



 United Technologies

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



Split-system units

38HB/HF

Nominal cooling capacity 19,3 - 36,9 kW
Nominal heating capacity 22,3 - 41,9 kW
50 Hz



Split-system cooling units and heat pumps

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1. INTRODUCTION

The **38HB/HF** cooling units and heat pumps are units which feature a split-system construction with components optimised for the R-410A refrigerant.

They are presented in two different elements:

- An outdoor unit (38HB/HF series) which features a horizontal construction and is equipped with a centrifugal fan, a hermetic scroll-type compressor and an electric panel with electronic control. Supply and return air on the same side.
- An indoor unit or or air-conditioning unit (40HB/HF series) which features a horizontal construction and has supply and return air on the same side.

• 38HB/HF series

38HB series: Outdoor unit **cooling-only** air-condensed with centrifugal fan, horizontal design, designed for installation indoors.

38HF series: Outdoor unit **heat pump** air-air reversible with centrifugal fan and expansion valve, horizontal construction, designed for indoor installation.

• 40HB/HF series

40HB series: Indoor unit **cooling only** with centrifugal fan and expansion valve, horizontal construction, designed for installation on premises connected to a network of ducts.

40HF series: Indoor unit **heat pump** reversible with centrifugal fan and expansion valve, horizontal construction, designed for installation on premises connected to a network of ducts.

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 2014/68/EC (Category 2).

Those in charge of the installation, commissioning, operation and maintenance of the unit must know the instructions contained in this brochure and the specific technical characteristics of the installation place.

2. OPERATING LIMITS

Inlet air conditions		Cooling	Heating
Indoor coil	Minimum	14 °C WB	10 °C
	Maximum	22 °C WB	27 °C
Outdoor coil	Minimum	12 °C ①	-10 °C WB ②
	Maximum	48 °C	15 °C WB

① With a condensation pressure control operating down to -10°C.

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

3. TECHNICAL CHARACTERISTICS (EN-14511-2013)

38HB/HF		80	90	120	160
Cooling capacities	Cooling capacity ① (kW)	19,3	21,2	27,3	36,9
	Power input ③ (kW)	8,0	9,6	11,5	14,2
	EER performance	2,40	2,20	2,38	2,60
Heating capacities	Heating capacity ② (kW)	22,3	24,2	32,0	41,9
	Power input ③ (kW)	7,7	9,1	10,6	13,5
	COP performance	2,88	2,67	3,03	3,11
Outdoor circuit centrifugal fan	Nominal air flow (m³/h)	6.500	7.000	10.000	12.200
	Available static pressure (mm.w.c)	25	20	20	20
	Number / turbines	1 / 1			
	Motor output (kW)	3	3	4	5,5
	Power input (kW)	2,33	2,71	2,51	3,18
	Speed (r.p.m.)	1.489	1.522	940	836
Compressor	Type	Scroll			
	No. compressors / circuits / stages	1 / 1			
	Oil type	Copeland 3MAF 32 cST, Danfoss POE 160 SZ, ICI Emkarate RL32 CF, Mobil EAL Artic 22 CC			
	Volume of oil (l)	1,6	3,0	3,3	3,3
Cooling connections	Liquid line	1/2"	1/2"	5/8"	5/8"
	Gas line	7/8"	7/8"	1 1/8"	1 1/8"
Refrigerant	Type	R-410A			
	Global warming potential (GWP) ④	2.088			
	Load up to 7,5 m (kg)	6,5	6,6	7,8	10,2
	Environment impact (tCO2 e)	13,6	13,8	16,3	21,3
Electrical features	Mains voltage	400 V / III ph / 50 Hz (±10%)			
	Power supply	3 Wires + GND			
Maximum absorbed current	Compressor (A)	15,9	15,3	20,1	25,1
	Fan (A)	6,9	6,9	9,0	11,6
	Control (A)	0,9	0,9	0,9	0,9
	Total (A)	23,7	23,1	30,0	37,6
Dimensions	Length (mm)	1.680	1.680	2.088	2.088
	Width (mm)	915	915	1.198	1.198
	Height (mm)	670	670	810	810
Weight	(kg)	224	245	322	344
40HB/HF		80	90	120	160
Indoor circuit centrifugal fan	Nominal air flow (m³/h)	4.000	4.600	6.000	7.000
	Available static pressure (mm.w.c)	20	20	20	20
	Number / turbines	1 / 1			
	Motor output (kW)	1,5	2,2	2,2	2,2
	Power input (kW)	1,07	1,48	1,56	1,62
	Speed (r.p.m.)	1.497	1.613	1.219	1.030
Max. abs.current	Fan (A)	3,6	5,0	5,0	5,0
Dimensions	Length (mm)	1.500	1.500	1.831	1.831
	Width (mm)	870	870	1.103	1.103
	Height (mm)	639	639	706	706
Weight	(kg)	125	128	171	181

① Cooling capacity calculated in accordance with the EN-14511-2013 standard given for indoor temperature conditions 27°C (19°C WB) 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 compressors and motorised fans under nominal conditions, calculated in accordance with the EN-14511-2013 standard.

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.



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

Ref. Produit\Item Nbr		Designation\Description	
An.Year		No Serie\Serial Nbr	
Refrigerant		No Produit	
Refrigerant kg		kW Absorbee\Input	
BP Mini PSM MOP		Tension\Voltage	
HP Maxi PSM MOP		Intensité\Current A	
		Int. Kit Elect.	
		Poids\Weight	
		Temperature Maxi C	
		IP	
		No CE	
		0056	


 CARRIER SCS
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 Phone: 34 957 65 23 11



 Made in Spain

Contains fluorinated greenhouse gases regulated by the Kyoto protocol

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 2002/96/EC and 2003/108/EC 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	CH ₂ F ₂	CHF ₂ CF ₃
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 which are 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

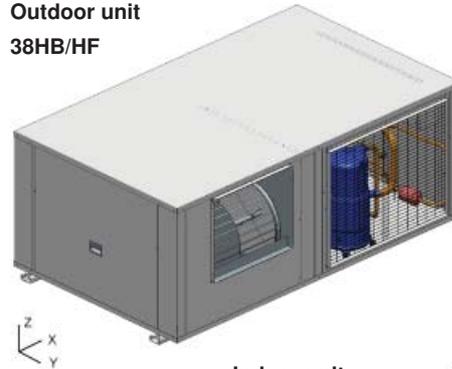
The unit must be handled with care to avoid transport damage. Thus we recommend:

- Do not dispose of the transport supports or the packaging materials until the unit is in its final location.
- For transport in a container, one must be selected that has an easy load and unload to the installation location.
- The unit must be lifted and fixed with care, with maximum inclination of 15°, since it could harm its operation. Please see the weight and the gravity centre coordinates of each model stated in the following table.

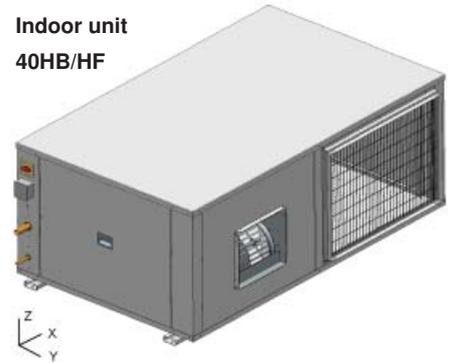
38HB/ HF	Centre of gravity (mm)			Weight (kg)	40HB/ HF	Centre of gravity (mm)			Weight (kg)
	X	Y	Z			X	Y	Z	
80	879	522	283	224	90	710	422	241	125
90	903	543	276	245	100	702	422	245	128
120	1087	708	337	322	120	847	549	275	171
160	1100	705	337	344	160	821	548	286	181

- The units can be handled with a forklift truck, taking all necessary precautions to avoid sliding of the unit on the truck's fork.

Outdoor unit
38HB/HF



Indoor unit
40HB/HF



7. LOCATION AND ASSEMBLING

Choice of location

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 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.
- Foresee appropriate damping devices in all the installation so that noise and vibration transmission is avoided (refer to the section "Anchorage for silent-blocks").
- It is necessary to check that the surface of the floor or the structure supports the weight of the unit (please, consult the weight of the unit in the section "Centre of gravity coordinates").

Both the outdoor unit 38HB/HF and the indoor unit 40HB/HF have been designed for working indoors, with ducted supply and return air. In this case, the following aspects must also be considered :

- All models can be installed on the floor or on a brick frame or steel profile. In any case, check that the unit is perfectly level.

- All models of 40HBHF units can be attached to the ceiling using the threaded rod:
 - Insert in the framework ceiling 4 threaded rods.
 - Insert the rods through the holes the unit has in its base.
 - 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.
 - Once these operations are finished, a false ceiling can be mounted to hide the unit, leaving a register cover to perform the maintenance and filter cleaning operations.
- When installing a false ceiling, it is necessary to leave a register cover to perform the maintenance operations. Access for cleaning the filter must be prepared for the indoor unit. If the installation has an air return which is not ducted, appropriately-sized grids must be planned in the space formed by the false ceiling, the framework and the walls so that the unit sucks the return air from the air-conditioned spaces.
- Ensure that the location of the outlet and return grilles does not generate air recirculation.
- Check that there is no obstruction in the air outlet and return due to tightly closed grille slats.

Sound level

These units have been designed to operate with a low sound level. In any case, in the design of the installation, it must be taken into consideration: the outdoor environment for the acoustic radiation, the type of building for the noise transmitted in the air and the solid elements for the vibration transmission. If necessary, a study must be commissioned to an acoustic technician.

A) The **sound power level** in the **outdoor unit fan** supply to be taken into account for the silencer operation:

38HB/HF	80	90	120	160
dB(A)	79,1	81,5	79,2	83,9

B) The **sound pressure level** of the **outdoor unit**, measured at a distance of 5 metres, in open field, directivity at 2 and 1.5 m from the ground, is:

38HB/HF	80	90	120	160
dB(A)	65,0	68,4	68,5	69,7

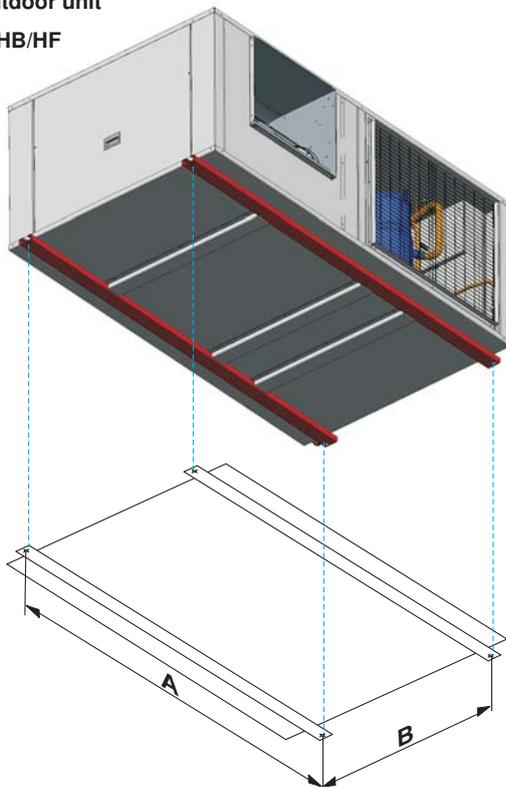
C) The **sound pressure level** of the **indoor unit**, with the ducted supply and discharge connections, measured at a distance of 5 metres, in open field, directivity at 2 and 1.5 metres from the ground, is:

40HB/HF	80	90	120	160
dB(A)	65,9	64,6	65,2	64,2

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

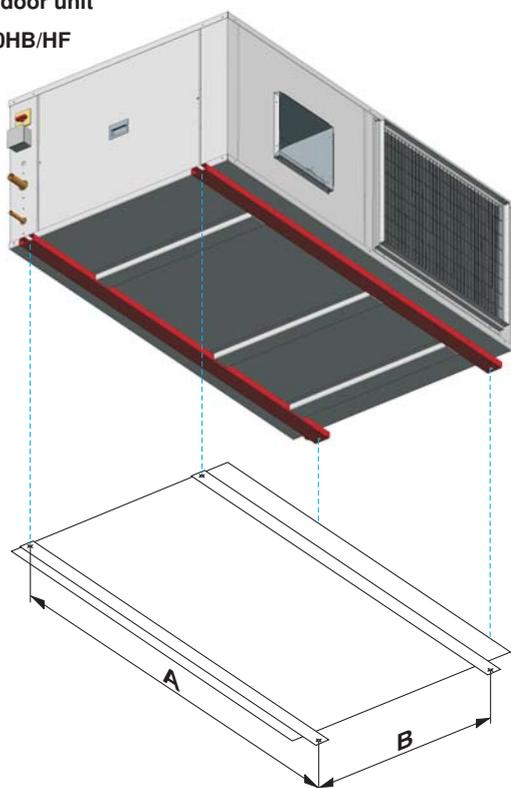
Anchorage for silent-blocks

Outdoor unit
38HB/HF



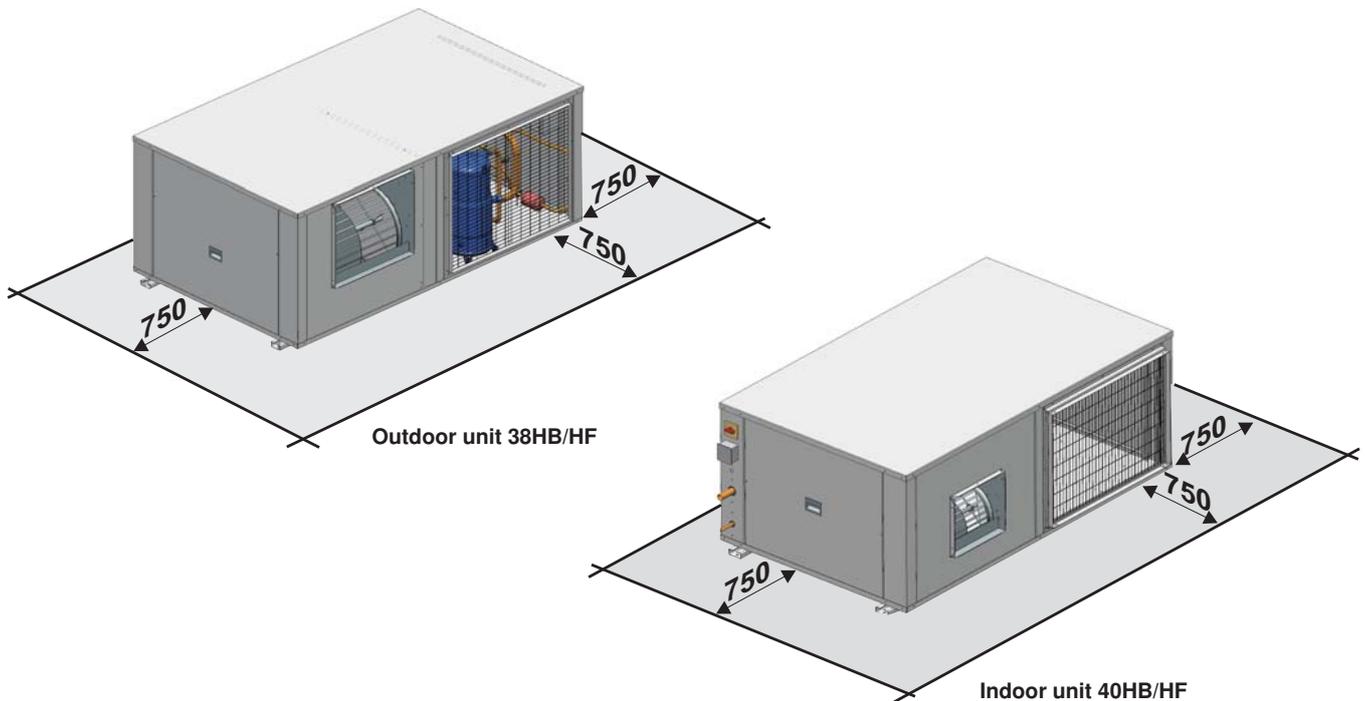
38HB/HF	A (mm)	B (mm)	Ø
80 and 90	1630	728	M8
120 and 160	2038	974	M8

Indoor unit
40HB/HF



40HB/HF	A (mm)	B (mm)	Ø
80 and 90	1450	630	M8
120 and 160	1781	863	M8

Minimum free space for commissioning and maintenance operations (mm)



8. CHECKING BEFORE COMMISSIONING



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

Electrical connections

Installation norms

To perform the electric installation of the unit (cable glands, conductor section and their calculations, protections, etc.), refer to the information provided in this document (see the 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.

The electric power supply of the unit must be sized in accordance with the maximum power input by the unit taking into account all the options it features (if necessary, refer to the technical brochure).

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



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

• *CARRIERrtc basic*

All 38HB/HF units have the *CARRIERrtc basic* electronic control, comprised of a control board and a TCO user terminal.

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

Recommendations for installation of the TCO terminal

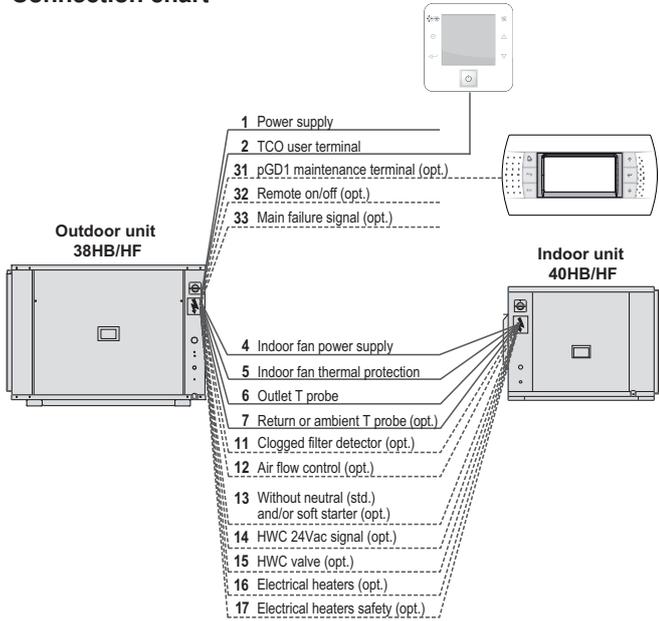
From the thermostat some of the unit operation aspects are controlled: operation modes, setpoint, differential, timings... Because of this, it is very important to choose an appropriate location within the room since in it is where the unit's control probe is located. This probe must report about the environmental conditions of the occupied area.



The thermostat must be fixed at a height of 1,5 metres from the ground and 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.

Note: Please refer to the *CARRIERrtc basic & medium* control brochure to obtain more detailed information about its operation.

Connection chart



No.	38HB/HF - 40HB/HF	80	90	120	160
1	Power supply	400 III (±10%)	3 + GND		
2	TCO user terminal connection ①	2 wires for power supply 230V + 1 shielded cable for communication type AGW20 / 22 (1 braided pair + drainwire + shielding)			
4	Indoor fan power supply	3 + GND			
5	Thermal relay signal of the indoor fan	2 wires			
6	Outlet temperature probe	2 wires			
7	Return or ambient temperature probe (optional)	2 wires			
11	Clogged filters detector (optional)	2 wires			
12	Air flow control (optional)	2 wires			
13	Unit without neutral (std) and/or soft starter (opt.)	1 wire			
14	HWC 24 Vac signal (optional)	2 wires			
15	HWC valve (optional)	1 wire			
16	Electrical heaters (optional) ②	3 wires (per stage) + GND			
17	Safety thermistors of electrical heaters (optional)	2 wires			
31	pGD1 maintenance terminal connection (optional)	telephone cable 6 wires standard (RJ12 connector)			
32	Remote on/off (optional)	2 wires			
33	Main failure signal (optional)	2 wires			

① If the unit is going to be installed in an industrial environment with a high level of electromagnetic interference, it is recommended to shield the cables of the thermostat control.

② The power supply for the electrical heater must be protected by an automatic switch and/or fuses to be foreseen by the installer.

Condensate drain connection

All the units, both outdoor and indoor, are equipped with a condensates drain pan, with a bronze, gas threaded M 3/4" drain junction.

**CONNECT SIPHON
METTRE SIPHON
PONER SIPHON**
V220014

Siphon installation norms

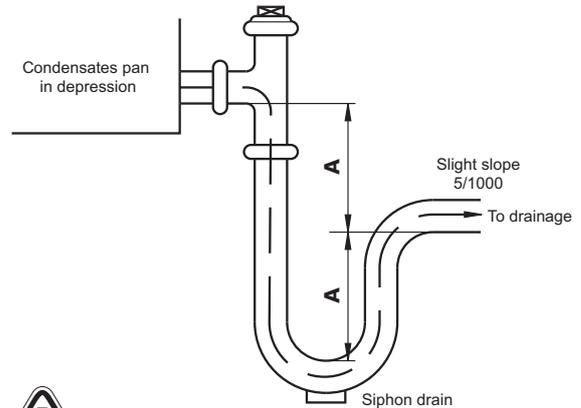
All water drain tubes must be provided with a siphon to avoid bad smell and water spills.

Pan in overpressure:

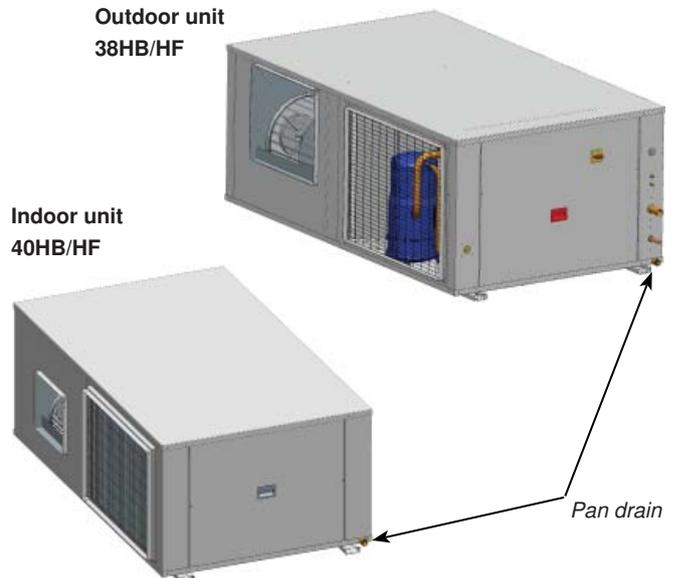
- It's installed to avoid the access through the drain piping of bad smells.

Pan in underpressure:

- Besides the above application, water must be suctioned from the pan because of the depression with respect to the motorfan assembly.
- Perform the siphon assembly as per the scheme of the attached starting diagram:
 - For the correct siphon design, the "A" height must be at least twice that of the underpressure (mmwc) where the condensate pan is placed.
 - Check that the condensate outlet is not clogged.
 - The drain piping must be slightly sloped to ease circulation towards the drain.
 - The original diameter of the piping must be respected. No reduction can be made.
 - In the case of units installed outdoors, with outdoor temperatures which are lower than 0°C the necessary precautions must be taken to prevent the water in the drain piping from freezing.

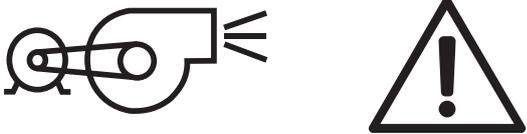


Check the watertightness of the connection.



Checks in the 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 overlapping of characteristic curves 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 INTERRUPERE L'ALIMENTAZIONE ELETTRICA E ASPETTARE 2 MIN.

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

V220086

• Soft starter detail (optional):

Soft starter of the supply centrifugal fan which prolongs the set time, available for indoor units 40HB/HF.

It's mainly aimed at installations with cloth ducts.



Pulley and belt calibration

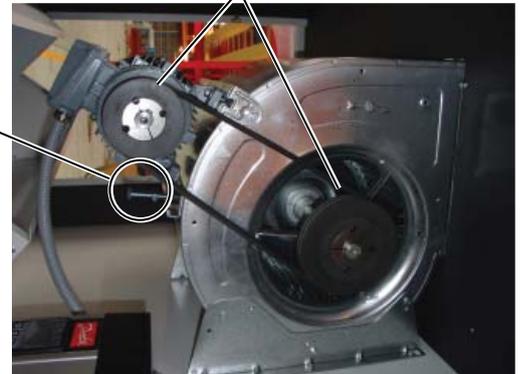
Attention: Before performing these operations, it is necessary to verify that the unit is disconnected from mains.

Centrifugal motorfans are coupled with pulleys and belts.

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

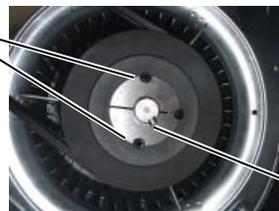
- The pulleys must be on the same plane, so it is important to check them with the help of a ruler or a laser aligner.
- In case they are not aligned, remove the pulley screws, remove the pulley and, after removing the taper pin, it can be slid over the axle (this action can be performed both in the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

Pulleys must stay on the same plane



Tensor screw

Pulley screws



Taper pin

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:

- Curves in the fan supply outlet(s) 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 discharge 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, these must be insulated and 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: Indoor units are designed to connect to a duct network. In the event that the outlet fan of the indoor circuit is accessible from a particular point in the duct network, the installer must install a protection mesh in the discharge as per the current regulation.

Cooling connections

Once installed the outdoor and indoor units, the cooling links must be laid between them

La maximum equivalent length of the cooling line is 30 metres, with a maximum geometric height of 20 metres when the outdoor unit is high.

The optional available depending on the equivalent equivalent length between indoor and outdoor unit:

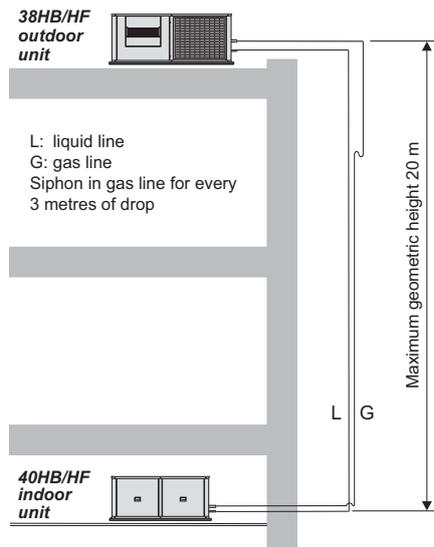
- Medium-distance option (for an equivalent length from 30 to 50 metres): particle separator.
- Long-distance option (for an equivalent length longer than 50 metres): particle separator + oil separator.

If it is the indoor unit which is high, the maximum equivalent length is reduced to 7 metres.

It is recommended to place a siphon in the gas line every 3 meters of shoulder to ease the oil return to the compressor.

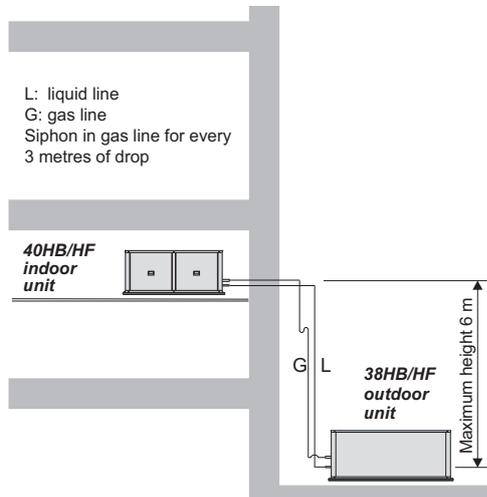
Outdoor unit top

Maximum equivalent length of the cooling line: 30 metres
For longer lengths it is necessary to consult optional



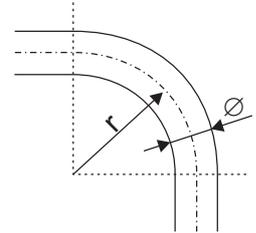
Outdoor unit bottom

Maximum equivalent length of the cooling line: 7 metres



Pressure drops in elbows expressed as equivalent lengths (m):

Tube installation norms must be respected and inspect carefully the tube lay out, looking for the shortest distance and the lowest possible number of curves. Also, chokes must be avoided, using large curve radii (the curve radius must be $\geq 3,5 \times \varnothing$).



Tube diameter (inches)	1/2"	5/8"	7/8"	1 1/8"
Equivalent elbow length 45° (m)	0,24	0,30	0,39	0,48
Equivalent elbow length 90° (m)	0,45	0,54	0,72	0,90
Equivalent elbow length 180° (m)	0,75	0,80	1,00	1,30

Connection of the unit to the cooling lines

For the refrigerant lines, use only cooling type seamless tubes. Under no circumstance use sanitary type copper pipe.

Following these steps is recommended:

- Revise and clean the tube ends to eliminate the burs from cutting them and any other impurity that could have deposited inside or on the outer surface. How clean the tubes are will dictate the degree or air tightness. Also, we will avoid the dirt formation that may collapse some spots in the cooling circuit.
- Apply isolator to the piping, covering them and affix it with tape. The material used must guarantee the air tightness at operation pressure and temperature.
- Remove the plugs that protect the cooling connections of the unit precisely at the moment of connecting the tubes.
- Align precisely both parts of the connection (unit and piping). There is no error risk when both tubes have different diameters.
- Run a pressure test in the cooling tubes and a search for leaks to verify the cooling installation.
- Create a vacuum in the installation to eliminate humidity inside the circuit.
- Charge the unit with gas as per the data stated in the technical characteristic table. Add the refrigerant slowly via the schrader valve built into the liquid line, whilst the compressor is in operation, monitoring the pressures to detect if there are any possible anomalies.
- If the equivalent length of the cooling lines is over 7 m, an additional charge will be needed per meter as per the following table.

Nominal diameter (")	1/4"	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"
Indoor section (cm ²)	0,149	0,444	0,900	1,505	2,282	3,120	4,290	5,346
Liquid line charge (g/m)	19,3	57,0	115,0	193,5	292,3	404,1	550,3	685,7
Gas line charge (g/m)	-	0,2	0,4	0,7	1,0	1,4	2,0	2,5

Note: To ensure that the gas charge is correct, when performing the "unit operation verification" the subcooling of the liquid must be checked.



For determining the equivalent length, the pressure drops in accessories must be taken into account.

9. SAFETY ELEMENTS

Low pressure pressostat

When connected to the compressor suction, it will stop its operation when the pressure at that point goes down below the tare value (caused by obstructions in the circuit, excessive dirt in the filters, fan stop or ice formation in the evaporator).



This pressostat disconnects at 2 bar and is automatically reactivated.

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.



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.

Defrost control

This safety device is intended to eliminate ice which could accumulate in the outdoor coil when the unit is working in the heating cycle. Defrosting is carried out by the control depending on the value measured by the sensor(s) on the outdoor coil(s) and the time set between defrosting operations.

Magnetothermals for line protection

They are located at the beginning of the power lines for the compressor(s) and motor fan(s) to protect them.

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).

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 optional return air probe, the electronic control can activate an anti-fire safety device that detains the unit when the return air surpasses a temperature of 60°C (by default). It cannot return to operation until the temperature has dropped to below 40°C.

Clogged filter detector (optional)

Differential pressostat for indication, through an automatic reset alarm, of a level of dirtiness of the filters greater than the established level. This pressostat is installed in the factory in the indoor unit.

Control of air flow (optional)

A differential pressostat can be incorporated in order to measure the variation in air flow. This pressostat allows the detection of fan belt breakages, since the fan relay only detects operating faults that have arisen in the motor. This safety device is included in units with electrical heaters. This pressostat is installed in the factory in the indoor unit.

10. OPTIONAL



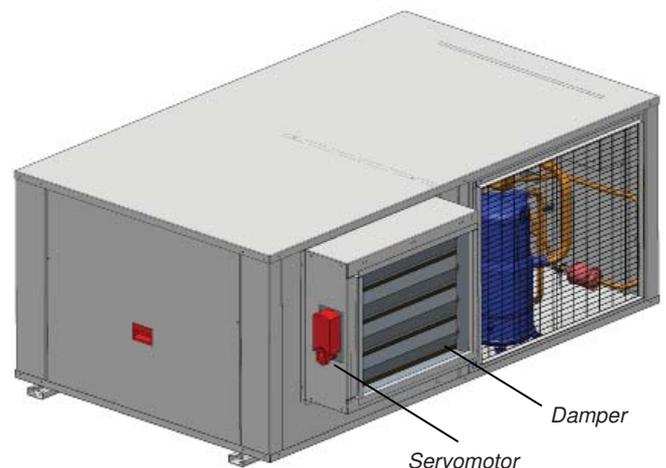
The installation of some of these options brings in pressure drops at air level therefore this must be considered when selecting fans.

The pressure drop graphs in the options, can be seen in the technical brochure.

Condensation pressure control (38HB/HF)

This control is advisable for outdoor units 38HB/HF 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 supply. A servomotor opens or closes the damper depending on the proportional signal 0-10V received from the electronic control system.

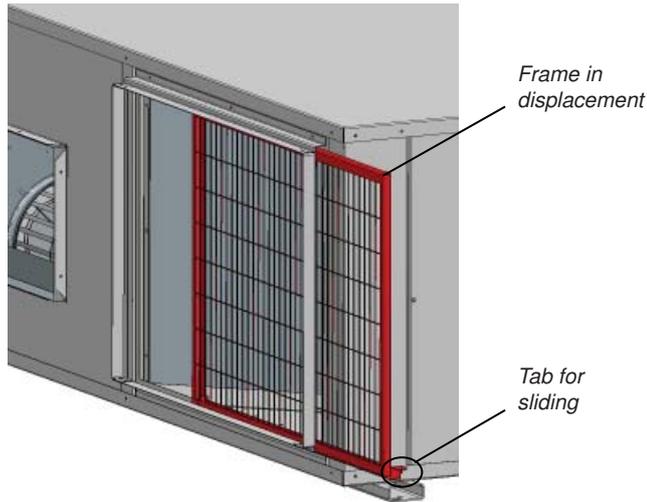


Filters (40HB/HF)

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

Filter removal:

The filter is assembled over a steel metal profile. By dragging a tab, it slides laterally by the rail. Then, the filter is removed vertically.



Hot water coil (40HB/HF)

Hot water coil for assembly in duct with a three-way valve managed by the electronic control of the unit.

Recommendations:

- Coil filling:
 - The coil filling must be made with the bleeder valve open until water runs through it, which is when it is time to close it.
 - Cut off the water supply and let the bubbles generated go up to the highest coil point, which is the same as the bleeder valve, and eliminate by opening the purger.
 - Pour more water into the circuit and repeat the previous steps.
 - Activate the water pump (to be foreseen by the installer) and repeat the previous steps until no air noises are heard in the piping, which is when the filling of the installation will have been finished successfully.
- In case of long unit stops, and forcibly if they happen in the winter season, the coil must be emptied.
- Possible water freezing must be avoided: glycoling water or by using anti-freeze thermostat that triggers the 3-way valve.
- The direction of the water flow must be correct and so the following indications must be observed:

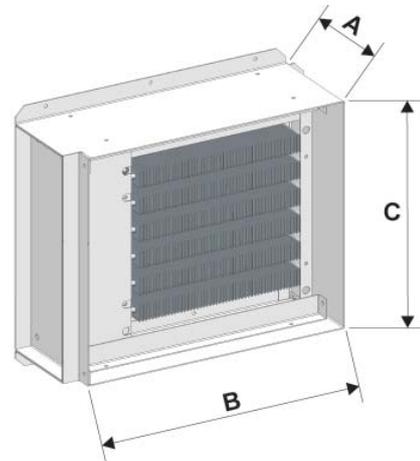


Electrical heater (40HB/HF)

- The auxiliary electrical heaters are ready for operation in one power stage.
- The electrical 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.

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

Frame for assembly of the auxiliary electrical heaters in the fan discharge

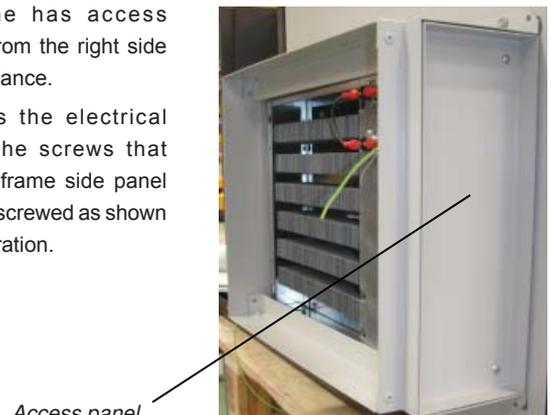


40HB/HF	Output	Dimensions (mm)		
		A	B	C
80 / 90	3 to 6 kW (1 row)	150	432	341
	9 to 12 kW (2 rows)	262	432	341
120	3 to 6 kW (1 row)	150	432	341
	9 to 12 kW (2 rows)	262	432	341
	12 to 18 kW (2 rows)	262	482	443
160	3 to 12 kW (1 row)	150	547	443
	15 to 18 kW (2 rows)	262	547	443

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.



Split-system cooling units and heat pumps

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



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.



Then, unscrew the screw that fastens the electrical heaters' frame and take out by the rail, as shown in the following images.



Rail



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

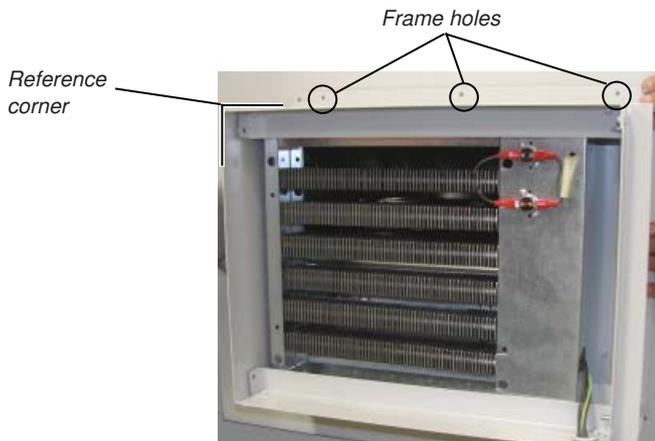
Note: The connection of the necessary elements for the adequacy to the handling of the unit must be performed by the installer.



Kit assembly:

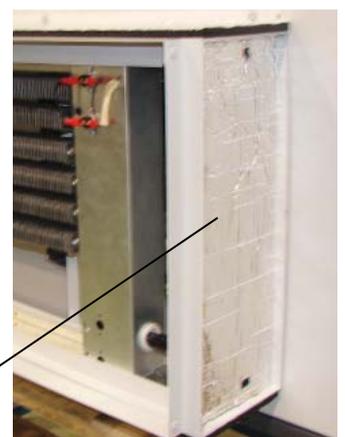
When the frame with the electrical heaters is provided in a kit, follow the steps below for connecting it:

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).



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

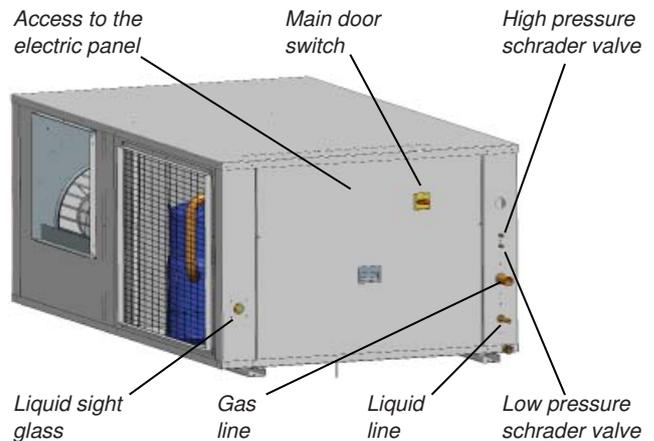
Access panel



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.
- The following must be verified:
 - That the electrical power supply remains constant and that it corresponds to that featured on the unit data plate.
 - 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").
 - The correct connection of the sensors supplied with the unit.
 - That they are no cables close to heat sources.
- Once the above verifications have been carried out, the control circuit is supplied with voltage by the automatic control switch. It is necessary to leave the compressor crankcase heater with voltage for 24 hours before starting the compressor.
- If the refrigerant load has not been completed and is lower than that required, the suction pressure will be rather lower than normal, and overheating when suctioning from the compressors will be high. This can cause an interruption in operation due to activation of the refrigerant load safety device.
- If the refrigerant load is insufficient the liquid sight glass will not be clean, gas bubbles will appear as foam. To adjust the refrigerant load, a schrader valve is built into the unit on the liquid line. The liquid sight glass is located on the support next to the electric panel.



WICHTIG: WIEDERBEHEIZUNG DER OLWANNE

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

IMPORTANT: CRANKCASE HEATING

FOR THE FIRSTSTART OR AFTER A LONG 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 ABSCECE 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) COMPRESORE(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

- All the 38HB/HF units are equipped with 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

R 410A

- When commissioning the compressor, check the subcooling and overheating and thus verify if the refrigerant load is appropriate to the operating conditions.

- Verify the absence of any leaks of the refrigerant. In the event of a leak completely empty the unit using a specific recovery unit for R-410A. Refill by following the recommendations featured in the chapter "Checking before commissioning".
- Check the unit operation and verify the safety devices.

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 temperatures, originated by a high pressure drop in the ducts, or by other causes that impede the correct 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.

Operational checks

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

It is also recommendable to create a report, taking note of the date, which includes the following information:

- the nominal power,
- current absorbed by the compressors, fans, and other electric components,
- the significant temperatures of the cooling circuit (see attached table),
- and other aspects that are considered interesting, such as, for example, 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		
Compressor	Aspiration pressure	bar	Compressor	Aspiration pressure	bar
	Aspiration temp. (1)	°C		Aspiration temp. (1)	°C
	Condens. pressure	bar		Condens. pressure	bar
	Condens. temp. (2)	°C		Condens. temp. (2)	°C
Air condenser	Gas inlet temperature	°C	Air evaporator	Liquid inlet temperature	°C
	Liquid outlet temp. (3)	°C		Gas outlet temp. (4)	°C
	Air inlet temperature	°C		Air inlet temperature	°C
	Outdoor temperature	°C		Outdoor temperature	°C
	Air outlet temperature	°C		Air outlet temperature	°C
Air evaporator	Air inlet temperature	°C	Air condenser	Air inlet temperature	°C
	Air outlet temperature	°C		Air outlet temperature	°C
	Liquid inlet temperature	°C		Gas inlet temperature	°C
	Evap. outlet temp. (4)	°C		Liquid outlet temp. (3)	°C
Undercooling (2) - (3)		°C	Undercooling (2) - (3)		°C
Overheating (4) - (1)		°C	Overheating (4) - (1)		°C

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.

General recommendations:

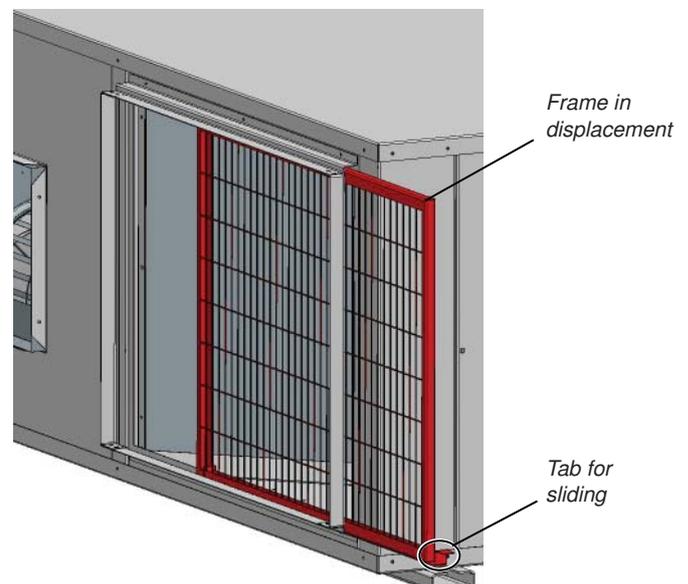
- Do not lean on the unit. A platform must be used to work on a level.
- Do not lean on the copper refrigerant tubes.
- Keep the unit clean.
- Keep the space surrounding the unit clean and cleared in order to avoid accidents and ensure the proper ventilation of the coil.
- Perform a visual (remains of 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.

Air filters

- Clean regularly. 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.

Filter removal:

The filter is assembled over a steel metal profile. By dragging a tab, it slides laterally by the rail. Then, the filter is removed vertically.



Compressor

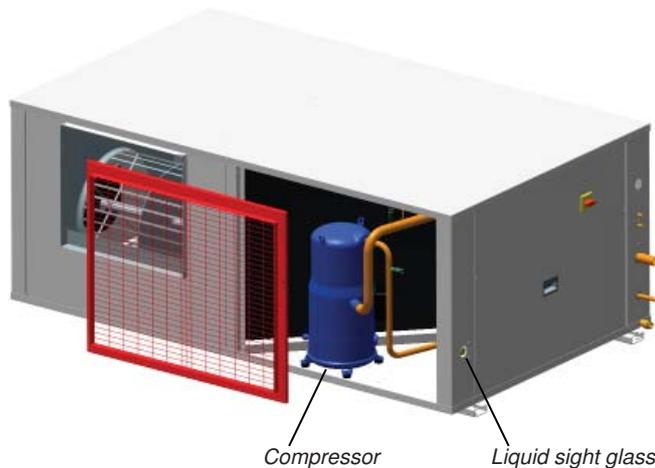
In the case of compressor replacement:

- 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, please consult the maximum torque that can be applied.

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.



Liquid sight glass

- This sight glass, located on the liquid line, after the dehydrating filter, enables controlling the refrigerant load and the presence of moisture in the circuit. The presence of bubbles in the indicator means that the refrigerant fluid load is insufficient or that there are non-condensable products in the cooling circuit. The presence of moisture is characterised by the change in colour of the control paper located on the sight glass.
- In the 38HB/HF units the liquid sight glass is located on the support next to the electric panel.

Warning:

If the unit stops, certain indicators may appear in yellow; the change in colour is due to the sensitivity, which depends on the temperature of the fluid. These will change to green after a few hours of the unit operating.

If the indicators remain yellow, that will indicate the presence of excessive humidity in the circuit. This will require the presence of a specialist.

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:

$$\text{Load kg x GWP} = \text{t CO2e}$$

Carbon dioxide equivalency (t CO_{2e}) 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 CO_{2e}) provided in the technical characteristics tables of this manual.

- Operators shall ensure that the unit is checked for leaks ad minima according to the following frequency:
 - t CO_{2e} < 5 not subjected
 - t CO_{2e} 5 to 50 every year
 - t CO_{2e} 50 to 500 ... every 6 months
 - t CO_{2e} > 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.

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.



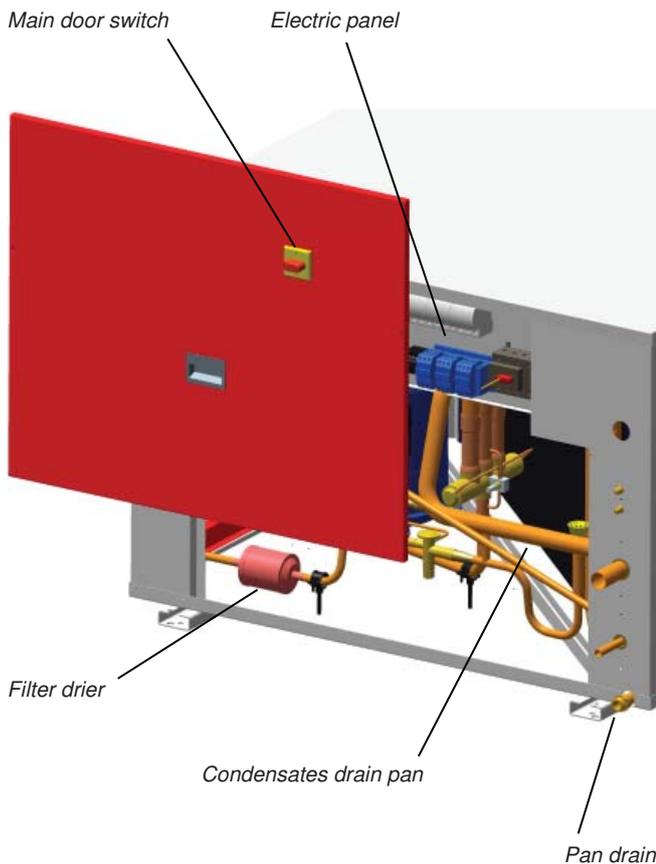
Use safety gloves for this task. Take care with the sharp parts of the coil.

Condensate drain pan

- Check that the condensate pan is 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.

Filter drier

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

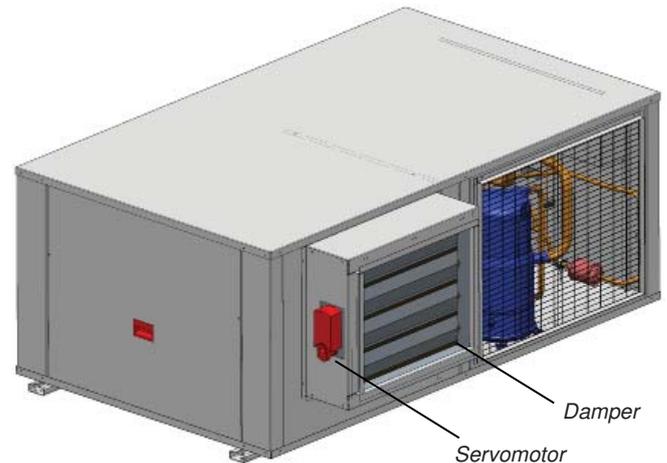


Centrifugal fan

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

Servomotor (optional)

It is advisable to check the condition of the servomotors in outdoor units 38HB/HF with condensation control damper.



Oil

Oils used for cooling machines do not post 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 "Technical characteristics" tables given in this manual.

- 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 filter drier.
- 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.

Oil separator (optional)

When the maximum equivalent length of the cooling line is greater than 50 metres, an oil separator must be fitted.

- During the first few days of operation check the oil level in the compressor sight glass. If there is not enough, oil can be added (via the compressor schrader valve or the unit low pressure).

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 suction 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 suction not air tight c) Cycle reversing 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 load (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 cut-off)	<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, fuses b) Verify the safety chain of the electronic control c) Verify electronic control d) Replace e) Replace f) Wait for reactivation, verify current 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) Insufficient gas, cut-off 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 reversing 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



Order No.: 10127, 07.2015. Supersedes order No.: New
The manufacturer reserves the right to change the specification without prior notice.



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