



INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



Packaged rooftop units and separated gas module option

50FF/FC 020-093

Nominal cooling capacity 22.3 - 90.2 kW
Nominal heating capacity 21.9 - 89.7 kW

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1 - INTRODUCTION

The new **50FF/FC** packaged rooftop range consists of autonomous compact air-air units of horizontal design, rooftop type.

- **50FF series:** for **cooling-only** operation.
- **50FC series:** for **reversible heat pump** operation.

The range of available capacities in the series allows for the air conditioning of medium and large surface areas which are common in shopping malls, food retail, logistics and many other commercial and industrial applications.

Designed to withstand outdoors installation, it can operate all-year-round performing at the highest levels of seasonal efficiency thanks to the management of the new control inside.

Ease of maintenance is also granted thanks to the great accessibility to components through removable side panels, access doors fitted with dual hinges with locking functions or removable outdoor fans covers. The condensates drain pan is now removable for easy cleansing.

The unit is connected directly to an air distribution ductwork without additional elements or equipment, pipes, cables, etc. taking no floor space at all. This design reduces the cost of installation, facilitates a quick connection and ensures reliable operation.

2 - SAFETY ADVISE

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 this brochure, the labels, and the specific instructions.

Compliance with the norms and regulations in effect is mandatory. 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.



Caution: Before intervening in the unit, verify that the main power to the unit is cut off. An electric shock can cause personal damage. The main disconnect switch is located in the unit's electrical cabinet.



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.



During any handling, maintenance or service operations, the technicians involved must be equipped with safety gloves, glasses, shoes, insulating clothing, etc

2.1 - Refrigerant

Important: These units contain **R-410A**, a fluorinated greenhouse gas covered by the Kyoto protocol.

All interventions on the refrigerating circuit must be performed in accordance with applicable legislation. Within the European Union, it is necessary to observe regulation (EU) No.517/2014, known as F-Gas, over **Certain greenhouse effect fluoride gases**.

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 European Directives:
 - Machinery Directive 2006/42/EC (MD)
 - Electromagnetic Compatibility Directive 2014/30/EU (EMC)
 - Low Voltage Directive 2014/35/EU (LVD)
 - Pressure Equipment Directive 2014/68/EU (Category 2) (PED)
 - RoHS Directive 2011/65/EU (RoHS)
 - Eco-design Directive 2009/125/EC (ECO-DESIGN)
 - Energy Labelling Directive 2017/1369/EU (ECO-LABELLING)
 - Harmonised Standard: EN 378-2:2012 (Refrigerating systems and heat pumps - Safety and environmental requirements).

Technicians who install, commission, operate and service the unit must possess the necessary training and certifications, understand the instructions given in this manual and be familiar with the specific technical characteristics of the installation site.

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	

Ensure that refrigerant is never released to the atmosphere when the equipment is installed, maintained or sent for disposal.

It is prohibited to deliberately release refrigerant into the atmosphere. The operator must ensure that any refrigerant recovered is recycled, regenerated or destroyed.

The operator is bound by the obligation to perform periodical sealing tests on the refrigerating circuit according to the regulation (EU) No.517/2014. Please, consult the frequency of tests in chapter of "Maintenance".

In case of a leak:

- **Toxicity:** According to EN 378-1, 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 still hazardous because they are heavier than air and can force the latter out of the machine rooms. If refrigerant is accidentally released, ventilate the room with fans.
- Although it is not flammable, keep them away from open flames (e.g. cigarettes) as temperatures of over 300°C cause their vapours to break down and form phosgene, hydrogen fluoride, hydrogen chloride and other toxic compounds. These compounds may produce severe physiological consequences if accidentally inhaled or swallowed.
- To detect leaks, an electronic leak detector, an ultraviolet lamp or soapy water must be used. Flame detectors do not help.
- Immediately repair any refrigerant leak, using a recovery unit specific for R-410A that avoids a possible mixture of refrigerants and/or oils.

3 - POSSIBLE TYPES OF ASSEMBLIES

Depending on the indoor airflow direction

Assembly	Description	Models	Indoor air direction			
			0 Lower supply Lower return	1 Lateral supply Lower return	2 Lower supply Lateral return	3 Lateral supply Lateral return
B1	"Standard"	All				
B2	"Standard" Economizer, 2 dampers	All				
B3	"Standard" Economizer, 3 dampers	All			×	×
BX	"Standard" Axial fan in return section	All			×	×
BP	"Standard" EC plug-fan in return section	All			×	×
BA	"Standard" Cooling recovery circuit with EC plug-fan in return section	All			×	×
BT	"Standard" Return top box with EC plug-fan or centrifugal fan	All	×	×		
BB	"Standard" Cooling recovery circuit with EC plug-fan in return top box or centrifugal fan	All	×	×		
BW	"Standard" Heat recovery wheel module				×	×

S: air supply R: air return F: fresh air intake E: air exhaust


4 - UNIT IDENTIFICATION

Check the unit for any damage or missing components upon delivery.



Check that the details on the label, the packing and the name 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 name plate located in a prime space, as appears in the attached image: Check that this plate matches the correct model.

Año/An.Year	Ref/Reference	No Serie/serial Nbr.
1	2	3
Product/Product/Produit		
4		
Ref. Produit/Item Nbr		
5	6	7
Tension/Voltage	Kit Elec.	Max.Intensidad/Intensité/Current
8	9	10
Refrigerant	Refrig.KG (Fábrica/Factory/Usine)/Co2 Teq.	
11	12	
PSmax(API/HP)	PSmax(BP/LP)	Temp. Max./ IP
13	14	15
	Peso/Poids/Weight	NoBo
	16	17

 CARRIER SCS
 Route de Thil
 01122 Montluel-FRANCE

Fabricante/Fabricant/Manufacturer:
 Compañía Industrial de Aplicaciones Térmicas, S.A.
 P. Ind. Llanos de Jarata s/n. 14550 Montilla-SPAIN

Contient des gaz à effet de serre fluorés \ Contains fluorinated greenhouse gases regulated by the Kyoto protocol
 Contiene gases fluorados de efecto invernadero regulados por el protocolo de Kyoto



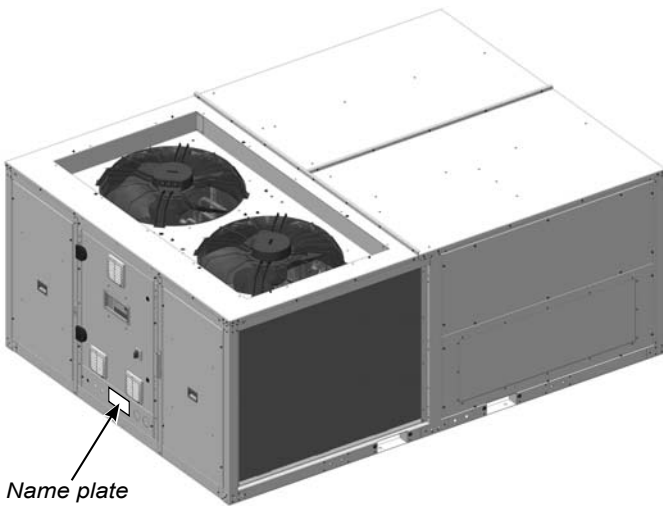
Important: The serial number must be used in all correspondence regarding the unit.

Markings (name plate, punch marks, labels) must remain visible. They must not be altered, removed or modified.

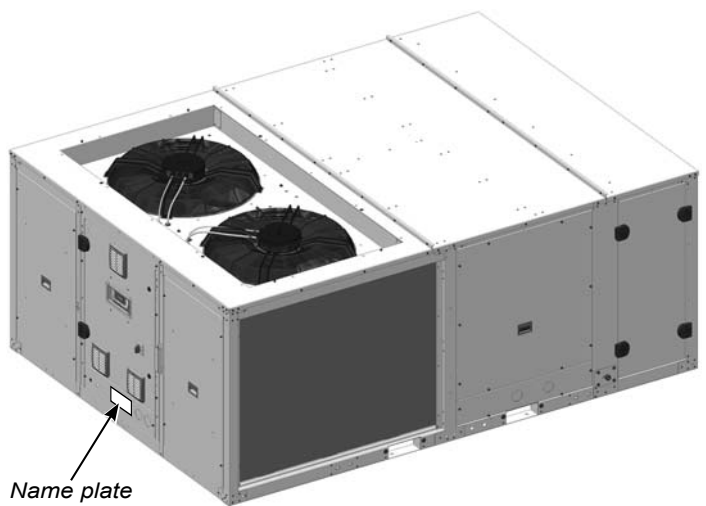
Legend

- 1 Year of manufacture
- 2 Commercial product name
- 3 Serial number
- 4 Description of the product
- 5 Purchase order number
- 6 Sales order number
- 7 Work order number
- 8 Power supply
- 9 Power output of the auxiliary electrical heaters kit (optional) (kW)
- 10 Maximum absorbed current under full load (A) (including the electrical kit)
- 11 Type of refrigerant
- 12 Refrigerant content (kg) and Environment impact (CO₂ Teq.)
- 13 Maximum service pressure in the high pressure side (R-410A = 42 bar)
- 14 Maximum service pressure in the low pressure side (R-410A = 24 bar)
- 15 Maximum operating temperature (refer to "Operation limits")
Maximum shipment and storage temperature: +50°C
Electrical protection rating: IP54
- 16 Operation weight (kg) (empty weight + fluid + refrigerant)
- 17 Notified Body number for surveillance of the Pressure Equipment Directive

"Standard" (all models)



"In-line" (models 052 to 093)



5 - OPERATION LIMITS

Inlet air conditions		Cooling	
		50FF	50FC
Indoor coil	Minimum temperature	13°C WB	
	Maximum temperature	24°C WB	
Outdoor coil	Minimum temperature	12°C (1)	
	Maximum temperature	52°C	48°C

Inlet air conditions		Heating
		50FC
Indoor coil	Minimum temperature	10°C
	Maximum temperature	27°C
Outdoor coil	Minimum temperature	-15°C WB (2)
	Maximum temperature	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, the installation of a support element is recommended.

6 - TRANSPORT AND HANDLING

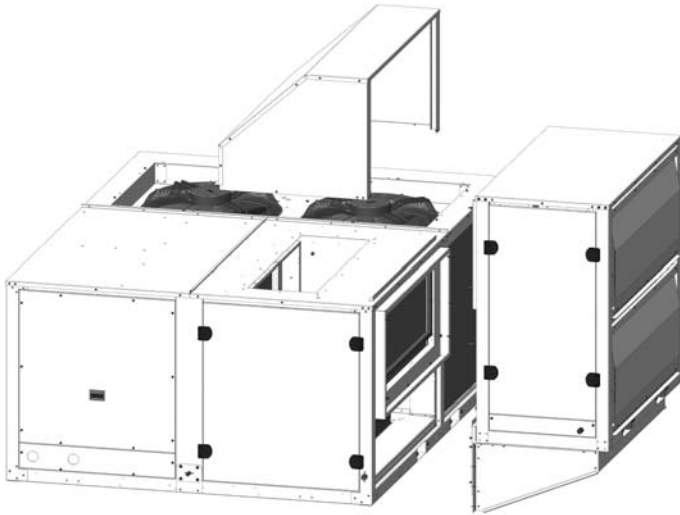
These machines must be unloaded and positioned by a specialist handling company using the appropriate, standardised tools.

Important: The transport of two stacked units is allowed, but not the simultaneous handling of both units.

The unit must be handled with care to avoid transport damage. Do not remove the protective packaging and the transport guards until the unit is in its final location.

Before handling, check that the path leading to the installation location is accessible and free from obstacles.

Optional modules, such as the fresh air housing (B3, BX, BP, BA, BW, RP and RW assemblies) and the heat recovery wheel (BW and RW assemblies), are supplied disassembled with the unit, for installation on site.



The unit can be discharged using a crane with a rocker arm and cloth slings or using a forklift truck if it is done on the side of the transport box.

In both cases, it is always mandatory to grasp the unit by the points intended for that purpose, as described in this chapter.

Any handling of the unit by other means or by gripping points different from those described here may be dangerous for both the unit and the personnel who are carrying out the discharging or transport work.



Always check the weight of the unit and verify that the discharging method used is approved for handling that weight.

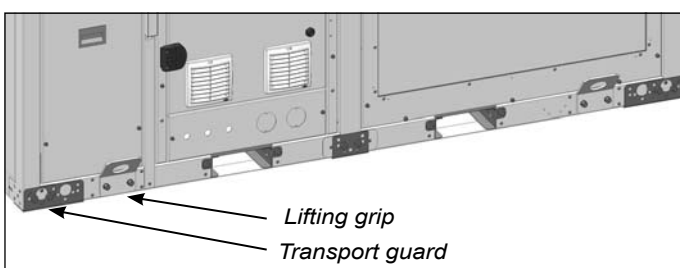
6.1 - Discharge via crane

A rocker arm, as well as approved slings, both suitable for the dimensions and weight of the unit, must be used in order to carry out the work safely.

Important: to avoid damaging the casing, use textile slings with shackles.

Only attach the slings to the two lifting grips located on each crossbar.

Important: Three lifting grips are attached on each crossbar on models 052 to 093 with BA and BB assemblies.



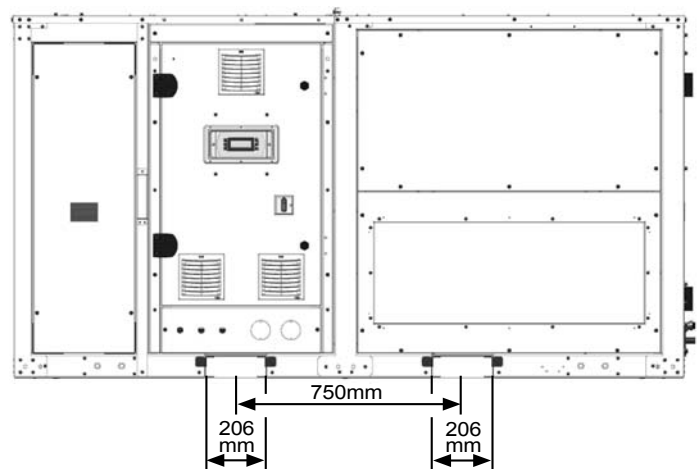
Raise and set down the unit carefully. Take care not to tilt it by more than 15°, as this could adversely affect its operation.

The centre of gravity is not necessarily in the middle of the unit and the forces applied to the slings are not always identical. Please consult the weight and the centre of gravity of each model stated in paragraph 7.6.

After the placing of the unit, it is recommended to remove the grips as they can be a hindrance for maintenance. Put the grips back in case of unit transport. The grips are fixed to the crossbar using M10 screws (hex. key 17).

6.2 - Discharge via forklift truck

The unit is designed to be transported safely by using a forklift truck. The base features guide rails to accommodate the forks of the fork-lift truck. These guide rails ensure that the centre of gravity of the unit remains within the forks, and at the same time, avoid the possible introduction of the truck's fork into functional parts that may cause damage to the unit.



Note: the module with the heat recovery wheel (BW and RW assemblies) also includes these guides in its base frame with the same dimensions.

The recommended length for the forks will be bigger than the unit width (refer to the following table), so that the entire weight-bearing structure of the unit can be supported on the forklift truck.

The standards and recommendations of the forklift truck must also be respected with regards to the maximum load, inclination of the fork carriage, elevation of the load for transport, and, in particular, the maximum speed.

Units dimensions for transportation (*):

50FF/ FC	B1, B2, B3, BX, BP, BA, BW assemblies			BT, BB assemblies			R1, R2, RP, RW assemblies		
	Length (mm)	Width (mm)	Height (mm)	Length (mm)	Width (mm)	Height (mm)	Length (mm)	Width (mm)	Height (mm)
020	2.225	1.750	1.230	2.230	1.760	1.975	--	--	--
028	2.225	1.750	1.230	2.230	1.760	1.975	--	--	--
037	2.225	1.750	1.230	2.230	1.760	1.975	--	--	--
040	2.225	1.750	1.230	2.230	1.760	1.975	--	--	--
045	2.225	1.750	1.230	2.230	1.760	1.975	--	--	--
047	2.225	1.750	1.230	2.230	1.760	1.975	--	--	--
052	3.000	2.200	1.230	3.000	2.210	1.995	3.000	2.200	1.230
058	3.000	2.200	1.230	3.000	2.210	1.995	3.000	2.200	1.230
062	3.000	2.200	1.230	3.000	2.210	1.995	3.000	2.200	1.230
070	3.650	2.200	1.230	3.655	2.210	1.995	3.650	2.200	1.230
074	3.650	2.200	1.230	3.655	2.210	1.995	3.650	2.200	1.230
086	3.650	2.200	1.230	3.655	2.210	1.995	3.650	2.200	1.230
093	3.650	2.200	1.230	3.655	2.210	1.995	3.650	2.200	1.230

(*) Consult the overall dimensions of the available assemblies in paragraph 7.7 "Recommended service clearance".

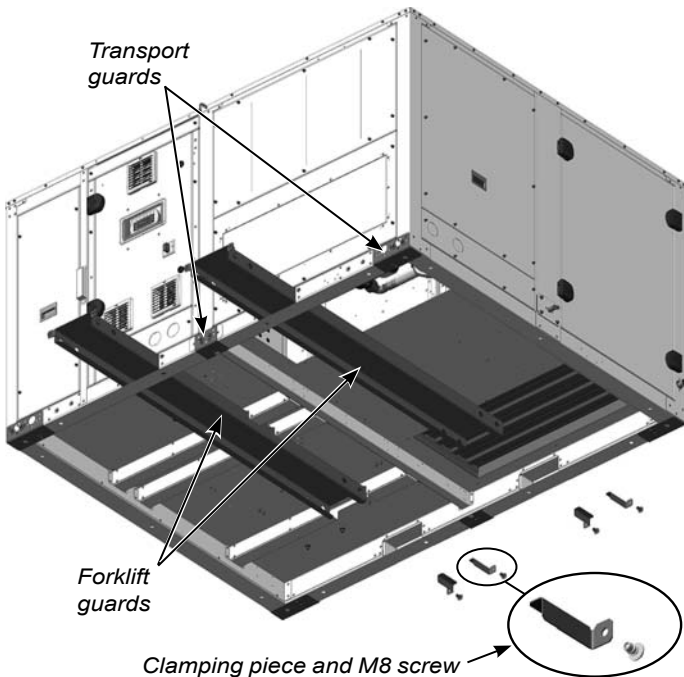
7 - POSITIONING AND INSTALLATION

7.1 - Removing forklift guards

On units with lower supply and return, the fork-lift truck guards must be removed. This is also the case when the units are to be connected onto a roofcurb.

These guide rails are designed to be removed from both sides of the unit, as required. They are secured to the unit using 4 clamping pieces with M8 screws.

Attention: a free space equal to the width of the machine is required for removing the rails, bigger than the "Recommended service clearance".



Important: the transport guards also must be removed before installing. These guards are fixed with M4.8 self-tapping screws.

7.2 - Choice of location

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.
- It is necessary to check that the structure supports the unit's weight (please consult the weight in paragraph 7.6).
- The area where the unit will be located must be perfectly accessible for cleaning and maintenance operations (please consult the "Recommended service clearance" in paragraph 7.7). Leave enough space for air circulation around the unit.
- Since the unit is designed to work outdoors, some specific installation norms must be followed:
 - The unit will be located on the roof of the premises. If it is foreseen that it will work more on heating than on cooling, it is preferable to direct the coil towards the sun. If little work on heating is foreseen, choose North direction.
 - Avoid placing obstacles in the air supply or return. No obstacle may impede the air aspiration into the coils. Do not fix the outdoor coil side in the predominant wind direction.
 - Do not install the unit in a closed enclosure or in conditions that originate air recirculation.
 - The chosen location must not flood and must be above the average height the snow reaches in that region.

7.2.1 - Preparation of the ground

It is necessary to ensure that the surface where the unit is going to be installed is completely flat. Any defect in the preparation of the unit support surface translates into stresses on the structure, which may result in its deformation.

These units can be installed on the floor or on a brick curb or steel profile. Based on the fixing solution defined in the installation project, it will be necessary to plan the placement in the base of the threaded rods in the expectation that the unit supports can be fixed later on. To do so, it is recommended that a template be made with the heights corresponding to the fixings.



Foresee appropriate damping devices in these fixings to ensure that noise and vibration transmission is avoided (consult the reactions in the support in paragraph 7.6).

7.2.2 - Sound Level

These units are designed to work with a low acoustic level. In any case, the following must be taken into account for the design of the installation: the outdoor environment for acoustic radiation, the type of building for the noise transmitted by air, the solid elements for the transmission of vibrations.

To reduce transmission through solid surfaces to the maximum, it is very advisable to install shock absorbers between the ground or structure and the unit frame. If necessary, a study must be commissioned to an acoustic technician.

Note: Sound levels can be found in the technical brochure of this series.

7.3 - Antivibrators assembly (silent-blocks)

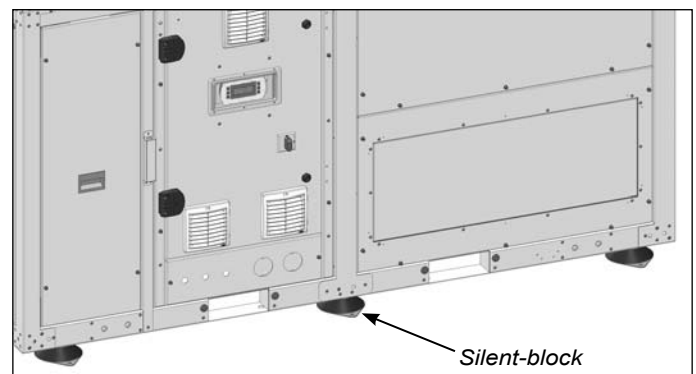
Although the installer is the one who must decide on a case-by-case basis the best way to place the unit in the ultimate location, always in observation of the handling standards that have been described, below is a proposed assembly sequence that may facilitate the operation, keeping in mind that the sequence performed in the installation shall be the one most suitable to the solution chosen for each particular case based on the existence (or lack thereof) of brick curb, type of silent-blocks used, etc.

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, as described in the paragraph "Preparation of the ground".

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.

M12 metric threads have been provided for their placement in the supports (consult the fixing for antivibrators in paragraph 7.6). A hex key 19 or Allen wrench 10 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.

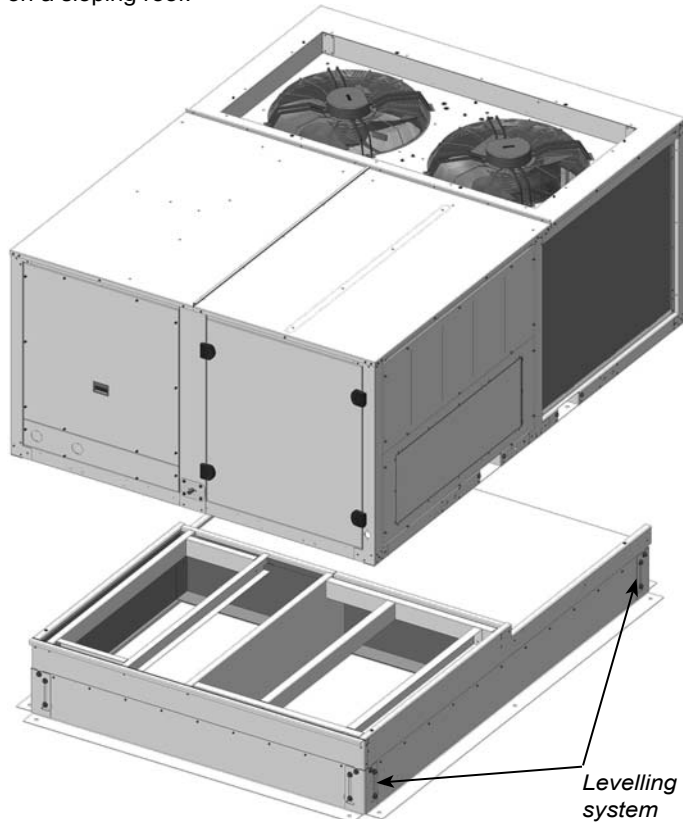


7 - POSITIONING AND INSTALLATION

7.4 - Pre-assembly roofcurb (optional)

The "Standard" assemblies can rest on standardised pre-assembly roofcurbs with adjustable height, built in galvanised steel panelling with polyester paint and thermal insulation.

The levelling system uses angle pieces that allow adjustments in the X and Y axes. As a result, the unit will be perfectly levelled on a sloping roof.



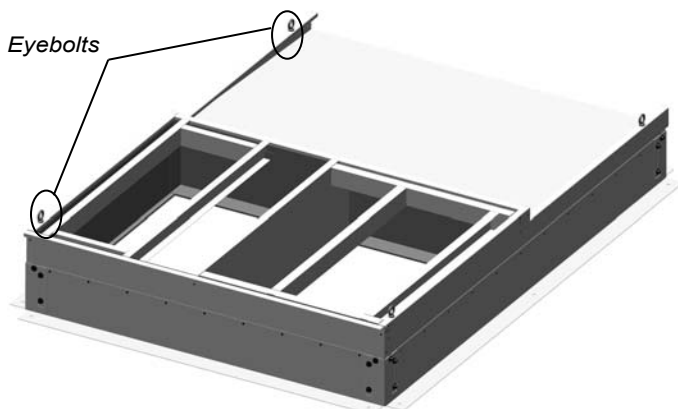
These roofcurbs can also incorporate a gas burner. For more information consult the paragraph 12.11 "Gas burner".

Note: units with "In-line" assemblies have a wide range of adaptation roofcurbs that are ready for direct replacement on site of units from different manufacturers (upon request).

7.4.1 - Handling

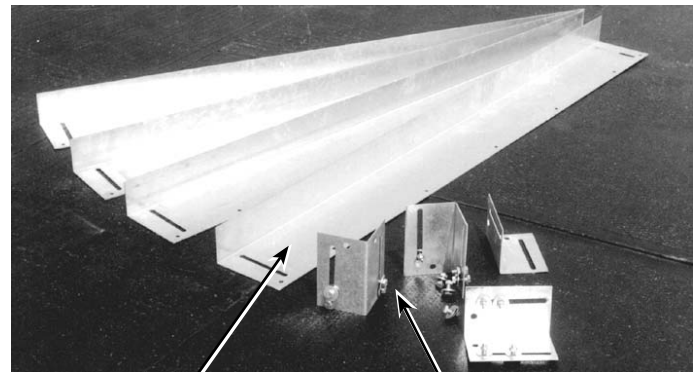
For transport and lifting up to the roof using a crane, a rocker arm as well as approved slings, both suitable for the dimensions and weight of the roofcurb, must be used. These slings will be hooked on the eyebolts fitted to the roofcurb. Check that the eyebolts are perfectly screwed in before attaching the slings.

After the placing of the roofcurb, it is necessary to remove the eyebolts. Put the eyebolts back in case of transport.

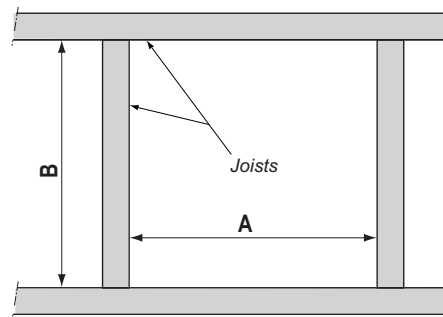
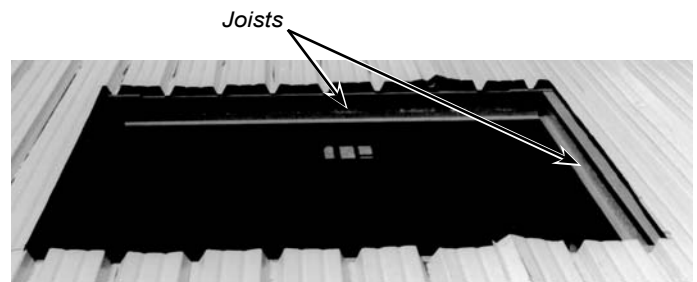


7.4.2 - Installation on the roof

The following picture shows the roofcurb elements that enable adjusting and levelling it:



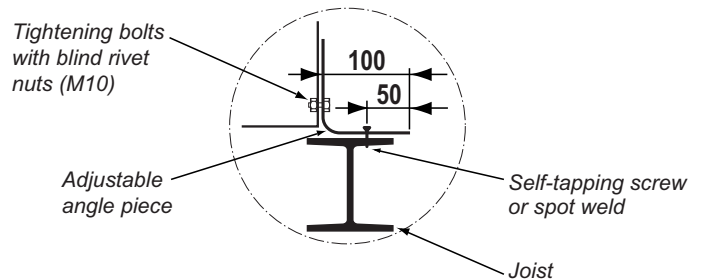
The roofcurb will be supported on some joists placed for this purpose in the roof (check the location of ducts for the air supply and air return).



50FF/FC roofcurb	A (mm)	B (mm)
020 to 047	1970	1567
052 to 052	2739	2013
070 to 093	3390	2013

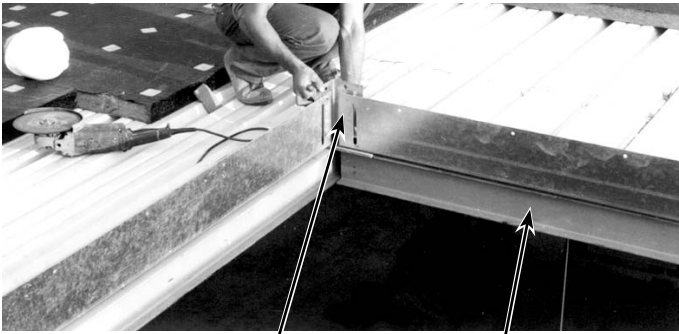
Slide the four adjustable angle pieces below the steel pan on top of the joists.

The adjustable angle pieces are fixed to the joists using self-tapping screws or electric spot welding.



Check that the adjustable angle pieces are in the correct position on the joists before the roofcurb is fitted. Next, provisionally attach the adjustable angle pieces to the joists with one or two self-tapping screws per angle part.

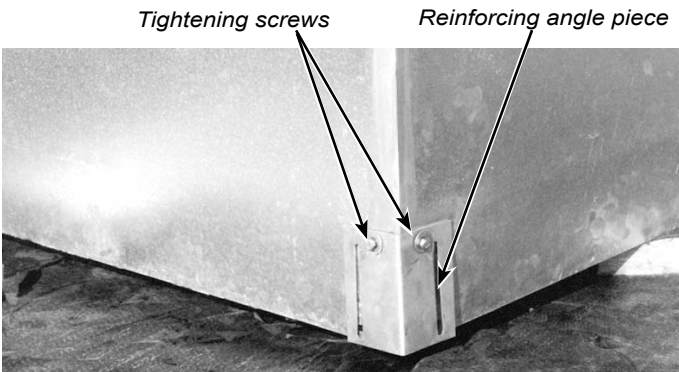
7 - POSITIONING AND INSTALLATION



Reinforcing angle piece

Joist

After the above operation remove the four reinforcing angle pieces to position them in the roofcurb. Attach them to the roofcurb with two screws without screwing them completely.



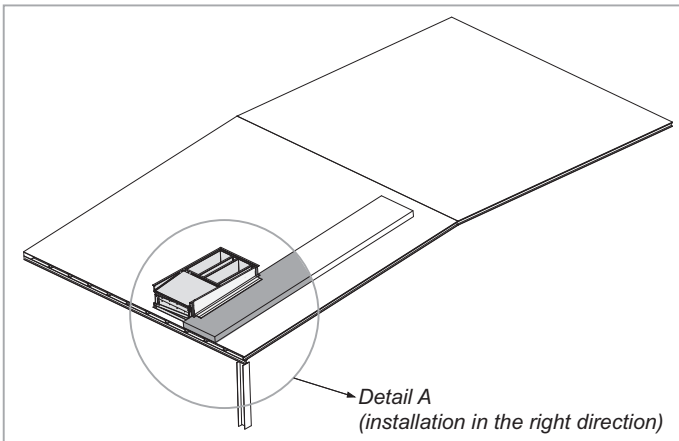
Tightening screws

Reinforcing angle piece

Lay the roofcurb. The reinforcing angles prevent the roofcurb from moving. The roofcurb should slide into the 4 adjusting angle pieces.



It is important to check that the roofcurb is installed in the right direction.



Detail A
(installation in the right direction)

Position the remaining screws on the four corners of the roofcurb. Use a screwdriver to line up the roofcurb, adjustable angle pieces and reinforcing angle piece holes opposite each other. Do not tighten the screws fully.



After levelling the roofcurb perfectly, secure the adjustable angle piece to the roofcurb using self-tapping screws or spot welds. Tighten the reinforcing angle pieces down onto the joists.

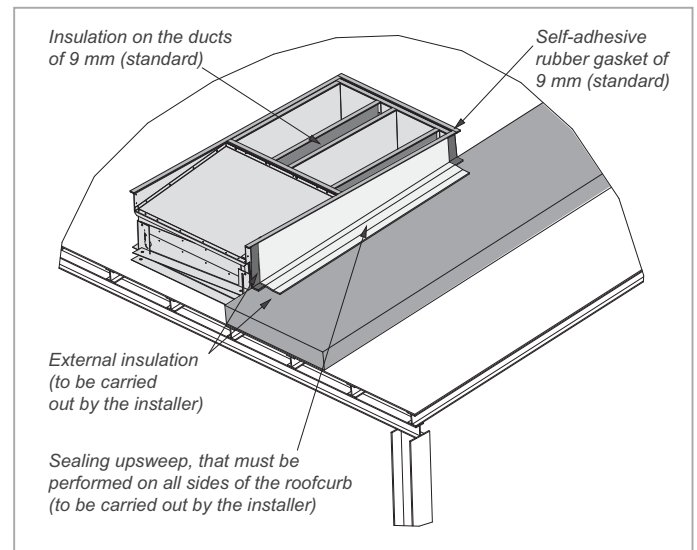


7.4.3 - Waterproof sealing

Following insulation is standard for the roofcurb:

- Self-adhesive rubber gasket of 9 mm around its entire perimeter and the crossbeams.
- Thermal insulation of 9 mm on the outer faces of the ducts of supply and return. As an option, insulation A2-s1, d0 (M0).
- Insulation of 3 mm on the panel of the condensates pan (outdoor unit).
- Note: Acoustic and thermal insulation in this part of the roofcurb is recommended.

Important : it's the responsibility of the installer to insulate and to make a sealing upsweep around the roofcurb to ensure that water does not penetrate the roof (see the following image).



Please follow the recommendations given in the following sticker located on the roofcurb:

PARA GARANTIZAR LA ESTANQUEIDAD DE LA BANCADA DESPUÉS DE LA INSTALACIÓN, HAY QUE REVISAR QUE TODAS LAS JUNTAS Y UNIONES ESTÉN EN PERFECTO ESTADO. ES NECESARIO ASEGURAR LA ESTANQUEIDAD Y LA SUJECIÓN DEL EQUIPO Y LA BANCADA DESPUÉS DE MONTAR EL CONJUNTO.

IN ORDER TO GUARANTEE THE FRAME TIGHTNESS AFTER THE INSTALLATION, THE PERFECT CONDITION OF ALL SEAMS AND JOINTS SHOULD BE REVISED. IT IS NECESSARY TO ENSURE THE TIGHTNESS AND FASTENING OF THE UNIT AND THE FRAME AFTER MOUNTING THE ASSEMBLY.

POUR GARANTIR L'ÉTANCHÉITÉ DE L'EMBASE APRÈS L'INSTALLATION, IL FAUT RÉVISER QUE TOUS LES RACCORDS ET JOINTS SOIENT EN PARFAIT ÉTAT. IL EST NÉCESSAIRE DE S'ASSURER DE L'ÉTANCHÉITÉ ET LA FIXATION DE L'UNITÉ ET L'EMBASE APRÈS LE MONTAGE.

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7 - POSITIONING AND INSTALLATION

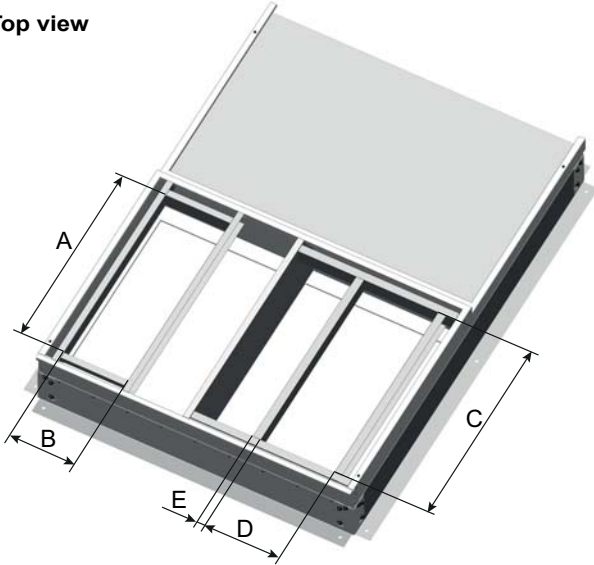
7.4.4 - Air ducts connections

For units with vertical airflow, included units with gas burner, the ducts must be connected to the roofcurb before installing the unit.

The ducts can be connected in two different ways:

- To the upper profiles of the roofcurb, except with gas burner. In this case, the ducts must be connected before to assemble the unit on the roofcurb.

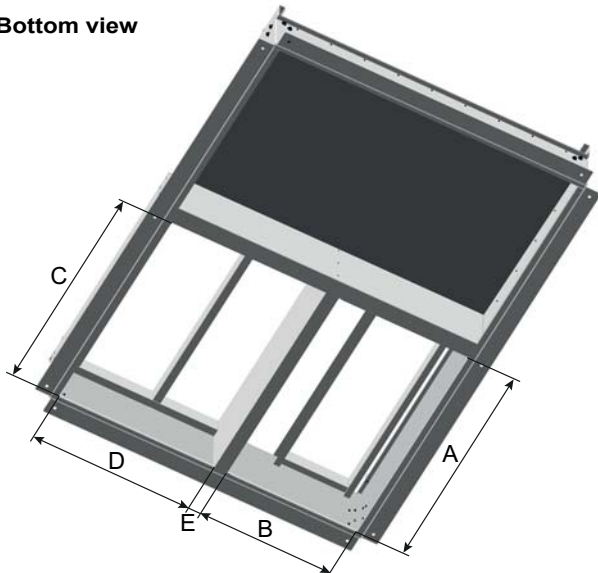
Top view



Dimensions (mm)		Supply		Return		Thickness
		A	B	C	D	
Standard roofcurb	020 to 047	848	297	830	376	37
	052 to 062	1.210	410	1.230	470	37
	070 to 093	1.510	410	1.570	470	37

- To the profiles from underneath the roofcurb.

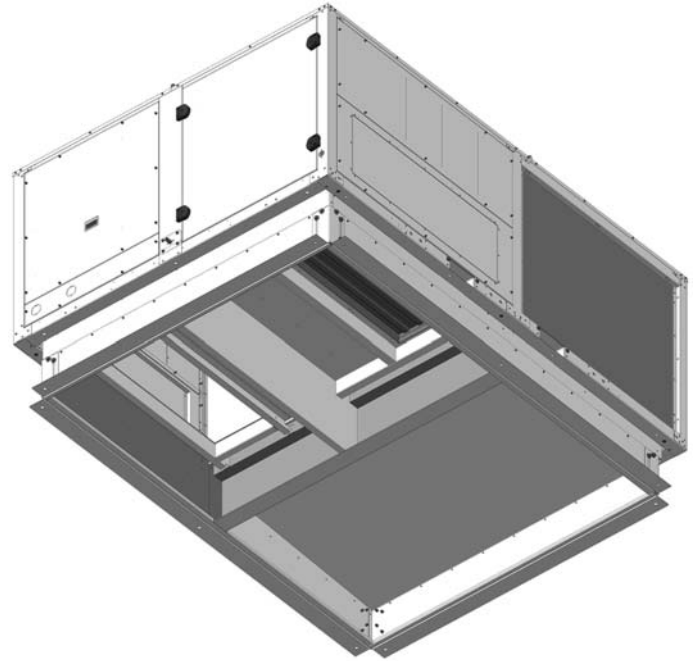
Bottom view



Dimensions (mm)		Supply		Return		Distance
		A	B	C	D	
Standard roofcurb	020 to 047	907	817	907	558	100
	052 to 062	1.349	817	1.349	1.004	100
	070 to 093	1.749	817	1.749	1.004	100
Burner roofcurb	020 to 047	770	686	907	558	231
	052 to 062	1.219	619	1.349	1.004	210
	070 to 093	1.491	704	1.749	1.004	126

7.4.5 - Assembling the unit on the roofcurb

The machine fits perfectly on the roofcurb, no connecting element is necessary.



7.5 - Change in the airflow direction

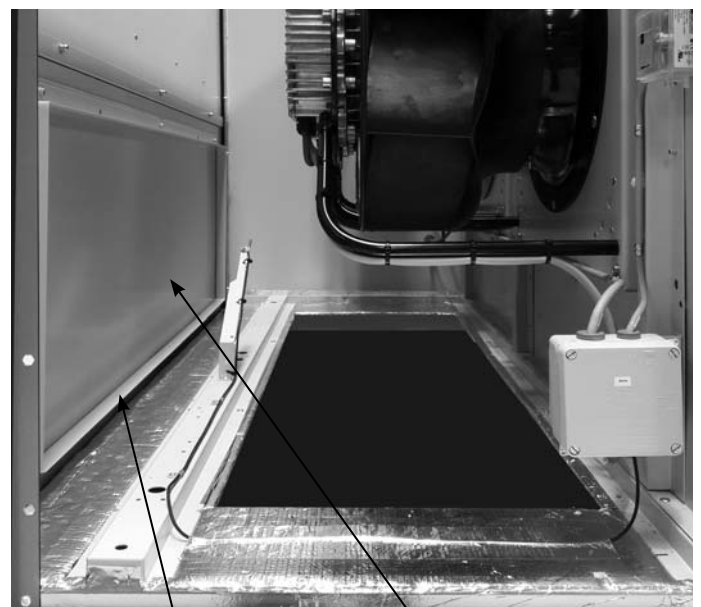
Depending on the unit assembly, it is possible to convert on-site a unit from vertical airflow to horizontal.

- Supply: all "Standard" assemblies, except when it incorporates the options of gas burner or boiler.
- Return: in B1, B2, R1 assemblies and models 070 to 093 with R2 assembly.

Note: on units with the "Very low outdoor temperature" option, air supply only may be lateral (factory-configured).

7.5.1 - Supply

The side panel for supply air is supplied closed. The two parts required to change direction are connected to the inside of this panel: the locking part and the profile for the outlet.



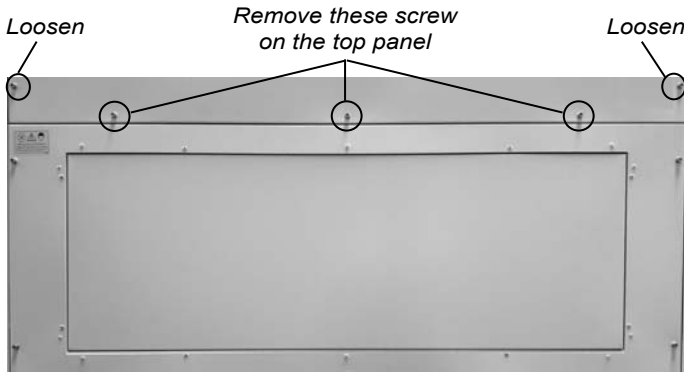
Profile for outlet

Locking part

7 - POSITIONING AND INSTALLATION

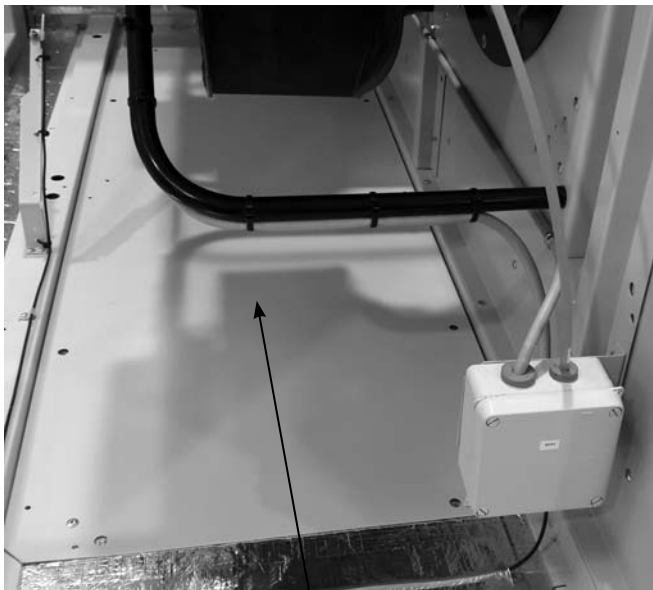
Note: the screws securing this structure are used to fix the locking part to the base of the unit. The screws required to secure the profile for the outlet are supplied in a bag.

Step 1: Remove the lateral panel completely. To do this it is necessary to remove the screws that attach the panel to the pillars (2 per side) as well as those which join the top panel. Also, it is necessary to loosen other two screws on the top panel (indicated in the picture). All screws are M6 Allen type.



Step 2: Then the outlet profile and the closing plate must be dismantled from this panel.

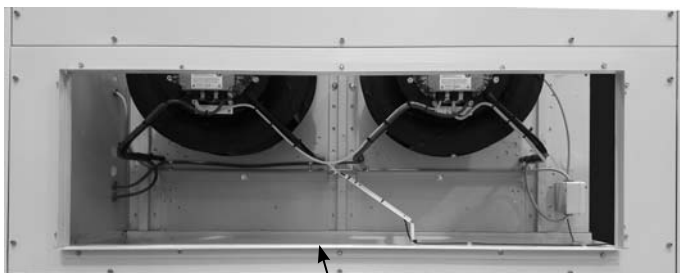
Step 3: Place the interchangeable closing plate at the base of the unit. For this, the screws used to fasten it to the lateral panel must be reused.



Closing plate

Step 4: Replace the lateral supply panel.

Step 5: Assemble the outlet profile (2 L-shaped brackets), using the 4 screws supplied in a bag (self-tapping screws M4.8).



Profile for outlet

7.5.2 - Return

The access panel to the return outlet features dual locks which can serve as a hinge or can be used to remove the panel.



Check that the locks are not blocked. Open the locks with a 4 mm Allen key (in an anticlockwise direction).

The procedure is the same as that used for supply, except with the B2 assembly, in which it's also required to change the position of the damper.

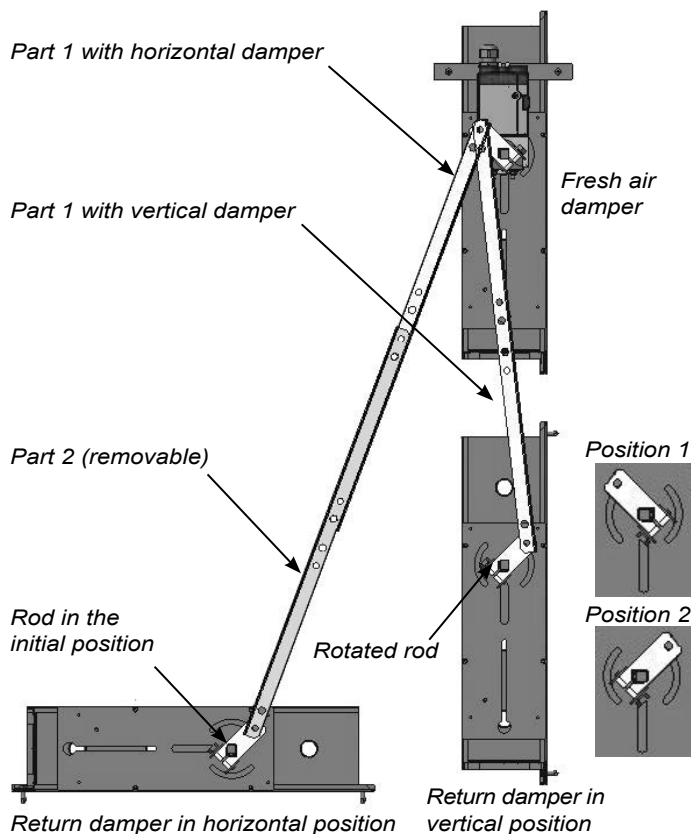
Step 1: Remove the screws (M6 Allen) connecting the rod of the return damper to the drive. Then disassemble the return damper.



Step 2: Fit the damper on the panel, placing the panel on the side of the unit, followed by the profile for the outlet.

Step 3: Rotate the rod on the axis so that the drive crosses between the return and fresh air dampers (see image below).

Step 4: The drive of the damper for the horizontal position is composed of two parts (1 and 2). Disassembly the lower part (2) secured with M6 Allen screws. The upper part (1) is the drive necessary for the vertical position. Screw the part (1) to the rotated rod.



7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“Standard” assemblies

50FF	B1 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.083	779	554	594	93	154	84	70	131	61
028	1.066	791	567	617	98	158	83	77	137	62
037	1.048	761	572	699	119	183	95	87	151	63
040	1.050	762	572	698	118	183	95	86	151	64
045	1.049	763	579	704	119	185	96	87	153	64
047	1.049	761	576	701	119	184	96	87	152	64

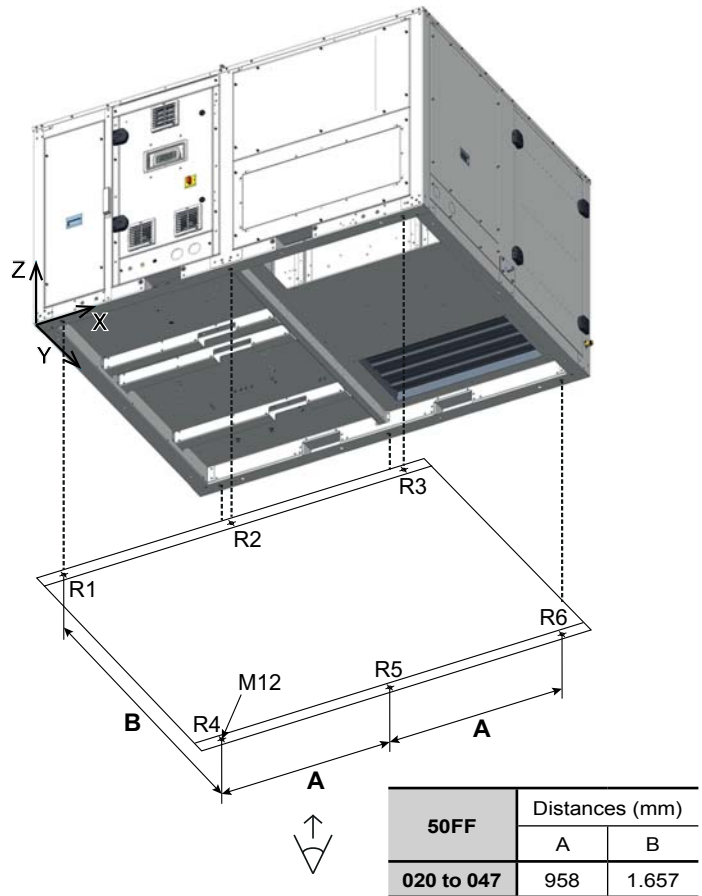
50FF	B2 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.104	803	558	609	90	155	87	72	137	69
028	1.087	814	570	632	94	159	86	79	144	70
037	1.065	783	571	718	116	185	98	89	159	71
040	1.065	783	571	718	116	185	98	89	159	71
045	1.064	784	581	718	116	185	98	89	159	71
047	1.064	782	575	720	116	186	98	89	159	71

50FF	B3 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.162	868	629	682	82	165	99	79	162	96
028	1.145	876	638	705	87	169	98	86	169	97
037	1.120	841	631	796	108	197	111	97	185	99
040	1.120	841	631	796	108	197	111	97	185	99
045	1.119	841	640	796	109	196	110	97	185	99
047	1.119	840	635	798	109	197	111	97	185	99

50FF	BX assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.183	890	615	713	79	169	104	82	173	107
028	1.165	896	624	736	83	174	103	89	179	108
037	1.134	857	621	815	105	199	114	99	192	107
040	1.134	857	621	815	105	199	114	99	192	107
045	1.133	857	630	815	105	198	113	99	192	107
047	1.133	856	625	817	106	199	114	99	192	107

50FF	BP assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.187	897	617	723	78	170	105	83	176	110
028	1.170	903	626	746	83	175	104	90	182	112
037	1.144	863	621	831	104	202	117	100	197	112
040	1.144	863	621	831	104	202	117	100	197	112
045	1.138	862	631	828	105	201	115	100	196	110
047	1.143	862	625	833	105	202	117	100	197	112

50FF	BA assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.163	934	613	781	83	178	103	101	196	120
028	1.148	939	620	804	88	183	102	108	203	121
037	1.102	926	614	900	112	207	106	129	224	123
040	1.102	926	614	900	112	207	106	129	224	123
045	1.101	927	622	897	111	206	105	129	223	122
047	1.101	925	618	902	112	208	106	129	224	123



50FF	BT assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.222	804	796	774	91	197	134	67	174	111
028	1.205	813	800	797	96	202	133	74	180	112
037	1.177	787	779	882	117	228	145	84	195	113
040	1.177	787	779	882	117	228	145	84	195	113
045	1.176	788	787	882	117	228	145	84	195	113
047	1.176	787	782	884	118	228	146	85	195	113

50FF	BB assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.200	850	780	832	98	206	132	84	193	119
028	1.184	857	782	855	103	211	131	91	199	120
037	1.138	849	764	951	124	234	135	112	222	123
040	1.138	849	764	951	124	234	135	112	222	123
045	1.138	850	772	951	124	234	135	113	222	123
047	1.137	848	767	953	125	234	135	113	222	123

50FF	BW assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.301	1.243	719	976	87	242	182	72	226	167
028	1.286	1.240	724	999	94	248	183	77	231	166
037	1.258	1.188	713	1.088	130	249	211	89	240	170
040	1.258	1.188	713	1.088	130	249	211	89	240	170
045	1.257	1.189	719	1.088	130	249	211	89	240	170
047	1.257	1.187	715	1.091	131	250	211	89	240	170

7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“Standard” assemblies

50FF	B1 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.377	1.046	564	914	147	227	106	132	211	91
058	1.377	1.046	564	929	150	230	108	134	215	92
062	1.369	1.040	563	936	154	233	108	136	215	90

50FF	B2 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.396	1.067	562	946	146	232	110	136	222	100
058	1.393	1.070	561	967	150	236	111	140	227	102
062	1.387	1.066	561	969	152	237	111	141	227	101

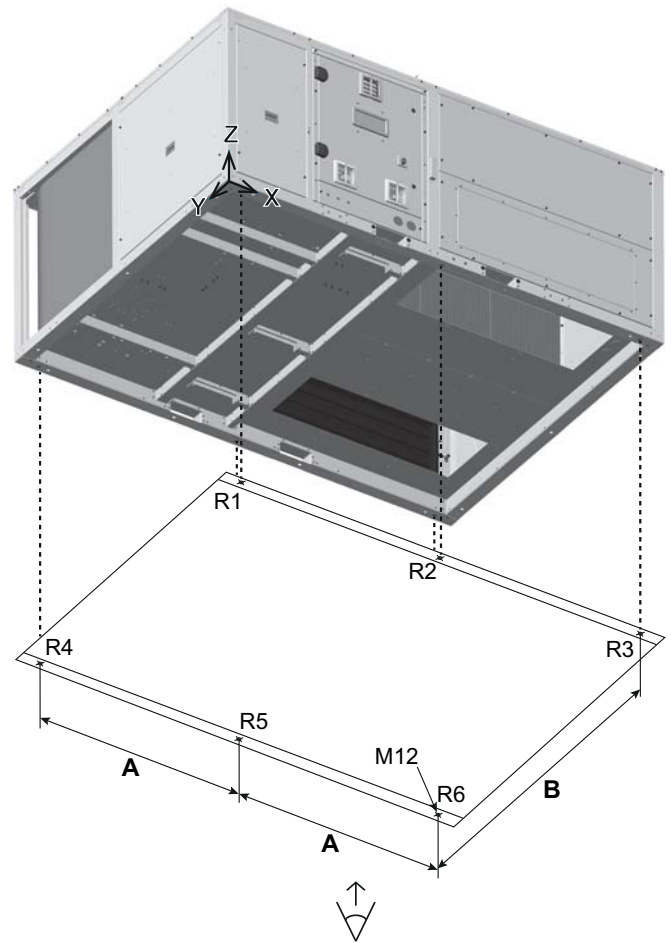
50FF	B3 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.476	1.138	622	1.047	135	245	126	147	257	138
058	1.476	1.138	622	1.062	137	248	128	149	260	140
062	1.467	1.131	620	1.070	141	252	128	151	261	138

50FF	BX assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.494	1.153	608	1.090	135	253	132	152	270	149
058	1.491	1.155	607	1.111	137	257	133	156	275	152
062	1.485	1.151	606	1.112	140	258	133	156	275	150

50FF	BP assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.512	1.167	609	1.120	132	257	137	155	280	160
058	1.509	1.170	608	1.141	135	261	138	159	285	163
062	1.503	1.165	607	1.142	137	262	138	159	285	161

50FF	BA assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.487	1.204	607	1.211	141	271	135	180	310	174
058	1.484	1.206	606	1.232	144	275	137	184	315	177
062	1.479	1.201	605	1.233	146	276	137	185	315	175

50FF	BT assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.565	1.047	796	1.213	154	302	184	132	280	162
058	1.565	1.047	796	1.228	156	305	186	134	283	163
062	1.556	1.042	792	1.236	161	309	186	136	284	161



50FF	Distances (mm)	
	A	B
052 to 062	1.356	2.108

50FF	BB assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.523	1.068	789	1.304	172	320	183	157	305	168
058	1.520	1.070	787	1.319	174	323	184	160	309	169
062	1.514	1.067	785	1.327	177	326	184	162	310	168

50FF	BW assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.661	1.515	696	1.470	146	350	233	150	354	237
058	1.658	1.516	695	1.491	149	355	236	153	359	239
062	1.652	1.509	694	1.493	152	357	236	153	358	237

7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“Standard” assemblies

B1 assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.628	1.054	564	1.035	173	256	112	158	241	97
074	1.628	1.054	564	1.059	176	261	115	161	246	99
086	1.644	1.055	572	1.057	174	261	117	158	246	102
093	1.634	1.048	569	1.078	180	267	119	162	249	101

B2 assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.659	1.080	563	1.070	169	260	116	162	253	110
074	1.659	1.080	563	1.094	173	265	119	166	259	112
086	1.667	1.074	569	1.112	176	271	123	166	262	114
093	1.664	1.074	568	1.113	176	271	123	167	262	114

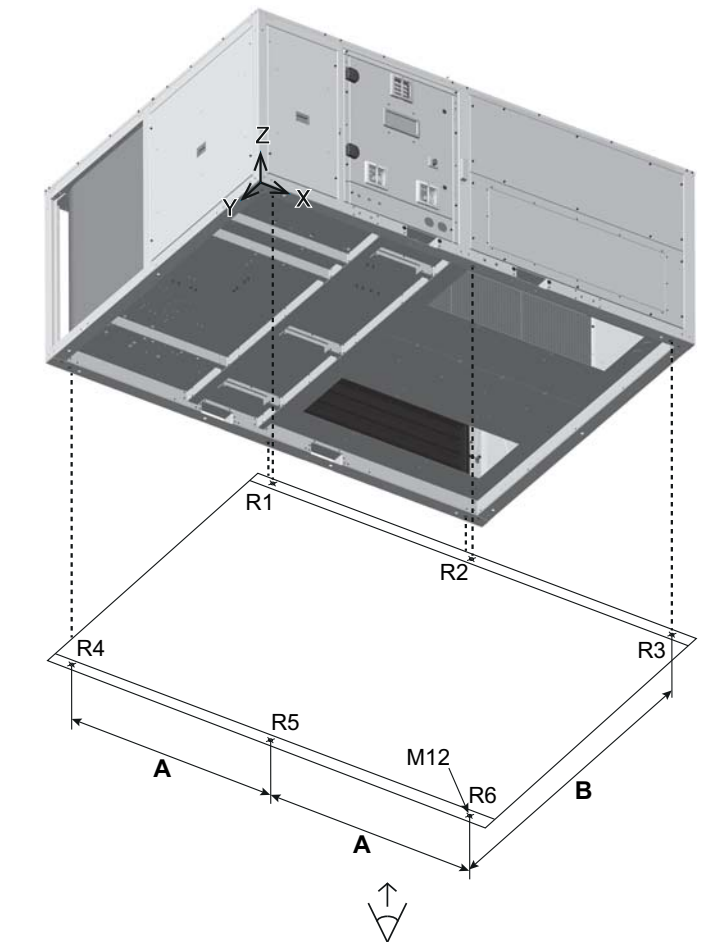
B3 assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.749	1.139	624	1.197	163	280	135	177	294	149
074	1.749	1.139	624	1.221	166	285	138	180	299	152
086	1.750	1.139	629	1.230	167	288	139	182	302	153
093	1.747	1.139	629	1.231	168	288	139	182	302	153

BX assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.784	1.168	608	1.248	158	286	142	184	312	167
074	1.784	1.168	608	1.272	161	292	144	187	318	171
086	1.790	1.162	613	1.290	163	297	149	187	321	173
093	1.787	1.161	612	1.291	164	297	148	188	321	172

BP assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.798	1.171	611	1.276	158	292	147	186	320	174
074	1.798	1.171	611	1.300	161	297	149	189	326	178
086	1.798	1.172	616	1.309	162	299	150	191	328	179
093	1.795	1.171	615	1.310	163	300	150	191	328	179

BA assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.781	1.208	611	1.379	167	308	148	211	353	193
074	1.781	1.208	611	1.403	169	313	150	215	359	196
086	1.786	1.202	615	1.412	171	317	154	214	360	197
093	1.784	1.201	615	1.413	171	317	153	215	360	197

BT assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.852	1.058	787	1.371	184	339	194	163	318	173
074	1.852	1.058	787	1.395	187	345	197	166	324	176
086	1.857	1.053	791	1.413	189	350	202	166	327	179
093	1.855	1.053	789	1.414	190	350	201	167	327	178



50FF	Distances (mm)	
	A	B
070 to 093	1.683	2.108

BB assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.831	1.090	771	1.474	195	357	196	188	350	189
074	1.831	1.090	771	1.498	198	362	199	191	355	192
086	1.836	1.085	775	1.516	200	368	204	191	359	195
093	1.833	1.085	774	1.517	201	368	204	191	359	194

BW assembly										
50FF	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.976	1.513	692	1.660	178	396	251	181	399	254
074	1.976	1.513	692	1.684	181	402	255	183	405	258
086	1.979	1.506	695	1.702	184	408	260	183	408	260
093	1.977	1.505	694	1.703	185	409	260	183	407	259

7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“In-line” assemblies

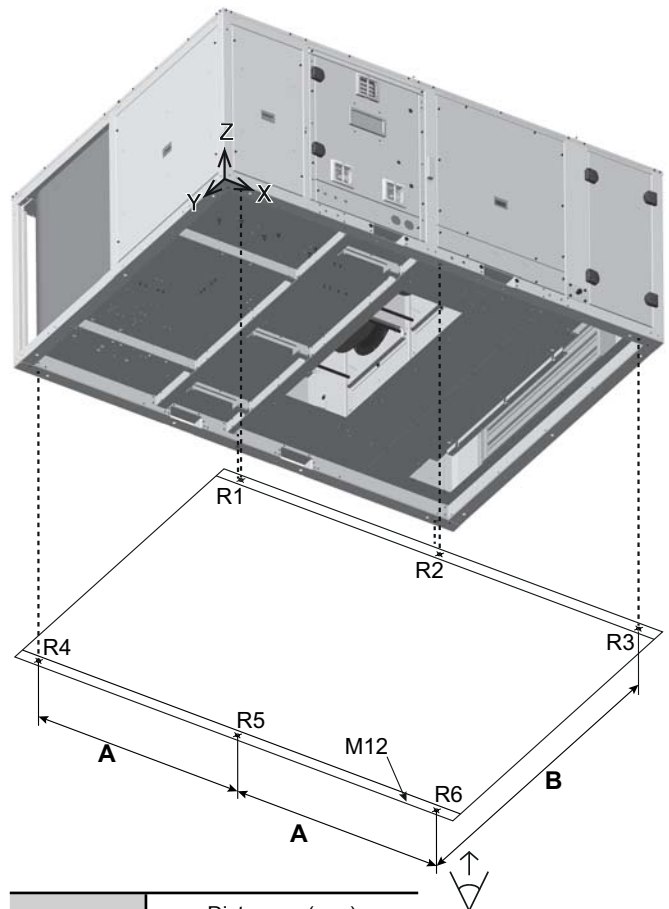
50FF	R1 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.402	1.104	569	972	144	232	108	145	234	110
058	1.399	1.107	568	993	147	237	110	149	239	112
062	1.393	1.103	568	994	149	238	109	150	239	110
070	1.607	1.106	571	1.068	173	255	104	175	257	105
074	1.607	1.106	571	1.092	177	261	106	179	263	108
086	1.608	1.106	578	1.111	179	265	108	182	267	110
093	1.606	1.106	577	1.111	180	265	107	182	267	110

50FF	R2 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.461	1.103	570	1.010	138	242	124	139	243	125
058	1.458	1.106	569	1.031	141	246	125	143	248	127
062	1.452	1.102	569	1.033	144	247	125	144	248	126
070	1.658	1.104	571	1.105	171	264	116	172	266	117
074	1.658	1.104	571	1.129	174	270	118	176	271	120
086	1.659	1.105	577	1.147	177	274	120	178	276	122
093	1.657	1.105	576	1.148	177	274	120	179	276	122

50FF	RP assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.732	1.103	535	1.180	197	282	110	198	283	111
058	1.728	1.105	534	1.201	201	287	110	203	289	112
062	1.720	1.101	535	1.202	203	288	109	204	288	110
070	1.866	1.103	615	1.294	161	310	176	161	310	176
074	1.866	1.103	615	1.318	164	316	180	164	315	179
086	1.866	1.104	620	1.336	167	320	182	166	320	181
093	1.863	1.103	619	1.337	167	321	181	167	320	181

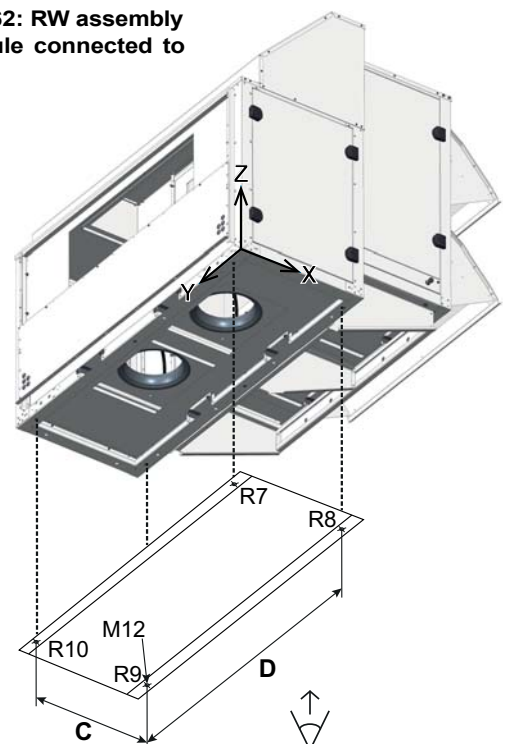
50FF	RW assembly (machine + recovery module)							
	Centre of gravity: Machine (mm)			Centre of gravity: Module (mm)			Weight: Machine (kg)	Weight Module: (kg)
	X	Y	Z	X	Y	Z		
052	1.345	1.105	568	905	1.093	864	957	719
058	1.342	1.108	567	905	1.093	864	978	719
062	1.337	1.103	567	905	1.093	864	980	719
070	2.364	1.102	693	--	--	--	1.247	454
074	2.364	1.102	693	--	--	--	1.271	454
086	2.362	1.103	697	--	--	--	1.289	454
093	2.358	1.102	696	--	--	--	1.290	454

50FF	RW assembly (machine + recovery module)										
	Overall weight (kg)	Reactions in the supports (kg)									
		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
052	1.676	132	230	118	131	229	117	150	214	209	146
058	1.697	135	234	120	135	234	120	150	214	209	146
062	1.699	137	235	119	136	234	118	150	214	209	146
070	1.701	189	408	256	187	407	254	--	--	--	--
074	1.725	192	414	259	190	412	258	--	--	--	--
086	1.743	194	418	261	193	417	260	--	--	--	--
093	1.744	195	419	260	194	417	259	--	--	--	--



50FF	Distances (mm)			
	A	B	C	D
052 to 062	1.356	2.108	766	1.916
070 to 093	1.683	2.108	--	--

50FF - 052 to 062: RW assembly
Recovery module connected to the machine



7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“Standard” assemblies

50FC	B1 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.083	779	554	594	93	154	84	70	131	61
028	1.066	791	567	617	98	158	83	77	137	62
037	1.048	761	572	699	119	183	95	87	151	63
040	1.050	762	572	698	118	183	95	86	151	64
045	1.049	763	579	704	119	185	96	87	153	64
047	1.049	761	576	701	119	184	96	87	152	64

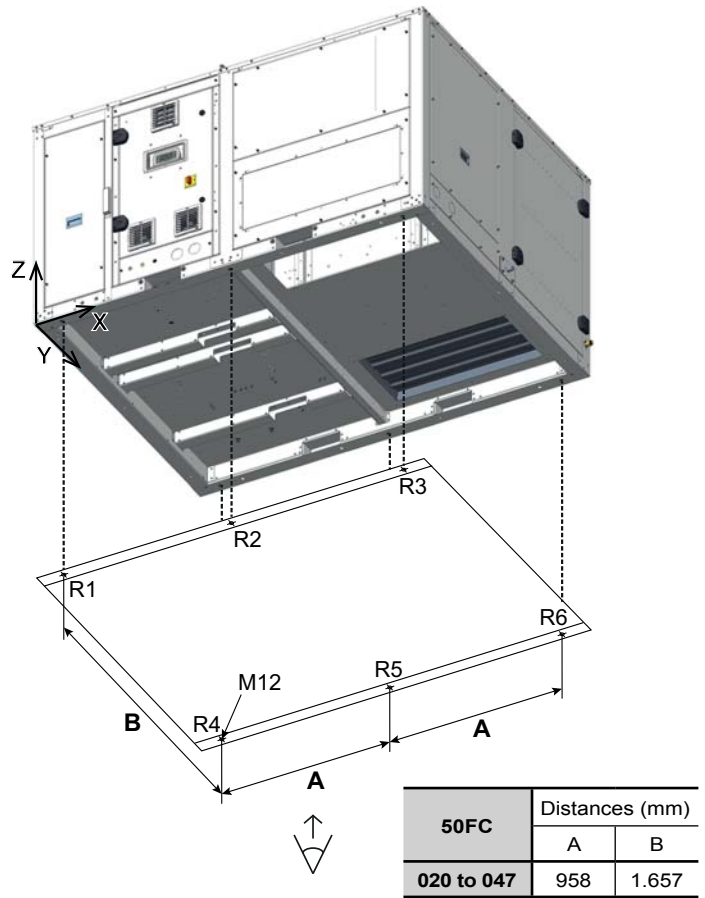
50FC	B2 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.104	803	558	609	90	155	87	72	137	69
028	1.087	814	570	632	94	159	86	79	144	70
037	1.065	783	571	718	116	185	98	89	159	71
040	1.065	783	571	718	116	185	98	89	159	71
045	1.064	784	581	718	116	185	98	89	159	71
047	1.064	782	575	720	116	186	98	89	159	71

50FC	B3 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.162	868	629	682	82	165	99	79	162	96
028	1.145	876	638	705	87	169	98	86	169	97
037	1.120	841	631	796	108	197	111	97	185	99
040	1.120	841	631	796	108	197	111	97	185	99
045	1.119	841	640	796	109	196	110	97	185	99
047	1.119	840	635	798	109	197	111	97	185	99

50FC	BX assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.183	890	615	713	79	169	104	82	173	107
028	1.165	896	624	736	83	174	103	89	179	108
037	1.134	857	621	815	105	199	114	99	192	107
040	1.134	857	621	815	105	199	114	99	192	107
045	1.133	857	630	815	105	198	113	99	192	107
047	1.133	856	625	817	106	199	114	99	192	107

50FC	BP assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.187	897	617	723	78	170	105	83	176	110
028	1.170	903	626	746	83	175	104	90	182	112
037	1.144	863	621	831	104	202	117	100	197	112
040	1.144	863	621	831	104	202	117	100	197	112
045	1.138	862	631	828	105	201	115	100	196	110
047	1.143	862	625	833	105	202	117	100	197	112

50FC	BA assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.163	934	613	781	83	178	103	101	196	120
028	1.148	939	620	804	88	183	102	108	203	121
037	1.102	926	614	900	112	207	106	129	224	123
040	1.102	926	614	900	112	207	106	129	224	123
045	1.101	927	622	897	111	206	105	129	223	122
047	1.101	925	618	902	112	208	106	129	224	123



50FC	BT assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.222	804	796	774	91	197	134	67	174	111
028	1.205	813	800	797	96	202	133	74	180	112
037	1.177	787	779	882	117	228	145	84	195	113
040	1.177	787	779	882	117	228	145	84	195	113
045	1.176	788	787	882	117	228	145	84	195	113
047	1.176	787	782	884	118	228	146	85	195	113

50FC	BB assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.200	850	780	832	98	206	132	84	193	119
028	1.184	857	782	855	103	211	131	91	199	120
037	1.138	849	764	951	124	234	135	112	222	123
040	1.138	849	764	951	124	234	135	112	222	123
045	1.138	850	772	951	124	234	135	113	222	123
047	1.137	848	767	953	125	234	135	113	222	123

50FC	BW assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
020	1.301	1.243	719	976	87	242	182	72	226	167
028	1.286	1.240	724	999	94	248	183	77	231	166
037	1.258	1.188	713	1.088	130	249	211	89	240	170
040	1.258	1.188	713	1.088	130	249	211	89	240	170
045	1.257	1.189	719	1.088	130	249	211	89	240	170
047	1.257	1.187	715	1.091	131	250	211	89	240	170

7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“Standard” assemblies

50FC	B1 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.377	1.046	564	986	159	245	114	142	228	98
058	1.377	1.046	564	986	159	244	114	142	228	98
062	1.369	1.040	563	1.004	165	250	116	146	231	97

50FC	B2 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.396	1.067	562	1.018	157	249	118	147	239	108
058	1.393	1.070	561	1.024	158	250	118	149	241	108
062	1.387	1.066	561	1.037	162	254	119	151	243	108

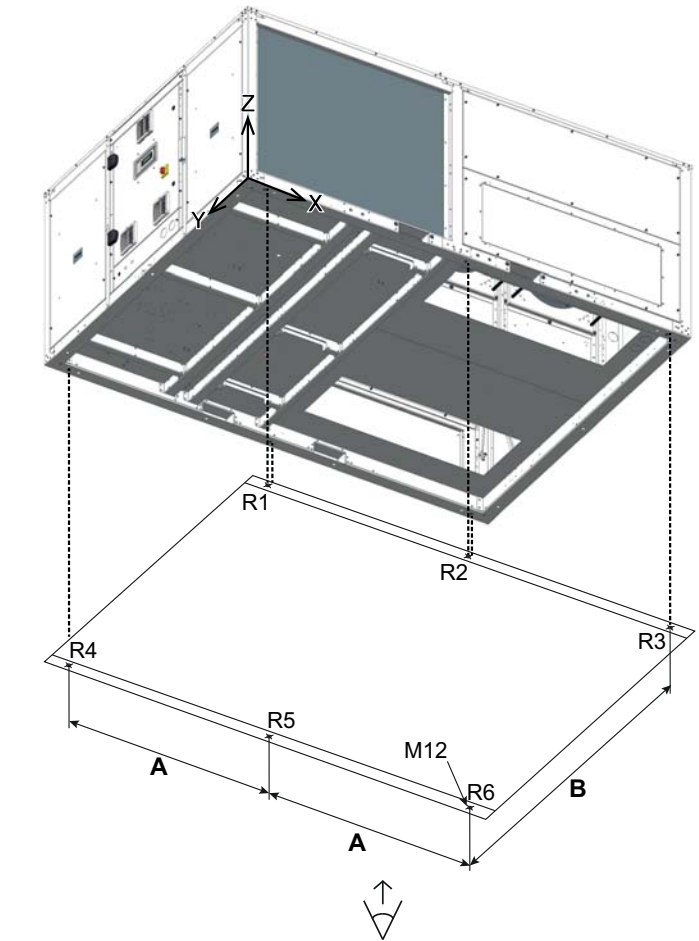
50FC	B3 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.476	1.138	622	1.119	144	262	134	157	274	147
058	1.476	1.138	622	1.119	144	262	134	157	274	147
062	1.467	1.131	620	1.138	150	267	136	160	278	146

50FC	BX assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.494	1.153	608	1.162	143	269	141	162	288	159
058	1.491	1.155	607	1.168	144	270	140	164	290	160
062	1.485	1.151	606	1.180	148	274	141	166	292	159

50FC	BP assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.512	1.167	609	1.192	140	273	146	165	298	170
058	1.509	1.170	608	1.198	141	274	145	167	300	171
062	1.503	1.165	607	1.210	145	278	146	169	302	170

50FC	BA assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.487	1.204	607	1.283	149	287	143	191	328	185
058	1.484	1.206	606	1.289	150	288	143	193	330	185
062	1.479	1.201	605	1.301	154	291	144	195	332	185

50FC	BT assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.565	1.047	796	1.285	164	320	195	140	296	171
058	1.565	1.047	796	1.285	164	320	195	140	296	171
062	1.556	1.042	792	1.304	169	325	196	143	299	170



50FC	Distances (mm)	
	A	B
052 to 062	1.356	2.108

50FC	BB assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.523	1.068	789	1.376	182	338	193	166	322	177
058	1.520	1.070	787	1.376	182	337	192	167	322	177
062	1.514	1.067	785	1.395	186	343	194	170	326	177

50FC	BW assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.661	1.515	696	1.542	153	368	245	157	371	248
058	1.658	1.516	695	1.548	155	369	245	158	373	249
062	1.652	1.509	694	1.561	159	374	247	160	374	247

7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“Standard” assemblies

50FC	B1 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.628	1.054	564	1.146	191	283	124	174	266	107
074	1.628	1.054	564	1.146	191	283	124	174	266	107
086	1.644	1.055	572	1.135	186	280	125	170	264	109
093	1.634	1.048	569	1.160	193	287	128	174	268	109

50FC	B2 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.659	1.080	563	1.181	187	287	128	179	279	121
074	1.659	1.080	563	1.181	187	287	128	179	279	121
086	1.667	1.074	569	1.190	188	290	132	178	280	122
093	1.664	1.074	568	1.195	189	291	132	179	281	122

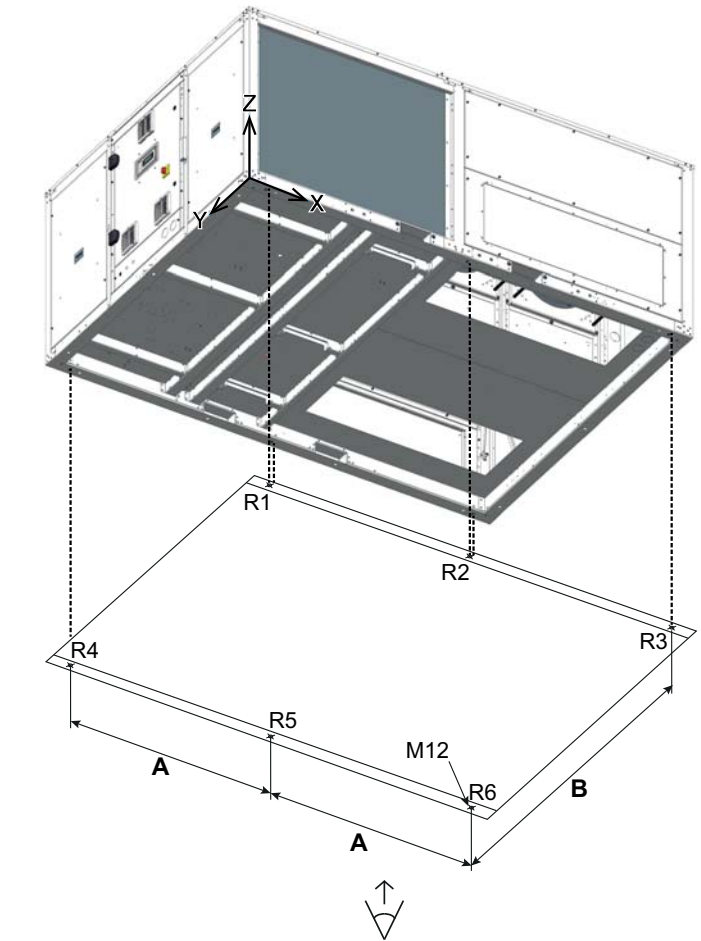
50FC	B3 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.749	1.139	624	1.308	178	306	148	193	321	163
074	1.749	1.139	624	1.308	178	306	148	193	321	163
086	1.750	1.139	629	1.308	178	306	148	193	321	163
093	1.747	1.139	629	1.313	179	307	148	194	322	163

50FC	BX assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.784	1.168	608	1.359	172	312	154	200	340	182
074	1.784	1.168	608	1.359	172	312	154	200	340	182
086	1.790	1.162	613	1.368	173	315	158	199	341	183
093	1.787	1.161	612	1.373	174	316	158	200	342	183

50FC	BP assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.798	1.171	611	1.387	172	317	159	202	347	190
074	1.798	1.171	611	1.387	172	317	159	202	347	190
086	1.798	1.172	616	1.387	172	317	159	202	348	190
093	1.795	1.171	615	1.392	173	318	159	203	349	190

50FC	BA assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.781	1.208	611	1.490	180	333	160	228	381	208
074	1.781	1.208	611	1.490	180	333	160	228	381	208
086	1.786	1.202	615	1.490	180	334	162	226	380	208
093	1.784	1.201	615	1.495	181	335	162	227	381	208

50FC	BT assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.852	1.058	787	1.482	199	366	210	177	344	187
074	1.852	1.058	787	1.482	199	366	210	177	344	187
086	1.857	1.053	791	1.491	200	370	213	175	345	189
093	1.855	1.053	789	1.496	201	371	213	176	346	188



50FC	Distances (mm)	
	A	B
070 to 093	1.683	2.108

50FC	BB assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.831	1.090	771	1.585	209	384	211	202	376	203
074	1.831	1.090	771	1.585	209	384	211	202	376	203
086	1.836	1.085	775	1.594	211	387	214	201	377	205
093	1.833	1.085	774	1.599	212	388	215	202	378	205

50FC	BW assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
070	1.976	1.513	692	1.771	190	423	268	193	426	271
074	1.976	1.513	692	1.771	190	423	268	193	426	271
086	1.979	1.506	695	1.780	192	427	272	191	426	272
093	1.977	1.505	694	1.785	194	428	273	192	427	271

7 - POSITIONING AND INSTALLATION

7.6 - Centres of gravity, weight and reactions in the supports

“In-line” assemblies

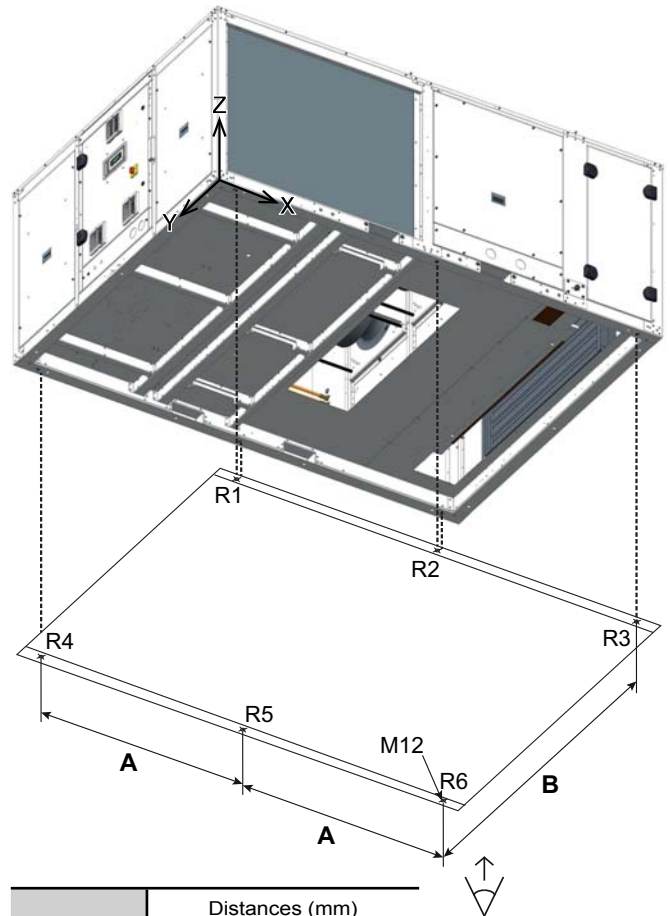
50FC	R1 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.402	1.104	569	1.044	154	249	116	156	251	118
058	1.399	1.107	568	1.050	155	250	116	158	253	118
062	1.393	1.103	568	1.062	159	254	117	160	255	118
070	1.607	1.106	571	1.179	191	282	114	193	284	116
074	1.607	1.106	571	1.179	191	282	114	193	284	116
086	1.608	1.106	578	1.189	192	284	115	194	286	118
093	1.606	1.106	577	1.193	193	285	115	195	287	118

50FC	R2 assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.461	1.103	570	1.082	148	259	133	149	260	134
058	1.458	1.106	569	1.088	149	260	132	151	262	134
062	1.452	1.102	569	1.101	153	263	133	153	264	134
070	1.658	1.104	571	1.216	188	291	127	189	292	129
074	1.658	1.104	571	1.216	188	291	127	189	292	129
086	1.659	1.105	577	1.225	189	293	128	191	295	130
093	1.657	1.105	576	1.230	190	294	129	192	296	130

50FC	RP assembly									
	Centre of gravity (mm)			Weight (kg)	Reactions in the supports (kg)					
	X	Y	Z		R1	R2	R3	R4	R5	R6
052	1.732	1.103	535	1.252	209	299	116	210	300	117
058	1.728	1.105	534	1.258	210	300	115	212	302	117
062	1.720	1.101	535	1.270	215	304	115	215	305	116
070	1.866	1.103	615	1.405	175	337	191	175	336	191
074	1.866	1.103	615	1.405	175	337	191	175	336	191
086	1.866	1.104	620	1.414	176	339	192	176	339	192
093	1.863	1.103	619	1.419	178	340	193	177	340	192

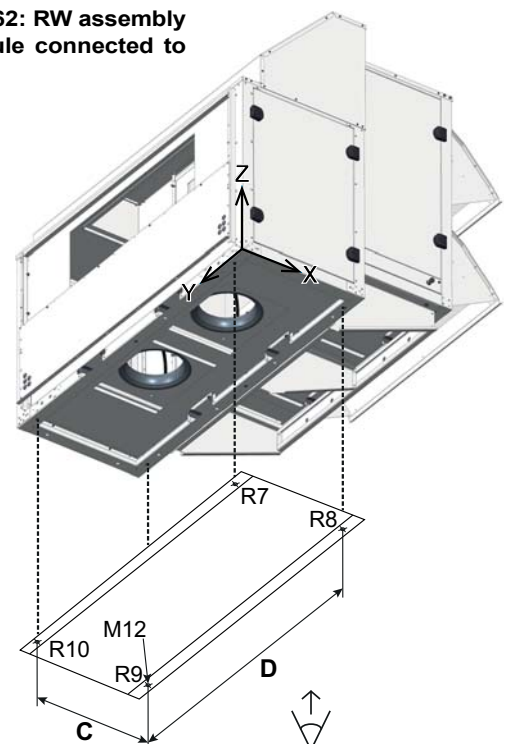
50FC	RW assembly (machine + recovery module)							
	Centre of gravity: Machine (mm)			Centre of gravity: Module (mm)			Weight: Machine (kg)	Weight Module: (kg)
	X	Y	Z	X	Y	Z		
052	1.345	1.105	568	905	1.093	864	1.029	719
058	1.342	1.108	567	905	1.093	864	1.035	719
062	1.337	1.103	567	905	1.093	864	1.048	719
070	2.364	1.102	693	--	--	--	1.358	454
074	2.364	1.102	693	--	--	--	1.358	454
086	2.362	1.103	697	--	--	--	1.367	454
093	2.358	1.102	696	--	--	--	1.372	454

50FC	RW assembly (machine + recovery module)										
	Overall weight (kg)	Reactions in the supports (kg)									
		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
052	1.749	142	247	127	141	246	126	150	214	209	146
058	1.755	143	248	127	143	248	127	150	214	209	146
062	1.767	146	252	128	145	250	127	150	214	209	146
070	1.812	201	435	272	200	433	271	--	--	--	--
074	1.812	201	435	272	200	433	271	--	--	--	--
086	1.822	203	437	273	202	436	271	--	--	--	--
093	1.826	204	438	273	203	437	271	--	--	--	--



50FC	Distances (mm)			
	A	B	C	D
052 to 062	1.356	2.108	766	1.916
070 to 093	1.683	2.108	--	--

50FC - 052 to 062: RW assembly
Recovery module connected to the machine

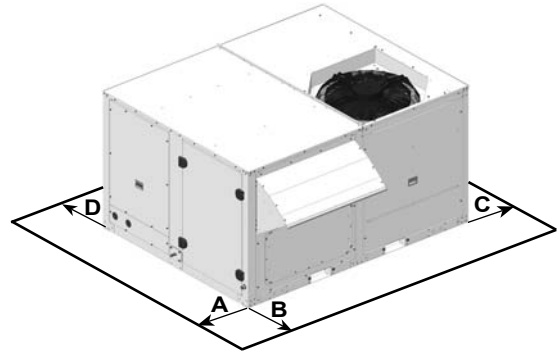


7 - POSITIONING AND INSTALLATION

7.7 - Recommended service clearance

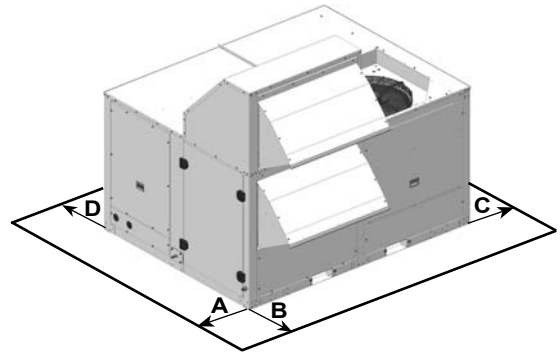
50FF/FC 020-028-037-040-045-047: B1 and B2 assemblies

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
020 to 047	2.225	1.750	1.230	1.200	1.000	1.000	1.600



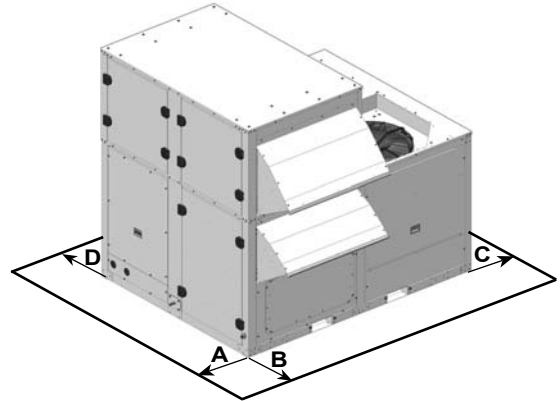
50FF/FC 020-028-037-040-045-047: B3, BX, BP and BA assemblies

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
020 to 047	2.230	1.755	1.905	1.200	1.000	1.000	1.600



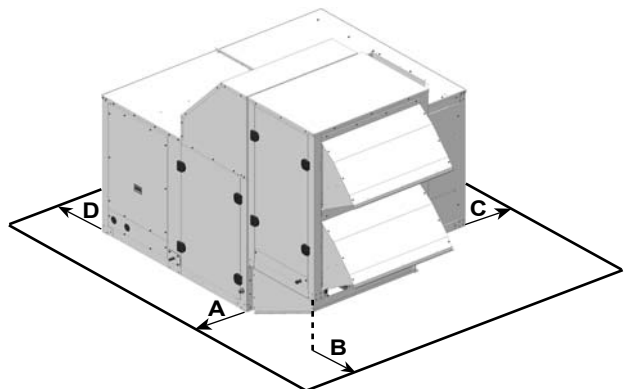
50FF/FC 020-028-037-040-045-047: BT and BB assemblies

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
020 to 047	2.230	1.760	1.975	1.200	1.000	1.000	1.600



50FF/FC 020-028-037-040-045-047: BW assembly

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
020 to 047	2.230	2.565	1.905	1.200	1.000	1.000	1.600



NOTE:

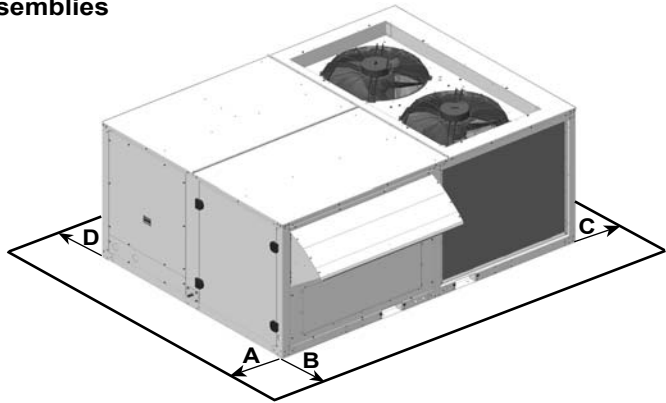
- Unit not designed to have overhead obstruction.

7 - POSITIONING AND INSTALLATION

7.7 - Recommended service clearance

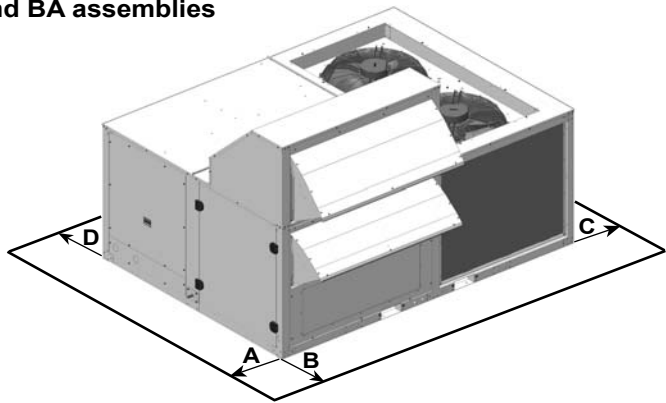
50FF/FC 052-058-062-070-074-086-093: B1 and B2 assemblies

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
052 to 062	3.000	2.200	1.230	1.600	1.000	1.000	1.000
070 to 093	3.650	2.200	1.230	2.000	1.000	1.000	1.000



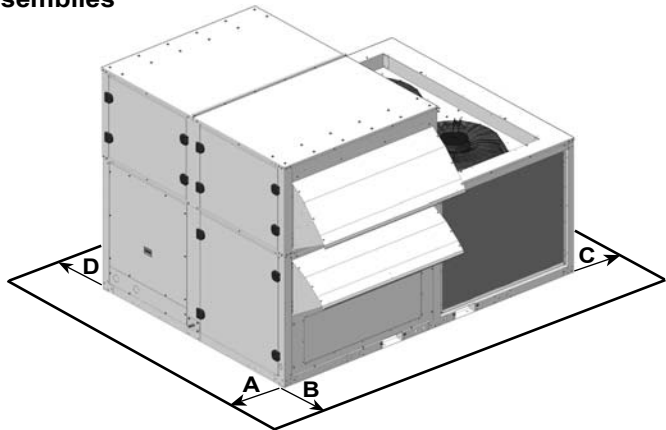
50FF/FC 052-058-062-070-074-086-093: B3, BX, BP and BA assemblies

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
052 to 062	3.000	2.205	1.905	1.600	1.000	1.000	1.000
070 to 093	3.655	2.205	1.905	2.000	1.000	1.000	1.000



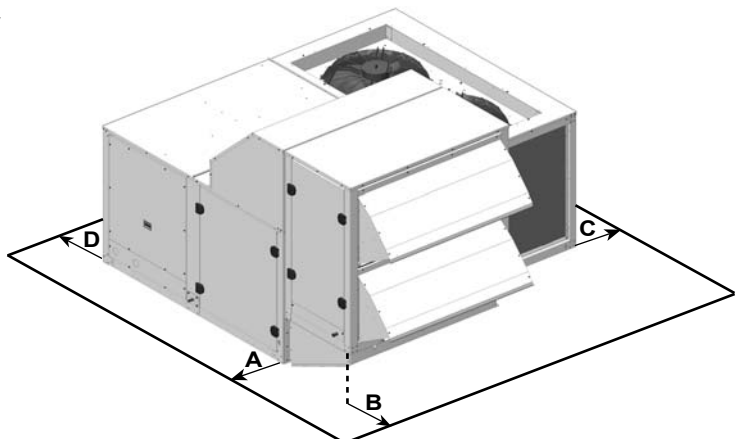
50FF/FC 052-058-062-070-074-086-093: BT and BB assemblies

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
052 to 062	3.000	2.210	1.995	1.600	1.000	1.000	1.000
070 to 093	3.655	2.210	1.995	2.000	1.000	1.000	1.000



50FF/FC 052-058-062-070-074-086-093: BW assembly

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
052 to 062	3.000	3.015	1.905	1.600	1.000	1.000	1.000
070 to 093	3.655	3.015	1.905	2.000	1.000	1.000	1.000



NOTE:

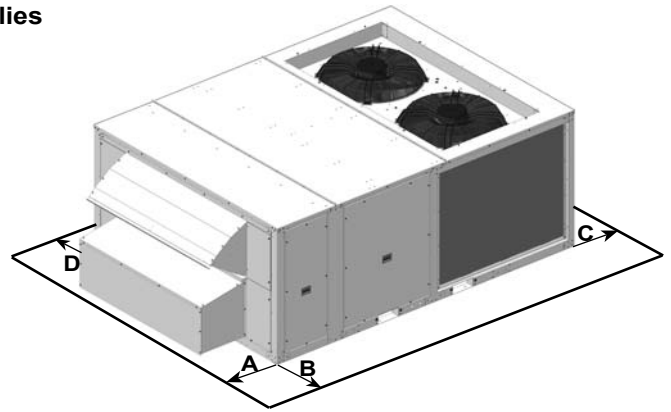
- Unit not designed to have overhead obstruction.

7 - POSITIONING AND INSTALLATION

7.7 - Recommended service clearance

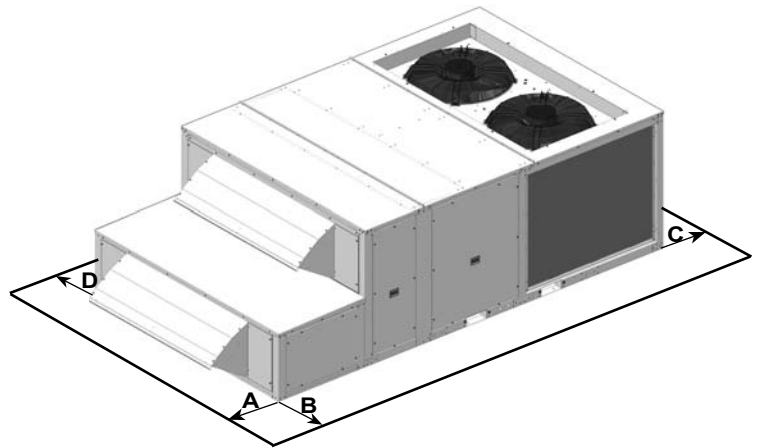
50FF/FC 052-058-062-070-074-086-093: R1 and R2 assemblies

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
052 to 062	3.000	2.200	1.230	1.000	1.000	1.300	2.200
070 to 093	3.650	2.200	1.230	1.000	1.000	1.600	2.200



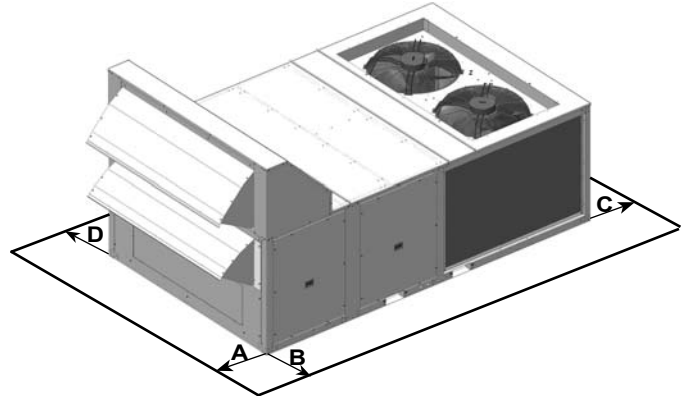
50FF/FC 052-058-062: RP assembly

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
052 to 062	3.865	2.200	1.230	1.000	1.000	1.300	2.200



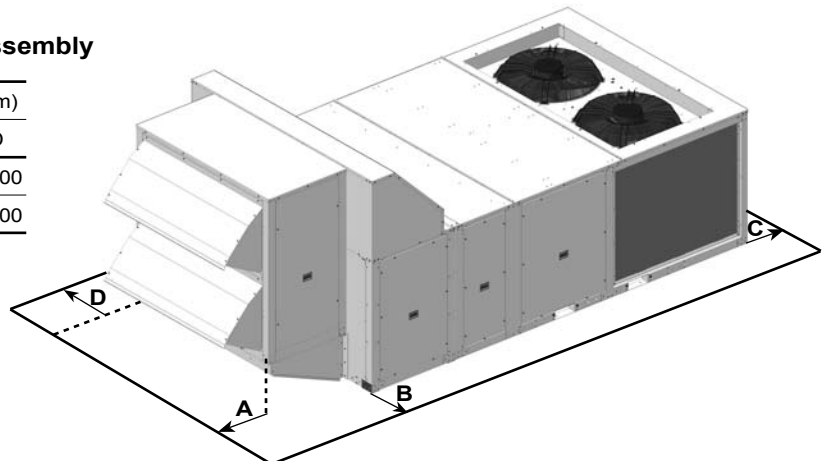
50FF/FC 070-074-086-093: RP assembly

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
070 to 093	3.655	2.210	1.905	1.000	1.000	1.600	2.200



50FF/FC 052-058-062-070-074-086-093: RW assembly

50FF/FC	Overall dimension (mm)			Service clearance (mm)			
	Length	Width	Height	A	B	C	D
052 to 062	4.675	2.210	1.905	1.000	1.000	1.300	2.200
070 to 093	4.465	2.210	1.905	1.000	1.000	1.600	2.200



NOTE:

- Unit not designed to have overhead obstruction.

8 - ELECTRICAL CONNECTION

8.1 - Installation norms



Important: All connections in the site are the responsibility of the installer. These connections are always made as per the current regulation. Always refer to the wiring diagram provided with the unit.



The installer must provide electrical circuit protections according to the effective legislation.



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.

8.2 - Power supply

Verify that power supply agrees with the unit name plate and that the voltage remains constant.

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

8.2.1 - Voltage phase imbalance (%)

$$\% \text{ imbalance} = \frac{100 \times \text{max. deviation from average voltage}}{\text{average voltage}}$$

Example:

On a 400 V - 3 ph - 50 Hz power supply, the individual phase voltages were measured with the following values:

AB = 406 V; BC = 399 V; AC = 394 V

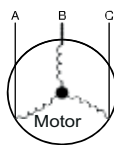
Average voltage = $(406+399+394)/3=1199/3 = 399.7$ i.e. 400 V

Calculate the maximum deviation from the 400 V average:

(AB) = $406 - 400 = 6 \rightarrow \% = 100 \times 6 / 400 = 1.5$

(BC) = $400 - 399 = 1 \rightarrow \% = 100 \times 1 / 400 = 0.25$

(BX) = $400 - 394 = 6 \rightarrow \% = 100 \times 6 / 400 = 1.5$



Important: It is the responsibility of the installer to protect the unit from overvoltage coming from the mains or voltage spikes caused by lightning. Depending on the geographic location and the type of mains network (buried or overhead), a lightning rod needs to be installed. Check the local electrical codes and regulations. Failure to comply with the requirements of standards in force in the country of installation will void the warranty.

8.3 - Wire sizing

Wire sizing is the responsibility of the installer to suit the characteristics of the installation site and comply with applicable regulations.

- To perform the electric installation of the unit (cable glands, wire sizing and their calculations, protections, etc.), refer to the information provided in:
 - The technical brochure of this series.
 - The name plate data.
 - The wiring diagram included with the unit.
 - Norms in effect that regulate the installation of air conditioning units and electrical receivers in the country of installation.

■ Wiring must be selected based on:

- The maximum power input, taking into account all the options it features (refer to the technical brochure and the name plate).
- The distance between the unit and its power source.
- The protection to be placed at the power source.
- Neutral operating conditions.
- The electrical connections (refer to the wiring diagram provided with the unit).
- The temperature the wiring is exposed to;
- The fitting method.

After wire sizing has been completed, the installer must verify the appropriate means of connection and define any modifications necessary on site.

8.3.1 - Power cable access routing

The power cables can be routed into the electrical box for the units:

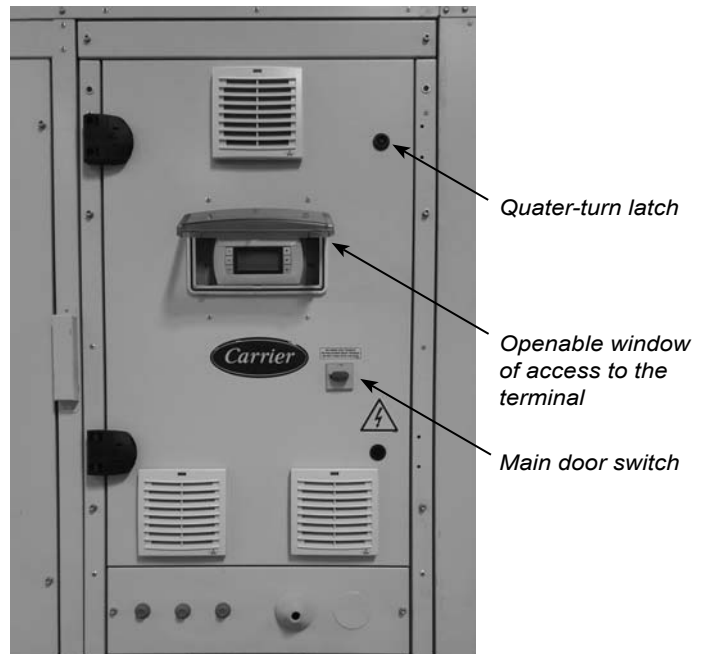
- Via the panel located under the electrical cabinet.
- Via the base of the unit

It is important to check that the power cable bend radius is compatible with the connection space available inside the electrical cabinet.

8.4 - Electrical cabinet

All units include a fully wired electrical cabinet, with forced ventilation.

The access door is insulated to prevent condensation. This door has hinges + quarter-turn latches.



These latches of stainless steel have triangular insert 8 mm (supplied wrench). The closing is done by rotating 90° (anti-clockwise): it brings the latch to the locked position.



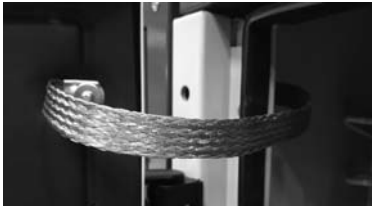
Dual locks can function as hinges or can be used to remove the door.

Note: Check that the locks are not blocked. Open them with a 4 mm Allen wrench (in an anti-clockwise direction).



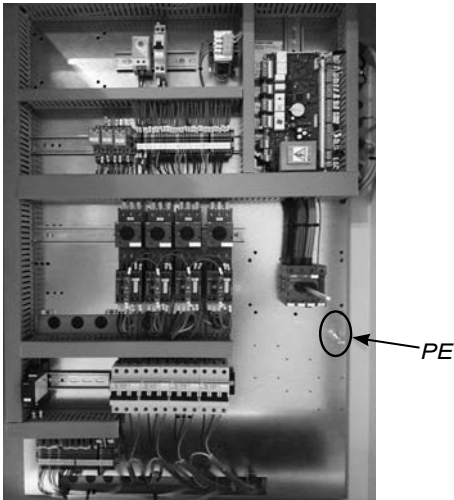
8 - ELECTRICAL CONNECTION

The fan for cooling the electrical cabinet, the graphic terminal and the ground connector, all located on the door, must be disconnected before removing the door.



Electrical components are identified and all wires are numbered. It permits easy tracing and diagnostics.

Power cables are identified with the colors: black (L1) - Brown (L2) - grey (L3) - yellow/green (Ground).

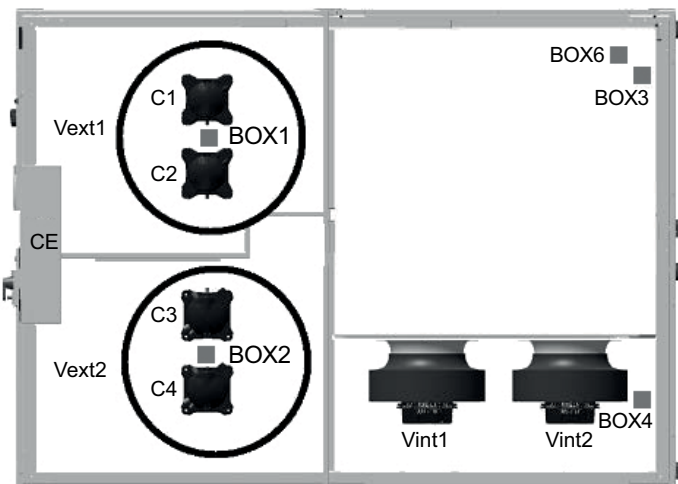


The grounding lug (PE), located on the panel plate, is used to earth the frame of the unit.

The main components of the unit are connected in intermediate boxes located next to these components.

- BOX1: Motor-compressor circuit 1
- BOX2: Motor-compressor circuit 2 (models 052 to 093)
- BOX3: Economizer
- BOX4: Indoor unit
- BOX6: Return box (optional)

The following image shows the location of boxes in a two-circuit unit with "Standard" assembly:



8.5 - "50FC" electronic control

"50FC" electronic control is basically comprised of a control board, sensors, a graphic terminal, an user terminal (optional) and a BMS card (optional).



Graphic terminal

User terminal

Touch panel

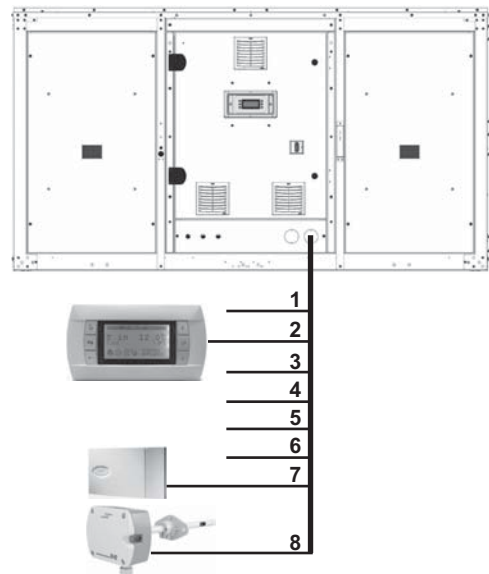
By default, this control is supplied with a graphic terminal, installed on the unit's electrical cabinet, but it can also be remotely connected:

- Up to 50 metres, it can be connected directly with telephone wire.
- From 50 to 200 metres, it is necessary to use the TCONN bypass cards and AWG 20/22 shielded cable with 2 twisted pairs.

The User terminal (optional) or the Touch panel (optional) can be installed in the electrical cabinet when the Graphic terminal is remotely connected.

Note: Refer to the "50FC" control brochure to obtain more detailed information on its operation.

8.5.1 - Customer connection

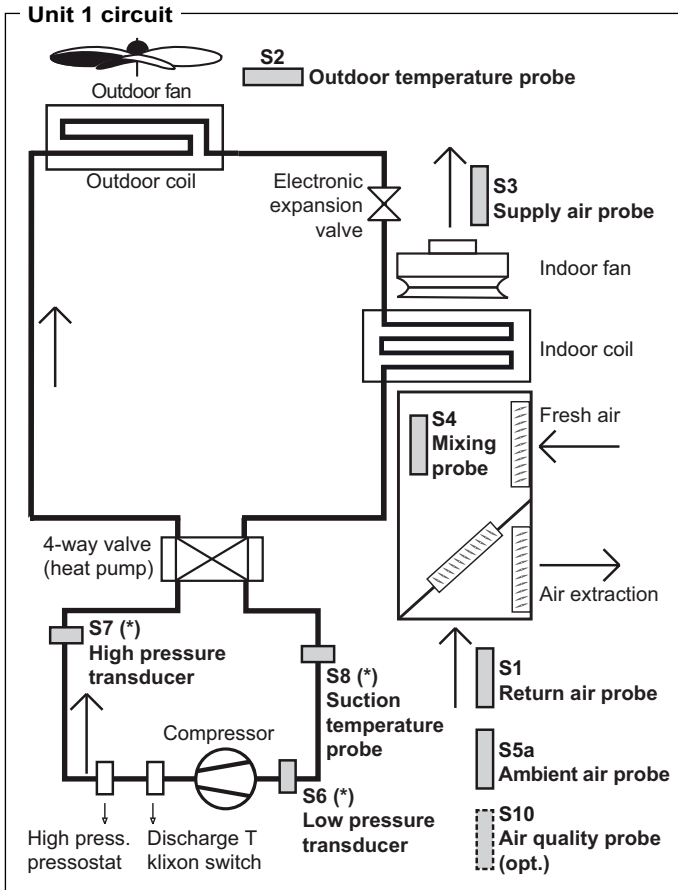


No.	50FF/FC		020 to 093
1	Main power supply	400 III ($\pm 10\%$)	3 Wires + Ground + Neutral
2	Remote connection of the graphic terminal (by default it's installed on the electrical cabinet) (1)		telephone cable 6 wires standard (RJ12 connector)
4	Remote off/on (optional)		2 wires
5	Main failure signal (optional)		2 wires
6	Circulation pump signal for HWC (antifreeze safety) (optional)		1 wire
7	Ambient sensor	NTC	2 wires
8		RS485	5 wires (2)
9	CO2 sensor (optional)		3 wires

- (1) In this case, it's possible to install the user terminal on the electrical cabinet.
 (2) Up to four RS485 ambient sensors can be connected in series on the field-bus of the control board.

8 - ELECTRICAL CONNECTION

8.6 - Location of sensors on the machine



(*) In units with 2 circuits:

- Low pressure transducers: S6 (circ.1) and S11 (circ.2)
- High pressure transducers: S7 (circ.1) and S12 (circ.2)
- Suction temperature probes: S8 (circ.1) and S9 (circ.2)

Note: If the unit needs the outdoor humidity probe, used with enthalpic or thermoenthalpic management of the economizer, this one (S5h) will be connected in the place of the ambient probe (S5a). In this case it is necessary to use a RS485 ambient temperature probe connected on the Field-bus.

8.7 - Sensors connection by the costumer

The client must connect on-site the following probes:

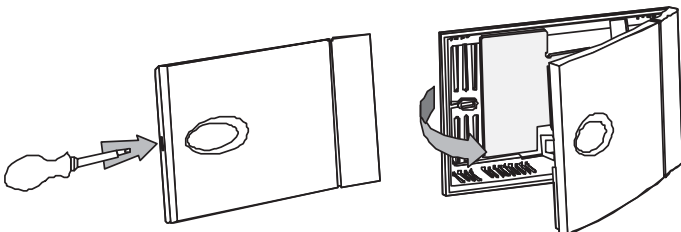
- Ambient NTC (standard) or RS485 (optional).
- Air quality (optional).
- Outdoor humidity (optional).

These probes are supplied inside the electrical cabinet.

Please refer to the wiring diagram and the "50FC" control brochure, both provided with the unit.

8.7.1 - Connection of the ambient probe

- To do this, the following steps are recommended:
 - Open the case using a flathead screwdriver in the slot, paying extra care not to damage the electronic parts.

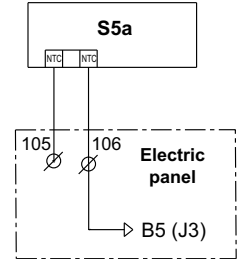


- Fasten the rear of the sensor case to the panel or the wall (for fastening the case, use the screws supplied with the fastening kit, paying attention to use the proper spacers, to not damage the sensor's electronics).
- This probe must be fastened to the panel or the wall of the room to be conditioned, at ca. 1.5 m height.

■ Electrical connection:

Make the electrical connection according to the unit configuration:

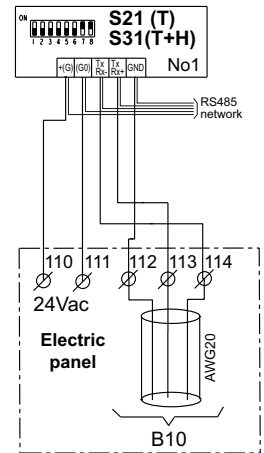
- NTC Probe S5a: B5 (connector J3): with 2 x 1,5 mm² section cable, within a maximum distance of 30 meters.



- 1 to 4 RS485 probes (connector J10): with AWG20 section cable, single braided pair preferably shielded with drain wire + Power supply 24 Vac (2 wires).

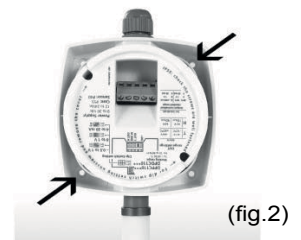
- Temperature: S21 to S24.
- Dual temperature-humidity: S31 to S34.

Note: in the case of more than one probe, connection of the probes in series, in the RS485 network. Please, refer to the control manual.

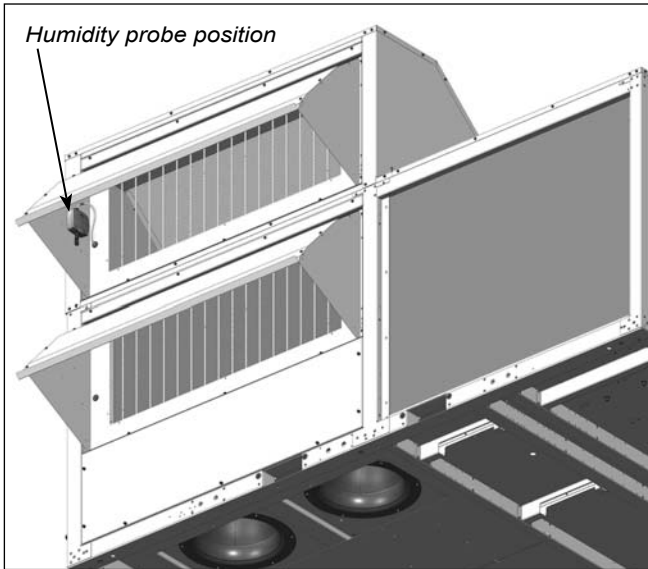


8.7.2 - Connection of the outdoor humidity probe (optional)

- The outdoor humidity probe (optional), necessary for the enthalpic and thermo-enthalpic management of the economizer, must be installed on-site, on the hood of the fresh air intake.
 - Open the case by turning the top cover anticlockwise (fig.1).
 - Fasten the rear of the sensor case to the side panel of the hood (use the screws supplied together with the probe) placing the screws in the holes provided (fig.2).
 - Make sure that the screws that hold the board protective cover are fastened tightly (fig.3).
 - Close the sensor by turning the cover clockwise (fig.4).

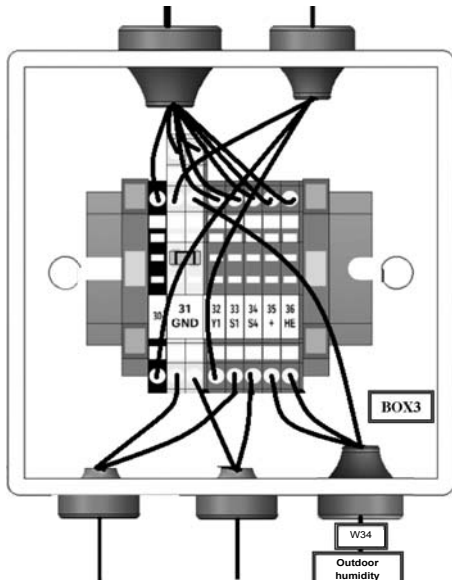


8 - ELECTRICAL CONNECTION



The installer must feed the W34 cable through the M16 feedthrough to connect it in the BOX3, located inside the unit, behind the side access panel.

■ Electrical connection:



BOX3 (terminals)

Black: 35

Brown: 31

Grey: 36

Probe (terminals)

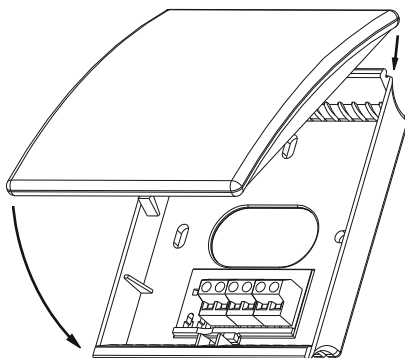
Black: G+

Brown: M

Grey: H

7.8.3 - Connection of the air quality probe

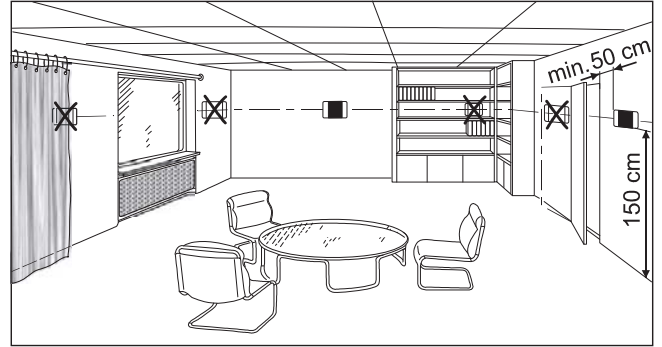
■ Installation in the environment:



- This probe must be fixed to the interior wall of the room to be conditioned, at ca. 1.5 m height in the room and at least 50 cm from the next wall.

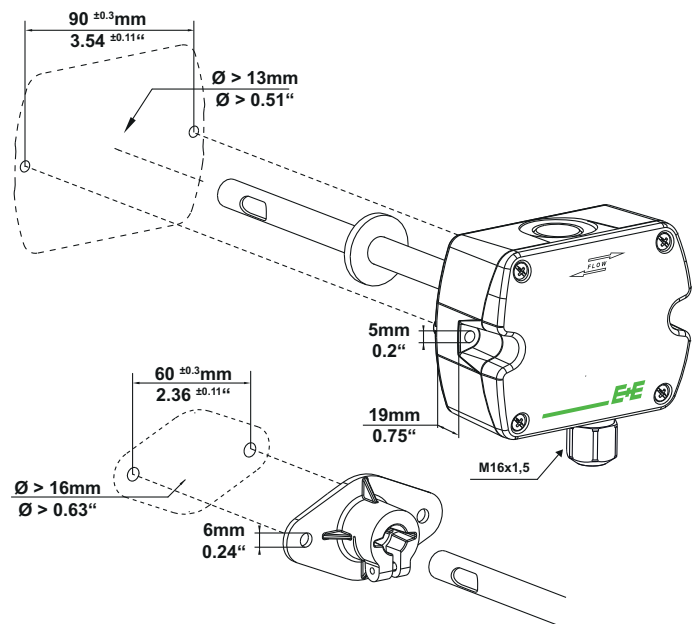
- It should never be mounted:

- On outside walls.
- In niches or behind curtains.
- Above or near heat sources or shelves.
- On walls covering heat sources such as a chimney.
- In the radiation range of heat sources and lighting bodies e.g. spotlights.
- In areas exposed to direct solar radiation.



■ Duct-mounted:

This version can be connected to the air duct in these two ways:

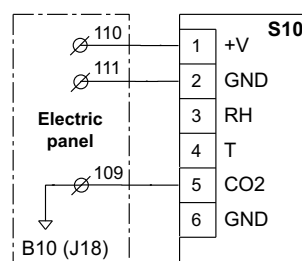


■ Electrical connection:

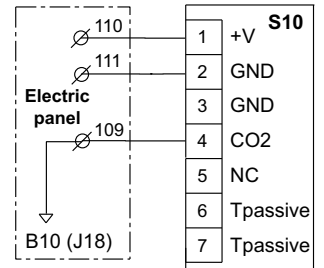
- This probe (S10) is configured as analogue output 4...20 mA (0...2000 ppm), in the analogue input B10 of the control board (connector J18).

- Recommended cable section : 1,5 mm²

Environment:



Duct-mounted:

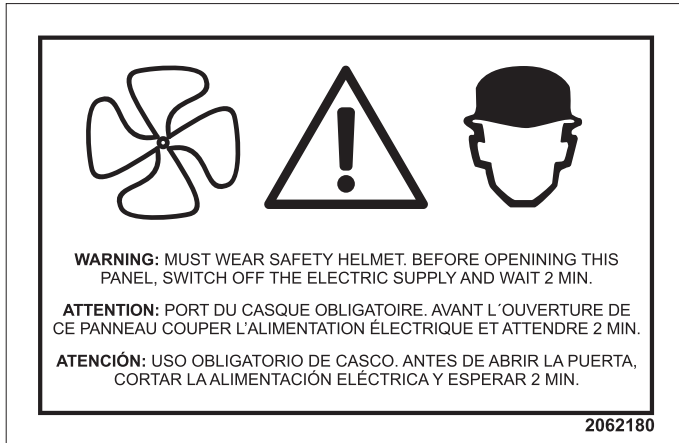


9 - FANS AND AIR DUCTS

9.1 - Checks in the axial 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.
- With electronic fans (standard), check that they adapt their rotational speed based on the condensation or evaporation pressure.

Note: Optionally these units can be supplied with two-speed fans.



9.1.1 - Access to the outdoor unit from the fans

For some maintenance tasks, it may be convenient to access the outdoor unit by lifting the cover with the fan(s) (depending on the model).

First, the power supply to the fan must be disconnected.

Each fan features two quick-release connectors (power and control) inside the compressor box.

Then, the cover must be unscrewed.

This is fixed to the machine using M6 Allen screws.



Ring screws (not supplied with the unit) are to be fixed to the M10 hex nuts existing on the cover. The lifting slings will be hooked to these ring screws.

- Lid with 1 fan (weight 78 kg): 3 nuts.
- Lid with 2 fans (weight 145 kg): 4 nuts.

Important: These nuts are only intended to lift the cover.



9.2 - Checks in the EC plug-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 curves of the fan and the room is very important, so that the flows and pressures provided to the duct network are as required.
- The variable-speed plug-fans, both supply and return, have a flow control pressostat. This pressostat comes from the factory adjusted to the indicated flow. However, the flow for different conditions can be readjusted on site from the graphic terminal (please refer to the "50FC" control brochure).

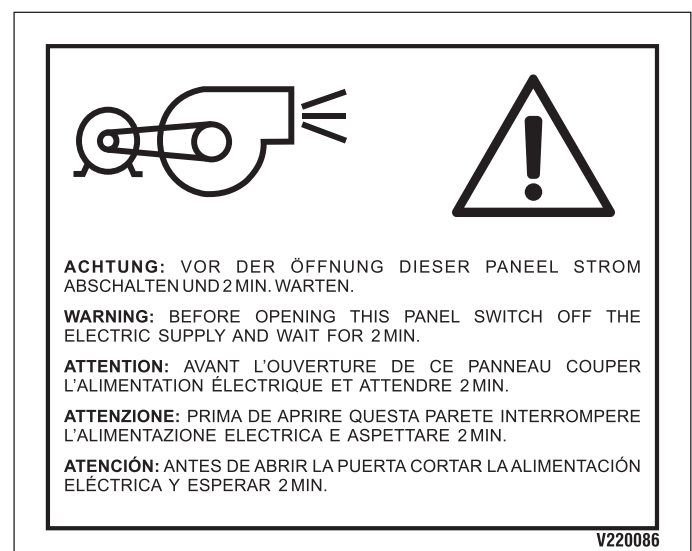


Flow control pressostat

9.3 - Checks in the centrifugal fans (optional)

If the unit is equipped with centrifugal return fans (available in BT and BB assemblies):

- 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.



9 - FANS AND AIR DUCTS

9.3.1 - Pulley and belt calibration



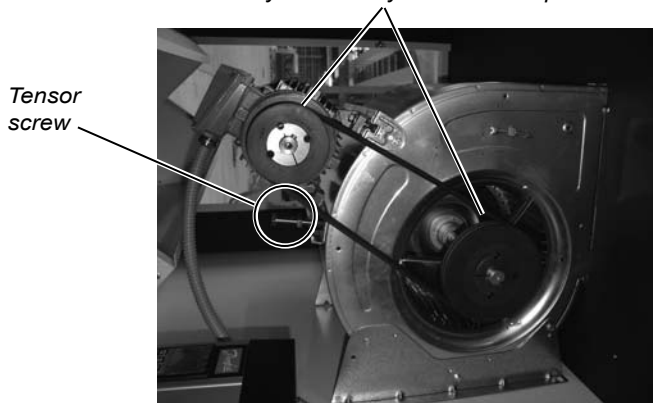
Attention: Before performing these operations, it is necessary to verify that the unit is disconnected from mains.

The centrifugal motorfans are coupled through pulleys and belts. In these fans, the following must be taken into consideration:

Pulley alignment:

- 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, and after removing the taper pin, the set of pulley and taper can be slid over the axis (this action can be performed both in the motor as well as in the fan).

Pulleys must stay on the same plane



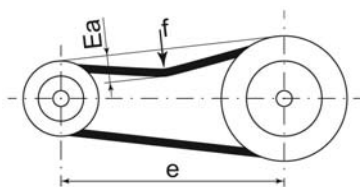
Belt tension:

After fixing the pulleys on the same plane, the belt tension is made by tightening the tensor screw.

Excessive tension on the belt can lead to premature wear on the assembly. Insufficient belt tension can cause slippage, overheating and premature wear of the belt.

It is essential to tension the belts using the "Deflection test" described below:

- The belt tension must be checked and corrected using a suitable measuring instrument (tensiometer or dynamometer).



- "Ea" calculation:

- $Ea = (e \times E)/100$ = deformation in mm for a pulley centre distance of 100 mm

- e = pulley centre distance in mm
- E = see table below for the value
- f = force applied

- At the centre of the centre distance "e", apply a force "f", as determined in the table below, to each belt. Set the belt tension to obtain the calculated deflection "Ea".

Belt type	f(N) ①	d (mm) ②	E (mm) ③
SPZ	25	56 ≤ 71	2.45
		< 71 ≤ 90	2.20
		< 90 ≤ 125	2.05
		125	1.90

① Load to be applied per belt f (N)

② Small pulley diameter (mm)

③ Belt deformation for a pulley centre distance of 100 mm - E (mm)



Important: During commissioning, the belt tension must be checked after 48 hours of operation.

The belt tension must be checked in all cases and before system start-up.

9.4 - Air ducts connections

The air supply and return ducts must be calculated in accordance with the nominal 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:

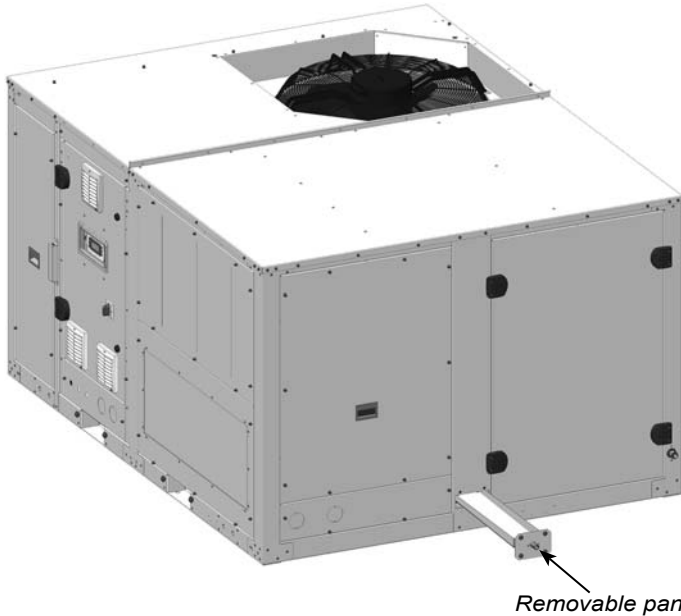
- Curves in the fan supply outlet(s) must be avoided. It is recommendable to have a straight section of duct measuring approximately 1 metre. If it is not possible, they must be as smooth as possible, using indoor deflectors when the duct is of large dimensions.
- When making the ducts, direction sharp 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.
- Consideration should be given to the need to install filters on the return ducts, taking into account any particles in suspension existing which could settle inside the machine (e.g. textile fibres).
- Flexible connections must be made between the ducts and the unit that avoid the noise and vibration transmission.
- No matter the type of ducts used, they must be isolated 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.

10 - CONDENSATE DRAIN

These units are equipped with a condensate drain pan in the indoor circuit, with a 1/2" M gas threaded plastic drain connection.

This drain pan is removable for easy cleaning. It is important to check that the drain is not clogged. The pan is secured to the unit using 4 M6 Allen screws.

Optionally, this pan can be made of stainless steel for corrosion protection.



Some options are equipped with a separate drain, 1/2" M gas threaded plastic:

- Cooling recovery circuit (BA and BB assemblies).
- Heat recovery wheel module (BW and RW assemblies).
- Gas burner (roofcurb).



With outdoor temperatures which are lower than 0°C the necessary precautions must be taken to prevent the water in the drain ducts from freezing.



Check the connection watertightness.

Important: the water drain pipe must be provided with a siphon to avoid bad smell and water spills.

**CONNECT SIPHON
METTRE SIPHON
PONER SIFON**
V220014

10.1 - Siphon installation norms

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

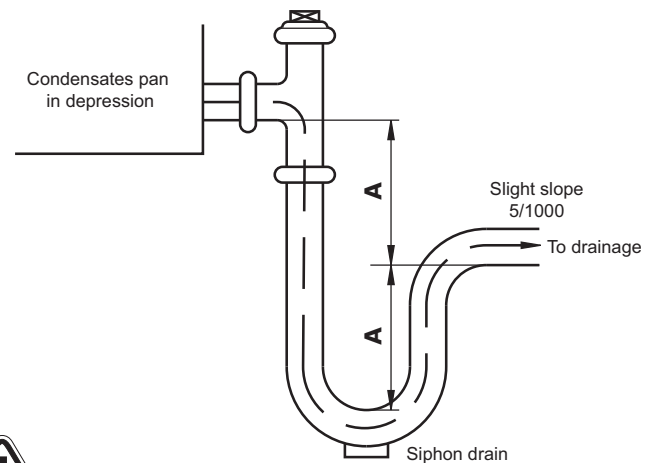
■ Pan in overpressure:

It is installed to avoid the access through the drain piping 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 (mm.w.c) where the condensate pan is placed.
- 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.



11 - SAFETY ELEMENTS

11.1 - 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.



11.2 - Low pressure safety

The low pressure safety is done by the "50FC" electronic control via the measure of the low pressure transducer.

11.3 - Automatic switch in the control circuit

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

11.4 - Main door switch

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

**DO NOT OPEN WITH VOLTAGE
NE PAS OUVRIR SOUS TENSION
NO ABRIR CON TENSION**
V220007

11.5 - Magnetothermic switches for line protection

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

11.6 - Safety at the compressor

These units have a klixon switch on the compressor discharge which stops the operation of the motor when there is excessive heating.

11 - SAFETY ELEMENTS

11.7 - Defrost control

This safety device is intended to eliminate ice which could accumulate in the outdoor coil when the unit is working in heating mode.

Defrosting is carried out by the control depending on the outdoor temperature and the value measured by the low pressure transducer.

11.8 - Condensation and evaporation pressure control

This safety, integrated in the control, enables managing the outdoor fan(s) when the units are working in cooling mode with low outdoor temperatures (condensation control) or in heating mode with high outdoor temperatures (evaporation control). This aids the unit's operation in all the seasons.

With electronic axial fans, the speed control is proportional, based on the average pressure measured by the pressure transducers.

11.9 - Anti-fire safety

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.

Note: "50FC" electronic control allows to select the functioning logic for the fulfillment of the ERP French fire regulations.

11.10 - Control of air flow

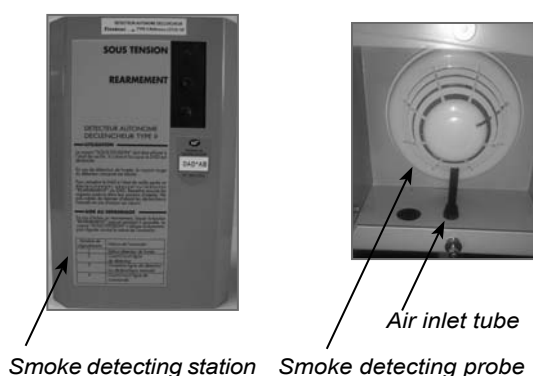
The supply plug-fans adapt their speed to the average flow measured by the differential pressure sensor and the value set as a setpoint in the electronic control.

11.11 - Smoke detector (optional)

In accordance with standard NF S 61-961, this smoke detection station uses a LED to indicate the installation status, and if the probe detects the presence of smoke in the installation, it stops the operation of the unit.

The station is installed in the factory on a panel next to the electrical cabinet. To reset the station it is necessary to disassemble the protection box.

The probe is placed on a pillar next to the supply fan.



11.12 - Filter fouling detection (optional)

Filter fouling detection with differential pressure switch. The value for alarm signalling is set in factory, depending on the filters selected for the unit.

The electronic control allows the settings selection for the filter fouling alarm: only indication (by default) or unit stoppage.

Manual reset.

Pressure reading is done thanks to two intakes within the air flow before and after the filter, such that a comparison is made between the pressure of the inlet air to the filter (positive) and the supply air of the same to the other side of the evaporating coil (negative).

This safety device is recommended in particular with gas burner.

This pressostat is installed in the factory:

- In the electrical cabinet, for "Standard" models.
- On a panel next to the indoor coil, for "In-line" models.



11.13 - Freeze protection OAT (optional)

- Electrical heater for protecting the components of the electrical cabinet. This safety device is mandatory for an outdoor temperature lower than -10°C WB.

A reinforced electrical heater is mandatory for a temperature lower than -14°C WB.

The electrical heater(s) is(are) activated when the thermostat installed inside the electrical cabinet detects that the temperature drops below 5°C.

- Compressor with low-temperature protection using an additional crankcase heater: mandatory for an outdoor temperature lower than -10°C WB.

Activation temperature: -10°C WB.

- Electrical heater for freeze protection of the economizer dampers: mandatory for an outdoor temperature lower than -14°C WB.

Activation temperature: -14°C WB.

- Electrical heater for protection of the gas burner housing (optional): mandatory for an outdoor temperature lower than -14°C WB.

Housing temperature for activation: +1°C.

- Spring shut-off dampers for automatic closing in the case of a cut in power.

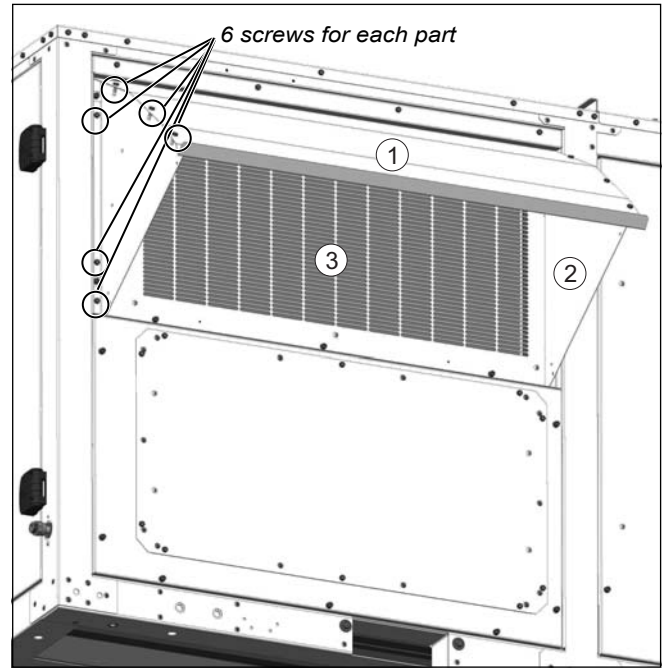
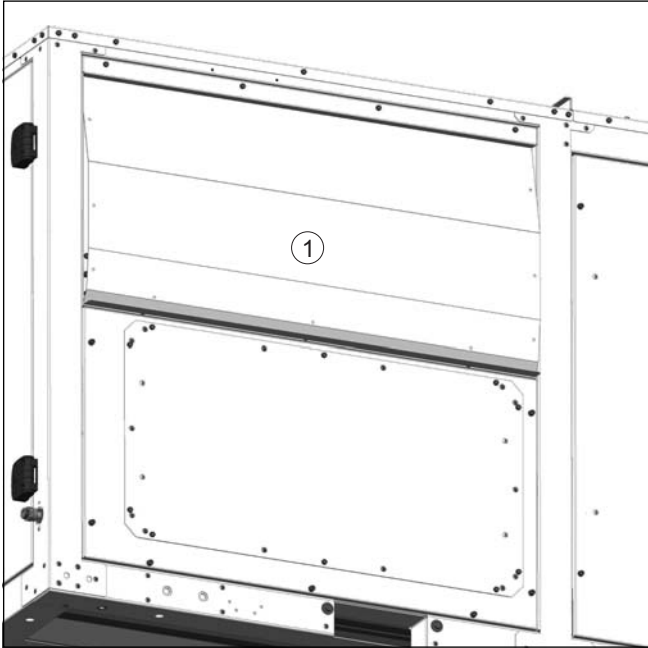
11.14 - Remote alarm (optional)

"50FC" control allows the management of a relay for remote alarm signalling.

12 - FACTORY OPTIONS AND ACCESSORIES

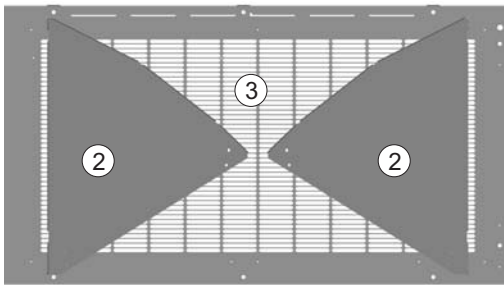
12.1 - Dampers hoods

- Depending on the assembly chosen, the fresh air and exhaust air damper hoods are supplied folded down, to be fitted on site by the installer.

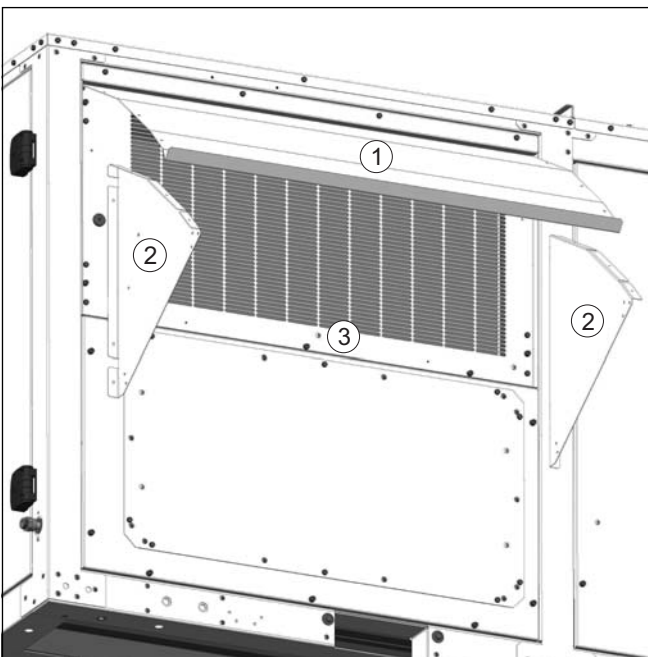


Note: Even though the previous images correspond to a "Standard" assembly, this procedure is also valid for "In-line" assemblies.

- The side parts (2) are supplied screwed to the inside panel (3).



- Each part (2) will be screwed to the panel (3) using 3 screws and to the hood (1) using another 3 screws. These screws are 4.8 self-tapping hex screws and are supplied with the unit.

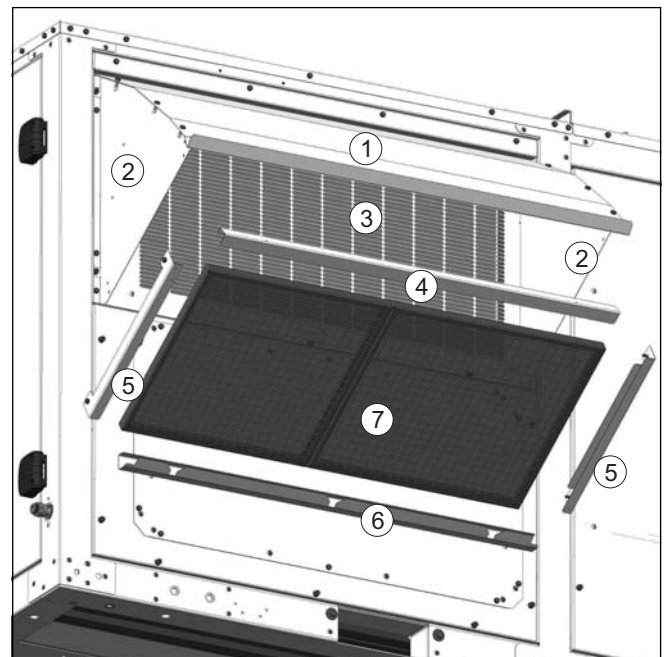


12.2 - Droplet eliminator at the fresh air intake

The droplet eliminator can be installed on the fresh air intake. It is recommended in cases where a high moisture content in the air is foreseen.

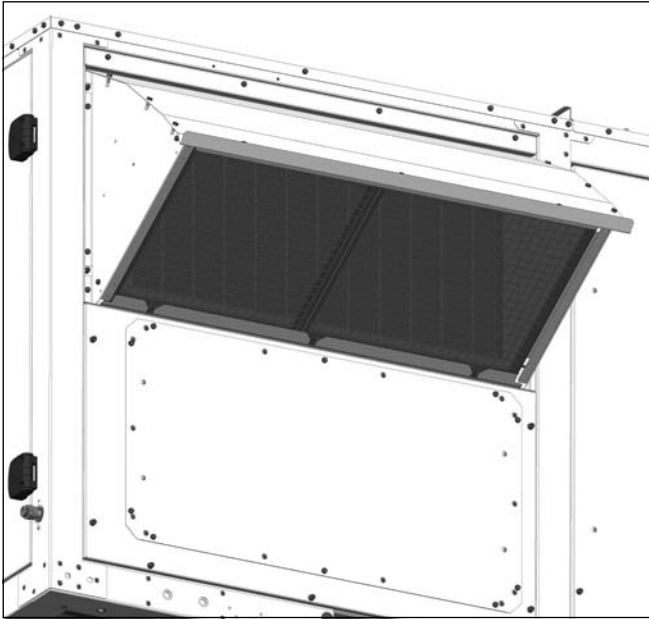
The droplet eliminator (7) is placed after the hood:

- First, the part (4) is placed inside the hood (1), using 3 of the 4.8 self-tapping hex screws. If the droplet eliminator has been ordered together with the unit, this part will be installed in the factory.
- Next, the side profiles (5) are fitted onto the side parts of the hood (2), each with 2 of the 4.8 self-drilling hex screws.
- Finally, the profile (6) is fitted onto the panel (3). To do this, unscrew the 3 lower screws on the panel (M6 Allen) and screw them back on, attaching the profile.



12 - FACTORY OPTIONS AND ACCESSORIES

The following image shows the droplet eliminator placed:

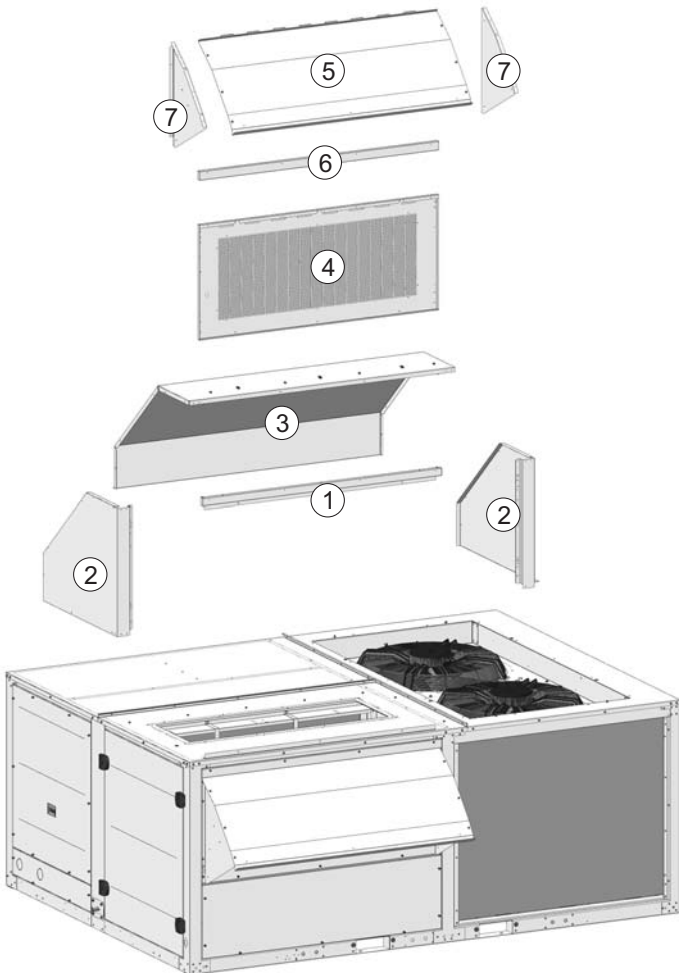


All the screws required for this assembly are supplied in a bag.

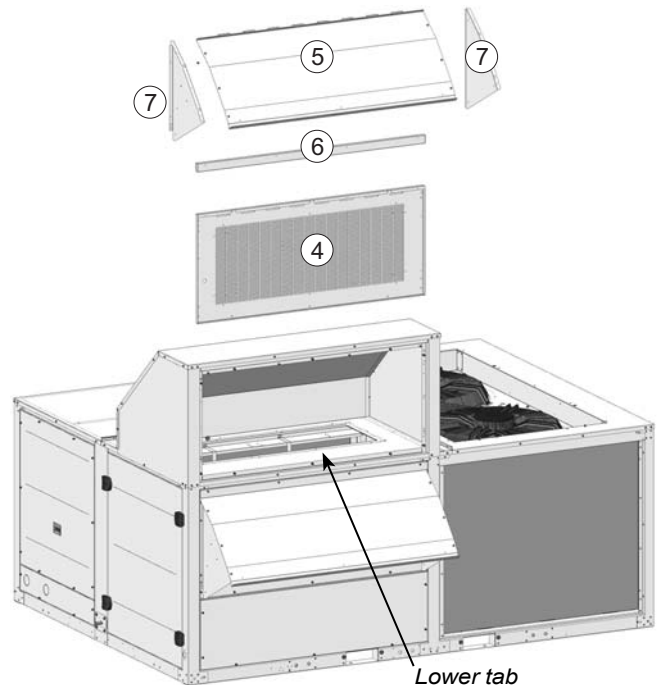
12.3 - Fresh air housing (B3, BX, BP, BA, BW, RP 070 to 093, RW assemblies)

The fresh air housing is supplied disassembled with the unit, for installation on site.

This housing is composed of the parts that appear in the following image. The number of each part corresponds to the order of assembly.

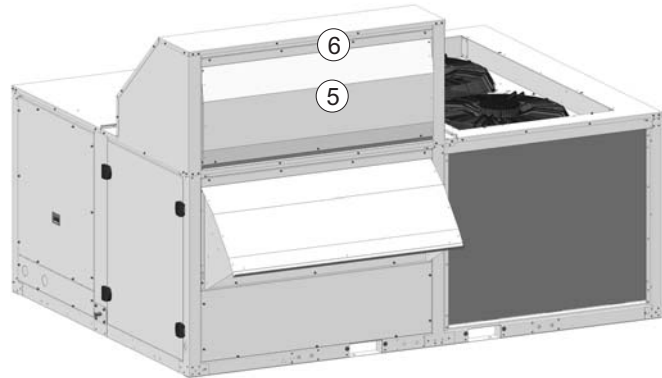


- First, parts (1) and (2) must be connected. Then, part (3) is put in place. This structure must be fitted on top of the unit before continuing with the assembly process.

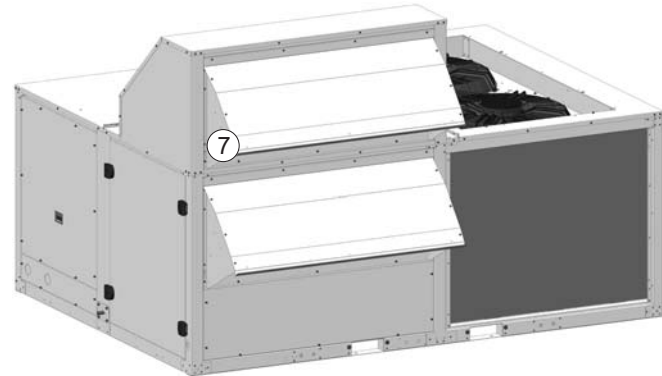


- Then, the screen panel (4) is fitted to the cover and to the lower tab which incorporates the unit.

- Before fitting the trim (6), the folded down hood (5) must be positioned so as to rest against the lower tab of the trim. Next, the trim is screwed onto the screen panel (4). This ensures that the hood is secure but still able to move.



- Finally, the hood (5) is raised and the side parts (7) are secured, by being screwed onto the screen panel (4) and onto the hood.



All the screws required for this assembly are supplied in a bag. These screws are 4.8 self-tapping hex.

Note: if the unit incorporates droplet eliminator, the assembly process is described in the previous section.

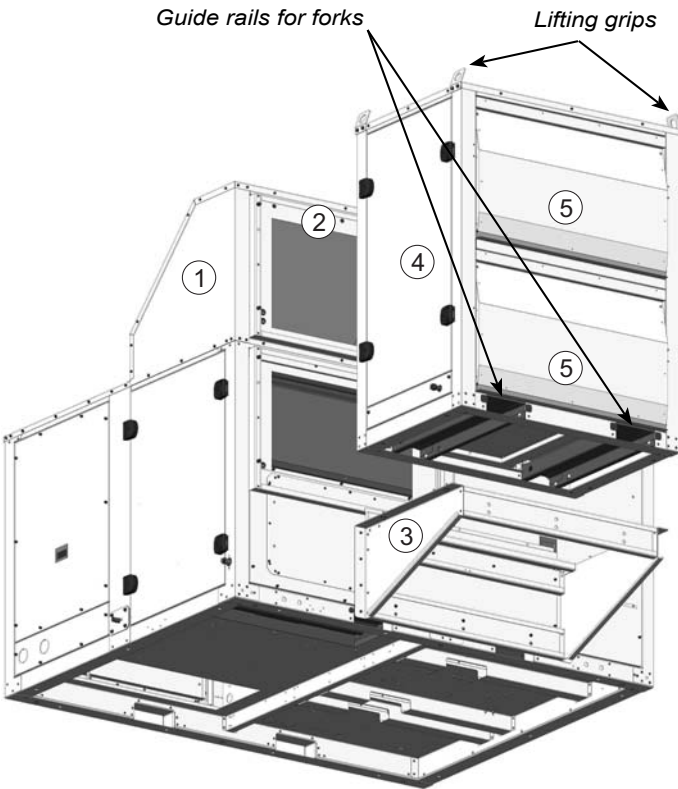
12 - FACTORY OPTIONS AND ACCESSORIES

12.4 - Heat recovery wheel module (BW and RW assemblies)

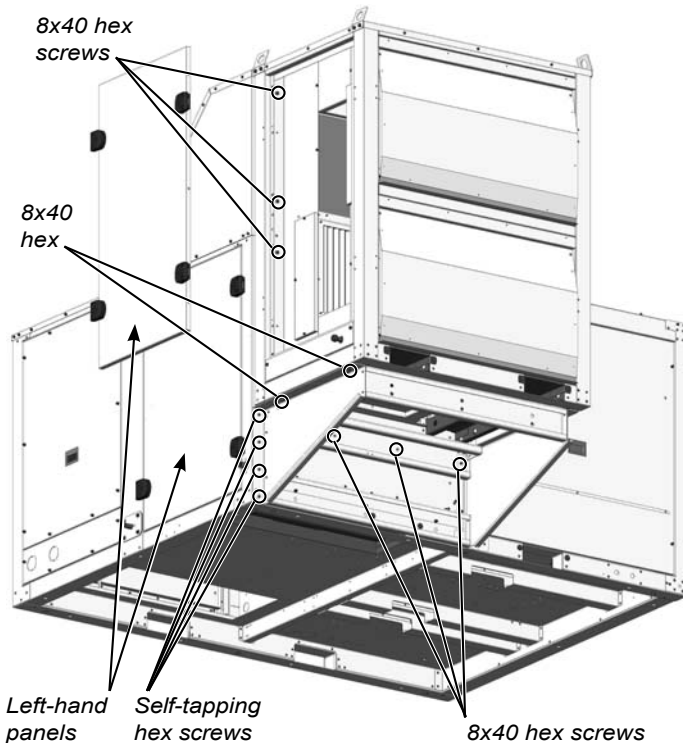
12.4.1 - Transport and handling

The module with the heat recovery wheel and its support bed are supplied disassembled with the unit, for installation on site.

- The module can be handled safely by using a forklift truck. The base frame features guide rails to accommodate the forks of the fork-lift truck. These guide rails avoid any slippage.
- For transport and lifting up to the roof using a crane, a rocker arm as well as approved slings must be used. These slings are attached on the grips fitted to the cover of the module.



12.4.2 - Installation of models RW - 070 to 093 and BW



- First, the fresh air housing (1) is connected. Follow the steps detailed in paragraph 12.3.
- Next, the front panel (2) is secured using 8x40 hex screws.
- Then, the support bed (3) is fitted. This is fixed to the panel using 4.8 self-tapping hex screws on the sides and 8x40 hex screws on the front.
- Next, the recovery module is positioned on the support bed but without efforts on it. Do not remove the fork-lift truck until the module is not secured to the unit.
- The module is secured to the unit using 8x40 hex screws. To do this, the side panels must be removed from the module. The right-hand panel (front view) is secured using M6 Allen screws, while the left-hand panel incorporates dual locks.

Note: Check that the locks are not blocked. Open the locks with a 4 mm Allen key (anticlockwise).

- The module is screwed to rest on the support bed using 8x40 hex screws on both sides.
- Finally, raise the hoods (5) and secure the side parts. Follow the steps detailed in the preceding paragraph.

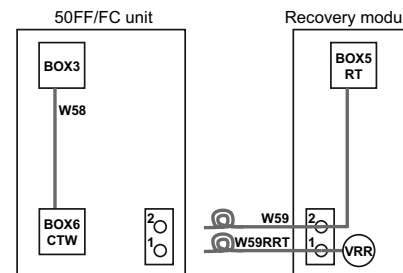
Note: All the screws required for this assembly are supplied secured on the module and the support bed.

Electrical connection to be made by the customer

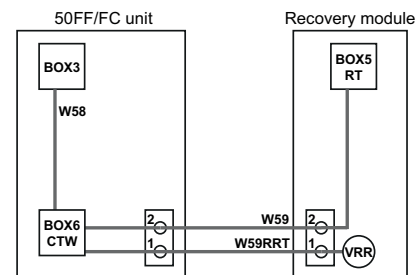
Note: see the wiring diagram included with the unit for a more detailed information about the wiring.

The connection is done through the left-hand panels (front view).

Initial location of the cables for connection:



Connection to be made by the customer:

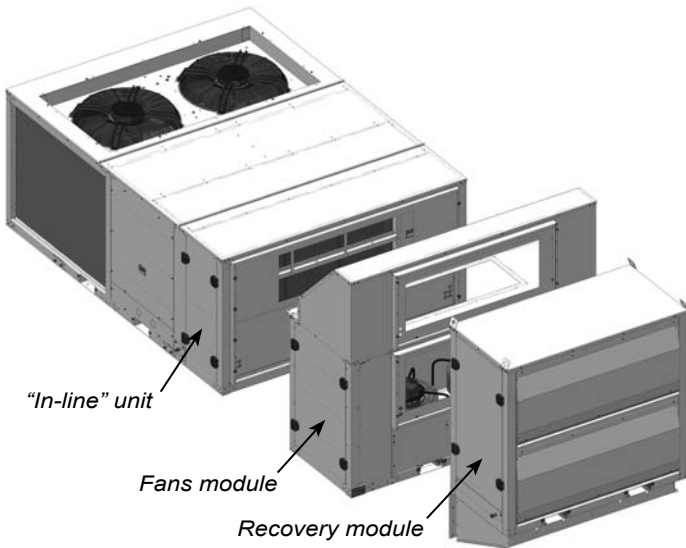


12.4.3 - Installation of models RW - 052 to 062

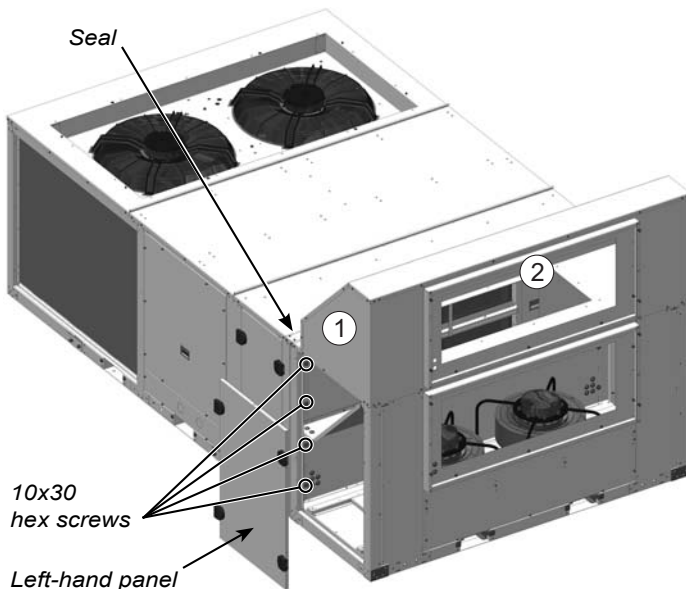
In this case, before carrying out the steps outlined above, the return air fans module must be connected to the unit.

- The module can be handled safely by using a forklift truck. The base frame features guide rails to accommodate the forks of the fork-lift truck. These guide rails avoid any slippage.
- For transport and lifting up to the roof using a crane, a rocker arm as well as approved slings must be used. These slings will be hooked on the anchorage points intended for this purpose in its base frame.

12 - FACTORY OPTIONS AND ACCESSORIES



- First, the fresh air housing (1) is connected. Follow the steps detailed in paragraph 12.3.
- Next, the front panel (2) is secured using 8x40 hex screws.
- The fan module is secured to the unit using 10x30 hex bolts. To do this, the side panels must be removed from the module. The right-hand panel (front view) is secured using M6 Allen screws, while the left-hand panel incorporates dual locks.
- The cover of the unit and the cover of the module are joined using a seal. This is supplied attached to the cover of the module and must be joined to the cover of the unit using 4.8 self-tapping hex screws.



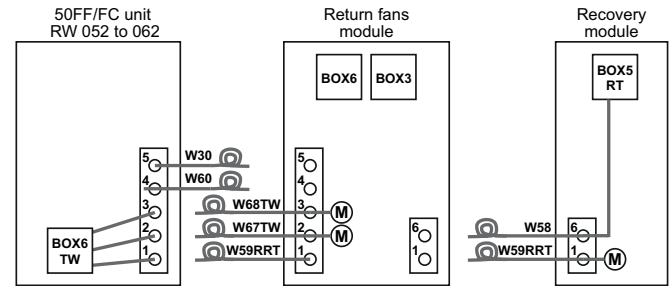
- Then, the recovery module is connected as described above.
- Note: All the screws required for this assembly are supplied secured on the fans module.

Electrical connection to be made by the customer:

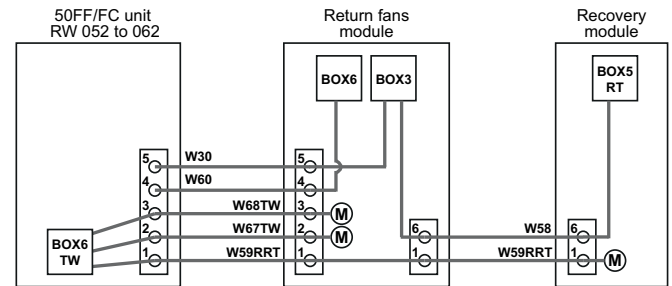
Note: see the wiring diagram included with the unit for a more detailed information about the wiring.

The connection is done through the left-hand panels (front view).

Initial location of the cables for connection:



Connection to be made by the customer:



12.4.4 - Access to the inside of the recovery module

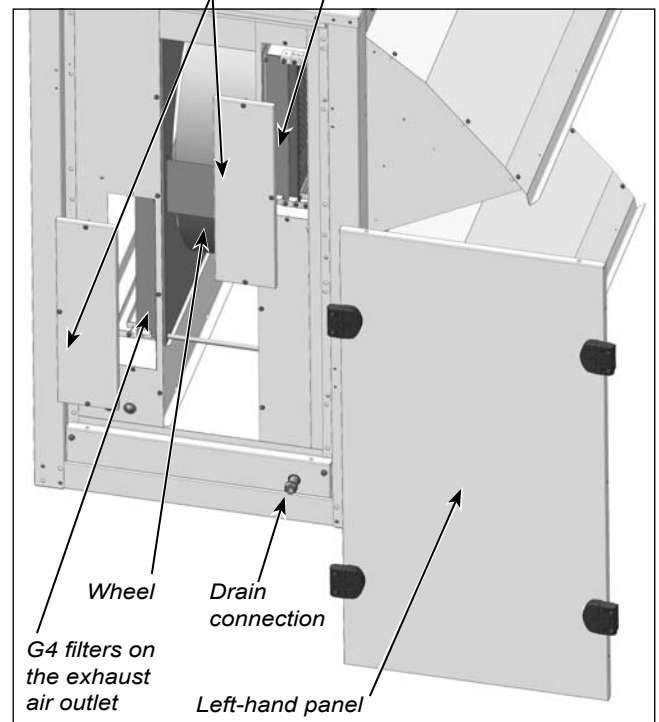
- The inside of the heat recovery unit module is accessed via the left-hand panel (front view), for maintenance tasks concerning the filters and the condensate pan (1/2" M gas threaded plastic drain connection). This panel features dual locks. Check that the locks are not blocked. Open the locks with a 4 mm Allen key (in an anticlockwise direction).

The access panels to the filters (G4 or G4+M6) are secured using M4 Allen screws.

Note: The general procedure for removing and cleaning the filters is described in chapter "Maintenance".

Access panel to filters, M4 Allen screws

G4 filters on the fresh air intake

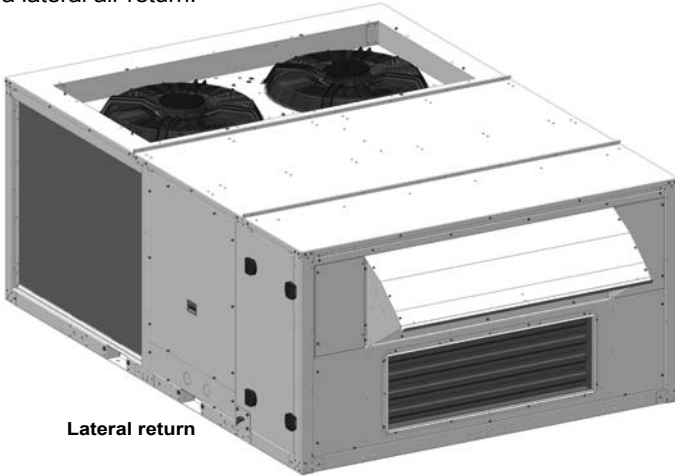


- The wheel motor can be accessed via the right-hand panel (front view). This panel is secured using M6 Allen screws.

12 - FACTORY OPTIONS AND ACCESSORIES

12.5 - Enclosure for lower return (models 052 to 062 with R2 assembly)

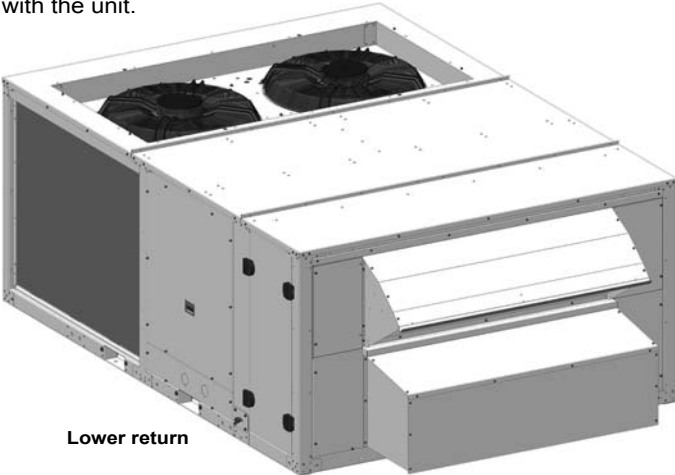
Models 052 to 062 with R2 assembly are supplied factory-set with a lateral air return.



Lateral return

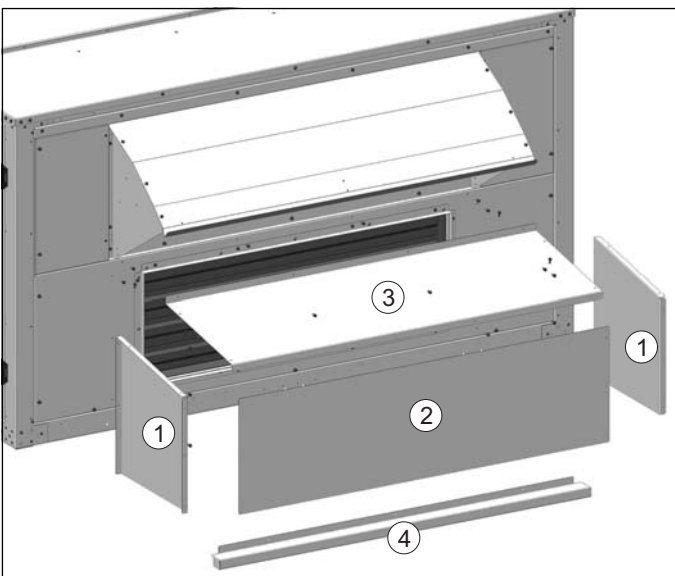
An enclosure must be fitted for the lower return, as shown in the image.

All the parts and screws required for this assembly are supplied with the unit.



Lower return

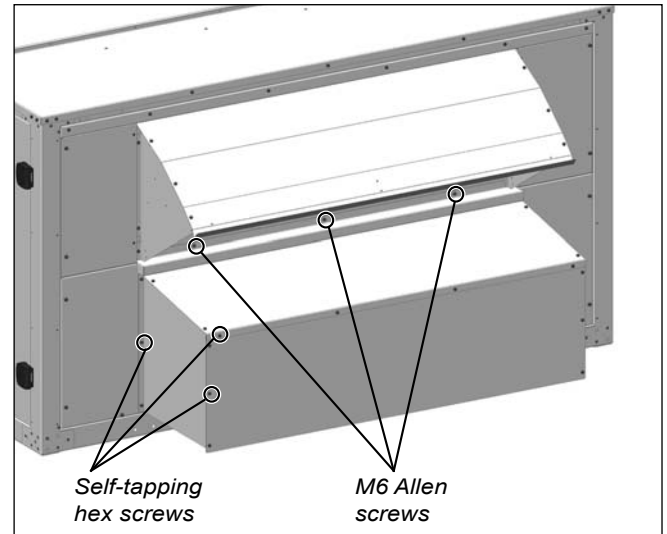
This enclosure is composed of the parts that appear in the following image. The number of each part corresponds to the order of assembly.



■ First, side part (1) must be connected. Then, parts (2) and (3) are put in place.

All these parts are fitted to the unit using 4.8 self-tapping hex screws.

■ Finally, the trim (4) is fixed using M6 Allen screws.

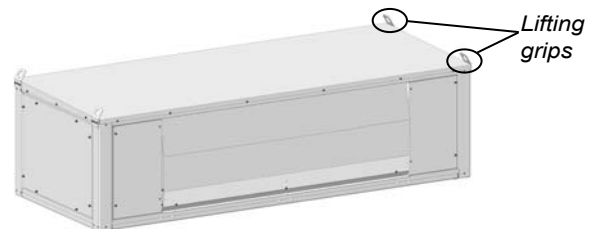


12.6 - Return fans module (models 052 to 062 with RP assembly)

12.6.1 - Transport and handling

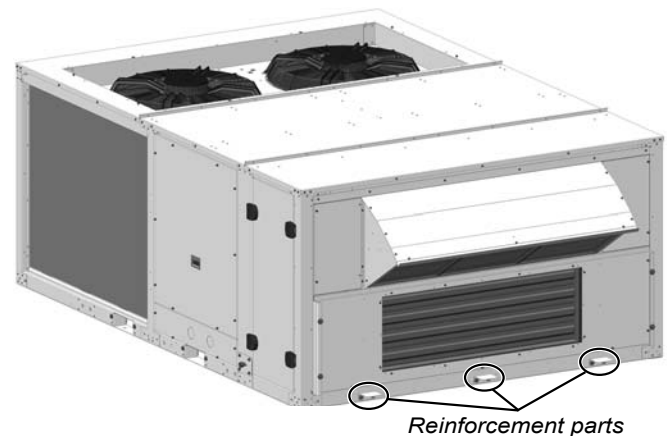
In these models, the module with the return fans is supplied disassembled with the unit, for installation on site.

For transport and lifting up to the roof using a crane, a rocker arm as well as approved slings must be used. These slings are attached on the grips fitted to the cover of the module.



12.6.2 - Installation

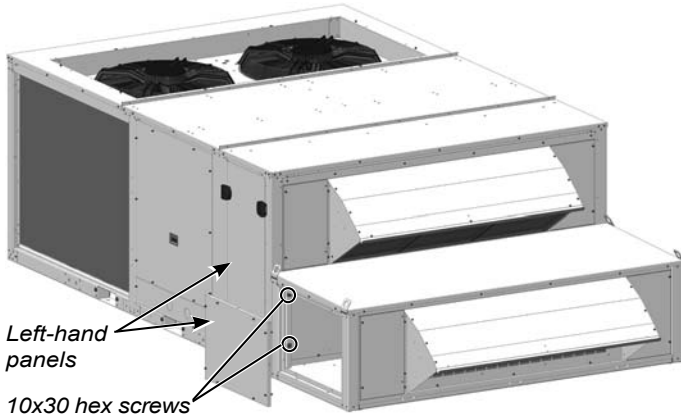
■ First, the three reinforcement parts (1) are fitted to the base frame of the unit, using the 8x30 hex screws (supplied in a bag).



■ Next, the module is secured to the unit using 10x30 hex bolts. To do this, the side panels secured with M6 Allen bolts must be removed from the module.

12 - FACTORY OPTIONS AND ACCESSORIES

- Finally, raise the hoods and secure the side parts.

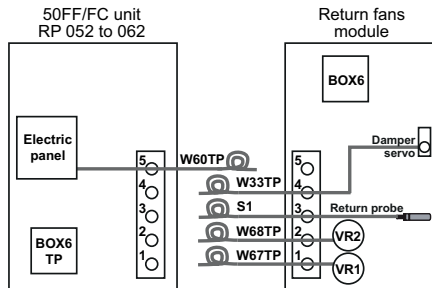


Electrical connection to be made by the customer:

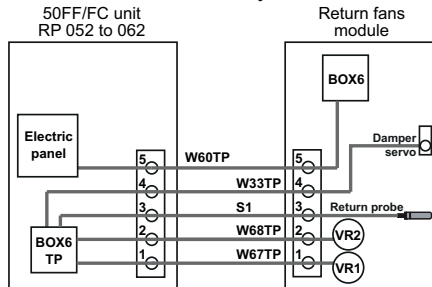
Note: see the wiring diagram included with the unit for a more detailed information about the wiring.

The connection is done through the left-hand panels (front view).

Initial location of the cables for connection:



Connection to be made by the customer:

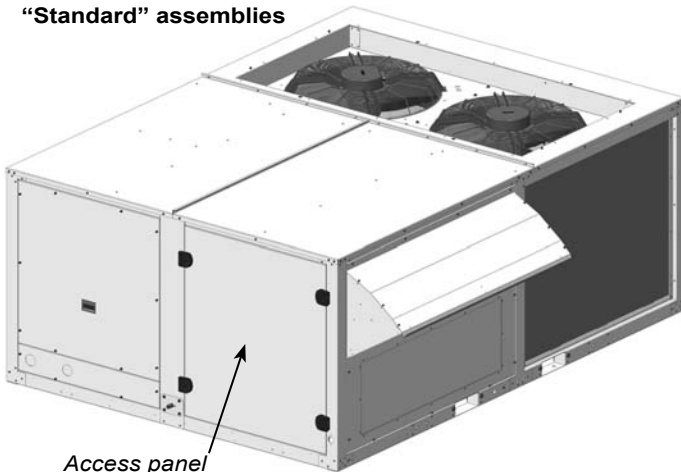


12.7 - Air filters

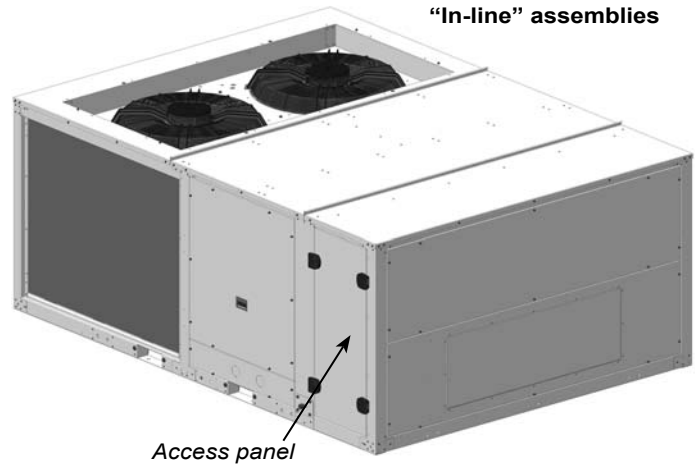
The access panel to the filters incorporates dual locks, they can function as hinges or can be used to remove the panel.

Note: Check that the locks are not blocked. Open them with a 4 mm Allen wrench (in an anti-clockwise direction).

“Standard” assemblies



“In-line” assemblies



- These units include as standard G4 gravimetric filters, which can be replaced by:
 - G4 gravimetric filters with low pressure drop.
 - G4 gravimetric filters + M6, F7 or F9 folded opacimetric filters.
 - G4 gravimetric filters with low pressure drop + F7 or F9 folded opacimetric filters.
 - Double stage of folded opacimetric filters (M6+F7, M6+F9, F7+F9 or F9+F9).



- The structure that supports the frames with the filters has been designed to feature the various combinations of filters. The width of the frame is 24 mm for G4 and 48 mm for the remainder. When the selected combination of frames has less than 98 mm width, the structure incorporates a tensioner to lock the position of the frames.

To extract the frames it is necessary to loosen the screws securing the tensioner.

Note: the filters cleaning procedure is explained in the chapter of “Maintenance”

12 - FACTORY OPTIONS AND ACCESSORIES

12.8- Heat recovery coil

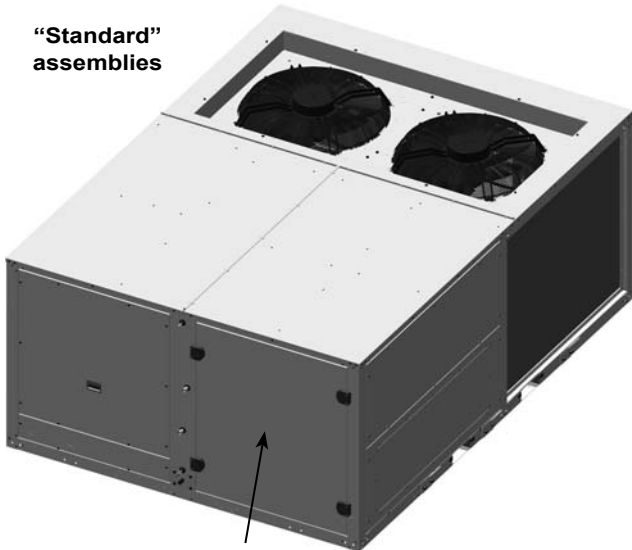
This option is compatible with B1, B2, BT, BB, R1 and R2 assemblies.

- The function of the heat recovery coil (HRC) is to pre-heat the air that will pass through the main indoor coil. For this, it uses the temperature of an outdoor water installation. Unit's control doesn't manage this function.

Note: a three-way valve is supplied with this coil to assemble out of the unit. This valve is not managed by the control.

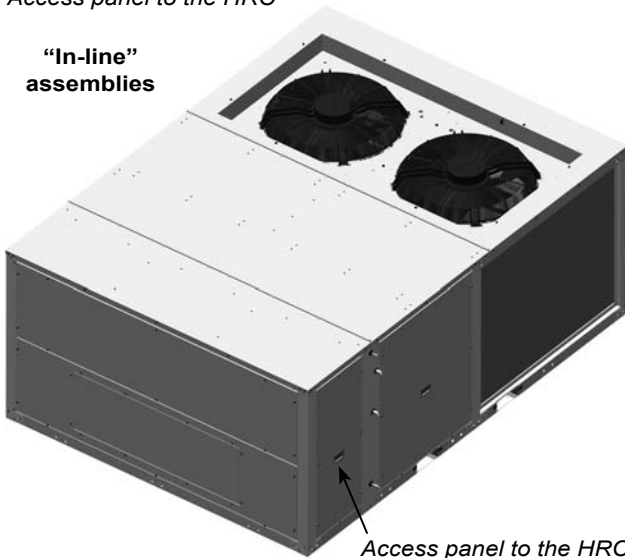
- The heat recovery coil is assembled inside the unit. It is placed between the main indoor coil and the air filters.

"Standard" assemblies



Access panel to the HRC

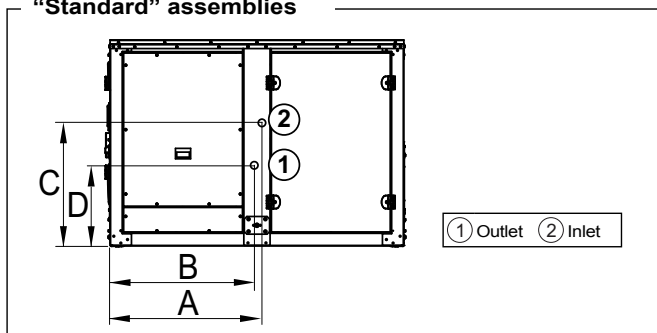
"In-line" assemblies



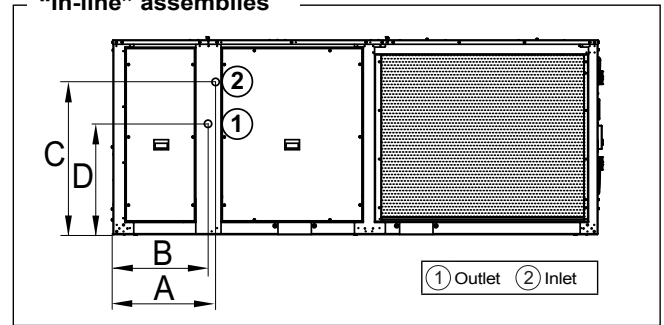
Access panel to the HRC

- The inlet/outlet connections of the coil are located on a side pillar of the unit. The position is shown in the following diagrams.

"Standard" assemblies

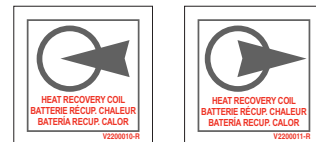


"In-line" assemblies

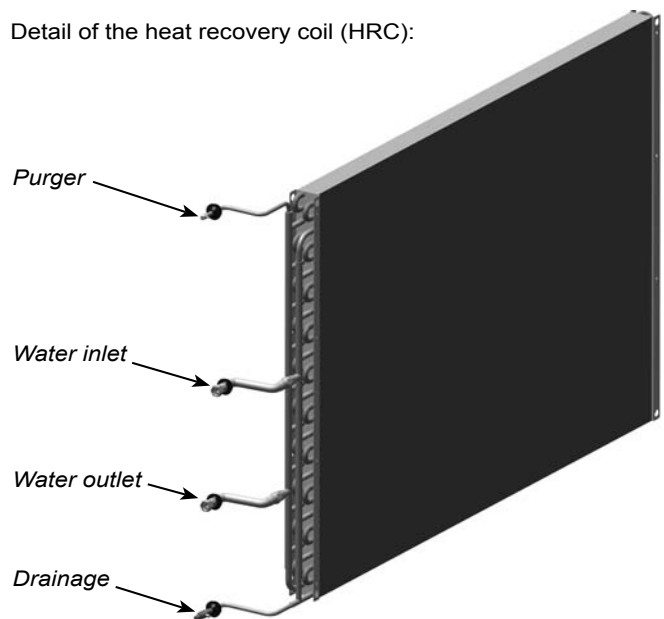


Dimensions (mm)		A	B	C	D	Ø I/O
Standard	020 to 037	899	872	721	443	1/2"
	052 to 062	1127	1099	721	443	1/2"
	070 to 093	1127	1099	721	443	1/2"
In-line	052 to 062	636	609	968	691	1/2"
	070 to 093	928	903	884	631	1/2"

- Coil filling:
 - It's mandatory to fill the coil with glycol water to prevent the water from freezing.
 - Cut off the water supply and let the bubbles generated go up to the highest coil point 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.
- The direction of the water flow must be correct and so the following indications must be observed:



- Detail of the heat recovery coil (HRC):



12 - FACTORY OPTIONS AND ACCESSORIES

12.9 - Electrical heaters

- The auxiliary electrical heaters are ready for operation in two power stages. These heaters are managed by the electronic control of the unit that can activate them in the following cases:
 - As a backup in HEATING mode, following the input of all the available compressors.
 - In HEATING mode, instead of compressors.
 - During the defrosting operation if selected as support.
 - As a backup in COOLING mode in accordance with the return and supply temperatures.

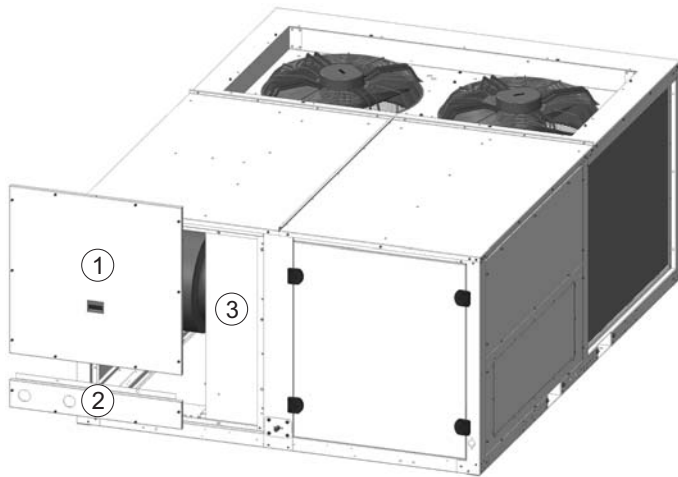
- Up to 3 values of total power available for each model:

50FF/FC	020 to 047	052 to 062	070 to 093
RAF (Low)	12 kW	12 kW	18 kW
RAM (Nominal)	18 kW	18 kW	27 kW
RAS (High)	unavailable	27 kW	36 kW

- The electrical heaters are assembled and connected inside the unit. They can be accessed by the same panel that the supply fan.

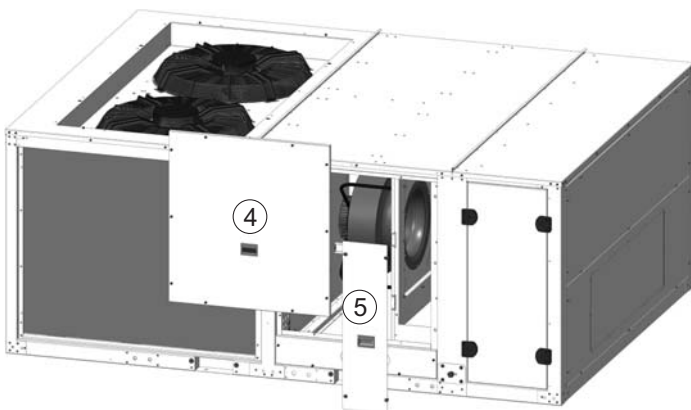
“Standard” assemblies:

The heaters are accessed by removing the panels (1) and (2), and then the inside panel (3), all of them fixed with M6 Allen screws.



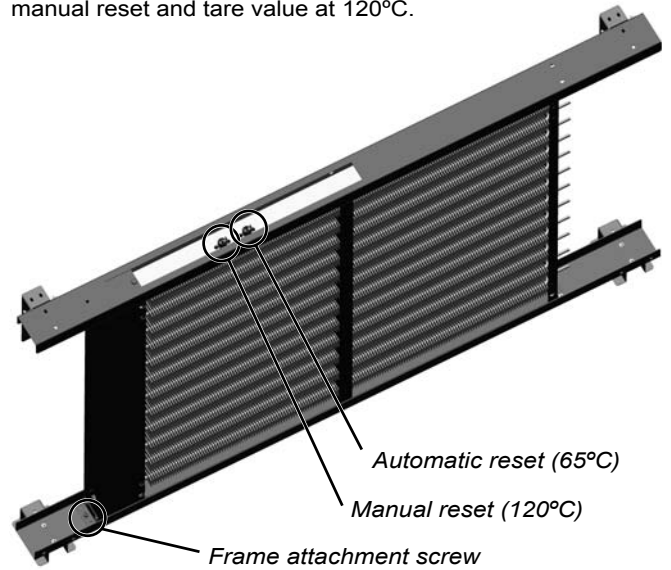
“In-line” assemblies:

The heaters are accessed by removing the panel (4), and then the inside panel (5), both fixed with M6 Allen screws.



- To remove the frame with the electrical heaters it is necessary to disconnect the safety thermistors from the connection box and unscrew the frame attachment screw (M4 Allen).

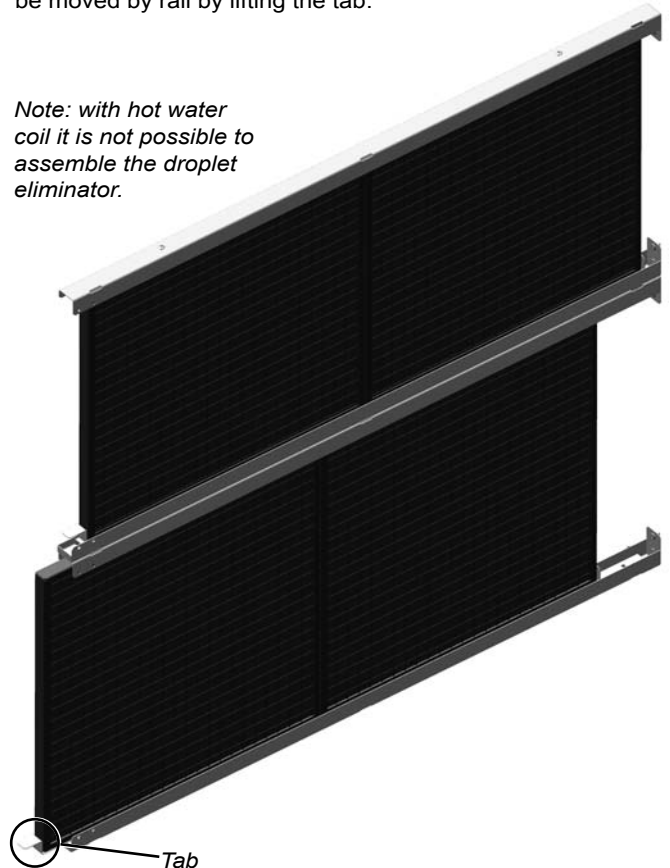
- The electrical heaters incorporate safety thermistors for protection of the unit against excess temperature. One of them has automatic reset and tare value at 65°C, the other one has manual reset and tare value at 120°C.



12.10 - Droplet eliminator after the indoor coil

- The droplet eliminator can be installed in the indoor coil. It's recommended in cases where a high moisture content in the air is foreseen or when the air flow is high.
- The droplet eliminator is accessed by that same panels of electrical heaters, since it is placed between the indoor coil and the electrical heaters (see previous images).
 - “Standard” assemblies: panels (1), (2) and (3).
 - “In-line” assemblies: panels (4) and (5).
- The droplet eliminator frames are easily removable. They can be moved by rail by lifting the tab.

Note: with hot water coil it is not possible to assemble the droplet eliminator.



12 - FACTORY OPTIONS AND ACCESSORIES

12.11 - Hot water coil

■ Hot water coil with a three-way valve managed by the electronic control of the unit. The water coil could be activated in the following cases:

- As a backup in HEATING mode, following the input of all the available compressors (by default) or as first control stage.
- As a backup in HEATING mode in accordance with the supply temperature.
- During the defrosting operation if selected as backup.
- With the unit running or shut down if an anti-freeze alarm is triggered.
- With the unit stopped when the outdoor temperature drops below 4°C. In this case the circulation pump of the water circuit is connected.
- As a backup in COOLING mode in accordance with the return and the outlet temperatures.

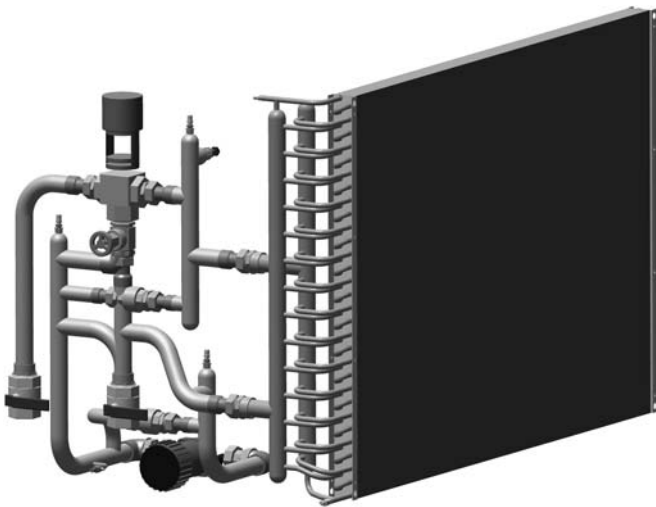
■ This option always incorporates an anti-freeze thermostat as safety system.

■ There are two configuration types available:

- Standard (HAS), the only safety system is the freeze protection thermostat. This thermostat is accessed via the same panel used for the electrical heaters, if necessary to reset the safety. Consult the images on the previous paragraph.
- Very low outdoor temperature (HAF), with additional freeze protection technology based on the water temperature. This protection is made up of a circulation pump as well as two probes inserted in the input and the output of the coil.

Important: this option is mandatory for an outdoor temperature lower than -20°C WB. Consult for percentages of glycol water above 20%.

Note: on units with the "Very low outdoor temperature" option, air supply only may be lateral (factory-configured).



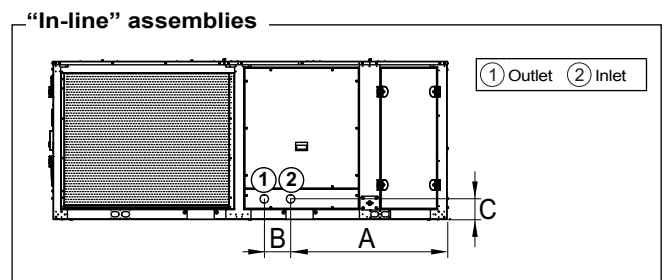
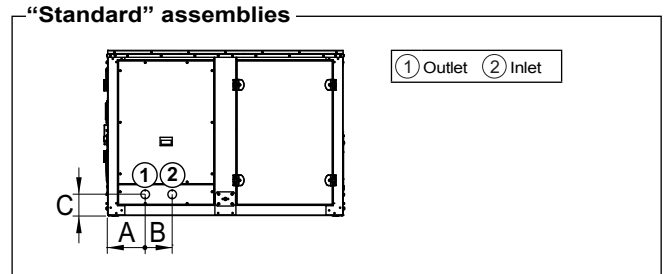
■ The pump of the water circuit has to be activated whenever the 3-way valve is switched on. It is the installer's responsibility to connect the pump to the electronic control, except with the factory-installed "Very low outdoor temperature" option. Please refer to the wiring diagram provided with the unit.

Operation of the pump with the "Very low outdoor temperature" option:

- Antifreeze protection: if the water temperature in the coil drops below 4°C, the control activates the pump and the 3-way valve opens to 100%. The pump stops when 7°C are reached.
- Safety of minimum outdoor temperature: if the outdoor temperature drops below 4°C, the control activates the pump and the 3-way valve opens to maintain, in the water coil, a water outlet temperature of 10°C in ON operating mode and 15°C in OFF operating mode.

■ The hot water coil is assembled inside the unit. The inlet/outlet connections of the hot water coil are located inside the unit. The connection can be established via the unit base using flexible piping or via the side panel.

■ The position of the sheet metal precuts on the side panel are shown in the following diagrams.



Dimensions (mm)		A	B	C	Ø I/O
Standard	020 to 047	142	160	158	1 ¼"
	052 to 062	159	245	158	2"
	070 to 093	159	245	158	2"
In-line	052 to 062	934	280	158	2"
	070 to 093	1314	280	158	2"

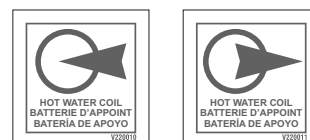
■ Coil filling:

- 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, except with the "Very low outdoor temperature" option) 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.

■ To prevent the water from freezing, with this option the unit always has an anti-freezing thermostat. Add glycol to the water if necessary. It is necessary to consult for glycol percentages higher than 20%.

■ The direction of the water flow must be correct and so the following indications must be observed:

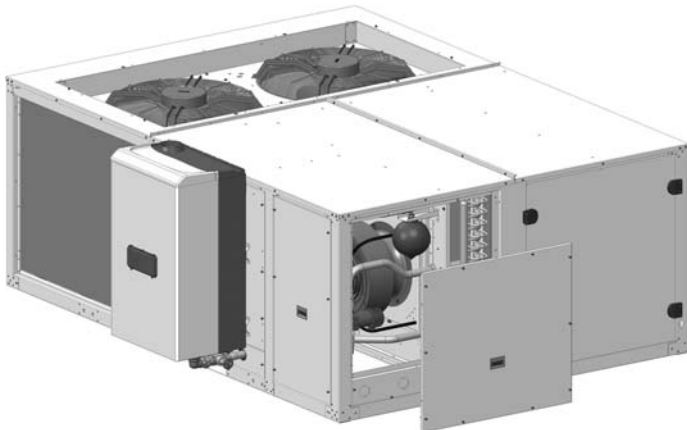


Note: With droplet eliminator after the indoor air coil it is not possible to assemble the hot water coil.

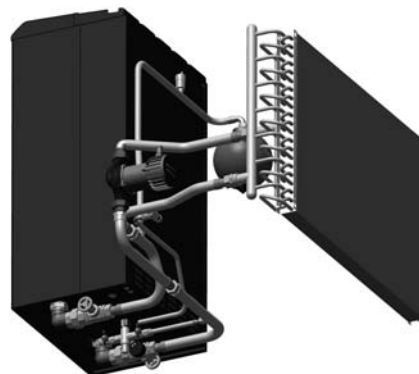
12 - FACTORY OPTIONS AND ACCESSORIES

12.12 - Gas-fired condensing boiler

Natural or propane gas boiler with modulating actuator, in accordance with the Gas Directive 2009/142/EC, connected to one side of the unit.



- Safety valve with a tare value of 4 bar.
- Automatic air bleeder valve.



- Up to 3 values of total power available for each model:

50FF/FC	020 to 047	052 to 062	070 to 093
BBF (Low)	unavailable	Condexa PRO 50 (coming soon)	Condexa PRO 50 (coming soon)
BBM (Nominal)	Condexa PRO 50 (coming soon)	Condexa PRO 70	Condexa PRO 70
BBS (High)	Condexa PRO 70	Condexa PRO 100	Condexa PRO 100

Important: The staff responsible for the installation, operation and maintenance of this burner must always strictly follow the instructions given in this manual, as well as in the manufacturer's (RIELLO) installation and maintenance brochure for the boilers in the CONDEXA series, supplied with the unit.

12.12.1 - Characteristics of gas boiler

- The key features of the boiler are:
 - Burner with premixing and modulation technology that allows outputs close to 109% (Hi performance).
 - Heat exchanger made of stainless steel with a low carbon content.
 - Proportional air / gas valve. Low NOx emissions (class 5, according to standard EN 297).
 - Condensate drain with siphon.
 - Forced draught.
 - Electronic ignition.
 - Safety devices: safety thermostat, low water pressure safety switch, flowmeter, Delta-T control, smoke temperature sensor.
 - NTC sensor for boiler water temperature regulation.
 - Working temperature of water from -7°C to 100°C. Consult for percentages of glycol water above 20%.
 - Electronic controller with microprocessor and Multifunction LCD display for boiler's control, configuration and diagnostics. Possibility of ModBus communication.
 - The electronic control of the unit will only manage the boiler connection as heating support depending on the ambient conditions.

- The boiler is connected to the hydraulic circuit of the auxiliary hot water coil (consult paragraph 12.10).

This water circuit, installed inside the unit, is composed of:

- Water coil.
- Circulation pump.
- Expansion vessel.
- Gate valves.

12.12.2 - Safety instructions

Safety instructions to be followed by the staff responsible for work with this burner are described below.

■ General cautions

Check the condition of the equipment upon delivery. Check that the details on the label, the packing and the name plate match the order. If equipment has been damaged, or there is a shortfall in delivery, notify accordingly.

During the installation, operation and maintenance of the boiler described in this manual, the use must always strictly follow the instructions given in all the chapters of this manual, and in the manufacturer manual provided with this unit.

The boiler must be installed in compliance with current regulations, according the manufacturer's instructions and by qualified staff, technically specialised in the heating field.

This thermal module must be used only for the applications it was designed for. Any other wrong or unreasonable use must be regarded as improper and therefore hazardous.

In the event of a water leak, disconnect the thermal module from the main power supply, shut off the water supply and promptly notify the Technical Assistance Service, or professionally qualified personnel.

Periodically check that operating pressure in the water circuit is over 1 bar but below the maximum limit specified for the boiler. If this is not the case, contact Technical Assistance Service or a professionally qualified heating engineer.

The following operations shall be necessary if the boiler is not used for a long period of time:

- Switch the boiler OFF at the control panel.
- Turn the magnetothermic switch "off", placed in the electrical cabinet of the 50FF/FC unit.
- Close the fuel cock and heating circuit water cock.
- Drain the central heating circuit if there is any risk of freezing.

Maintenance must be performed on the boiler at least once a year.

This manual and the manufacturer's manual must be kept with care. If it is lost or damaged, please contact the Technical Assistance Service for a new copy.

The thermal module, before being connected to the hydraulic system, the gas network, and the electrical system, may be exposed to temperatures ranging from 4°C to 40°C. After it can activate the Frost Protection function.

Regularly check that the condensate drain is free from obstruction.

We recommend cleaning inside the exchanger once a year, extracting jet and burner and removing any installation debris by suction. This operation will be done by personnel from the Technical Assistance Service only.

12 - FACTORY OPTIONS AND ACCESSORIES

Basic safety rules

The operation of any appliance that uses fuel, electrical power and water demands that a number of fundamental safety precautions be respected. It is forbidden:

- To use electrical devices or equipment, such as switches, appliances, etc. if there is a smell of gas or unburnt products. If so:
 - Close the fuel shut-off cock.
 - Report the fault immediately to the Technical Assistance Service or a professionally qualified heating engineer.
 - Any technical or cleaning activity is forbidden before disconnecting the boiler from the main power supply by switching the magnetothermic switch placed in the electrical cabinet of the 50FF/FC unit.
- To tamper with or adjust the safety or control devices without prior authorisation and instructions from the manufacturer.
- To pull, disconnect, or twist the electrical cables coming from the boiler even if it is disconnected from the mains electricity supply.
- To plug or block the condensate drain outlet
- To switch off the appliance if the outdoor temperature may drop to below ZERO (frost hazard).
- To activate the thermal module without water.

Safety devices

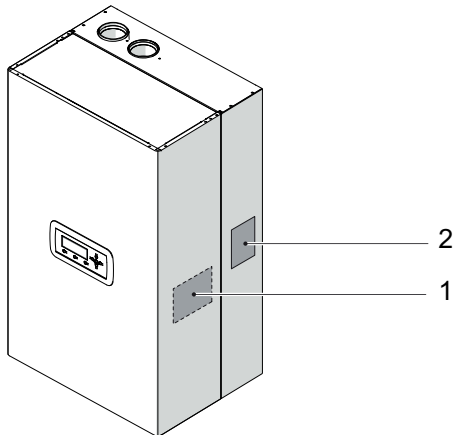
The triggering of safety devices indicates the malfunction of a potentially hazardous thermal module. Therefore, contact Technical Assistance Service immediately. After a brief pause, it is possible to try and restart the appliance.

Safety devices must be replaced by Technical Assistance Service, using only original parts. Refer to the spare parts catalogue supplied with the appliance. After making the repair, check that the appliance is working properly.

The appliance must not be put in service, even temporarily, when tampered safety devices are not in operation or have been tampered with.

12.12.3 - Identification of the boiler

The boiler can be identified as follows:



1- Technical data plate:

G20 - 20 mbar IT	RIELLO		Gas type:	Category:	0085 / 17 0085CP0214
	RIELLO S.p.A. Via Ing. Placido Riegler, 7 37046 Legnago (VR)		IT: G20-20 mbar G30-25-30 mbar G31-37 mbar	II2H3+	
Cella a combustione - Chambered combustion - Brennverfahren - Condensando versamngelast CONDEXA PRO 100					
IP X0D P _{max} G20=20 mbar				European Directive G42EC: IIJ ★★★★★	
Cod. 20115226 N° FC145000263		G20	G25		
230V - 50Hz 150 W		Qn(min)=	19,4kW	- kW	NOx: 5
		Pn(min)=	19,0kW	- kW	
		Qn(max)=	97kW	- kW	
		Pn(max)=	95,16kW	- kW	
PMS=6 bar T=90°C		B23-B53-B53p (C63, C63X)			

This plate indicates the technical and performance data.

Key:

- Central heating section
- Qn** Rated heat input
- Pn** Rated useful heat output
- IP** Electric degree of protection
- Pmw** Maximum operating pressure, DHW circuit
- Pms** Maximum operating pressure, CH circuit
- T** Temperature
- η Efficiency
- D** Specific flow rate
- NOx** NOx class

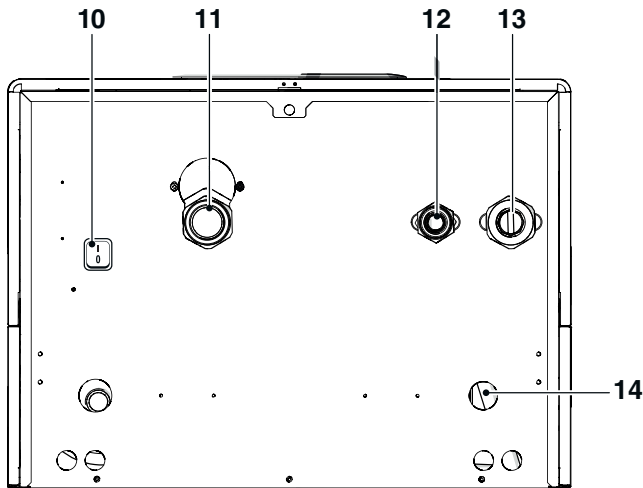
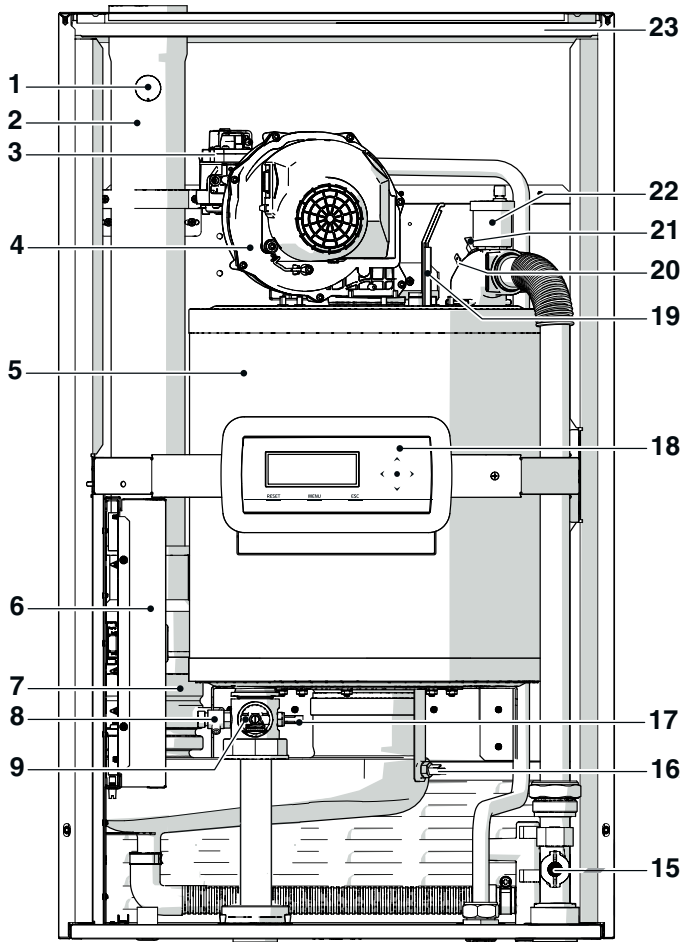
2- Gas label:

Is located on the appliance's side and states the type of fuel used and the country of destination:

Country	Category	Gas	Pressure (mbar)	Gas	Pressure (mbar)
Italy, Ireland, Great Britain, Portugal, Slovenia, Slovakia, Greece	II2H3+	G20	20	G30/G31	28-30/37
Spain	II2H3+	G20	18	G30/G31	28-30/37
Romania, Bulgaria, Turkey, Denmark, Estonia, Sweden, Norway, Latvia, Lithuania, Finland, Russia, Azerbaijan	II2H3B/P	G20	20	G30	30
Hungary	II2H3B/P	G20	25	G30	30
Poland	II2H3B/P	G20	25	G30	37
Croatia	II2H3B/P	G20	20	G30/G31	30
Holland	II2H3B/P	G25	25	G30	30
Czech Republic, Austria, Switzerland	II2H3B/P	G20	20	G30	50
Luxembourg	II2H3B/P	G20	20	G30	50
	II2E3P	G20	20	G31	37
Belgium	I2E(S)	G20/G25	20/25	--	--
	I3+	--	--	G30/G31	28-30/37
France	II2E+3+,	G20/G25	20/25	G30/G31	28-30/37
Malta, Cyprus, Iceland	I3B/P	--	--	G30	30
Germany	II2ELL3B/P	G20/G25	25	G30	50

12 - FACTORY OPTIONS AND ACCESSORIES

12.12.4 - Boiler layout



- | | |
|--|---------------------------------------|
| 1 Flue gas analysis outlet | 12 Gas supply |
| 2 Flue gas exhaust connection | 13 Discharge to the hydraulic circuit |
| 3 Gas valve | 14 Condensate drain connection |
| 4 Fan | 15 Flow-meter |
| 5 Combustion chamber | 16 Exhaust flue probe |
| 6 Electrical cabinet | 17 Return probe |
| 7 Flue non-return valve | 18 Control panel |
| 8 Drain cock | 19 Ignition/detection electrode |
| 9 Minimum pressure switch | 20 Safety thermostat |
| 10 Main switch | 21 Flow probe |
| 11 Return from the hydraulic circuit of the hot water coil | 22 Automatic bleed valve |
| | 23 Casing |

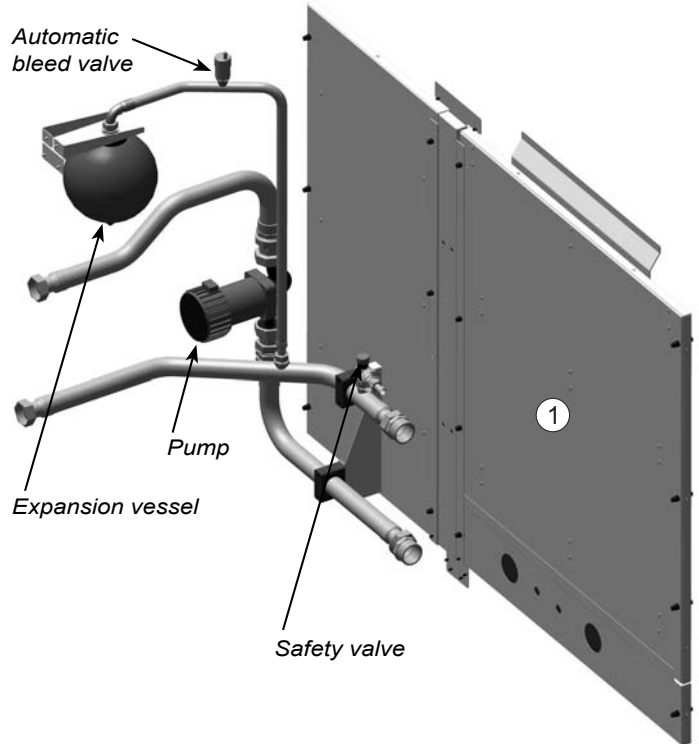
12.12.5 - Installation of the boiler

The boiler is supplied disassembled with the 50FF/FC unit, for installation on site.

The hydraulic circuit is assembled inside the 50FF/FC unit. This circuit is filled with a preload of water mixed with glycol at 20%.

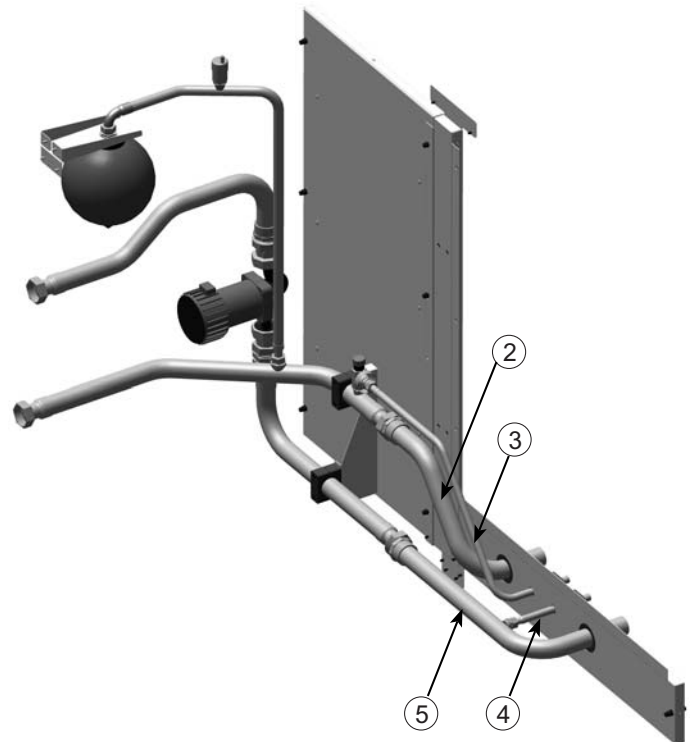
The installer must connect the connecting piping with the boiler.

Note: all this piping system is sent packed together with the boiler.



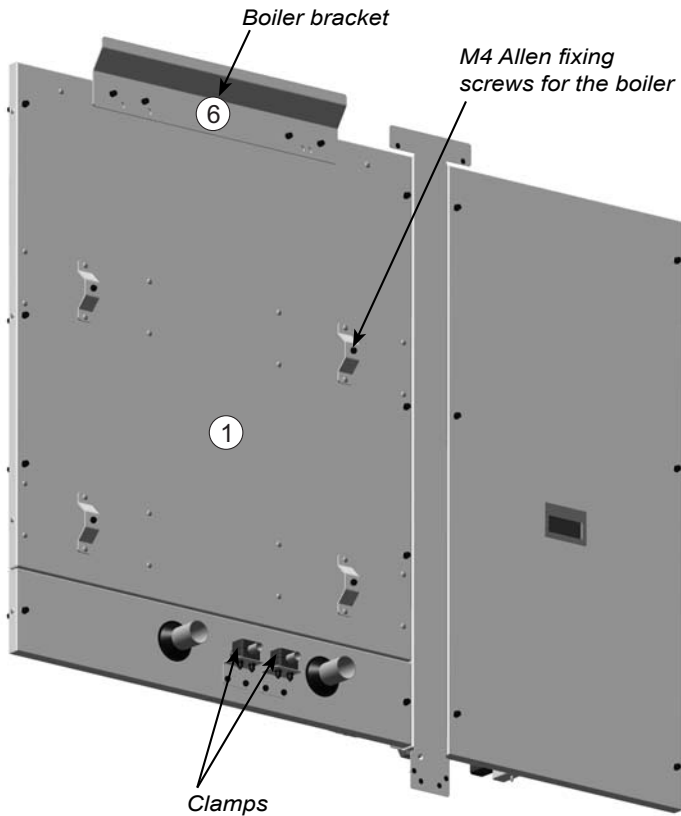
Step 1: Remove the panel (1) secured using M6 Allen screws to facilitate the work. Next, connect the piping:

- (2) Discharge to the hydraulic circuit of the hot water coil
- (3) Drain connection of the safety valve
- (4) Filling line
- (5) Return from the hydraulic circuit of the hot water coil



12 - FACTORY OPTIONS AND ACCESSORIES

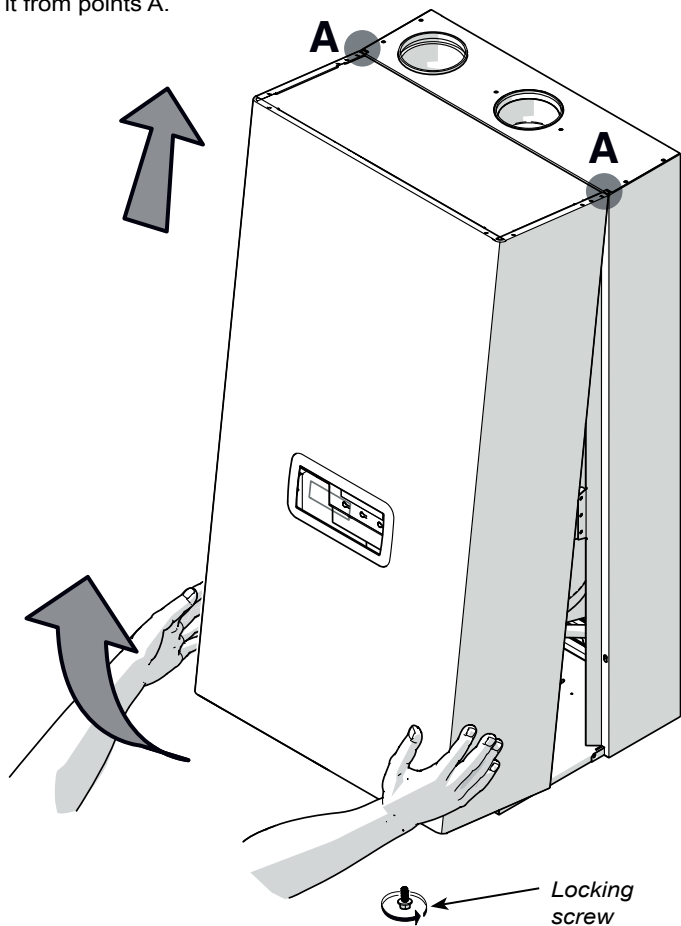
Step 2: Replace the panel (1). The following image shows the panel by the outer side of the 50FF/FC unit. Then fix the clamps supplied to secure the pipes (3) and (4) (M6 Allen screws).



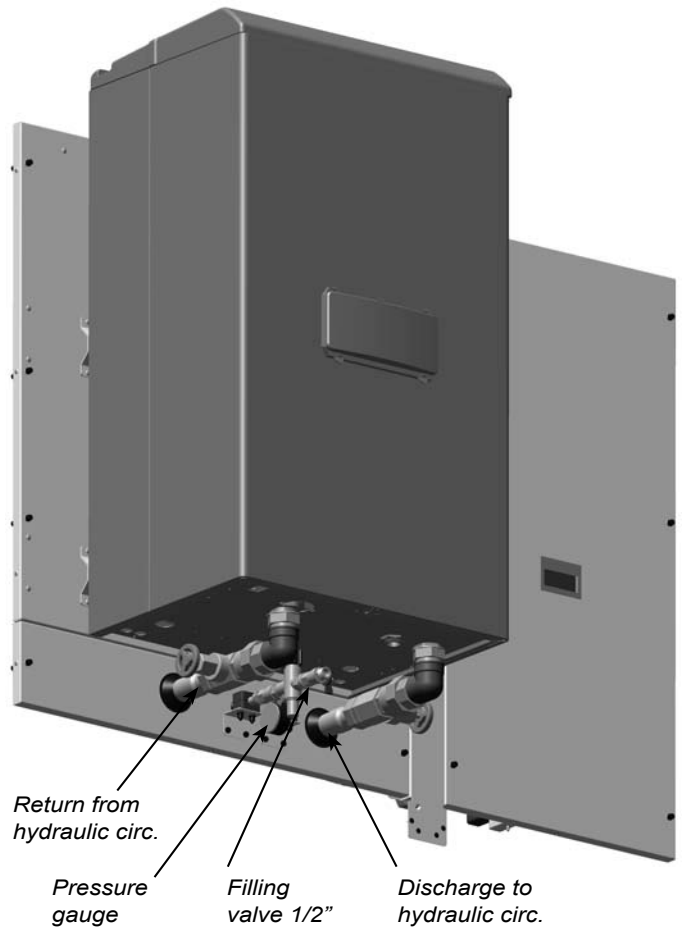
Step 4: Drop the boiler on the bracket (6) and screw on the four fixings of this panel to secure (M4 Allen screws). Then reassemble the casing.



Step 3: Remove the casing of the boiler to screw it to the panel (1). To do this it is necessary to remove the locking screw, and then, pull the front panel outwards and later to the top to decouple it from points A.



Step 5: Finally join the boiler with the piping using elbows and accessories factory-supplied.



12 - FACTORY OPTIONS AND ACCESSORIES

12.12.6 - Gas connections

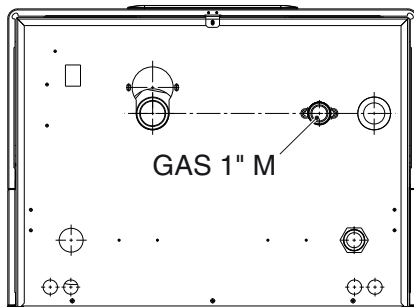
The gas connection must be made respecting the installation regulations in force, and sized to ensure the correct gas delivery to the burner.

Before making the connection, check that:

- The gas type is suitable for the boiler. Do not use any fuels other than those provided under any circumstances.
- If the boiler needs to be adapted for use with another gas fuel, contact the Technical Assistance Service to have the necessary modifications made. These operations may not be performed by the installer under any circumstances.
- The piping is thoroughly clean.
- The gas meter's flow rate is capable of ensuring the simultaneous use of all the appliances connected to it. The appliance's connection to the gas supply line must be carried out in accordance with the current regulations.
- Intake pressure with the appliance in the off position has the following reference values:
 - Powered by methane gas: optimal pressure 20 mbar.
 - Powered by L.P.G.: optimal pressure 35 mbar.
- The pressure never falls below 15 mbar.

While it is normal for the intake pressure to decrease while the boiler is in operation, it is advisable to verify that no excessive pressure fluctuations take place. In order to limit the extent of these types of variations, the diameter of the gas supply line to be used must be assessed based on the length and the pressure drops of the line itself, from the meter to the thermal module.

- If fluctuations in the gas distribution pressure are encountered, it is recommended to install an appropriate pressure stabiliser upstream of the boiler's gas intake. For G30 and G31 gas supply, all the necessary precautions must be taken in order to prevent the gas from freezing in the case of extremely low outdoor temperatures.
- If the gas distribution network contains solid particles, install a filter on the fuel supply line. When selecting it, consider that pressure drops due to the filter should be as low as possible.
- Once the boiler has been installed, check the connections are sealed according to current installation regulations.



12.12.7 - Connection at the flue

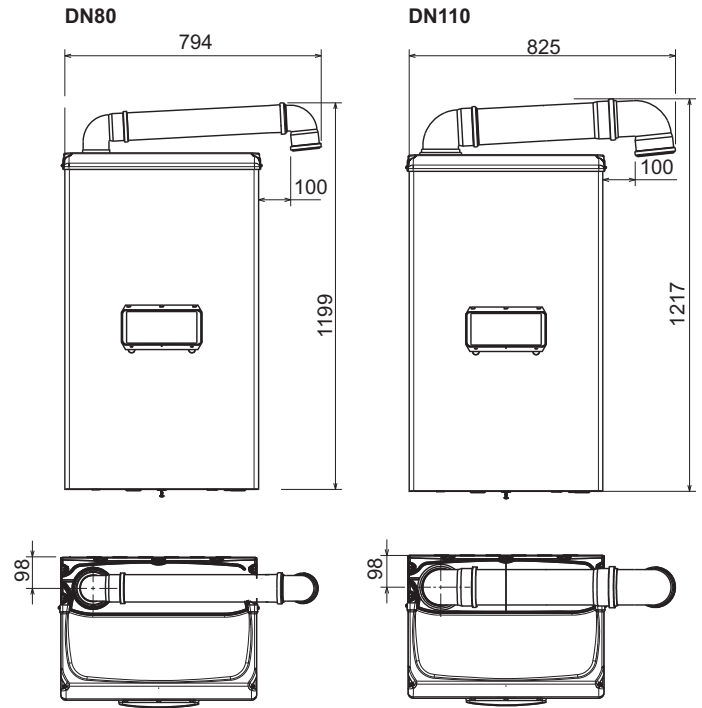
The boiler is supplied as standard in B-type configuration (B23-B53P-B53P), i.e. pre-fitted to suction air directly into the installation room and may be converted into a C-type appliance with the use of specific accessories.

For flue gas extraction and the intake of combustion air, it is essential to use only specific pipes for condensing boilers and ensure that they are correctly connected.

Diameter of the flue gas outlet (flue connection):

- * Condexa PRO 40 / 50 / 70: DN80
- * Condexa PRO 100: DN110

Optionally, a kit with all the flue gas accessories can be supplied:



Note: dimensions in mm

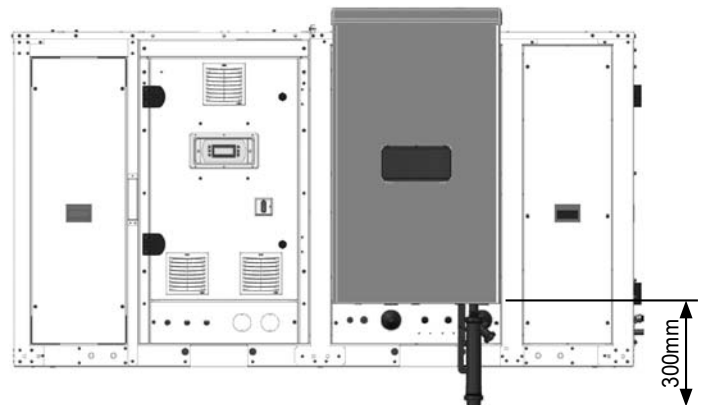
12.12.8 - Preparation for the condensate drain

The condensate produced by the appliance Condexa PRO during normal operation must be extracted using an accessory (siphoned condensate collector).

This accessory must be fitted below the aforementioned thermal module, in line with the following instructions:

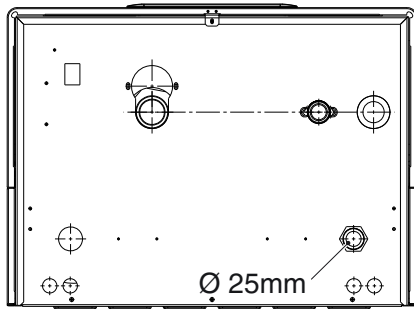
- It is advised to use plastic (PP) piping for building the condensate drainage. Never use copper pipes under any circumstances, as the condensate itself will cause them to rapidly deteriorate.
- The connection pipes used must be as short and as straight as possible. Any curves or sharp bends can lead to hoses becoming clogged and, therefore, can prevent proper condensate discharge.
- **Important:** The minimum distance between the condensate outlet and the ground must be at least **300 mm** to facilitate the proper implementation of the siphon. Therefore, it is essential to provide a roofcurb for installation of the 50FF/FC unit on it.

Note: optionally 50FF/FC units can be supplied with roofcurb.



12 - FACTORY OPTIONS AND ACCESSORIES

- The first section of the condensate drain pipe, which is connected to the condensate outlet from the boiler (Ø 25 mm), must be flexible pipe to avoid any contact with the discharge pipe.



- Always maintain a slope angle of over 3° and ensure that the diameter of any condensate drain pipe is greater than that of the connection fitted at the drain outlet.
- The condensate drain must be connected to the drain and sewage network in such a way so that the condensate may not freeze under any circumstances.
- Connect the condensate drain hose to a domestic water drain in accordance with national and local legislation and standards.
- Fill the siphon with water before activating on the thermal module in order not to release any combustion products into the environment when the thermal module is first switched on.

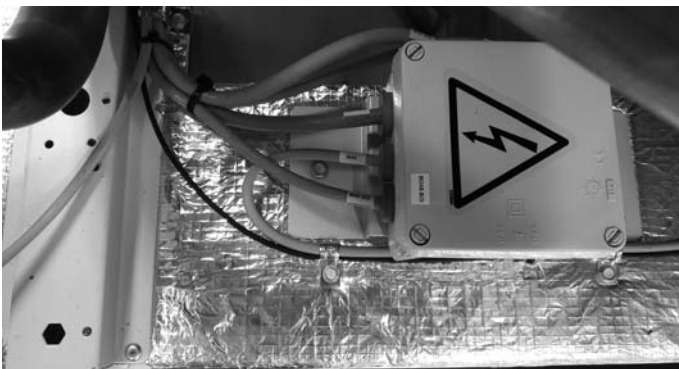
12.12.9 - Electrical connection

The cables for the electrical connection of the boiler are located on the lower part of the boiler.

The installer must pass these cables through the bottom panel of the 50FF/FC unit, and next, route them to the connection box "BOX8-BOI".

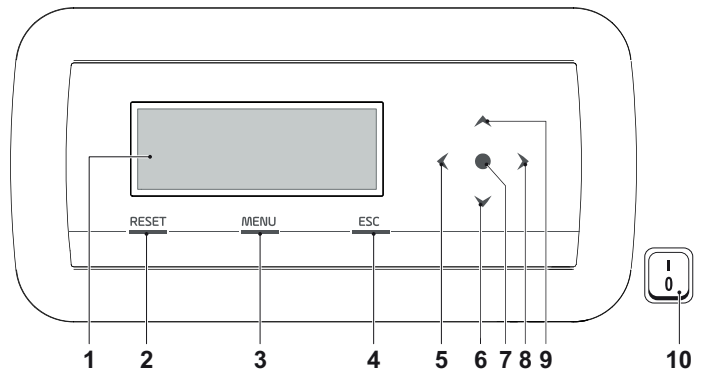


W48-BOI W49-BOI



Note: see the wiring diagram included with the unit for a more detailed information about the wiring.

12.12.10 - Boiler control panel



1 255x80 point backlit display (106,4 x 39,0mm)

2 RESET key:

- Restores normal operations after a safety shut-down.

3 MENU key:

- Switches on the main menu

4 ESC key:

- In menu navigation, it enables you to exit a menu item and go back to the previous one.

5 ◀ navigation key:

- Within a list of parameters if the cursor is located in the right column (values column), move the cursor in the left column (descriptions column).

6 ▼ navigation key:

- Within a menu, this allows the navigation down to select different submenus;
- Within a list of parameters, if the cursor is in the right column, it reduces the value of the selected parameter;
- Within a list of parameters, if the cursor is in the left column, it selects the next parameter.

7 ● navigation key:

- In menu navigation, It allows to enter the selected menu item;
- Within a list of parameters, it allows to confirm a value or setting.

8 ▶ navigation key:

- Within a list of parameters if the cursor is located in the left column (descriptions column), move the cursor in the right column (values column).

9 ▲ navigation key:

- Within a menu, this allows the navigation up to select different submenus;
- Within a list of parameters, if the cursor is in the right column, it increases the value of the selected parameter;
- Within a list of parameters, if the cursor is in the left column, it selects the previous parameter.

10 Main switch (located on the lower part of the boiler)

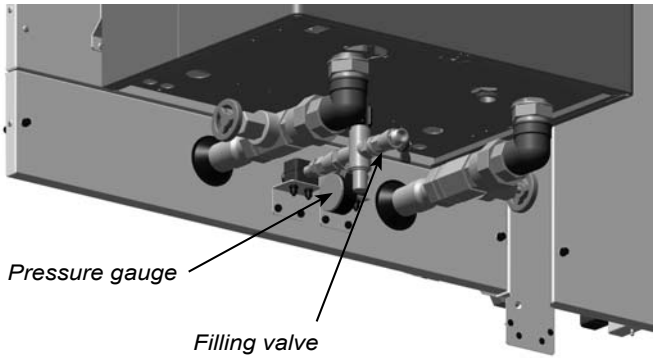
Important: For more information about the electronic control of the boiler refer to the manual of the manufacturer, provided together with the unit.

12 - FACTORY OPTIONS AND ACCESSORIES

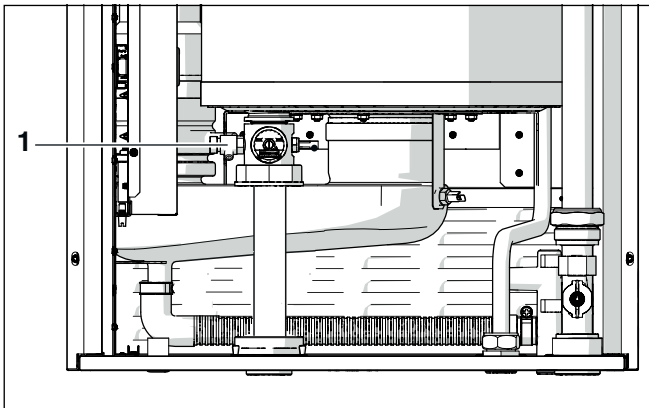
12.12.11 - Hydraulic circuit

■ Circuit filling

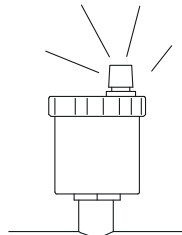
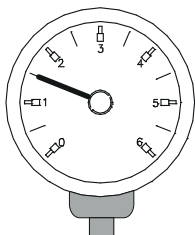
The charging system is connected to the boiler's return line. Automatic filling valve 1/2".



- Before filling the system, switch-off the thermal module's switch (0) and switch-off the magnetothermic switch placed in the electrical cabinet of the 50FF/FC unit.
- Make sure that drain cocks (1) are closed before to start the load of the system. Then, the shut-off valves of the hydraulic circuit must be opened. This circuit is filled with a preload of water mixed with glycol at 20%.



- Unscrew the vent valve's release cap
- Open the shut-off cocks in order to slowly fill the system.
- Use the pressure gauge to check that the pressure is rising and the water is exiting through the vent valves.
- Close the shut-off cocks after the pressure reaches 1.5 bar.
- Start-up the circulation pump. This operation can be performed manually from a screen of the "50FC" electronic control (on a screen of the "Service menu", password protected).
- During this stage, check that the air is correctly eliminated.
- Restore the pressure if necessary.
- Stop the pump and start-up again.
- Repeat the last three steps until the pressure is stabilised. Excessive pressure fluctuations can cause stress and fatigue to the heat exchanger. Keep the operating pressure constant.

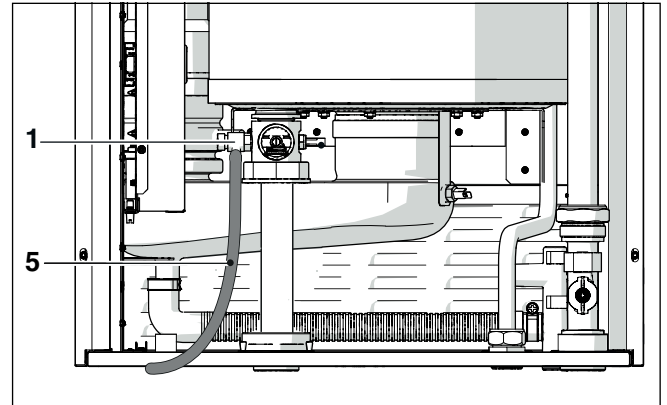


Immediately repair any leaks or drips that could result in air entering the system.

■ Circuit emptying

In case of long unit stops, and forcibly if they happen in the winter season, the circuit must be emptied.

- Before emptying the system, switch-off the thermal module's switch (0) and switch-off the magnetothermic switch placed in the electrical cabinet of the 50FF/FC unit.
- Close the water supply shut-off cocks.
- In order to empty the boiler, fit a rubber hose (5) (inner diameter int. $\varnothing = 12$ mm) to the thermal module's discharge valve (1).



■ Water quality requirements

It is **ABSOLUTELY NECESSARY** to treat the water system in order for the heat generator to work properly and to guarantee its service life, as well as that of all its components.

The water used for the central heating circuit must conform to the quality parameters given in the following table:

Parameter	Value	Unit
General characteristic	Colourless, without sediment	
PH value	Min. 6,5 ; Max. 8,0	pH
Dissolved oxygen	< 0,05	mg/l
Total iron (Fe)	< 0,3	mg/l
Total copper (Cu)	< 0,1	mg/l
Na ₂ SO ₃	< 10	mg/l
N ₂ H ₄	< 3	mg/l
PO ₄	< 15	mg/l
CaCO ₃	Min. 50 ; Max. 150	ppm
Trisodium phosphate	None	ppm
Chlorine	< 100	ppm
Electrical conductivity	<200	μSiemens/cm
Pressure	Min. 0.6 ; Max. 6	bar
Glycol	Max. 20% (only propylene glycol)	%



All data in the table refer to water contained in the system after 8 weeks' operation.

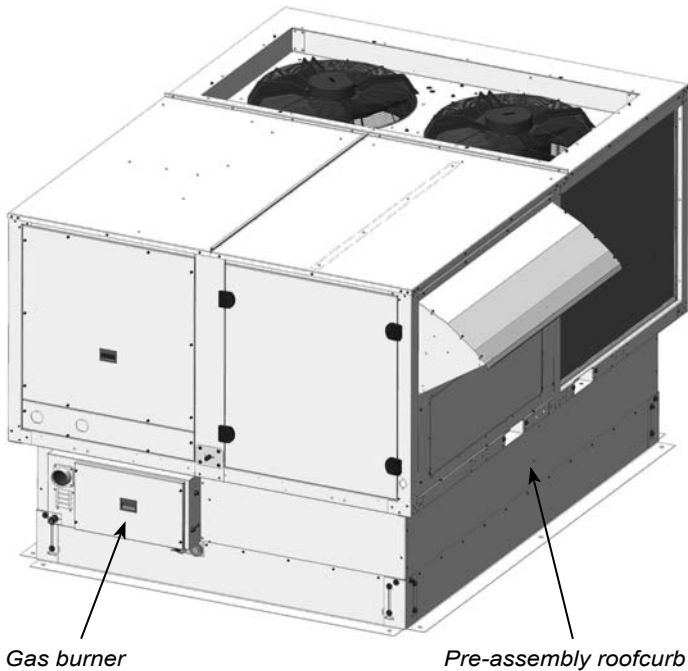
Do not use excessively softened water. Excessive water softening (total hardness < 5° f) results in corrosion due to contact with metal elements (pipes or thermal module components).

To prevent the water from freezing, with this option the 50FF/FC unit always has an anti-freezing thermostat and water mixed with glycol at 20%. It is necessary to consult for propylene glycol percentages higher than 20%.

12 - FACTORY OPTIONS AND ACCESSORIES

12.13 - Warm air heater module with gas burner

Natural or propane gas burner with modulating actuator, in accordance with the Gas Directive 2009/142/EC, installed inside a pre-assembly roofcurb (see EC homologation certificate at the end of this manual).



- Up to 3 values of total power available for each model:

50FF/FC	020 to 047	052 to 062	070 to 093
BAF (Low)	PCH020	unavailable	unavailable
BAM (Nominal)	PCH034	PCH065	PCH080
BAS (High)	PCH045	PCH080	PCH105

Important: The staff responsible for the installation, operation and maintenance of this burner must always strictly follow the instructions given in this manual, as well as in the manufacturer's (APENGROUP) installation and maintenance brochure for the burners in the PCH series, supplied with the unit.

12.13.1 - Characteristics of the gas burner

- Air is heated by contact with the surfaces of the combustion chamber and the heat exchanger pipes.
 - The heat exchanger complies with construction requirements set by EN1196 regulations for equipment where combustion gases produce condensate.
 - The combustion chamber is entirely made of stainless steel whilst surfaces of components where condensation occurs (such as pipe bundle and exhaust hood), are made of AISI 441, in order to provide high resistance to condensation.
- The following table illustrates the types of stainless steels used:
- USA-AIS EN-No COMPOSITION
 - AISI 430 1.4016 X6 Cr17
 - AISI 441 1.4509 X2 CrTiNb 18
 - The burner is entirely made of stainless steel with special mechanical solutions to ensure optimal reliability and performance levels, as well as high thermal and mechanical resistance.

- The PCH heater is a modulating type; the thermal power output and, therefore, the thermal capacity (fuel consumption) vary according to the demand for heat. When the demand for heat from the environment drops, the heater uses less gas, increasing its performance up to 109% (performance on Hi).

- Inherent safety:

- The performance increase at minimum power is achieved by using a sophisticated air/gas mixing technique and by adjusting at the same time the combustion air and the fuel gas.
- This technology increase the heater safety as the gas valve supplies the fuel according to the air flow. The CO₂ content, unlike atmospheric burners, remains the same throughout the heater operating range, allowing it to increase its performance when the thermal power drops.
- If there is no combustion air, the valve will not supply gas; if the combustion air flow drops, the valve will automatically reduce the gas flow yet will keep its combustion parameters at optimal levels.

- Lowest polluting emissions. The premixed burner, in combination with the air/gas valve, ensures a "clean" combustion by emitting a very low level of pollutants.

- The control located inside the burner housing allows the service centre to check and view the working phases and identify any faults that may have occurred.

- The electronic control of the unit will only manage the burner connection as heating support depending on the ambient conditions.

Note: the main technical characteristics of the burner can be found in the technical brochure.

12.13.2 - Safety instructions

Safety instructions to be followed by the staff responsible for work with this burner are described below.

- **General cautions**

This burner module must be used only for the applications it was designed for. Any other wrong or unreasonable use must be regarded as improper and therefore hazardous.

During the installation, operation and maintenance of the burner described in this manual, the use must always strictly follow the instructions given in all the chapters of this operating and maintenance manual.

The condensing warm air heater must be installed in compliance with current regulations, according the manufacturer's instructions and by qualified staff, technically specialised in the heating field.

When first switched on, conversion between different types of gas and maintenance operations must be carried out only by staff provided by Service Centres authorised by current and older regulations. For more information, please contact us.

The warranty conditions are specified on the warranty certificate supplied with this burner module.

The manufacturer declares that the unit has been manufactured in compliance with UNI, UNI-CIG, CEI technical standards and with all relevant legislation, as well as with the 90/396/EEC gas directive and the later 2009/142/EC Directive.



Attention: In compliance with the requirements of the Gas Directive 90/396 EEC it is strictly prohibited to alter the burner or the electronic control unit.

12 - FACTORY OPTIONS AND ACCESSORIES

■ Fuel

Before starting up the heater, make sure that:

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



If the burner is not going to be used over a prolonged period the gas supply valve must be closed.

■ Gas leaks

If there is gas smell:

- do not operate electrical switches, telephones or any other object or device that could produce sparks;
- immediately open doors and windows to create an air flow to vent the gas out of the room;
- close the gas valves;
- call for **qualified staff**.



Supplying the gas circuit with pressure higher than 60 mbar is strictly prohibited. Such pressures could cause the valve to break.

■ Operation

Do not allow children or inexperienced people to use any electrically powered equipment.

The following instructions must be followed:

- do not touch the equipment with wet or damp parts of your body and/or with bare feet;
- do not leave the equipment exposed to the elements (rain, sun etc....) unless it is adequately protected;
- do not use the gas pipes to earth electrical equipment;
- do not touch the hot parts of the heater, such as the fume exhaust duct;
- do not wet the heater with water or other fluids;
- do not place any object over the burner;
- do not touch the moving parts of the burner.

■ Maintenance

Maintenance operations and combustion inspections must be carried out in compliance with current standards.

Before carrying out any cleaning and maintenance operations, isolate the heater from the mains power supply from the switch located on the electrical system and/or on the shut-out devices.

If the heater is faulty and/or incorrectly operating, switch it off and do not attempt to repair it yourself, but contact our local Technical Service.

All repairs must be carried out by using genuine spare parts.

Failure to comply with the above instructions could compromise the safety of the equipment and invalidate the warranty.

If the equipment is not used for long periods, shut the gas supply off through the gas stopcock and disconnect it from the power supply.

If the heater is to be put out of service, in addition to the above operations, potential sources of hazard on the unit must be removed.

It is strictly forbidden to obstruct the Venturi pipe inlet, located on the burner-fan unit, with your hands or with any other objects.

Any obstruction could cause a backfire from the premixed burner.

12.13.3 - General recommendations

■ Country table - gas category:

Country	Category	Gas	Pressure (mbar)	Gas	Pressure (mbar)
Austria, Switzerland	I12H3B/P	G20	20	G30/G31	50
Belgium <70kW	I2E(S) B, I3P	G20/G25	20/25	G31	37
Belgium >70kW	I2E(R) B, I3P	G20/G25	20/25	G31	37
Germany	I12ELL3B/P	G20	20	G30/G31	50
Denmark, Finland, Greece, Sweden, Norway, Italy, Czech Republic, Estonia, Lithuania, Slovenia, Albania, Macedonia, Bulgaria, Romania, Croatia, Turkey	I12H3B/P	G20	20	G30/G31	30
Spain, United Kingdom, Ireland, Portugal, Slovakia	I12H3P	G20	20	G31	37
France	I12Esi3P	G20/G25	20/25	G31	37
Luxembourg	I12E3P	G20/G25	20	G31	37/50
Netherlands	I12L3B/P	G25	25	G30/G31	50
Hungary	I12HS3B/P	G20/G25.1	25	G30/G31	30
Cyprus, Malta	I3B/P	--	--	G30/G31	30
Latvia	I2H	G20	20		
Iceland	I3P	--	--	G31	37
Poland	I12E3B/P	G20/G2.350	20/13	G30/G31	37
Russia	I12H3B/P	G20	20	G30/G31	30

12 - FACTORY OPTIONS AND ACCESSORIES

Location

These roofcurb with integrated burner are designed to be coupled with an 50FF/FC unit (roof-top installation). Make sure they are not fitted near areas where there is a risk of fire (flammable dust) or explosion, or in areas where aggressive products are kept, e.g. trichloroethylene, perchloric acid, etc.

Delivery of the roofcurb with gas burner

Check the condition of the equipment upon delivery. Check that the details on the label, the packing and the name plate match the order. If equipment has been damaged, or there is a shortfall in delivery, notify accordingly.

Burner identification

The roofcurb with the burner includes a name plate featuring the main gas characteristics as well as the roofcurb serial number.

GAS INFORMATION			
COUNTRY	<input type="text"/>	CONSUMPT.	<input type="text"/> m ³ /h
GAS	<input type="text"/>	PRESSURE	<input type="text"/> mbar
CATEGORY	<input type="text"/>	TYPE	<input type="text"/>
PIN	<input type="text"/>	WO	<input type="text"/>

Roofcurb with burner
CE certificate No.

Burner
model

Roofcurb
serial No.



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

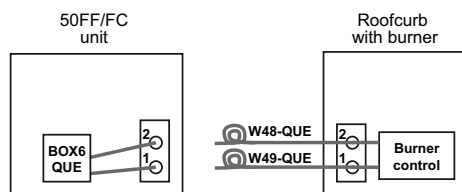
12.13.4 - Transport and installation

Follow the recommendations given in section 7.4 which details how to handle and fit the adjustable roofcurb, and how to fit the 50FF/FC unit onto this roofcurb.

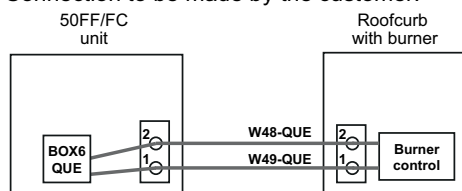
12.13.5 - Electrical connection of the burner

It is necessary to communicate the burner control with the electrical cabinet of the 50FF/FC unit. The customer must connect the cables coming from the burner to the connection box "BOX6-QUE" that is located inside of the 50FF/FC unit. This box is accessed via the same panel that the supply fans.

Initial location of the cables for connection:

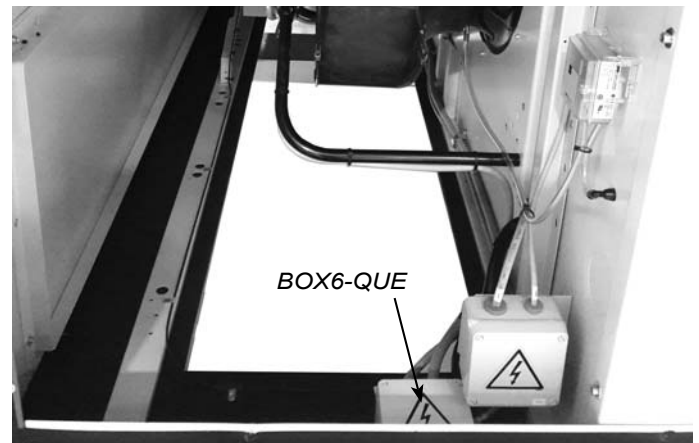


Connection to be made by the customer:



Note: see the wiring diagram included with the unit for a more detailed information about the wiring.

The following image shows the location of the connection box "BOX6-QUE".



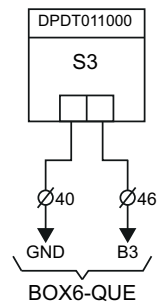
12.13.6 - Connection of the outlet probe

The connection of the outlet temperature probes must be performed on-site. This probe is supplied inside the electrical cabinet of the 50FF/FC unit.

Make the electrical connection of the probe (S3) to the connection box "BOX6-QUE" that is located inside of the 50FF/FC unit, using 2 x 1mm² section cable.

Note: this cable is **not** supplied with the probe.

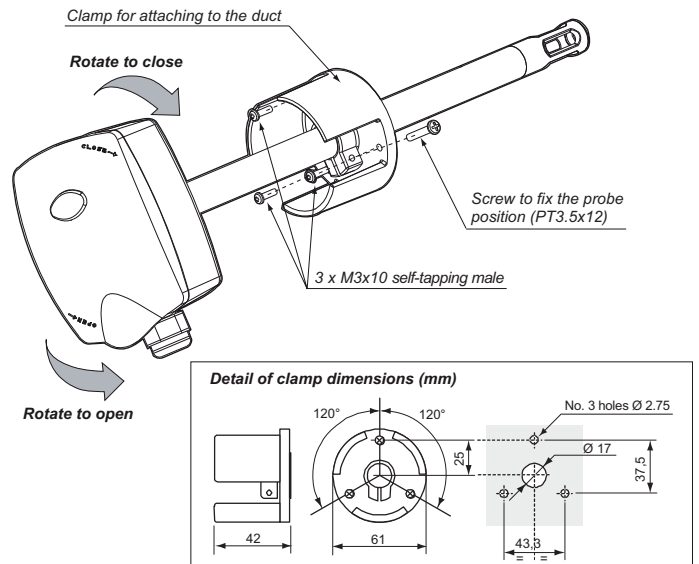
Please refer to the wiring diagram and the "50FC" electronic control brochure, included with the unit.



For the electrical connections, remove the top cover of the sensor. Remove the cover by rotating it anticlockwise.

In order to guarantee the correct measurement of the outlet air temperature this probe will be positioned at 1.5 metres as a minimum from the outlet mouth at the bottom of the duct and as near to the middle as possible inside this duct. The probe is connected to the air duct using the special fastening bracket.

- Fasten the bracket to the air duct;
- Insert the rod on the bracket to the required depth;
- Tighten the screw on the bracket to fasten.



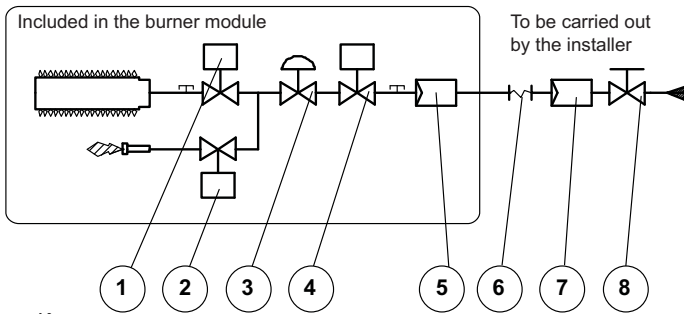
12 - FACTORY OPTIONS AND ACCESSORIES

12.13.7 - Gas connection

Use the gas line connections only with EC certified components. The PCH module is supplied complete with a dual gas valve, gas stabiliser and filter. All components are fitted inside the burner housing.

To complete the installation, as required by current standards, an anti-vibration joint and a gas valve must be fitted.

Note: A EN216 certified gas filter with filtration level lower or equal to 50 micron must be used, with no pressure stabiliser, a wide range gas filter must be used since the filter supplied as standard, upstream of the gas valve, has a limited area.

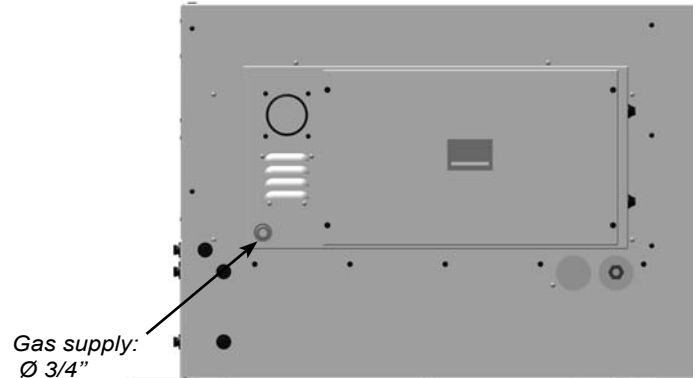


Key:

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

Important: For a correct maintenance, connect the PCH module by means of a seal and swivel gasket. Avoid using threaded connected directly on the gas connection.

During the installation, tighten the external gas supply pipe but without exceeding the tightening torque of 150 Nm.



Important: It is strictly prohibited to supply gas to the circuit with pressure higher than 60 mbar. Such pressures could cause the valve to break.

If pressure are higher than 60 mbar, a pressure reducer must be installed at least 10 m away and no pressure stabiliser must be fitted between the pressure reducer and the heater, but leaving the gas filter.



If the burner is not going to be used over a prolonged period the gas supply valve must be closed.

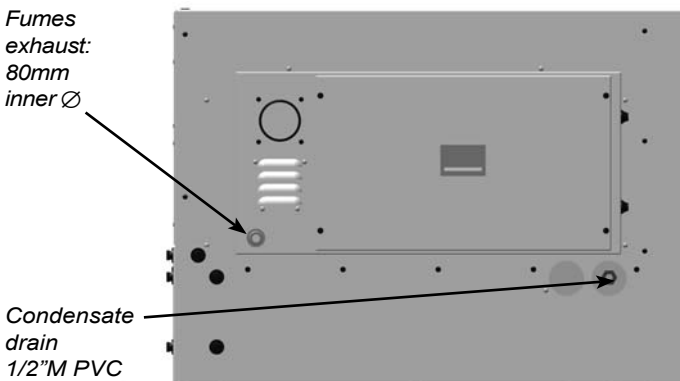
Gas type	Gas settings	PCH020		PCH034		PCH045		PCH065		PCH080		PCH105	
		min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
G20	Air supply pressure	mbar 20 [min 17-max 25]											
	Ø pilot nozzle	mm 0,7											
	Gas consumption (15°C-1013mbar)	0,51	2,01	0,80	3,69	0,90	4,66	1,31	6,88	1,74	8,68	1,90	10,58
	Carbon dioxide - CO ₂ content	8,8	9,1	8,7	9,1	8,7	9,1	8,7	9,1	8,7	9,1	8,5	9,1
	Fumes temperature	39	113	31	94	30	94	31	86	26,5	70	28	80
	Fume mass flow rate (max.)	31		57		72		107		135		165	
	Gas butterfly valve	5,8		7,4		7,5		11,0		12,2		15,8	
G25	Air supply pressure	mbar 25 [min 17-max 30] (20 for Germany)											
	Ø pilot nozzle	mm 0,7 (0,75 for Germany)											
	Gas consumption (15°C-1013mbar)	0,59	2,34	0,93	4,29	1,05	5,41	1,53	8,00	2,02	10,1	2,21	12,30
	Carbon dioxide - CO ₂ content	8,8	9,0	8,6	9,0	8,8	8,9	8,8	9,2	8,6	8,9	8,8	9,0
	Fumes temperature	39	113	31	94	30	94	31	86	26,5	70	28	80
	Fume mass flow rate (max.)	kg/h --											
	Gas butterfly valve	mm Not necessary											
G30	Air supply pressure	mbar 30 [min 25-max 35] - 50 [min 42,5-max 57,5]											
	Ø pilot nozzle	mm 0,51											
	Gas consumption (15°C-1013mbar)	0,40	1,58	0,63	2,90	0,71	3,65	1,03	5,39	1,36	6,80	1,49	8,30
	Carbon dioxide - CO ₂ content	10,8	11,4	10,8	11,5	10,8	10,9	10,7	11,3	11,2	11,6	10,9	11,2
	Fumes temperature	39	113	31	94	30	94	31	86	26,5	70	28	80
	Fume mass flow rate (max.)	kg/h --											
	Gas butterfly valve	3,7		5,0		5,2		6,5		7,0		9,3	
G31	Air supply pressure	mbar 30 [min 25-max 35] - 37 [min 25-max 45] - 50 [min 42,5-max 57,5]											
	Ø pilot nozzle	mm 0,51											
	Gas consumption (15°C-1013mbar)	0,39	1,55	0,62	2,85	0,70	3,60	1,01	5,31	1,34	6,70	1,47	8,18
	Carbon dioxide - CO ₂ content	9,3	9,8	9,2	9,7	9,3	9,4	9,4	9,6	9,3	9,6	9,1	9,6
	Fumes temperature	39	113	31	94	30	94	31	86	26,5	70	28	80
	Fume mass flow rate (max.)	24		45		58		84		107		130	
	Gas butterfly valve	3,7		5,0		5,2		6,5		7,0		9,3	

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12.13.8 - Connections at the flue



Important: The flue of the gas burner is not supplied with the unit. Its design and installation is the responsibility of the installer and must comply with all the directives and regulations in force in the installation location.



This PCH burner module is fitted with a watertight combustion circuit and with the burner fan located upstream of the heat exchanger.

Connection to the flue, according to how the heater is installed, can be made as "C" type, with combustion air being drawn from outside, or as "B" type with combustion air being drawn from the heater installation site. If the heater is installed outdoor, a "B" type installation is also a "C" type.

More specifically, the heater is certified for the following exhausts: B23P-C13-C33-C43-C53-C63; for more information on the flue types, please refer to current regulations.

To fit the fume exhausts, certified pipes and terminals must be used, taking into account that the modules are of a condensing type; the following material must be used:

- aluminium with a thickness of at least 1.5 mm;
- stainless steel with a thickness of at least 0.6 mm; the steel must have a carbon content of at least 0,2 %.

Use sealed pipe to prevent condensation from leaking from the pipes; the seal must be adequate to withstand a fume temperature ranging between 25°C and 120°C.

The flue does not need to be insulated to prevent the build-up of water in the pipes, as this does is not detrimental to the heater, which is fitted with a water trap. Insulate the pipe if required to protect the flue from accidental contact.

For the air intake, use:

- aluminium with a thickness of at least 1.0 mm;
- stainless steel with a thickness of at least 0.4 mm.

Important: The horizontal sections of flue, which make up the fume exhaust, must be installed with a slightly incline (1°- 3°) towards the heater, in order to prevent the build of condensation in the exhaust.

■ Terminal configuration

Type B23P

Open combustion circuit: the gases produced by the combustion are discharged outside, on a wall or on the roof, and the combustion air is directly drawn from the site where the equipment is installed.

In this case, the standards UNI-CIG 7129 and UNI-CIG 7131 require the provision of suitable vents on the walls.

Note: It is compulsory to fit an IP20 safety mesh to prevent solids with a diameter higher than 12mm from entering the combustion air intake; at the same time, the mesh opening must not be larger than 8mm.

Type C13

Sealed combustion circuit (type "C") connected to a horizontal terminal on the wall by means of its own ducting.

Type C33

Sealed combustion circuit (type "C") connected to a vertically installed terminal (on the roof) by means of its own ducting.

Type C53

Sealed combustion circuit (type "C") connected by means of its own ducting split in two terminals which could end up in areas with different pressure (such as a ducting connected to the roof and a second one connected to the wall).

Type C63

Sealed combustion circuit (type "C") connected to an approved and separately sold combustion air supply and combustion products exhaust system.

■ Selection Guide

If the terminal is not directly connected to the heater and, therefore, extra routing is required, according to the length of the ducting, the diameter of the selected terminals, extensions and bends must be checked.

After establishing the routing, the pressure drop must be calculated for each component; each component has a different pressure drop value as the glue gases flow rate is different.

The pressure drops of each component identified must be added, checking that the result is no higher than the value available for the PCH heater module used; if a combustion air supply pipe is fitted, the pressure losses must be added to the fume exhaust pressure drop.

If the sum of pressure drops caused by the fittings are higher than the pressure available at the exhaust, ducting with higher diameter must be used, rechecking the calculation; a pressure drop higher than the pressure available at the fume exhaust reduces the heater module thermal output.

If the duct routing requires the use of bends, the length required must be subtracted from the available length:

- Ø 80 wide radius bend at 90° EqL = 2.1m
- Ø 80 wide radius bend at 45° EqL = 1.1m
- Ø 100 wide radius bend at 90° EqL = 3.5m
- Ø 100 wide radius bend at 45° EqL = 1.6m

Pressure drop for terminals and exhaust ducting:

PCH model	020	034	045	065	080	105
Pressure available at the exhaust (Pa)	80	90	100	120	120	120
Component	Pressure drop (Pa)					
Ø 80 pipe (1 metre)	0,4	1,3	2,1	4,6	7,3	11,0
Ø 100 pipe (1 metre)	0,1	0,4	0,6	1,3	2,2	3,5
Ø 80 wide radius bend at 90°	0,9	2,8	4,4	9,5	15,0	22,2
Ø 100 wide radius bend at 90°	0,3	1,4	2,2	5,1	8,2	12,0
Ø 80 wide radius bend at 45°	0,5	1,4	2,2	4,6	7,3	11,0
Ø 100 wide radius bend at 45°	0,2	0,6	1,0	2,2	3,5	5,5
Ø 80 - 100 adaptor	0,2	0,6	1,0	1,2	1,8	2,7
Ø 80 hooded terminal	2,0	5,0	10,0	14,0	16,0	20,0
Ø 100 hooded terminal	1,5	3,7	7,5	10,5	12,0	15,0

12.13.9 - Burner condensate drain

These units are equipped with a junction for draining the burner condensates drain pan. Threaded connector 1/2" M in PVC.

To facilitate drainage, the structure of the group of generator pipes slopes slightly towards the discharge.

If the unit is going to be installed outdoors in a location where there are never low temperatures, the drain junction does not have to be connected to any pipe. It must simply be ensured that the water does not stagnate.

If the condensates are going to be discharged into a pipe do not seal it directly at the condensate outlet. If the water were to freeze in the pipe this could block the discharge of condensates and cause the water to accumulate inside the exchanger.

12 - FACTORY OPTIONS AND ACCESSORIES

12.13.10 - Operating cycle of the burner

■ Burner operation

When the unit demands heat, the modulation PCB will start the operation cycle. It authorises the flame monitoring equipment to start.

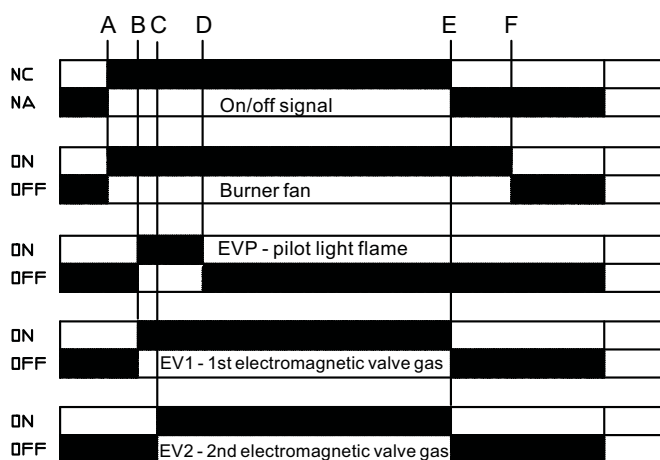
The equipment will immediately start ventilating burner [A] and prewashing the combustion chamber for a preset length of time.

After the prewash, the ignition phase starts: the equipment opens solenoid EV1 and, in parallel, solenoid EVP which supplies gas to the pilot burner [B].

After detecting the pilot flame, the equipment opens the main gas valve EV2 [C] to supply gas to the main burner.

After a time of dual functioning of the two burners (pilot and main), the modulation PCB removes gas from the EVP valve and turns off the pilot burner [D].

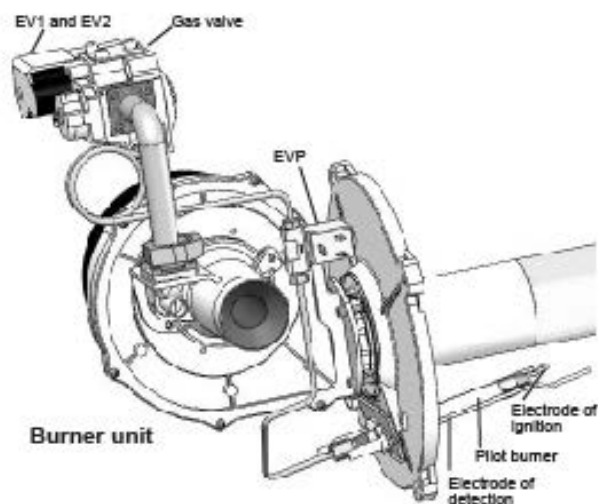
A single electrode detects the flame both for the pilot burner and the main burner.



The ignition program lights the burner to obtain an intermediate level heat production capacity, which corresponds to about 30% of the maximum capacity. Once the flame is stabilised for a few seconds at ignition power, the burner begins to modulate its output to reach maximum output, if required, in a variable length of time programmed into the modulation PCB.

During operation, the modulation PCB will regulate the power output of the burner proportionally to the voltage (0-10 Vdc) in the terminals.

If there are multiple power modules, the 0/10 Vdc signal could turn off one or more modules in cascade.



■ Turning off the burner

When the demand for heating ceases, signalled by a voltage lower than the preset limit (0.5 Vdc), the modulation PCB turns

off the burner [E]; the fan continues to purge the combustion chamber, post-wash, for a preset length of time [F].

Opening a contact (see electrical diagram) always causes the burner to stop without causing a fault.

■ Safety thermostats

A safety thermostat with automatic reset and positive safety setting is installed on the heater module. The breaking of the sensitive element corresponds to a safety intervention.

When the thermostat intervenes, through the flame monitoring equipment, the burner stops and the flame equipment is blocked.

The block of the flame equipment, caused by the safety thermostat, is signalled on the LCD display of the CPU PCB on the machine with F20. The block is classified as "non-volatile" and requires a manual reset.

Near the safety thermostat, there is an NTC1 probe set to the value of the ST1 parameter which reduced the burner's heat output independently from the incoming 0/10 Vdc signal when it reaches the set point. The probe monitors the ratio of heat capacity / cooling air flow. It is not advisable to change the ST1 value.

■ Fxx faults

The modulation PCB can distinguish between 30 different types of faults. This ensures accurate diagnostics. Also, codes and possible causes of faults are listed in this manual.

For more serious faults that require a manual reset, use the LCD display to reset the CPU PCB on the machine by pressing the arrows at the same time.

■ Air/gas premixing operation:

The PCH heater is fitted with a burner that completely premixes air and gas. The air/gas mixing occurs inside the impeller on the motor-fan.

The air taken into the impeller through the venturi tube, calibrated, creates a vacuum. The vacuum in the venturi is rebalanced by the gas valve, which is pneumatically controlled.

The air pressure - gas pressure ratio is 1:1. This ratio can be corrected by turning the offset adjustment screw (on the gas valve). The heater is supplied with the offset regulated and the screw sealed.

A second adjustment can be done with the screw on the venturi, which regulates the value of maximum gas capacity and determines the amount of carbon dioxide (CO₂) in the flue gases.

This adjustment is also made at the factory. The screw is not sealed to permit conversion to another type of gas, if desired.

To adjust the offset and CO₂, see the chapter about assistance. The modulation PCB, mounted on the heater, manages the motor rotation (in c.c.) depending on the heating capacity required by the environment. Varying the rotation speed of the motor changes the air flow capacity and therefore also the gas flow capacity. Minimum and maximum rotation values of the fan are programmed into the PCB and cannot be modified by the user or installer.

12.13.11 - Control of the gas burner



Important: All the connections to be established by the client are featured on the wiring diagram included with the unit.

■ Unit electronic control:

The "50FC" control has a proportional output 0/10V (Y2) where a natural gas or propane gas proportional actuator can be connected.

The burner connection is managed by the control, in HEATING mode, through an ON/OFF signal of the digital output NO5.

12 - FACTORY OPTIONS AND ACCESSORIES

It is possible to select three operating modes for the burner:

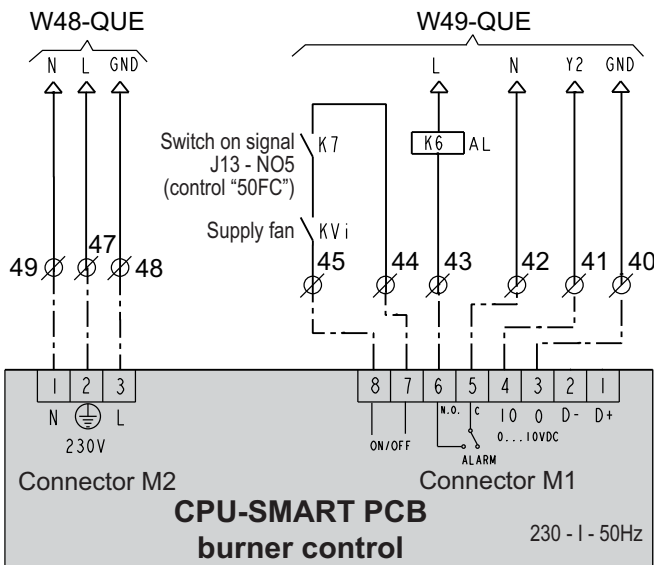
- Operation of the burner as one or two electrical heater stages (both option not compatible).
- Operation instead of the compressors.
- Operation instead of the compressors if the outdoor temperature is lower than the value set (5°C by default).

When the return temperature drops below the value set for the burner connection the burner will start to operate. The control of the power is carried out in accordance with the temperatures of the supply air and return air. The control compares both temperatures. If the supply temperature is excessively high, the control limits the power supplied by the burner despite the demand. This comparison avoids the stratification of the hot air masses and keeps the supply temperature below the safety value (55°C by default), which stops the burner.

Moreover, the control compares the supply temperature and the ambient temperature to improve the feeling of thermal comfort.

The gas burner integrates its own control. The "50FC" control only receives a safety signal from the burner in the event of failure (digital input DI5). This signal only indicates the failure.

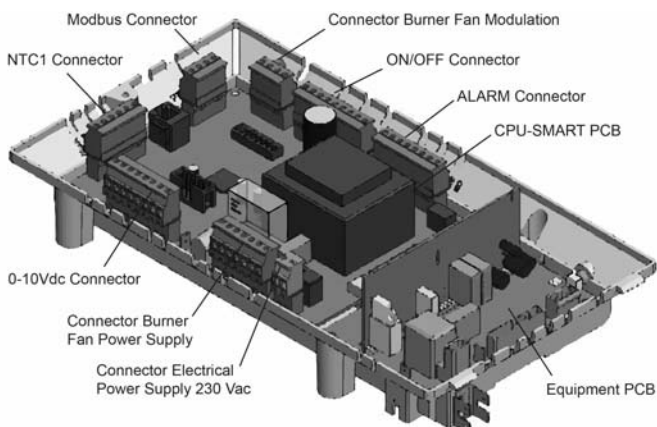
■ Burner control:



The gas burner integrates its own CPU-SMART PCB board that manages the operation and the safety devices.

The cables "W48-QUE" and "W49-QUE" with the wires required for the connection of the CPU-SMART PCB board with the 50FF/FC unit must be connected to the connection box "BOX6-QUE" that is located inside of the 50FF/FC unit (please consult the paragraph "Electrical connection of the burner").

Detail of CPU-SMART PCB board

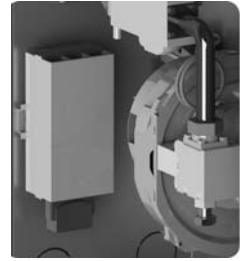


■ Burner protection for low outdoor temperatures (optional)

With outdoor temperatures below -14°C WB, a protection kit for low temperature is available.

The kit is composed of a 55W electrical heater and a NTC probe.

The burner control manages the electrical heater to maintain a constant temperature inside the burner housing higher than + 1° C.



■ Interface panel:

Each PCH heater is fitted as standard with a multifunction LCD panel located inside the burner housing, which is used to control, configure and diagnose all operating parameters of the equipment.

The instrument panel is fitted with a red 3 digit LCD display and four function keys: ↑, ↓, ESC and ENTER; the display allows the user to display the heater operating mode and its faults. It allows our service centre to change the main operating parameters.



Changing parameters requires a password.

- Viewing the burner status:

The machine status is shown on the display by the following wordings:

rdy: the machine is on without burner flame; it is waiting for the ON control and/or the heat demand from the room temperature monitoring system.

On: the machine is on with burner flame or is in the ignition phase.

Off: the machine is turned off by the control on the LCD. Any heat demands will be ignored. To light the burner, the LCD must show "operation ON";

Fxx: Fault detected.

During normal operation, the display will show the writing **On** if the burner is on; **rdy** when the heater is being switched off or the room temperature has been reached.

Air when the EST function in the menu FUN was selected by mistake; modify FUN to ON or OFF.

In the event of communication problems between the CPU-SMART PCB of the burner and the LCD panel, the word CPU will flash on the display if the problem is caused by the CPU; three flashing dots will be displayed if the problem is caused by the display PCB. If needs be, check that the display and the PCB are correctly connected and that the small cable RJ11 is securely held in the connector.

- Navigating the menu:

The menu has three levels. The first is visible without entering a password, the second and third require using second and third level passwords.

Use the arrows to scroll the menus: ↑ (up arrow) and ↓ (down arrow). Press ENTER to select the menu, and again to select the parameter. Change the parameter with the arrows and confirm the change by pressing ENTER. To exit the parameter or menu, press ESC. If you exit the programming function, after about 10 minutes the program will exit the menu and go back to the "machine status" view.

To change the parameter, press the arrow keys: pressing ↑ (up arrow) increases the parameter by 1, pressing ↓ (down arrow) reduces it by 1. Pressing both arrow keys for at least three seconds increases the parameter scroll speed.

To confirm a change in parameters, press ENTER for at least 3 seconds. The change in the parameter is signalled by a flash of the display.

All submenus scroll from the bottom towards the top, and they start over when the end of the menu is reached.

12 - FACTORY OPTIONS AND ACCESSORIES

- Entering the password:

- From the initial screen (ON/OFF/rdy/FXX) use the ↑ (arrow up) and ↓ (arrow down) keys to reach the ABI function; hold down the ENTER key for 3 seconds;
- Set the password inside the menu ABI and confirm it with ENTER; hold it down per approximately 3 seconds (the flashing display will show that the parameter has been stored);
- Press ESC and, by using the ↑ and ↓ arrow keys, return to the initial screen (ON/OFF/rdy/FXX); press ENTER for 3 seconds;
- Use the ↑ and ↓ arrow keys to reach the desired menu item (Fit, I/O, SET, PAR);
- Press ENTER to access the function;
- Use the ↑ and ↓ arrow keys to select the parameters to be displayed and edited;
- Press ENTER to display the parameter value;
- Use the ↑ and ↓ arrow keys to edit the value (only SET and PAR);
- Press ENTER to confirm the change made;
- To exit the parameter and the menu, press ESC until the initial screen is displayed (ON/OFF/rdy/FXX).

- First level menu:

The following menus are present on the first level:

machine status gives information about the operation of the PCH (ex. rdy, ON, etc.);

FUN from FUN it is possible to select the function ON, OFF or EST (do not select EST);

REG this menu allows the user to force the burner to the minimum or the maximum for combustion tests; it automatically returns to the previous position at the end of the preset time (10 minutes);

TIN allows the user to read the value of the 0/10 Vdc signal coming into the PCH;

Pra not used;

ABI used to enter the PWD to access menus of second and third level.

Entering the password 001 will provide access to the second level and make the Set Point and I/O menus available.

Entering the second password grants access to third level. This password must be requested directly to CARRIER technical service.

■ Reset:

The modulation PCB allows the operator to identify more than thirty different causes of faults. This makes it possible to manage each event very precisely.

To reset the faults, press both arrows simultaneously for a few seconds.

If ignition fails, the flame monitoring system reattempts ignition four times. After four failed attempts, it will block and display the code F10.

The faults code and cause of the faults is shown in the FAULT table in next Paragraph.

If the flame monitoring equipment is blocked (codes from F10 to F20), it is also possible to unblock it by using the button on the equipment itself. This block is shown by a LED that lights up on the equipment.

Warning: The flame monitoring equipment memorises the number of manual resets that are performed during its lifetime. In case of five resets performed in a period of 15 minutes, without a flame being ignited and detected, the equipment will go into a "timed" lockout (F13). In this case, it is required to wait another 15 minutes before resetting again. Press the reset button on the equipment to immediately reset this block condition.

Note: should the safety thermostat (STB) be open before starting the start-up cycle (this could be caused, for example, by low temperatures), the pilot light equipment will be kept in "standby" and block F15 will be shown.

■ Analysis of Blocks - Faults

The CPU-SMART manages two types of blocks:

- preventive, it warns the client that the PCH heater requires maintenance;
- operational, it stops the PCH heater for safety reasons or to ensure its correct operation.

Some operational blocks require manual resets; others reset themselves when the problem that caused them is solved.

Below is a complete list of faults, possible causes and possible remedies.

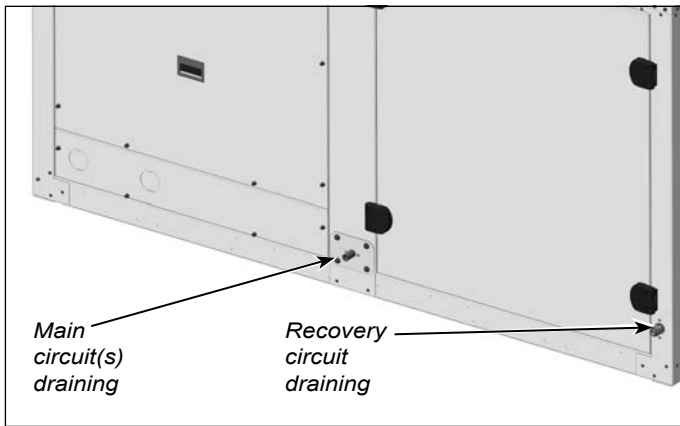
Fault	Description	Cause	Remedy
Blocks caused by Flame - Dependent on the TER equipment			
F10	Failure to ignite flame after 4 attempts performed by the equipment	• Phase and neutral reversed. • Earth wire not connected.	Manual reset
F11	Ill-timed flame	• Phase-phase connection without neutral.	
F12	Failure of ignition; not visible. The count, displayed in the historical list, indicates whether the heater has had problems with ignition	• Start-up electrode failed or badly positioned • Detection electrode failed or badly positioned • Detection electrode that moves or disperses to the earthing system when hot. • Low CO2 value	
F13	The TER equipment doesn't accept the reset command from CPU-SMART	TER has finished its 5 reset attempts in the period of 15 minutes.	Wait 15 min. or use reset button on equipment
F14	Lack of communication between TER equipment and CPU for more than 60s	TER equipment or CPU-SMART PCB broken	Auto-reset
F15	The CPU-SMART PCB sent the ignition signal to the equipment. After 300 seconds, the equipment has not yet lit the flame	Safety thermostat blocking start up TER equipment broken	Check contact closing Manual reset
F16	Generic equipment block	TER equipment broken	Manual reset
F17	Internal malfunction of TER equipment that does not accept reset command from CPU-SMART	TER equipment broken	Manual reset of equipment
Blocks caused by temperature (safety blocks)			
F20	Activation of safety thermostat STB	• Excess air temperature due to lack of air circulation • Safety thermostat broken or not connected	Manual reset
Block FAN - burner ventilator			
F30	Fan speed too low in start up phase - VAG	Burner fan broken. FAN electrical cables broken or not connected	Manual reset
F31	Fan speed too high in start up phase - VAG		Manual reset
F32	Fan speed, during operation, outside minimum and maximum set parameters - VAG		Manual reset, autoreset after 5 min.
NTC probes broken or missing			
F41	Probe NTC1 error, air intake temperature	Absence of signal from probe or broken probe	Auto-reset
Over-temperature			
F51	The temperature of the air intake probe NTC1>TH1	• The minimum heat power of the PCH heater module is over-sized compared to the power output required by the environment. • Check the TH1 param. - air intake set point.	Auto-reset if NTC1< TH1-15
Lack of voltage			
F75	No voltage during operation cycle (excluding stand-by); the fault is not visible on remote control but only counted.	No voltage during operation	Auto-reset
Internal malfunction of CPU-SMART PCB			
F00	Internal malfunction of CPU-SMART PCB	Perform a manual reset of the PCB; replace the CPUSMART if the problem persists	Manual reset

12 - FACTORY OPTIONS AND ACCESSORIES

12.14 - Cooling recovery circuit (BA and BB assemblies)

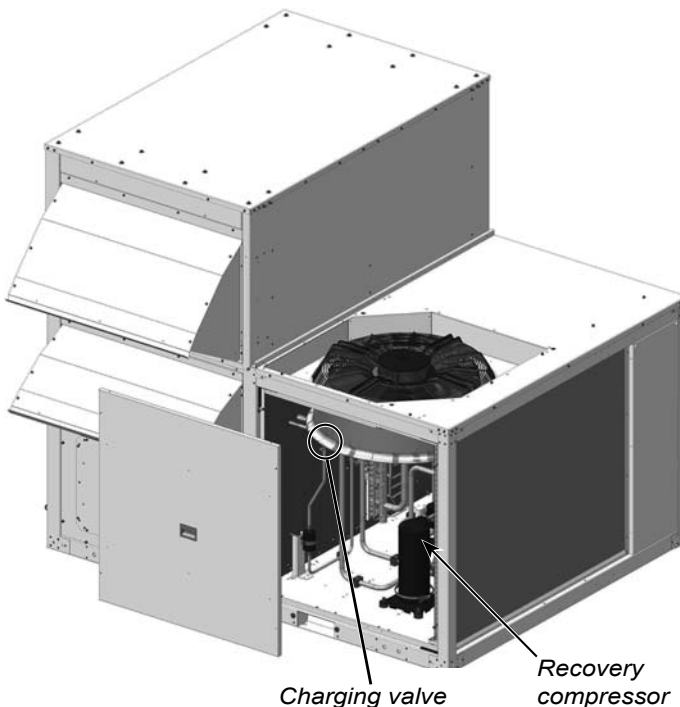
Thermodynamic circuit dedicated to the recovery of the extracted air energy, with independent and proportional control, adapted to the air renewal requirements in order to raise the COP and EER of the unit.

- The circuit is composed of:
 - Return EC plug-fan.
 - Air circuit comprised of coils with copper pipes and aluminium fins.
 - Electronic expansion valve.
 - Hermetic scroll-type compressor with sound insulation, assembled over antivibration mounts.
 - Crankcase heater.
 - Four-way cycle reversing valve.
 - Anti-acid dehydrator filter.
 - High and low pressure transducers.
 - Condensates drain pan, with a 1/2" M gas threaded plastic drain connection.

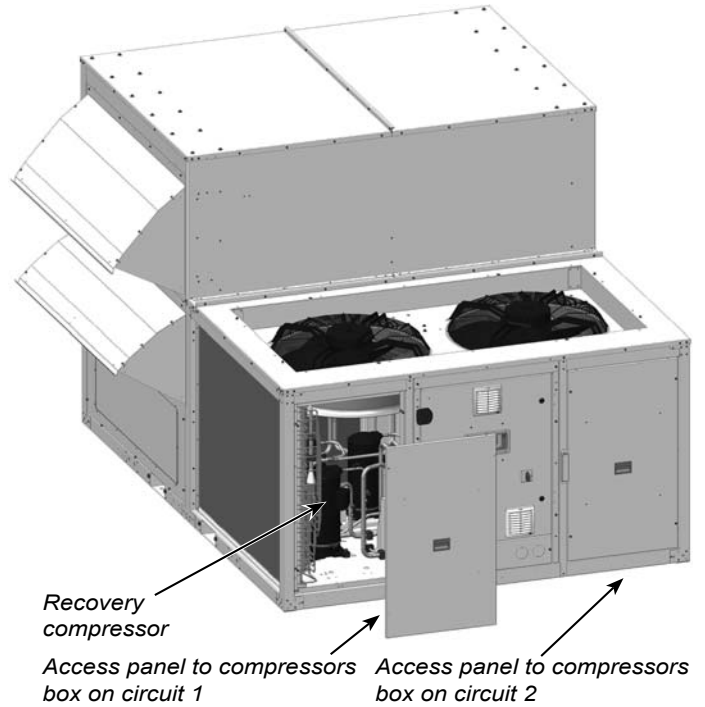


12.14.1 - Access to the recovery circuit

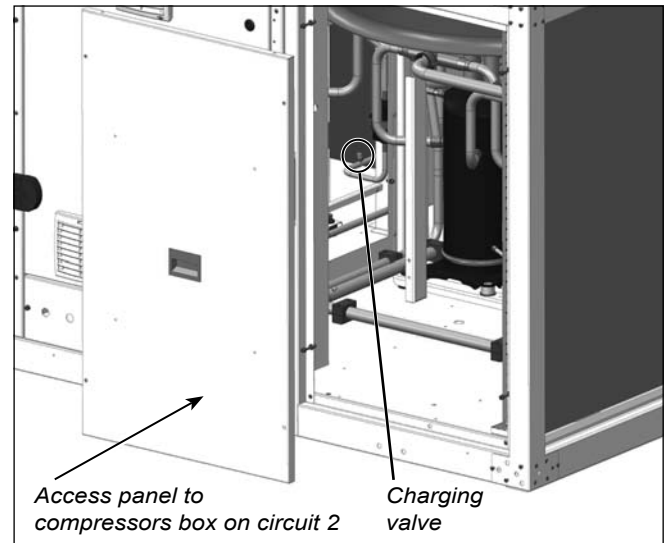
Models of 1 circuit (50FC 020 to 047 and 50FF 020 to 093):



Models of 2 circuits (50FC 052 to 093):



The charging valve, placed on the liquid line, is accessed via the compressors box on circuit 2, removing the communication panel between both circuits.



The charging valve (schrader type) must be used to adjust the refrigerant charge of the recovery circuit when this one is lower than required.

12.14.2 - Characteristics of the recovery circuit

50FF/FC		020 to 028	037 to 047	052 to 062	070 to 093
Compressor type		Scroll			
No. of compressors / circuits		1 / 1			
Max. absorbed current (A)		5,4	7,2	10,1	12,1
Oil type		Copeland 3MAF 32cST, Danfoss POE 160SZ, ICI Emkarate RL 32CF, Mobil EAL Arctic 22CC			
Volume of oil (l)		0,7	1,2	1,7	1,8
Charge of R-410A (kg)		1,7	2,5	3,0	3,4
Environment impact (tCO ₂ eq)		3,5	5,2	6,3	7,1

13 - COMMISSIONING

13.1 - 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 "Electrical connection").
- The correct connection of the sensors supplied with the unit (consult the chapter on "Electrical connection").
- 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.

Attention: the compressor crankcase heater must be put under voltage for 24 hours before starting the compressor.

WICHTIG: WIEDERBEHEIZUNG DER OLWANNE

BEIDER ERSTEN INBETRIEBSETRUNZ ODER 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 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

Important: As a safety feature to ensure heating of the crankcase heater, if there is a power cut lasting over 2 hours, the compressors will be locked. The unit must be powered for 8 hours to unlock them. The graphic terminal will displays the time remaining until they can be unlocked.

■ All the units are equipped with scroll type compressors and a phase control relay. Verify that they rotate in the correct sense and, if not, reverse the power wires.

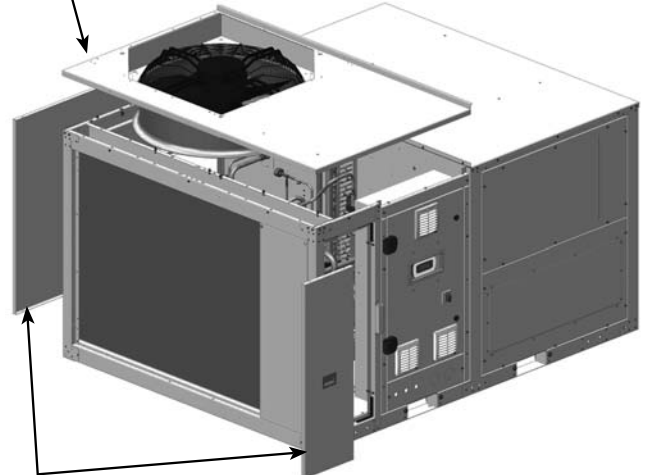
SCROLL COMPRESSOR.
CHECK SENSE OF ROTATION
COMPRESSEUR SCROLL.
VÉRIFIER LE SENS DE ROTATION
COMPRESOR SCROLL.
COMPROBAR SENTIDO DE GIRO

Optionally, these compressors can be fitted with a semiconductor compressor softstarter which limits the starting current using an auto adaptive algorithm.

■ Check the unit operation and verify the safety devices.

Models 50FF/FC 020 to 047:

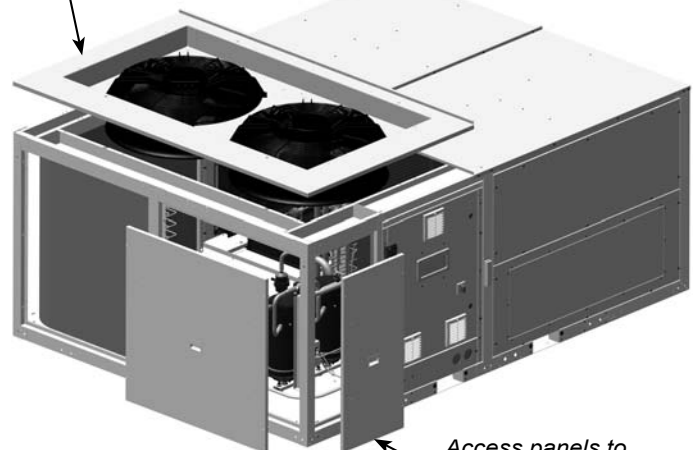
Fan cover lifted (*)



Access panels to compressor box

Models 50FF 052 to 093:

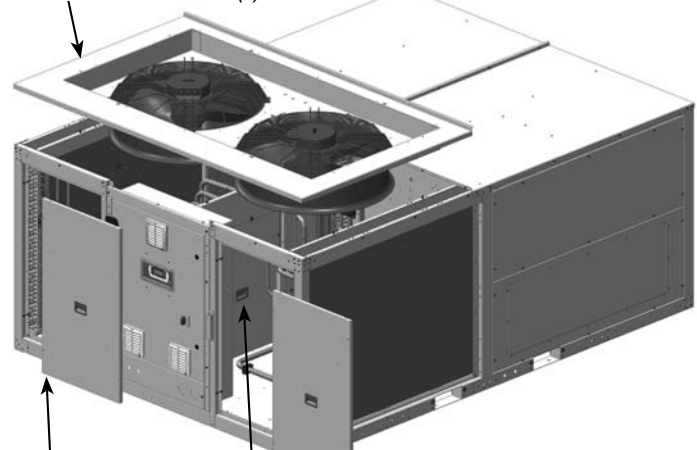
Fans cover lifted (*)



Access panels to compressor box

Models 50FC 052 to 093:

Fans cover lifted (*)



Communication panel between both circuits

Access panel to compressor box on circuit 1

Access panel to compressor box on circuit 2

(*) For some commissioning and maintenance tasks, it may be convenient to access the outdoor unit by lifting the cover with the fan(s). See the lifting procedure in the section entitled "Fans and air ducts".

13 - COMMISSIONING

13.1.1 - Control of the refrigerant charge

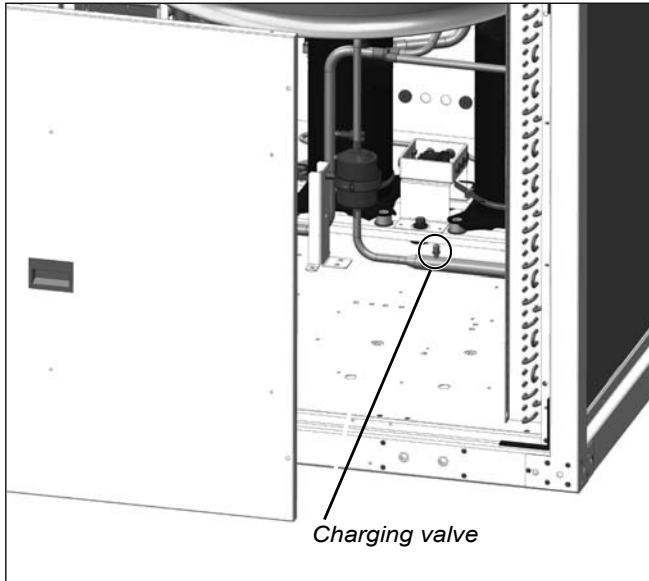
- Each unit is shipped with an exact charge of refrigerant for proper operation.

R 410A

- To make sure that the unit is filled with the correct charge of refrigerant, check the values of overheating and subcooling, circuit by circuit, with the system running at full capacity.

If the refrigerant charge is lower than required, the suction pressure will drop and overheating on the compressor inlets will be high. This can cause an interruption in operation due to activation of the refrigerant charge safety device.

To adjust the refrigerant charge, a schrader type valve is built into the unit on the liquid line for each circuit. This changing valve is located inside the compressor box.



- Verify the absence of any leaks of the refrigerant. In case of a leak:
 - Completely drain the refrigerant charge using a specific recovery machine for R-410A and repair the leak.
 - Next, reload the refrigerant into the unit according to charge data provided in a table of the chapter on "Maintenance" and in the unit's data plate.
 - Add the refrigerant via the charging valve using the appropriate equipment and tools, with the compressors stopped, monitoring the pressures to control any anomaly.

13.2 - Possible problems at commissioning

All indications given in this manual 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.

13.3 - 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 voltage;
 - current absorbed by the compressors, fans and other electrical components;
 - significant temperatures in the cooling circuit (see attached table);
 - 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.

Operating readings

Cooling MODE			
Compressor	Suction pressure	bar	
	Suction temperature (1)	°C	
	Condensation pressure	bar	
	Condensation temperature (2)	°C	
Air condenser	Gas inlet temperature	°C	
	Liquid outlet temperature (3)	°C	
	Air inlet temperature	°C	
	Outdoor temperature	°C	
Air evaporator	Air inlet temperature	°C	
	Air outlet temperature	°C	
	Liquid inlet temperature	°C	
	Evaporation outlet temperature (4)	°C	
Subcooling (2) - (3)		°C	
Overheating (4) - (1)		°C	

Heating MODE			
Compressor	Suction pressure	bar	
	Suction temperature (1)	°C	
	Condensation pressure	bar	
	Condensation temperature (2)	°C	
Air evaporator	Liquid inlet temperature	°C	
	Gas outlet temperature (4)	°C	
	Air inlet temperature	°C	
	Outdoor temperature	°C	
Air condenser	Air outlet temperature	°C	
	Air inlet temperature	°C	
	Gas inlet temperature	°C	
	Liquid outlet temperature (3)	°C	
Subcooling (2) - (3)		°C	
Overheating (4) - (1)		°C	

14 - MAINTENANCE

The minimal maintenance operations and their periodicity will be made in accordance with national regulations.

All work on the unit's electrical or refrigerant systems must be carried out by a qualified authorised technician. See the standard EN 378-4.

It is advisable to sign a maintenance contract with the installer or an approved maintenance company.

14.1 - General recommendations

14.1.1 - Safety instructions

- Technicians working on the unit must wear the necessary safety gear (e.g. gloves, eye protection, insulating clothing, safety shoes).
- Similarly, it is recommended that personnel working close to sources of high noise emission wear ear defenders. The ear defenders should in no way impede the wearing of other protective equipment.
- The surfaces of the compressor and pipes may reach temperatures of over 100°C and cause burns if touched. Likewise, the surfaces of the compressor may in some cases drop to freezing temperatures which can cause frostbite. It is therefore important to take special care when carrying out maintenance work.
- Do not climb on the machine; use a platform to work at the necessary height.
- Do not climb on the copper refrigerant pipes.



Caution: Do not work on any electrical components without first turning off the main door switch in the electrical cabinet.

14.1.2 - Preliminary advise

- Keep the unit clean.
- To avoid accidents and ensure proper ventilation of the coil, keep the unit and the space around it clean and clear of clutter.
- Check the fouling level of the coil.

14.1.3 - Oil

Oils for refrigeration units do not pose any health risks if they are used in compliance with the precautions for use:

- Avoid unnecessary handling of components lubricated with oil. Use protective creams.
- Oils are flammable and must be stored and handled with care. Disposable rags or cloths used in cleaning must be kept away from open flames and disposed of in the appropriate manner.
- Containers must be stored with their caps on. Avoid using oil from an opened container stored under incorrect conditions.
- 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 dryer.
- If all the oil must be emptied, replace it imperatively with new oil of the same grade as the original oil which has been stored in a hermetically sealed container until its time of use.

- The oil type recommended for these units is:

Copeland 3MAF 32cST, Danfoss POE 160SZ, ICI Emkarate RL 32CF, Mobil EAL Artic 22CC.

The following table indicates the required volume:

50FF	020	028	037	040	045	047	052	058	062	070	074	086	093
Volume (l)	2,5	2,5	3,3	3,5	3,5	3,5	3,6	5,0	5,0	5,0	6,5	6,8	6,8

50FC	020	028	037	040	045	047	052	058	062	070	074	086	093
Volume (l)	2,5	2,5	3,3	3,5	3,5	3,5	2,5 +	2,5 +	2,5 +	3,3 +	3,3 +	3,5 +	3,5 +
							2,5	2,5	3,3	3,3	3,5	3,5	3,5

14.1.4 - Refrigerant

Only qualified personnel must perform a periodic leak testing, in accordance with the regulation (EC) **No. 517/2014**.

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

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

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).

The number of tonnes of CO₂ equivalent (t CO₂e) can be consulted in the following table:

50FF	020	028	037	040	045	047	052	058	062	070	074	086	093
Charge (kg)	8,0	8,3	11,0	11,0	11,3	11,6	9,7	9,7	10,0	17,0	17,5	17,5	18,0
Environ. impact (t CO ₂ e)	16,7	17,3	23,0	23,0	23,6	24,2	20,3	20,3	20,9	35,5	36,5	36,5	37,6

50FC	020	028	037	040	045	047	052	058	062	070	074	086	093
Charge (kg)	8,0	8,3	11,0	11,0	11,3	11,6	2 x 6,3	2 x 6,4	2 x 6,5	2 x 10,0	2 x 10,2	2 x 10,2	2 x 10,3
Environ. impact (t CO ₂ e)	16,7	17,3	23,0	23,0	23,6	24,2	26,1	26,7	27,1	41,8	42,4	42,4	42,8

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

Note: These machines use R410A. It is essential that technicians use equipment which is compatible with R410A with a working pressure which is approximately 1.5 times higher than that of units using R407C.

- Always remember that refrigeration systems contain pressurised liquids and vapours. All necessary provisions must be made when the system is partially opened: ensure the part of the circuit concerned is not pressurised.
- Partial opening of the primary refrigerating circuit will cause a certain quantity of refrigerant to be released into the atmosphere. It is essential to keep the amount of lost refrigerant as low as possible by pumping the charge and isolating it in another part of the system.
- The refrigerant and lubricating oil, and the low-temperature

14 - MAINTENANCE

liquid refrigerant in particular, may cause inflammatory lesions similar to burns if they come into contact with the skin or eyes. Always wear protective eyewear, gloves and other protective equipment when opening pipes or tanks liable to have liquids in them.

- Store unused refrigerant in the appropriate containers and limit the amounts stored in mechanical rooms.
- Cylinders and tanks of refrigerant must be handled with care and signs warning users of the related poisoning, fire and explosion hazards must be clearly visible.
Refrigerant that reaches the end of its life must be collected and recycled in accordance with applicable regulations.

14.2 - Servicing

It's recommended to note down the operating readings and perform the following checks at least twice a year and mandatory after each time a unit is started for seasonal use.

14.2.1 - Weekly checks

With the unit running at full capacity, check the following values:

- LP compressor suction pressure and HP compressor discharge pressure.
- The oil level and its appearance. If the colour changes, check the quality.
- Also check whether the safety devices operate correctly.
- Check the entire system for traces of water or oil under or around the unit and for any unusual noises.

14.2.2 - Monthly checks

- Check all the values listed in the table "Operating readings" on chapter 13.
- Check for corrosion on all metal surfaces (chassis, casing, exchangers, electrical cabinet, etc.).
- Make sure that the insulating foam is neither detached nor torn.
- Check the coolants for any impurities which could cause wear or corrosion in the exchanger.
- Check the circuits for leaks.
- Check whether the safety devices and the expansion valve(s) operate correctly.

14.2.3 - Annual checks

- Carry out the same inspections as during the monthly checks.
- Carry out an oil contamination test (every year or every 5000 hours). If acid, water or metal particles are found, replace the oil in the circuit concerned and the dryer. Follow the recommendations of paragraph 14.1.
- Check the electrical connections to ensure they are tight and in good condition.
- Check the condition of the contacts and the current at full load on all three phases.
- Check the electrical box for water seepage.

N.b.: The intervals for cleaning are given as a guide and should be adapted to each unit.

14.3 - Access to the main components

14.3.1 - Air coil

- Check that the coil is free from dust and grease.
- Cleaning the accumulated dust on the coil can be performed using a soft-bristled brush or 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.

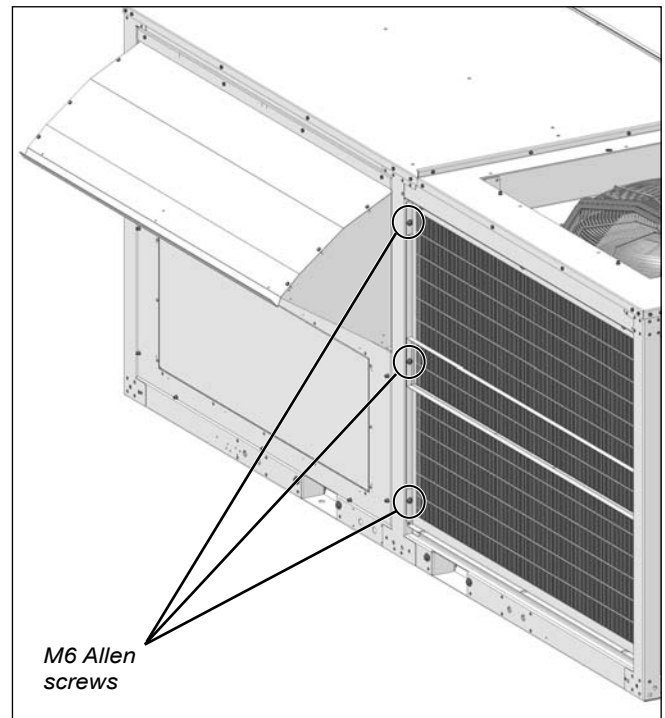


Use safety gloves for this task. Take care with the sharp parts of the coil.

Outdoor coil protection grid (optional)

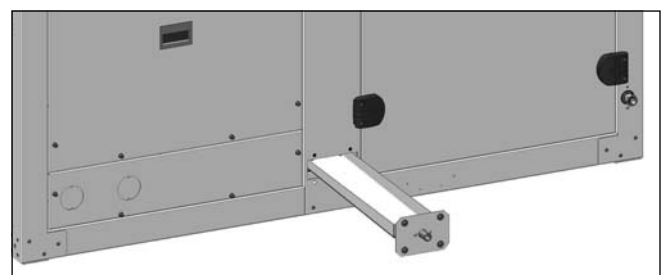
A protective grid can be fitted to the coil.

This grid, fixed with M6 Allen screws, must be removed to clean the coil.



14.3.2 - Condensate drain pan

- These units are equipped with a removable condensate drain pan for easy cleaning. The pan is secured to the unit using 4 M6 Allen screws.
- Check that the condensate pan is sufficiently clean.
- Check that the drain is not clogged.
- Cleaning of the pan can be done with water and non-abrasive detergent.



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14.3.2 - Compressor

- In the case of compressor replacement:
- Disconnect the unit from power supply.
- Completely empty the refrigerant charge using a specific recovery unit for R-410A
- Disconnect electrically the compressor.
- Carefully unsolder the suction and discharge piping.
- The compressor is fixed onto the platform with 4 screws.
- 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.

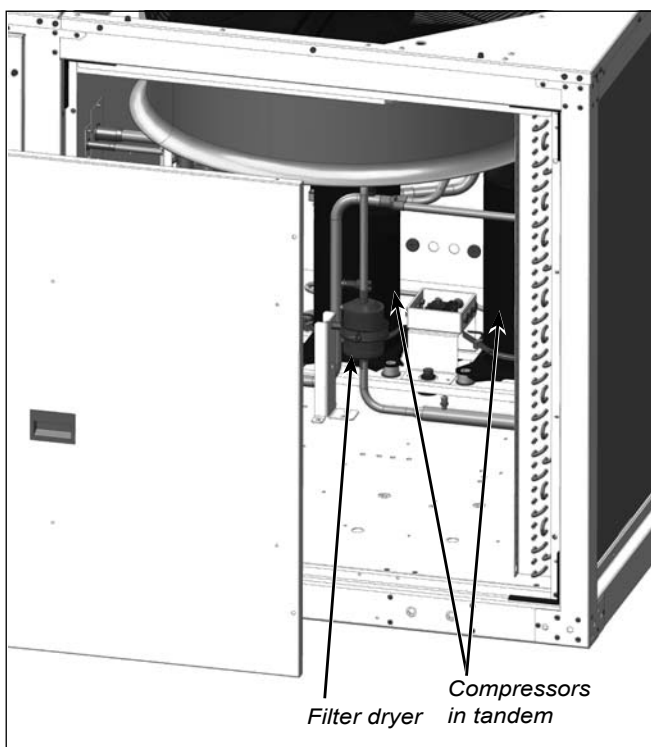
If a torque wrench is not available, tighten them until they are snug then tighten a further $\frac{3}{4}$ turn.

- Solder the suction and discharge piping.
- Connect the compressor in accordance with the wiring diagram.
- Make vacuum and next, reload the gas into the unit according to charge data provided in the table of paragraph 14.1 "General recommendations" and in the unit's data plate.

N.b.: For some maintenance tasks, it may be convenient to access the outdoor unit by lifting the cover with the fan(s). Consult the lift procedure in the chapter "Fans and air ducts".

14.3.3 - Dryer 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.
- Measure the difference in the temperature of the pipes at the dryer inlet and outlet.
- If necessary, replace.



14.3.4 - Air filters

- Depending on the installation conditions, the filter aspect must be examined to define the cleaning or replacing periodicity. Spare parts should be planned for.
- The pressure drop data of the technical catalogue are given for clean filters. Cleaning the filters is very important to maintain the required available pressure of the unit.
On units with filter fouling detection with differential pressure switch, an alarm is triggered on the electronic control when the factory-set clogging threshold is exceeded depending on the combination of filters selected.
- Gravimetric filters (G4). Cleaning can be done with a household vacuum cleaner. Replace them regularly.
- Creased opacimetric filters (M6, F7, F8 and F9). It is necessary to replace them.

Filter removal:

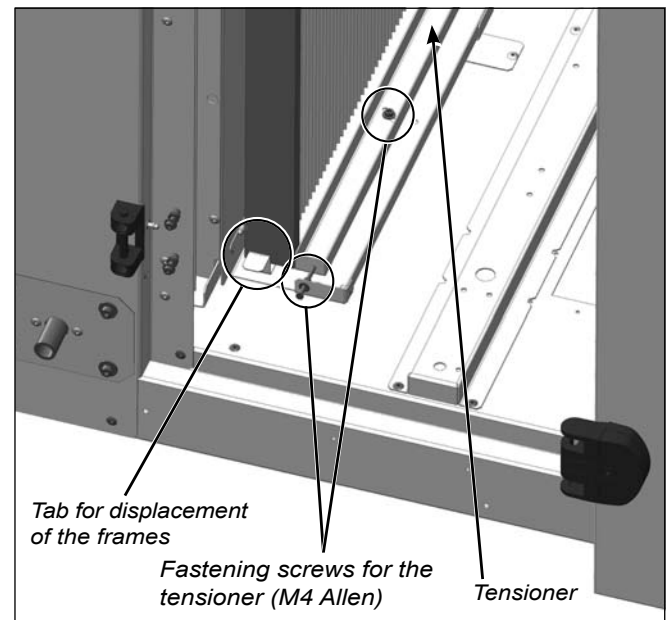
- The access panel to the filters features dual locks which can serve as a hinge or can be used to remove the panel.

Check that the locks are not blocked. Open the locks with a 4 mm Allen key (in an anticlockwise direction).



Caution: pay attention when opening the panel to avoid any damage to the siphon of the condensate drain.

- The structure supporting the frames with the filters is designed to incorporate the various filter combinations. The width of the frame is 24 mm for G4 and 48 mm for the remainder. When the selected combination of frames has less than 98 mm width, the structure features a tensioner to lock the position of the frames. To extract the frames it is necessary to loosen the screws securing the tensioner.



14.3.5 - Air filters in the grids of the electrical cabinet

- The appearance of the filters located inside of the grids must be examined periodically, because the clogged filters impede good ventilation.
- Cleaning can be done with a household vacuum cleaner. Replace them regularly. 115 x 115 mm G2 filters.



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14.3.6 - Gas burner



Only qualified staff are allowed to undertake maintenance tasks or resolve a breakdown.



Pay attention to the temperatures of some components after operation. They could be very high (exchanger, flue exhaust, etc).



Hazard: Never use a naked flame whilst checking the burner. Never store flammable material in the machine room.

During the maintenance, the user must always strictly follow the instructions given in all the chapters of this brochure, as well as on the manufacturer's (APENGROUP) installation and maintenance brochure for the burners in the PCH series, supplied with the unit.

The maintenance and checking of the combustion must be performed in compliance with the legislation in force.

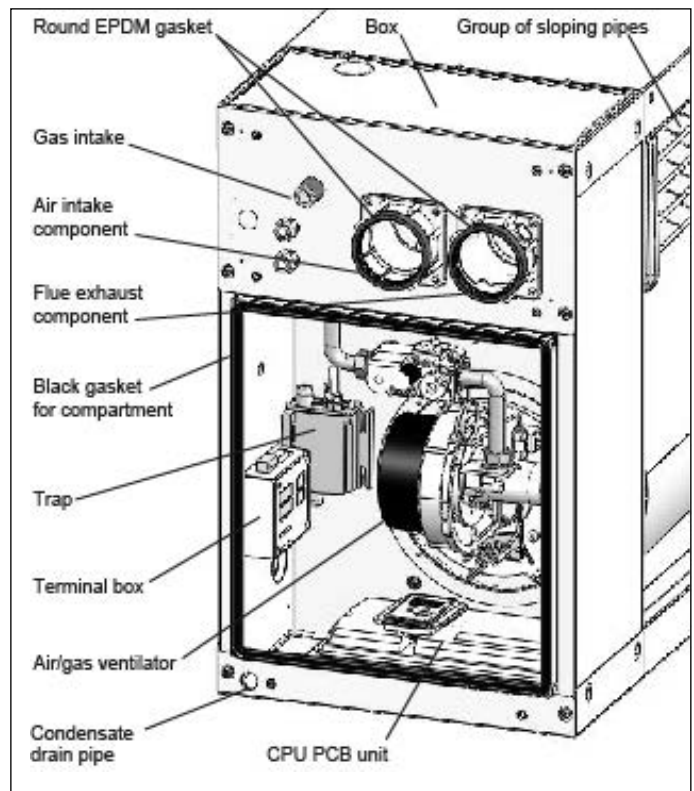
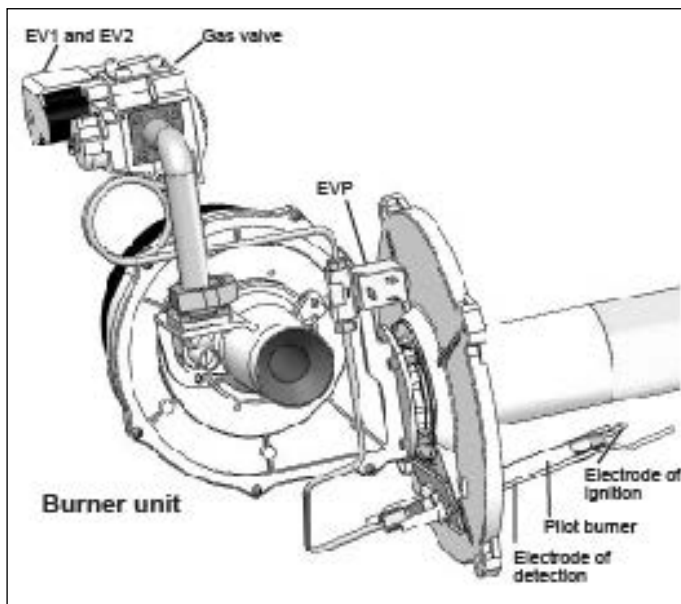
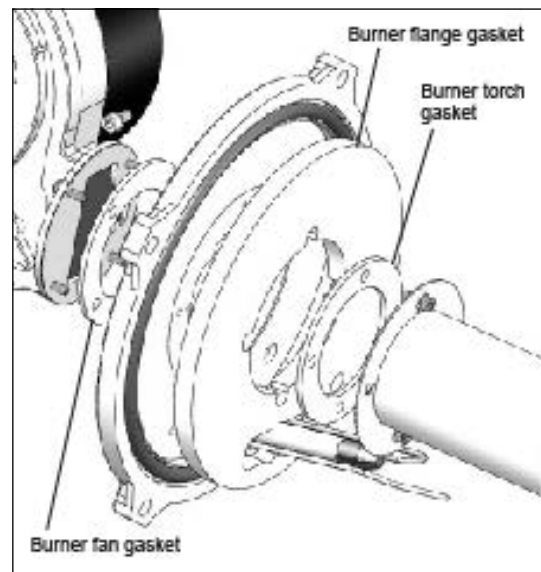
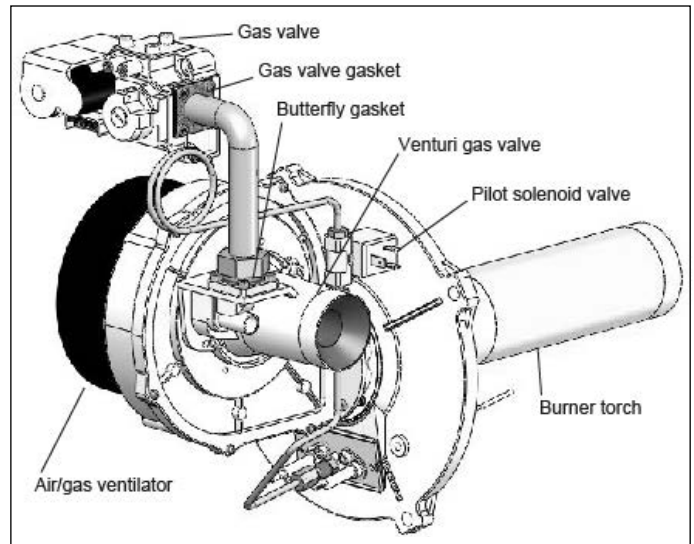
Any modification or change in the material must be undertaken with the manufacturer's consent; the replacement of a faulty component for another non-compliant component could present a hazard for which CARRIER could not accept liability.

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

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

Note:

- Operations at points 1, 2, 3, 4 and 5 must be performed after disconnecting the heater from the electrical mains and closed the gas supply.
- Operations at point 6, 7, 8 and 9 must be done with the heater on.

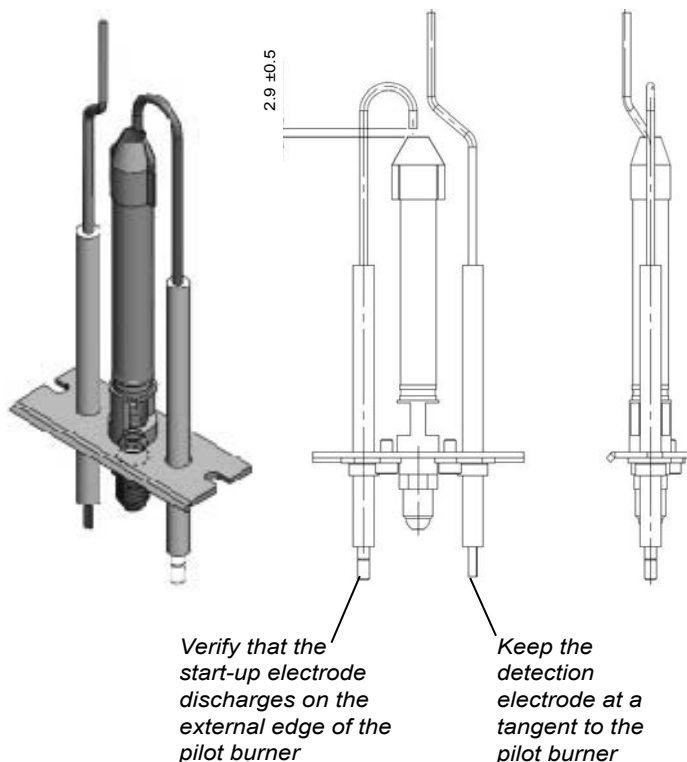


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1) Inspection of electrodes

Dismantle the complete pilot flame and use a jet of compressed air to clean the mesh and nozzle. Check the integrity of the ceramic and use sandpaper to remove any oxidation on the metal parts of the electrodes. Check the correct position of the electrodes (see drawing below).

It is important that the detection electrode is at a tangent to the head of the pilot and not inside it. The start-up electrode must discharge onto the mesh of the pilot burner.



2) Inspection of flue exhaust and air intake ducts

Visually inspect where possible or examine with specific tools to learn the status of the ducts.

Remove dust that forms on the air intake terminal.

3) Inspection and cleaning of the venturi

Remove any dirt at the mouth of the venturi with a brush, and be careful not to let it fall inside the venturi.

4) Inspection and cleaning of the exchanger and burner

Perfect combustion in PCH heaters prevents soot forming, which is normally caused by bad combustion.

It is advisable, therefore, not to clean the exchanger and burner unless there are exceptional circumstances.

An accumulation of soot inside the exchanger could be revealed by a sizeable variation in the heat output that is not caused by improper functioning of the gas valve.

Should it become required to clean the burner and/or exchanger, all of the gaskets mounted between the burner and the exchanger must be replaced.

5) Inspection and cleaning of the water trap

Clean the trap every year, and check the connections. Make sure there are no traces of metallic residue. If metallic residue has formed, increase the number of inspections.

6) Inspection of intake gas pressure

Verify that the intake pressure at the valve corresponds to the value required for the type of gas connected.

This verification must be done with the heater on at the maximum heat output.

7) Inspection of flame monitoring equipment

With the heater operating, close the gas tap and verify that the machine faults, signalled on the LCD display with code F10.

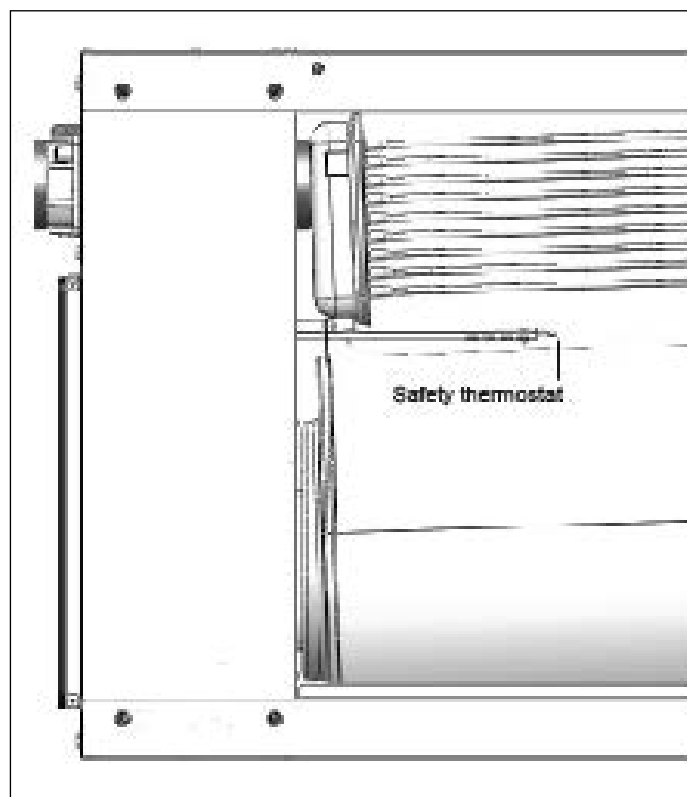
Reopen the gas tap, reset the fault and wait for the heater to start back up.

8) Inspection of the safety thermostat(s);

This procedure must be done with the heater on and the burner lit.

Open the thermostat series with an insulated tool [230 V], remove the fast-on from the safety thermostat, wait for the F20 block signal to appear on the LCD display.

Reclose the thermostat series, then reset the fault.



9) Inspection of the ionization current.

This procedure can be done directly from the LCD display by entering into the I/O menu (password 001). The **IO**n parameter indicates the value of the ionization current, and the reading is as follows:

- 100, indicates that the value is more than 2 microAmperes, which is plenty for the equipment to function;
- from 0 to 100, indicates a value from 0 to 2 microAmperes; for example, 35 corresponds to 0.7 microAmperes, which is the minimum threshold detectable for the flame monitoring equipment.

The value of the ionisation current must not be below 2 micro-Amperes. Lower values indicate: the detection electrode in a bad position, a rusted electrode or one about to stop functioning.

15 - 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 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 charge
Evaporation pressure too low (low pressure safety 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 the low pressure safety) g) Dehydrating filter clogged (cuts off the low pressure 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
Alarm or reading error in the humidity probe (with enthalpic control)	<ul style="list-style-type: none"> a) Dirt in the humidity sensor 	<ul style="list-style-type: none"> a) Disassembly the probe capsule. Proceed to clean the sensor with some soft cotton element and non-abrasive fluid, without pressing it. Reassemble the casing, checking that the cable is in contact externally with the metallic mesh.

16 - FINAL SHUTDOWN

16.1 - Shutting down

Separate the units from their energy sources, allow them to cool then drain them completely.

16.2 - Recommendations for disassembly

Use the original lifting equipment.

Sort the components according to their material for recycling or disposal, in accordance with regulations in force.

Check whether any part of the unit can be recycled for another purpose

16.3 - Fluids to be recovered for treatment

- Refrigerant
- Energy transfer fluid: depending on the installation, water, glycol/water mix.
- Compressor oil

16.4 - Materials to be recovered for recycling

- Steel
- Copper
- Aluminium
- Plastics
- Polyurethane foam (insulation)

16.5 - Waste electrical and electronic equipment (WEEE)

At the end of its life, this equipment must be disassembled and contaminated fluids removed by professionals and processed via approved channels for electrical and electronic equipment (WEEE).



Important: In order to recycle these units follow the stipulations of Directive 2012/19/EU on *Waste electrical and electronic equipment (WEEE)*.



Order No.: 10185, 07.2018. Supersedes order No.: 06.2018
Manufacturer reserves the right to change any product specifications without notice.



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