.
- Check that there are no obstructions in the air supply and return grille slats due to being tightly closed.
- If in the indoor/outdoor circuit the air return is not ducted, it is necessary to foresee in the plenum formed by the ceiling, framework and walls, adequately sized grids appropriate so that the circuit in question aspires the return air.

Sound level

These units are designed to work with a low acoustic level. In any case, the design of the installation the outer environment, the kind of building for the noise transmitted in the air and the solid elements for the vibration transmission must be taken into consideration for the acoustic radiation.

If necessary, commission a study to an acoustic technician.

A) The **sound power level** in the **outdoor fan** outlet to be taken into account for the silencer calculation:

HCompact2 HA	55	65	80	90	120	160
dB(A)	80,5	82,7	74,4	76,3	83,5	83,3

B) The **sound power level** in the **indoor fan** outlet to be taken into account for the silencer calculation:

HCompact2 HA	55	65	80	90	120	160
dB(A)	72,0	77,4	80,4	77,1	79,2	77,1

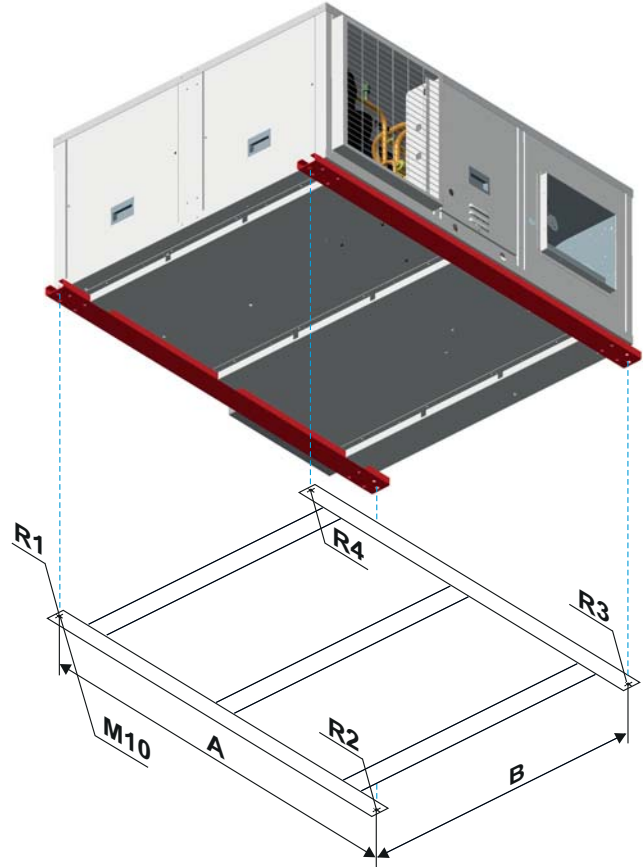
C) The **sound pressure level** of the unit, with the ducted return and supply connections, measured at a distance of 5 metres, in open field, directivity at 2 and 1.5 metres from the ground is:

HCompact2 HA	55	65	80	90	120	160
dB(A)	69,3	71,6	69,4	70,8	70,7	71,2

Note: The sound pressure level depends on the installation conditions and, as such, is only indicated as a guide.

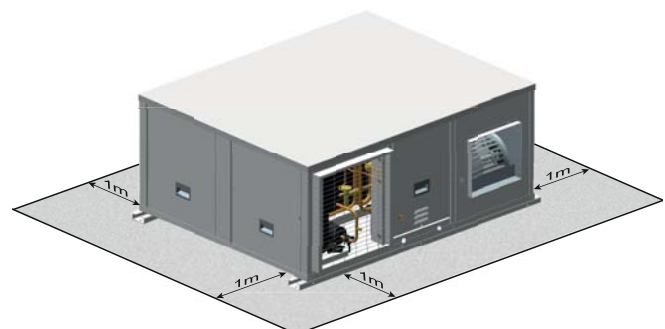
Anchorage for silent-blocks

When selecting damping devices both the unit weight and reactions in the supports must be taken in account and are featured in the following table.



HCompact2 HA	A (mm)	B (mm)	Weight (kg)	M000 assembly Reactions in the supports (kg)			
				R1	R2	R3	R4
55	1.392	1.092	245	78	58	45	65
65	1.392	1.092	253	81	59	45	67
80	1.732	1.432	332	96	75	70	91
90	1.732	1.432	375	110	88	77	99
120	2.311	1.817	472	125	113	112	122
160	2.311	1.817	521	139	126	122	135

Minimum free space for commissioning and maintenance operations



8. CHECKING BEFORE COMMISSIONING



Note: Under no circumstance should the unit be started without having read the brochure completely.

Electrical Connections

Installation norms

To have electrical power to the unit: wire intake, conductor section and their calculations, protections, etc..., ask the information provided in this document (refer to technical characteristic table), the electrical scheme included with the unit and norms in effect that regulate the installation of air conditioning units and electrical receivers.

Verify that electrical power supply corresponds to the one on the data plate and that the voltage remains constant according to the stipulated range.



Check that the electrical connections are correct and tight (an electrical diagram is included with each unit, along with its legend).



Note: All connections in the site are the responsibility of the installer. These connections are always made as per the current regulation.



To prevent electrical shocks, make all electrical connections before energizing the unit. Check that the automatic switch is closed. Omitting this can cause personal damage. Make the ground connection before any other electrical connection.



The installer must fix line protection elements according to the effective legislation.

Electronic control

• AVANT electronic control

All HCompact2 HA units have an AVANT electronic control as standard from the factory comprised of a main board and a TCO user terminal.

Optionally, this control can have a terminal for pGD1 maintenance that facilitates the initial scheduling of the unit, the modification of the operating parameters and the description of the alarms produced.

Note: For more detailed information on this control please refer to the specific brochure.

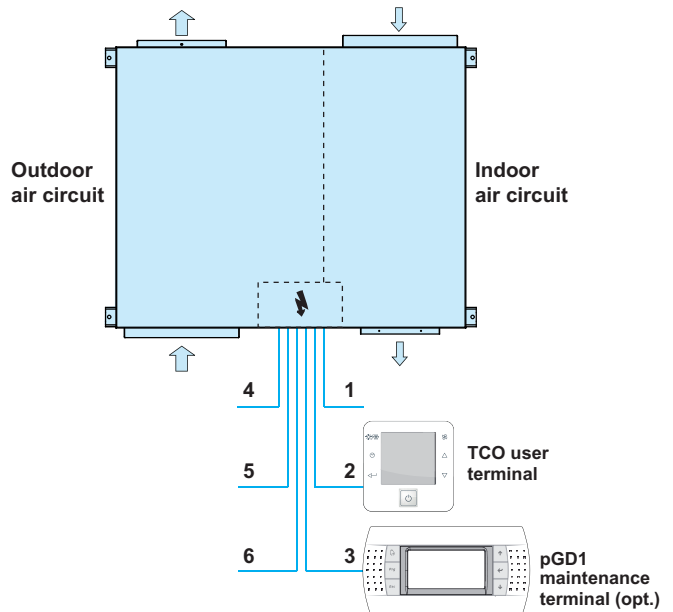
Recommendations for the TCO thermostat installation

From the thermostat some of the unit operation aspects are controlled: operation modes, setpoint, differential, timings...

Because of this, it is very important to choose an appropriate location within the room since in it is where the unit's control probe is located. This probe must report about the environmental conditions of the occupied area.

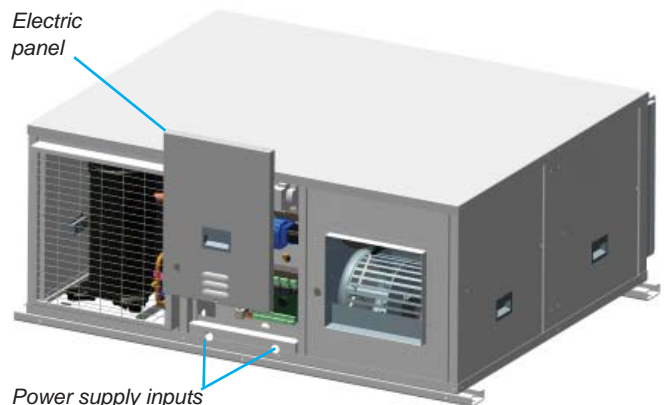
The thermostat must be fixed at a height of 1.5 m y all possible interferences must be avoided: sun, outdoor air, internal heat sources... Mount the thermostat to the wall using the bracket, do not leave it hanging from the wire or embedding it in the wall.

Connection chart

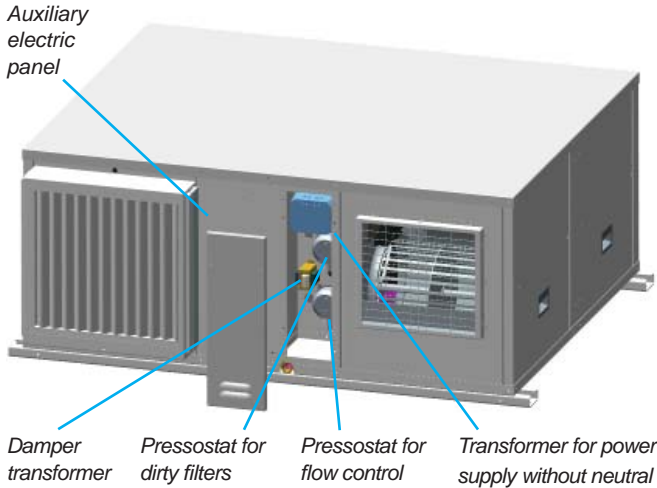


No.	Description		55 to 160
1	Main power supply	400 III (±5%)	3 + GND
2	TCO user terminal connection		2 wires for power supply 230V + 1 shielded cable for communication type AGW20 / 22 (1 braided pair + drainwire + shielding)
3	pGD1 maintenance terminal connection (optional)		telephone cable 6 wires standard (RJ12 connector)
4	Remote off/on (optional)		2 wires
5	Main alarm signal (optional)		2 wires
6	Safety electrical heaters (optional)		2 wires

① The same power supply used for powering the control board must also be used for powering the terminal.



These units can incorporate an auxiliary electric panel for optional components such as: transformer for power supply without neutral, transformer for damper of condensation pressure control and differential pressostats for dirty filters and control of air flow.



Checks at centrifugal fans

- Before commissioning, check the blade rotation direction and that the axis turns without strokes nor vibrations
- Once running, check the operation conditions: pressures, flows and consumptions.
- The coupling of characteristic bends of the fan and the room is very important, so that the flows and pressures provided to the duct network are as required.

ACHTUNG: VOR DER ÖFFNUNG DIESER PANEEL STROM ABSCHALTEN UND 2 MIN. WARTEN.

WARNING: BEFORE OPENING THIS PANEL SWITCH OFF THE ELECTRIC SUPPLY AND WAIT FOR 2 MIN.

ATTENTION: AVANT L'OUVERTURE DE CE PANNEAU COUPER L'ALIMENTATION ÉLECTRIQUE ET ATTENDRE 2 MIN.

ATTENZIONE: PRIMA DE APRIRE QUESTA PARETE INTERROMPERE L'ALIMENTAZIONE ELETTRICA E ASPETTARE 2 MIN.

ATENCIÓN: ANTES DE ABRIR LA PUERTA CORTAR LA ALIMENTACIÓN ELÉCTRICA Y ESPERAR 2 MIN.

V220086

Pulley and belt adjustment

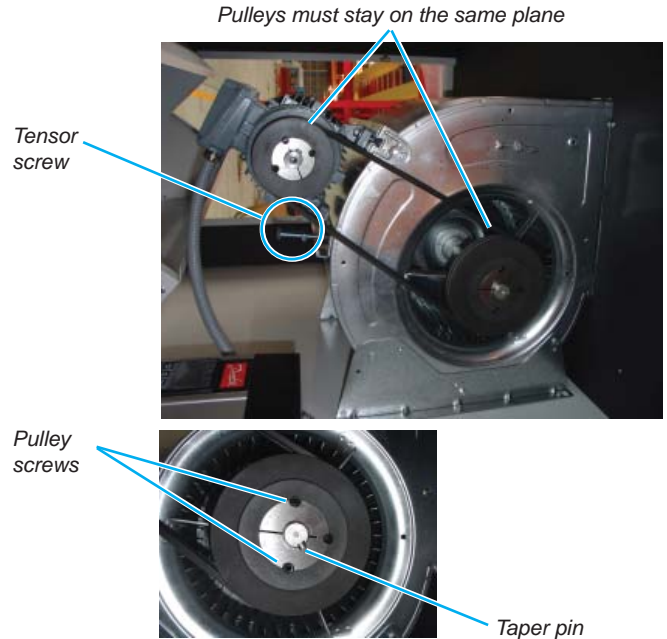
Both for the indoor circuit motorfans as well as the outdoor circuit are coupled by pulleys and belts.

In this type of fans, the following must be taken into considerations:

- The pulleys must be on the same plane, so it is important to check them with the help of a ruler or a laser aligner.
- In case they are not aligned, remove the pulley screws, remove the pulley and, after removing the hub pin, it can be slid over the axle (this action can be performed both in the motor as well as in the fan).

- After fixing the pulleys on the same plane, the belt tension is made by tightening the tensor screw.
- The belt tension must be checked after 24 hours of motor operation.

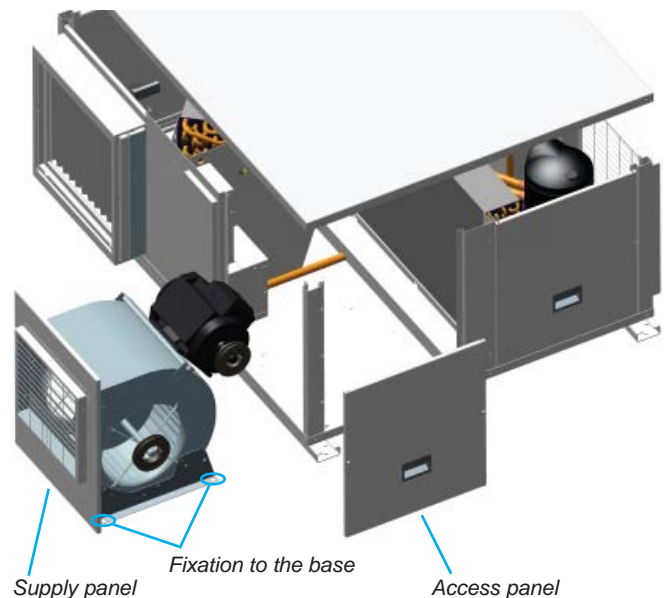
Attention: Before performing these operations, it is necessary to verify that the unit is disconnected from mains.



Interchangeable position of air supply

Both in the indoor air circuit as well as the outdoor circuit, the supply fan can be located in either of the two positions indicated in the following illustration, since both panels are easy interchangeable. This means it can be fitted on-site in accordance with the installation requirements.

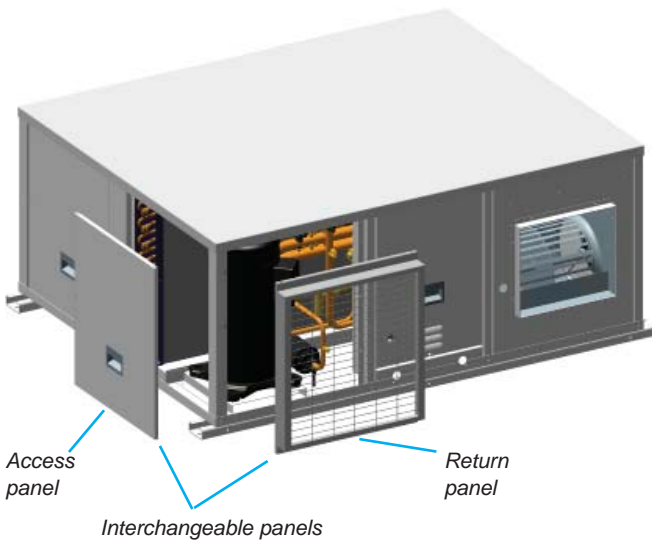
Fan panel is fixed to pillars inside the machine, using 4 sheet-metal screws Ø 3,5mm. The motor-fan assembly is fixed to the base of the machine with 4 rivet nut M8.



Interchangeable position of air return

Both in the indoor air circuit as well as the outdoor circuit, the return panel can be located in either of the two positions indicated in the following illustration, since both panels are easy interchangeable. This means it can be fitted on-site in accordance with the installation requirements.

The panel with the return grille is fixed to pillars inside the machine, using 4 sheet-metal screws \varnothing 3,5mm.



Air ducts connections

The air supply and return ducts must be calculated in accordance with the rated flow and the unit's available pressure (refer to the technical characteristics table). The duct calculation and design must be made by qualified technical personnel.

It is advisable to take into consideration the following recommendations:

- Bends in the fan discharge supply must be avoided. It is recommendable to have a straight section of duct measuring approximately 1 metre. If it is not possible, they must be as smooth as possible, using indoor deflectors when the duct is of large dimensions.
- When making the ducts, direction sharp changes must be avoided since they can generate occasional pressure drops, which affect the available pressure and the flow. The location of supply and aspiration grilles must be studied carefully to avoid the air recirculation and the transmission and generation of noises to the interior.
- Flexible connections must be made between the ducts and the unit that avoid the noise and vibration transmission.
- No matter the type of ducts type to use, they must not be composed of materials that propagate fire nor expel toxic gases in the event of a fire. The internal surfaces must be smooth and should not pollute the air that circulates within them. In any case, the effective legislation about this issue must be respected.

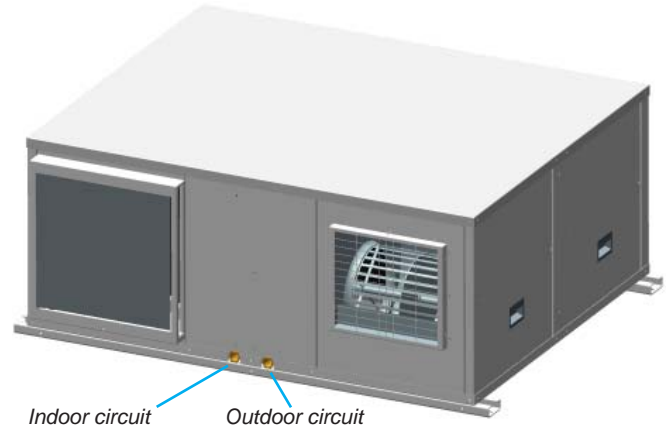


Caution: These units are designed to be connected to a duct network. If the indoor circuit outlet fan is accessible from a particular point in the duct network, the installer must fit a protection mesh in the discharge as per the current regulation.

Condensate drain connection

All models are provided with two condensates drain pans, one in the indoor circuit and another one in the outdoor circuit, with asphaltic paint and independent drains. Female drain joint, made of bronze, gas thread \varnothing 3/4".

**CONNECT SIPHON
METTRE SIPHON
PONER SIFON**
VZ20814



Do not connect the drains, make the siphons independent.

Siphon installation norms

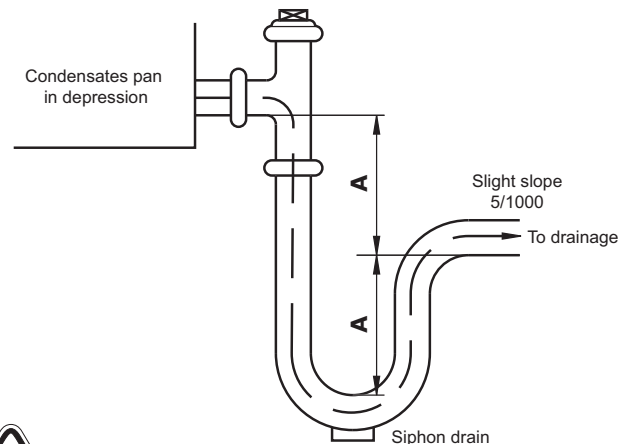
- Check that the condensate outlet is not clogged.
- All water drain tubes must be provided with a siphon to avoid bad smell and water spills.

Perform the assembly as per the scheme of the attached starting diagram:

Pan in overpressure: it is installed to avoid the access through the drain tubing of bad smells.

Pan in underpressure: besides the previous application, water must be sucked from the pan:

- For the correct siphon design, the "A" height must be at least twice that of the underpressure where the condensates pan is placed.
- The drain tubing must be slightly sloped to ease circulation towards the drain.
- The original diameter of the tube must be respected. No reduction can be made.



Check the connection tightness.

9. SAFETY ELEMENTS

Low pressure pressostat

When connected to the intake compressor, it will stop operating when the pressure at this point drops below the tare value (caused by obstructions in the circuit, excessive dirt in the filters, fan stop or ice formation in the evaporator). It disconnects at 2 bar and resets automatically.



High pressure pressostat

Connected to the compressor discharge, it will stop its operation when the pressure at that point reaches the setpoint. It disconnects at 42 bar and it is automatically reactivated.

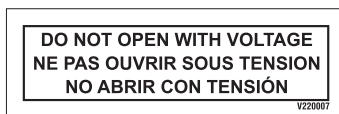


Magnetothermals for line protection

They are located at the beginning of the power lines of the compressor and motorfans to protect them.

Main door switch

By using a mechanical device, it impedes access to the electric panel when the unit is with voltage.



Anti-fire safety

With the return probe option, the electronic control can activate a safety anti-fire that, when the temperature of the air of comeback overcomes them 60°C (for defect), the unit stops.

This one will not be able to work again until the temperature does not descend below 40°C.

Safeties at the compressor

The scroll type compressor that these units as standard have the following safeties:

- Non-return valve built into the compressor.
- Temperature probe for the discharge from the compressor to protect the unit with discharge temperatures greater than 135°C.

Automatic switch in the control circuit

Magnetothermal switch that protects the operation circuit against continuous surges as well as against high currents of short duration (short circuits).

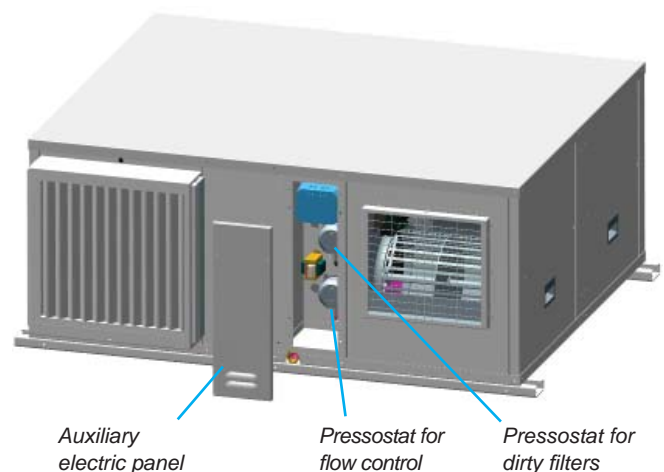
Air flow control (optional)

Differential pressostat that measures the flow variation in the air supply. This allows the detection of fan belt breakages, since the fan relay only detects operating faults that have arisen in the motor. This pressostat is installed in the auxiliary electric panel.

This safety device is compulsory in units with electrical heaters.

Clogged filter detector (optional)

Differential pressostat for indication of maintenance to filters. Automatic reactivation. This pressostat is installed in the auxiliary electric panel.

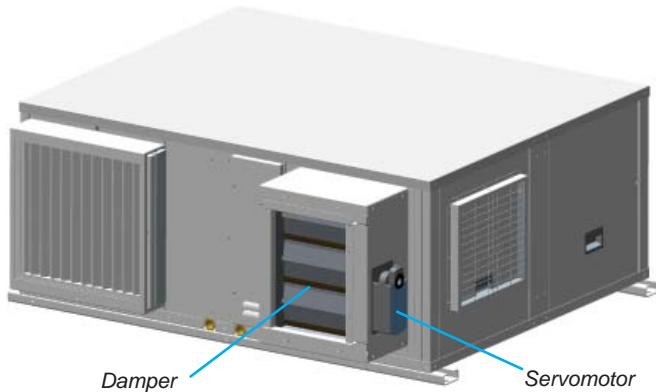


10. OPTIONS

Condensation pressure control

This control is advisable for units that work in cooling with an outdoor temperature below 15° C.

In units with centrifugal fan a check is performed per damper in the fan outlet. A servomotor opens or closes the damper depending on the proportional signal 0-10V received from the electronic control system.



In order to remove the electrical heaters the power supply cables must be disconnected from the terminal board and the hose taken out.

Safety thermistors

Electrical heaters

Hose



Then, unscrew the screw that fastens the resistor frames and take out by the rail, as shown in the following images.

Electrical heater

- The auxiliary electrical heaters are ready for operation in one power stage.
- The heaters acquired with the unit will be incorporated to it modifying the electric panel in the factory, so that it is compatible with the electronic control.
- The electrical heaters requested for units already shipped will be sent in a kit, and the installer will need to assemble the elements required for the operation of the unit and for compliance with the legal regulations that are applied to the modified unit with regard to safety.

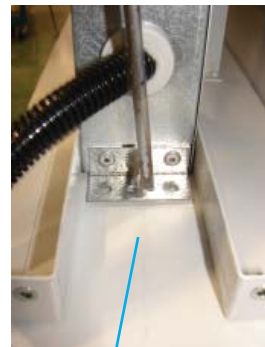
Note: with this option, the air flow controller is included.

Access for maintenance:

The frame has access designed from the right side for maintenance.

To access the electrical heaters, the screws that fasten the frame side panel must be unscrewed as shown in the illustration.

Access panel



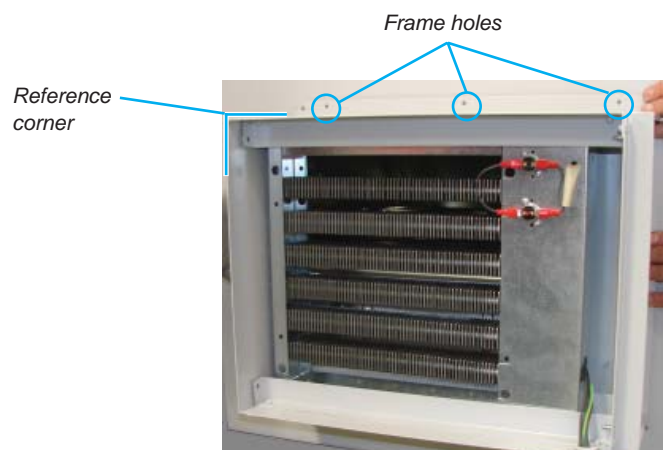
Rail



Kit assembly:

When the frame with the heaters is provided in a kit, follow the steps below for connecting it:

Step 1: place the frame on the panel to set the hole positions that will fix the frame to the panel (use the top left-hand corner as a guide).





Horizontal package air conditioners

Another hole must also be drilled to connect the hose to the electric power supply.

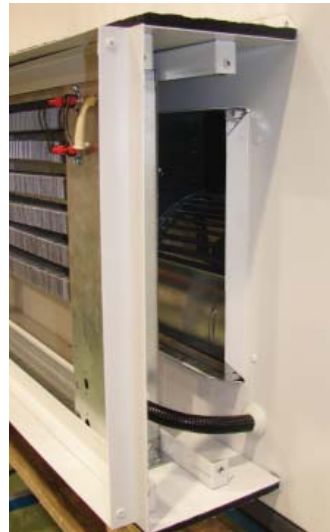


Hole for the power supply

Step 2: fasten the frame to the panel with selfturning screws.

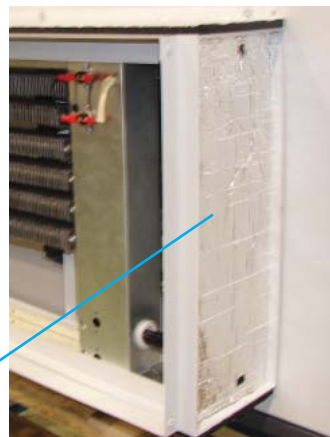


Step 3: insert the hose through the hole made for the connection in the electric panel.



Note: The connection of the necessary elements for the adequacy to the handling of the unit must be performed by the installer.

Step 4: close the access panel. The outlet is ready for ducting.



Access panel

Filters

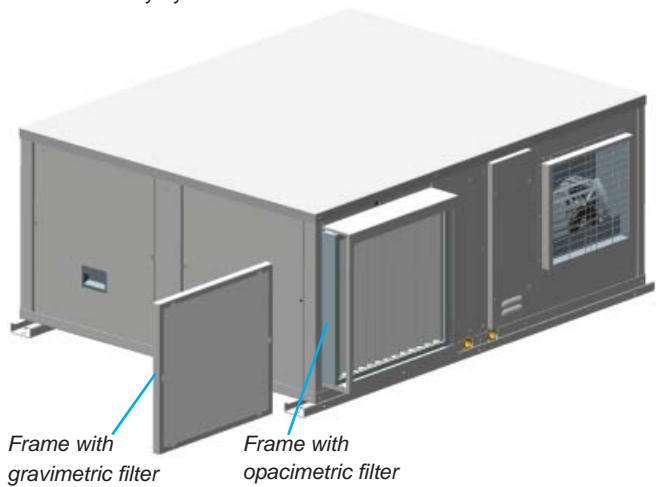
These units can substitute the filtering mesh that the units include regularly with G4 rating, mounted on the same frame.

Optionally these teams can incorporate, besides the gravimetric filter G4, an creased opacimetric filter with F7 rating. For this combination of filters, the filter holder profile is different. It is wider than the standard in 50 mm



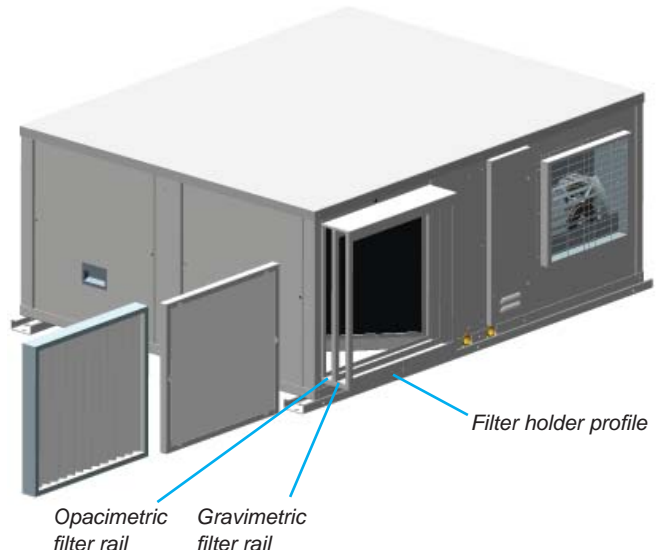
Filter removal:

These frames with the gravimetric and opacimetric filter can be extracted easily by both sides.



Frame with gravimetric filter

Frame with opacimetric filter



Opacimetric filter rail

Gravimetric filter rail

Filter holder profile

11. COMMISSIONING

Checks prior to commissioning

- It is advisable to make a complete sketch of the installation including the location of the unit and all the components used. This will be very helpful for maintenance and repairs to the installation.
- Check that the electrical power supply matches the unit voltage and that its value lies within acceptable limits.
- It must also be verified that the electric installation has been carried out according to the electric wiring diagram provided with the unit (consult the chapter on "Checking before commissioning").
- Once the above verifications have been carried out, the control circuit is supplied with voltage by the automatic control switch. It is advisable to leave with voltage the compressor crankcase heater for 24 hours before starting the compressor.

WICHTIG: WIEDERBEHEIZUNG DER OLWANNE

BEIDER ERSTEN INBETRIEBSETRUNZ ORDER NACH EINER LANGEN STROMUNTER-BRECHUNG BRINGEN SIE DIE MASCHINE UNTER SPANNUNG 24 STRUNDE LANG BEVOR SIE DEN(DIE) KOMPRESSOR(EN) EINSCHALTEN KOENNEN.

IMPORTANT: CRANKCASE HEATING

FOR THE FIRSTSTART OR AFTER ALONG TIME OUT OF VOLTAGE PUT THE MACHINE ON LIVE 24 HOURS BEFORE TO ALLOW THE COMPRESSOR(S) STARTING

IMPORTANT: SURCHAUFFE CARTER D'HUILE

AU PREMIER DÉMARRAGE OU APRÈS UNE ABSCENCE DE COURANT PROLONGÉE, METTRE LA MACHINE SOUS TENSION 24 HEURES AVANT D'AUTORISER LE DÉMARRAGE DU(DES) COMPRESSEUR(S).

IMPORTANTE: RISCALDARE IL CARTER DELL'OLIO

AL PRIMO AVVIAMENTO U DOPO UNA INTERRUZIONE PROLUNGATA DELLA ALIMENTAZIONE ELETTRICA, LASCIARE LA MACCINA SOTTO TENSIONE PER 24 ORE PRIMA DI AUTORIZZARE L'AVVIAMENTO DEL(DEI) COMPRESSORE(I).

IMPORTANTE: RECALENTAMIENTO DE ACEITE DEL CÁRTER

ANTES DEL PRIMER ARRANQUE O DESPUÉS DE UNA AUSENCIA DE CORRIENTE POR UN LARGO PERIODO DE TIEMPO, CONVIENE QUE LA UNIDAD ESTÉ CONECTADA UN MÍNIMO DE 24 HORAS.

V220084

- When starting the compressor, check the undercooling and overheating and thus verify if the refrigerant charge is appropriate to the operating conditions. To adjust the refrigerant charge, a schrader valve is available on the liquid line. R 410A
- Verify the absence of any leaks of the refrigerant.
- Check the unit operation and verify the safety elements.
- All the standard models are equipped with a scroll type compressor and have a phase control relay. Verify that they turn in the correct direction and, if not, reverse the power wires.

SCROLL COMPRESSOR.
CHECK SENSE OF ROTATION
COMPRESSEUR SCROLL.
VÉRIFIER LE SENS DE ROTATION
COMPRESOR SCROLL.
COMPROBAR SENTIDO DE GIRO

V220084

Operational checks

Check the unit operation by verifying the electronic control and the safety elements.

It is also recommendable to create a report, taking note of the date, which includes the following information: the nominal voltage, current absorbed by the compressors, fans and other electrical components, significant temperatures in the cooling circuit (see table below) and other aspects considered interesting such as alarms detected by the electronic control of the unit. The recording of these parameters whilst the unit is running allows controlling the installation performance and it is the best possible way to avoid breakdowns since the analysis of these data makes early detection of anomalies possible or the provision of the necessary means available to ensure that they do not take place.

Cooling MODE		Heating MODE	
Compr.	Aspiration pressure	bar	bar
	Aspiration temp. (1)	°C	°C
	Condens. pressure	bar	bar
	Condens. temp. (2)	°C	°C
Air condens.	Gas inlet temp.	°C	°C
	Liquid outlet temp. (3)	°C	°C
	Air inlet temp.	°C	°C
	Outdoor temp.	°C	°C
Air evap.	Air inlet temp.	°C	°C
	Air outlet temp.	°C	°C
	Liquid inlet temp.	°C	°C
	Evap. outlet temp. (4)	°C	°C
Undercooling (2) - (3)		°C	
Overheating (4) - (1)		°C	

Possible problems at commissioning

All indications given in this brochure must be respected and complied with to guarantee a correct operation of the units.

Next, several possible operation problems are stated which could happen if the conditions of the commissioning are not appropriate.

- Air flow lack: very high differences between inlet and outlet, originated by a high pressure drop in the ducts, or by other causes that impede the correct air circulation.
- Air recirculation in the unit, originated by some obstacle in the air aspiration or outlet.
- Noise problems because of excessive air flow in the grille.
- Water overflowing to the pan problems, originated by an excessive flow, an incorrect siphon installation or because a defective unit level.
- Refrigerant circuit humidity problem, because of an incorrect vacuum realization.

12. MAINTENANCE

The minimal maintenance operations and their periodicity will be made according to the national regulations.

Any intervention on the electric cooling components must be made by a qualified and authorized technician.

Technicians who intervene with the unit must use the necessary safety equipment (gloves, goggles, insulating clothing, safety shoes, etc.).

Furthermore, if working around sources of significant noise, we recommend the use of noise-dampening headgear.



Caution: Before intervening in the unit, cut off main power.



Access to the inside of the machine by all panels. These access panels are fixed with rivet nuts M4.

General recommendations:

- Do not lean on the unit. A platform must be used to work on a level.
- Do not lean on the copper refrigerant tubes.
- Keep the unit clean.
- Keep the space surrounding the unit clean and cleared in order to avoid accidents and ensure the proper ventilation of the coil.
- Perform a visual (remains of water or oil below or around the unit) and auditory inspection of the entire installation.
- In general, a corrosion control must be performed on the metallic parts of the unit (frame, bodywork, exchangers, electric panel, etc.).
- Check that the insulation foam is not unstuck or torn.
- All the electric connection states must be checked as well, as well as the air tightness of the different circuits.

Next, some recommendations are stated to perform the cleaning of the unit's components:

Air coil

- Check that the coil is free from dust and grease.
- Cleaning the accumulated dust on the coil can be performed with a vacuum cleaner perpendicular to the fins or with a low-pressure water cleaner. Grease can be removed with water with degreaser. Do not put stress on the fins as they could deform.



Use safety gloves for this task. Take care with the sharp parts of the coil.

Centrifugal fan

- Verify that the turbine and the motor remain clean.
- Foresee having a spare belt set for the fans.
- The motors and the fans have bushings that have been lubricated and sealed and, thus, do not need further lubrication.

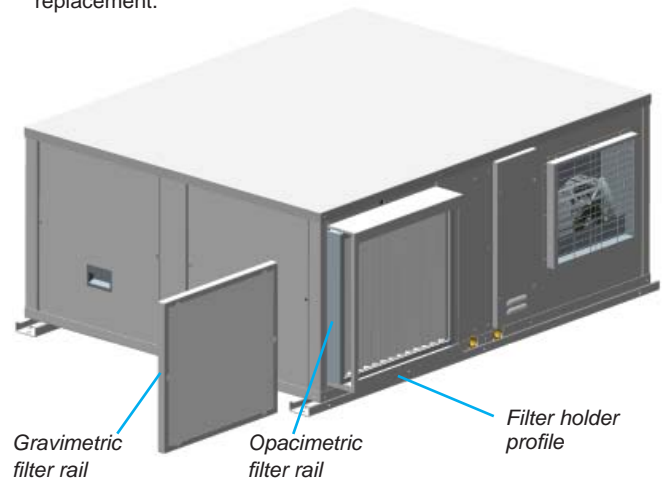
Servomotor (optional)

In units with a condensation pressure regulation damper (in the STD version), it is advisable to check the state of the servomotor.

Air filters

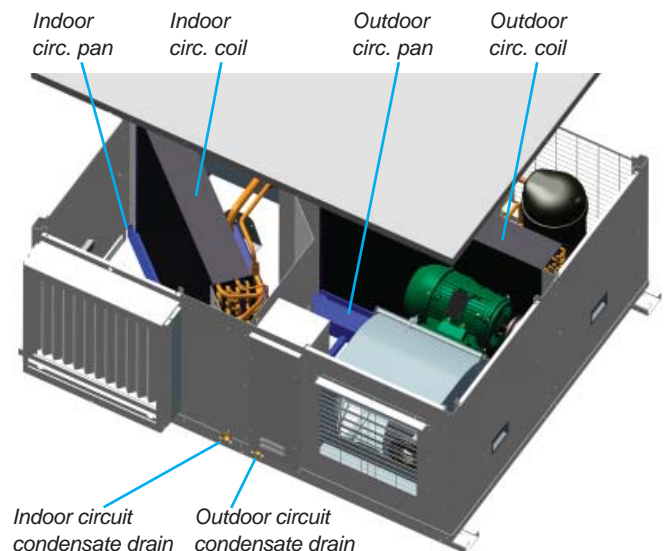
The frames with the gravimetric and opacimetric filter can be extracted easily by both sides.

- Clean usually. Depending on the installation conditions, the filter aspect must be examined to define the cleaning periodicity.
- Gravimetric filters. Cleaning the filtering mesh can be done with a household vacuum cleaner, or else by submerging it in water.
- Creased opacimetric filters. It is necessary to replace them. Foresee replacement.



Condensate drain pans

- Check that the condensate pans of the outdoor and indoor circuits are clean. There should be no stagnant water.
- Check that the drain is not clogged.
- Cleaning of the pan can be done with water and non-abrasive detergent.



Compressor

In the case of compressor replacement:

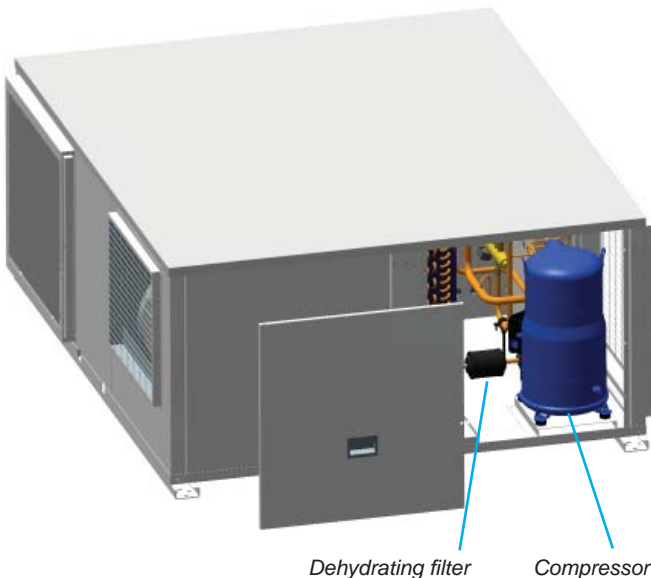
- Disconnect the unit from power supply.
- Completely empty the load of refrigerant using a specific recovery unit for R-410A
- Disconnect electrically the compressor.
- Carefully unscrew the suction and discharge piping.
- The compressor is fixed onto the platform with 4 screws Ø 8 mm. Unscrew the fixings.
- Place the new compressor and check that it has a sufficient oil charge.

Warning: when tightening the compressor screws, the maximum torque to be applied is:

- Models 55, 65, 80: 11 Nm.
- Models 90, 120, 160: 15 Nm.

If a torque wrench is not available, tighten them until noticing resistance, then tighten the screws by turning them 3/4 of a revolution.

- Screw the suction and discharge piping.
- Connect the compressor in accordance with the circuit diagram.
- Make vacuum and next, reload the gas into the unit according to load data provided in the technical characteristics table and in the unit's data plate.



Dehydrant filter

- The filter function is to preserve the cooling circuit clean and without humidity, neutralizing the acids that can be found in the cooling circuit. Verify dirt measuring the difference in temperature at the tubing level, at the inlet and at the outlet of the dehydrant.
- If necessary, replace.

Oil

Oils used for cooling machines do not pose any threat to one's health if used while following the usage guidelines:

- Avoid any unnecessary manipulation of the elements covered in oil. Use protection creams.
- Oils are flammable and must be stored and handled with precaution. "Disposable" rags or towels used for cleaning must be kept away

from open flames and must be discarded by using the appropriate procedure.

- Jugs must be kept closed. Avoid using oil from an already-open jug kept in poor conditions.

Both the oil type as well as the volume needed for each model are stated in the characteristics table in chapter 3.

- Check the oil level and aspect. In case of a colour change, check the oil quality using a contamination test.
- In the case of the presence of acid, water or metallic particles, replace the affected circuit oil, as well as the dehydrant filter.
- In the event of an oil charge change, only new oil will be used, which will be identical to the original oil and taken from a jug tightly closed until the moment of the charge.

Refrigerant

Only qualified personnel must perform a periodic tightness control, in accordance with the regulation (CE) N° 517/2014.

- The frequency of checks is no longer related to the load of refrigerant but to its global warming potential:

$$\text{Load kg x GWP} = \text{t CO}_2\text{e}$$

Carbon dioxide equivalency (t CO₂e) is a quantity that describes, for a given mixture and amount of greenhouse gas, the amount in tonnes of CO₂ that would have the same global warming potential (GWP).

Please, consult data of carbon dioxide equivalency (t CO₂e) provided in the technical characteristics table (chapter 4).

- Operators shall ensure that the unit is checked for leaks ad minima according to the following frequency:
 - t CO₂e < 5 not subjected
 - t CO₂e 5 to 50 every year
 - t CO₂e 50 to 500 ... every 6 months
 - t CO₂e > 500 every 3 months
- Where a leakage detection system has been installed the frequency of checks is halved.

Note: Never forget that the cooling systems contain liquids and vapours under pressure. The service pressure of R-410A is approximately 1.5 higher than that of R-407C.

- All necessary precautions must be taken during the partial opening of the cooling circuit. This opening entails the discharge of a certain amount of refrigerant to the atmosphere. It is essential to limit this quantity of lost refrigerant to a minimum by pumping and isolating the charge in some other part of the circuit.
- The refrigerant fluid at low temperature can cause inflammatory injuries similar to burns when contacting the skin or eyes. Always use safety goggles, gloves, etc. when opening ducts that may contain liquids.
- The refrigerant in excess must be stored in appropriate containers and the amount of refrigerant stored at the technical rooms must be limited.
- Refrigerant barrels and deposits must be handled with precaution and visible warning signs must be placed to attract attention over the risks of intoxication, fire and explosion linked to the refrigerant.
- At the end of its useful life, the refrigerant must be retrieved and recycled as per the current regulations.

13. CONTROL AND ANALYSIS OF BREAKDOWNS

Symptom	Cause	Solution
Evaporation pressure very high in relation with the air inlet	<ul style="list-style-type: none"> a) Charge excess b) High air temperature c) Compressor aspiration not air tight d) Cycle reversing valve in middle position 	<ul style="list-style-type: none"> a) Collect refrigerant b) Verify overheating c) Verify compressor state and replace d) Check that the valve is not clogged. Replace if necessary
Very low condensation pressure	<ul style="list-style-type: none"> a) Gas lack b) Compressor aspiration not air tight c) Cycle inversion valve in middle position d) Liquid circuit plugging 	<ul style="list-style-type: none"> a) Search for leaks, complete charge b) Verify compressor state and replace c) Check that the valve is not clogged. Replace if necessary d) Verify the dehydrating filter and expansion valve
Condensation pressure very high in relation to the air outlet, high pressostat cutoff	<ul style="list-style-type: none"> a) Insufficient air flow b) Air inlet temperature very high c) Dirty condenser (does not exchange) d) Much refrigerant charge (flooded condenser) e) The condenser fan is broken down f) Air in the cooling circuit 	<ul style="list-style-type: none"> a) Verify the air circuits (flow, filter cleanliness...) b) Verify the control thermostat readjustment c) Clean it d) Collect refrigerant e) Repair f) Make vacuum and load
Evaporation pressure too low (low pressostat cutoff)	<ul style="list-style-type: none"> a) Low flow in evaporator. Air recirculation b) Frozen evaporator c) Liquid line as different temperatures at filter inlet and outlet d) Gas lack e) Very low condensation pressure f) Evaporator fan broken down 	<ul style="list-style-type: none"> a) Verify the air circuits (flow, filter cleanliness...) b) Verify defrost c) Replace filter d) Search for leaks, complete charge e) Temperature of air or water in condenser very low (air or water flow very high), adjust flow f) Repair
Compressor does not start, does not make noise (humming)	<ul style="list-style-type: none"> a) No power b) The contacts of a control element are open c) Timing of anti cycle short does not allow the starting d) Open contact e) Contactor coil burnt f) Indoor Klixon open 	<ul style="list-style-type: none"> a) Check differential, magnetothermals b) Verify the safety chain of the electronic control c) Verify electronic control d) Replace e) Replace f) Wait for reactivation, verify intensity absorbed
Compressor does not start, motor sounds intermittently	<ul style="list-style-type: none"> a) Electrical power supply very low b) Power cable disconnected 	<ul style="list-style-type: none"> a) Control line voltage and locate voltage drop b) Verify connections
Repeated compressor starts and stops	<ul style="list-style-type: none"> a) Because of high pressure b) Control differential too short (short cycle) c) Gas lack, cutoff because of low pressure d) Dirty or frosted evaporator e) The evaporator fan does not work, cuts off the low pressostat f) Expansion valve damaged or clogged by impurities (cuts off low pressostat) g) Dehydrating filter clogged (cuts off low safety) 	<ul style="list-style-type: none"> a) Verify charge b) Increase differential c) Search for leak, reload unit d) Clean, verify evaporator air circuit e) Replace or repair f) Replace, as well as filter g) Replace
The compressor makes a noise	<ul style="list-style-type: none"> a) Loose attachment b) Oil lack c) Compressor noise 	<ul style="list-style-type: none"> a) Fix b) Add oil to recommended level c) Replace
Noisy operation	<ul style="list-style-type: none"> a) Unit installed without antivibration protection 	<ul style="list-style-type: none"> a) Place base over shock absorbers
Cycle reversing is not carried out: - No defrosting - Does not change winter - summer cycles	<ul style="list-style-type: none"> a) Electrical fault b) Inversion valve coil defective c) Defrost method not working d) Cycle inversion valve in middle position e) Control fault 	<ul style="list-style-type: none"> a) Locate and repair b) Replace c) Verify parameters d) Tap with running compressor. Replace if necessary e) Locate and repair

