

# *INSTALLATION, OPERATION AND MAINTENANCE MANUAL*

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*VENTILATION UNIT WITH  
VERY HIGH EFFICIENCY HEAT RECOVERY*

**SERIES *HRS***

**CE**

Dear Customer,

Thank you for having purchased an LMF product. It is the result of many years of experience, research and has been made with top quality materials and highly advanced technologies. The CE mark guarantees that the machine meets the European Standards regarding safety.

The qualitative level is kept under constant surveillance. LMF products therefore offer SAFETY, QUALITY and RELIABILITY.

**The manufacturer declines all responsibility for any inaccuracies in this manual due to printing or typing errors. The manufacturer reserves the right to modify the products contents in this catalogue without previous notice.**

## DECLARATION OF CONFORMITY



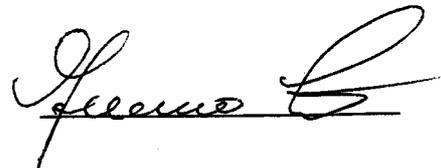
The Legal Representative of LMF S.p.A., located in Meledo di Sarego, via Paradiso 33 (Vicenza- ITALY), declares that the unit belonging to **HRS** series complies to the prescriptions of the Machine Directive 2006/42/CE, Low Voltage Directive 2014/35/EU (ex 2006/95/CE), EMC Directive 2014/30/EU (ex 2004/108/CE) and Ecodesign Directive 2009/125/CE.

The unit belonging to the above series is designed according to the following main safety prescriptions:

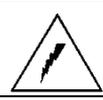
- *principals of safety integration;*
- *used materials free from risk;*
- *safety while transportation, handling and installation;*
- *protection against mechanical risks;*
- *protection against electrical risks;*
- *protection against fire risks;*
- *design and construction done so that noise emission is reduced to minimum level;*
- *protection against the risk to remain trapped inside the machine;*
- *CE indelible marking complete with the needed indications;*
- *supply of an "User manual"*

Meledo di Sarego (VI)  
23/12/2015

The Legal Representative



Ferraro Mauro

<b>SYMBOLOLOGY</b>	
	ATTENTION
	DANGER
	HIGH RISK OF ELECTRIC SHOCK
	ATTENTION: AUTHORIZED PERSONNEL ONLY

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## 1 - INTRODUCTION

Dear Customer,

this ventilation unit with air-to-air counterflow heat recovery has been designed and developed for civil (not residential) and commercial applications and allows the room air renewal while minimizing primary energy consumption; therefore, it shall be used only for this purpose.

LMF will not respond about any damage due to a different, improper and not right use, or to a use not described in this manual.

**HRS units are suitable for a working environment free of aggressive, corrosive and/or explosive agents, which can irreparably damage their components and structures.**

**Working environment shall be characterized by air temperature not lower than -20°C and not higher than 45°C and by relative humidity not higher than 95%.**

For special or out of range applications first contact LMF for a feasibility analysis.

HRS unit, in its basic configuration, is essentially composed of (fig. 1) :

- 1 – supply and exhaust EC fan
- 2 – high efficiency air-to-air heat recovery with built-in motorized by-pass device
- 3 – air filter close to air inlet (class efficiency : F7 on fresh air, M5 on return air)
- 4 – built-in electric box complete with controller (and remote user interface)
- 5 – self-supporting panels

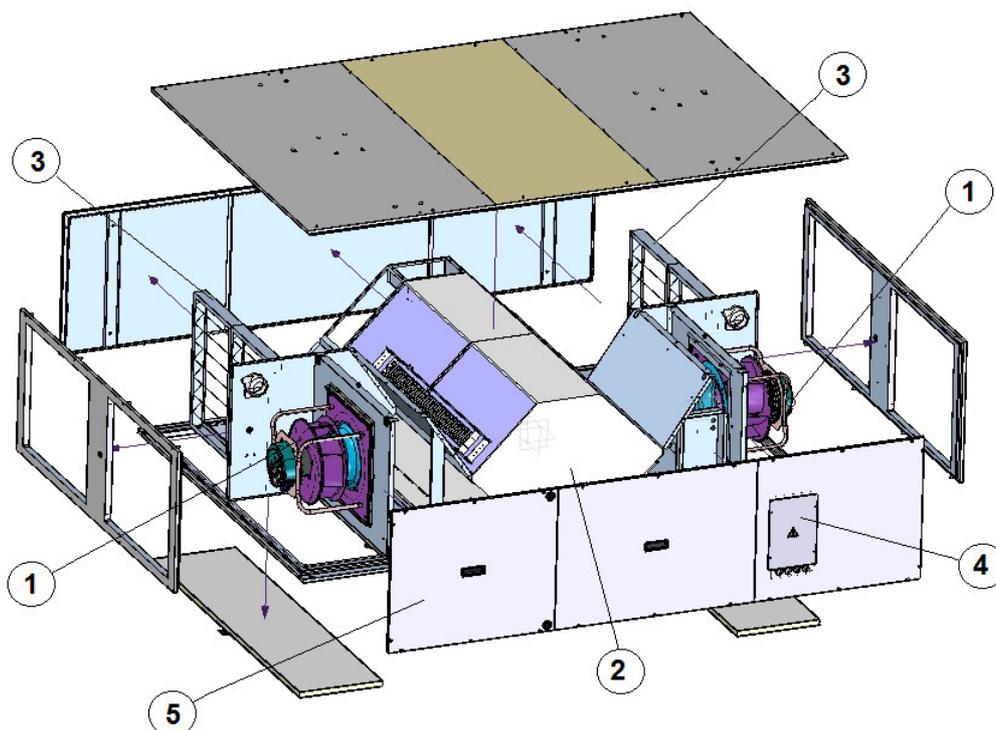


Fig. 1

This unit may be integrated with traditional heating and cooling systems, but it can operate also autonomously if equipped with the proper accessories.

- This manual together with separate wiring diagram and control instructions (supplied with the unit) must be kept in a dry place and ready to hand for future consultation when required.
- This manual has been compiled to ensure that the unit is installed in the correct way and to supply comprehensive information about how to correctly use and service the appliance. **Before proceeding with the installation phase, please carefully read all the information in this manual, which describes the procedures required to correctly install and use the unit.**
- Unit installation shall be done according to the laws in force in the country where unit will be placed.
- **Manumission of electrical or mechanical parts of the unit will VOID THE WARRANTY.**
- Check the electrical specifications on the identification plate before making the electrical connections. Read the instructions in the specific section where the electrical connections are described.
- If the unit must be repaired for any reason, this must only be done by a specialized assistance center recognized by the manufacturer and using genuine spare parts
- The manufacturer also declines all liability for any damage to persons or property deriving from failure of the information in this manual to correspond to the actual machine in your possession.
- **Proper use : forced air renewal with heat recovery in working environment as previously specified. Any use differing from this proper use or beyond the operating limits indicated in this manual is forbidden unless previously agreed with the manufacturer.**
- **The prevention of the risk of fire/injury at the installation site is the responsibility of the end user and/or installer.**

Verify, upon acquisition, that the unit is complete and supplied as described.  
Any eventual disputes must be presented in writing within 8 days from the reception of the goods.

Each unit is provided with identification plate listing the following:

- Address of Manufacturer
- “CE” Mark
- Model
- Serial Number
- Date of production
- Code
- Max input current [A] (for basic unit)
- Max input power [W] (for basic unit)
- Power supply [V-ph-Hz]
- Nominal (supply) airflow rate [m<sup>3</sup>/h]
- External static pressure [Pa] (for basic unit)
- Sound power level [dB(A)]
- Operative range (as air temperature & RH)
- Power supply [V-ph-Hz] for possible electric heater
- Max input current [A] for electric heater
- Max input power [W] for electric heater



UNITA' RECUPERO CALORE / HEAT RECOVERY UNIT / UNITE' RECUPERATION CHALEUR / UNIDAD RECUPERACION CALOR		
(1)	(2)	(3)
(4)	(5)	(6)
(1) Modello / Model / Modèle / Modelo (2) Numero di serie / Serial number / Numéro de serie / Numero de serie (3) Prodotto in / Built on / Construit sur / Fabricado el día (4) Codice / Code / Code / Código (5) Corrente MAX / MAX Input current / Intensité MAXI / Corrente MAX (6) Potenza MAX / MAX Input power / Puissance MAXI / Potencia MAX		

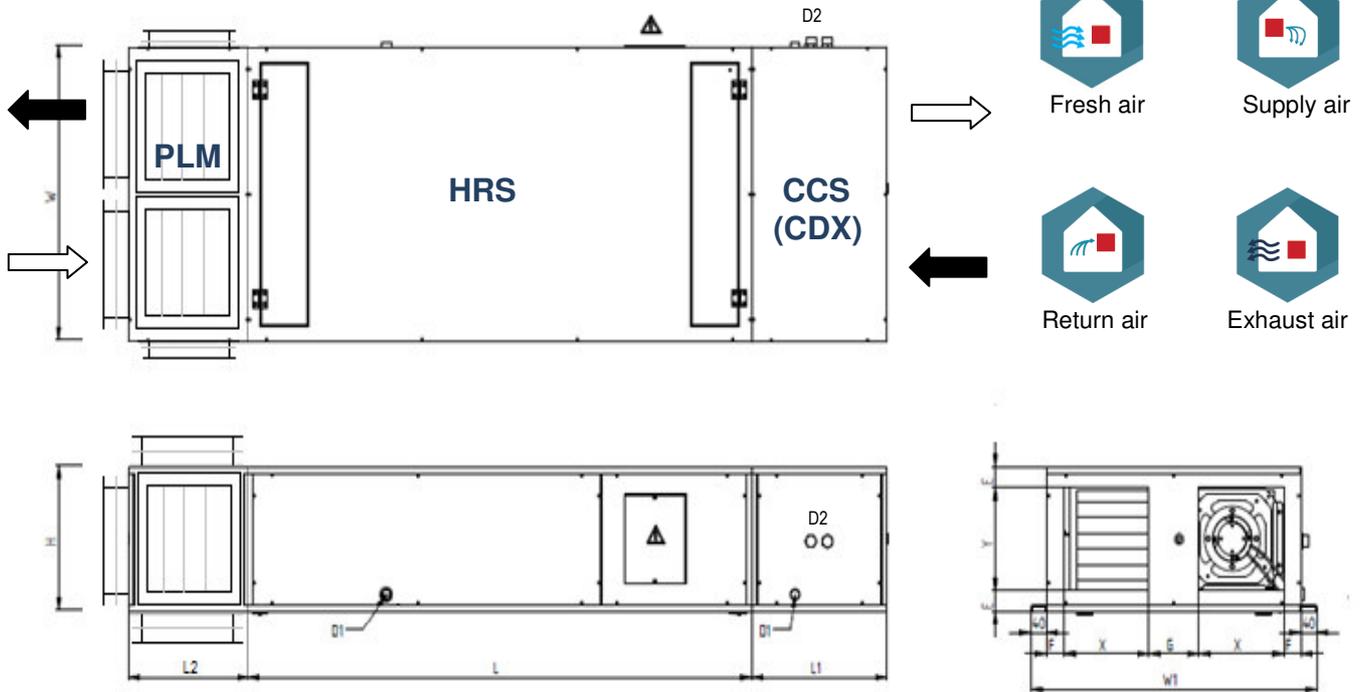
(7)	(8)	(9)
(10)	- 20°C < T < 45°C - 10% < RH < 95%	
(7) Alimentazione elettrica / Power supply / Alimentation / Línea eléctrica (8) Portata aria / Air flow rate / Débit d'air / Caudal de l'aire (9) P.S.E. / E.S.P. / P.S.E. / P.E.E. (10) Potenza sonora / Sound power / Puissance sonore / Potencia acústica		

RISCALDATORE ELETTRICO / ELECTRIC HEATER / CHAUFFAGE ELECTRIQUE / CALENTADOR ELECTRICO		
(11)	(12)	(13)
(11) Alimentazione elettrica / Power supply / Alimentation / Línea eléctrica (12) Corrente MAX / MAX Input current / Intensité MAXI / Corrente MAX (13) Potenza MAX / MAX Input power / Puissance MAXI / Potencia MAX		

## 2 – DIMENSIONS AND WEIGHTS

### 2.1 Dimensions (horizontal version unit)

The following table, referred to the figure, shows dimensions and weights of HRS series (horizontal version) and its accessories.



#### Horizontal configurations

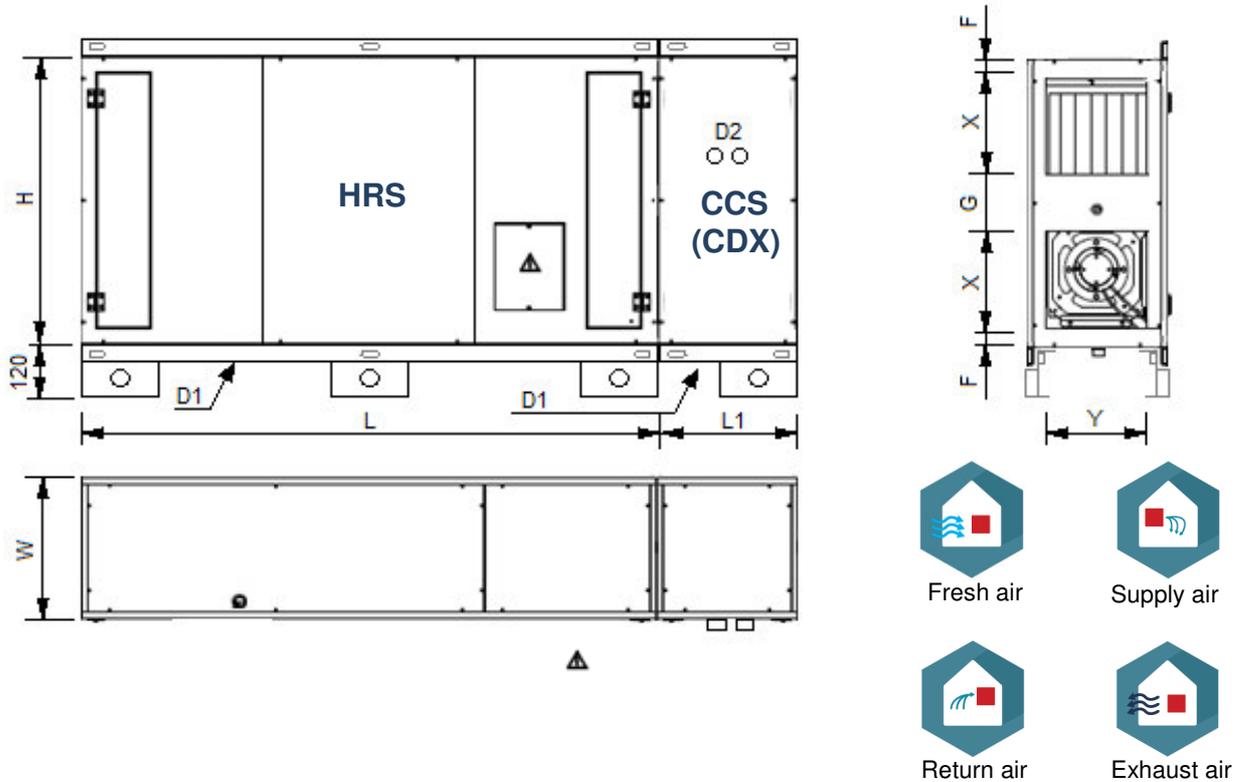
**A** : supply air at right side looking at the electrical panel (like in the drawing above)

**B** : supply air at left side looking at the electrical panel

Model		05	10	15	20	30	40
<b>L</b>	<b>mm</b>	1385	1505	1885	1885	2185	2185
<b>W</b>	<b>mm</b>	715	855	1065	1495	1495	1875
<b>H</b>	<b>mm</b>	365	405	490	490	625	625
<b>W1</b>	<b>mm</b>	795	935	1145	1575	1575	1955
<b>X</b>	<b>mm</b>	230	300	390	600	590	780
<b>Y</b>	<b>mm</b>	225	265	324	324	458	458
<b>E</b>	<b>mm</b>	70	70	83	83	83	83
<b>F</b>	<b>mm</b>	62.5	62.5	62.5	62.5	72.5	72.5
<b>G</b>	<b>mm</b>	130	130	160	170	170	170
<b>D1</b>	<b>mm</b>	1/2" M					
<b>D2</b>	<b>mm</b>	3/4" M	3/4" M	3/4" M	3/4" M	1" M	1" M
<b>L1</b>	<b>mm</b>	385	435	435	435	537	537
<b>L2</b>	<b>mm</b>	375	415	495	495	615	615
<b>Weight (basic unit)</b>	<b>kg</b>	90	115	190	260	330	395
<b>Weight (CCS/CDX)</b>	<b>kg</b>	28	31	35	42	52	58
<b>Weight (PLM)</b>	<b>kg</b>	21	23	26	30	39	44

## 2.2 Dimensions (vertical version unit)

The following table, referred to the figure, shows dimensions and weights of HRS series (vertical version) and its accessories.



### Vertical configurations

**C** : supply air at lower and right side looking at the electrical panel (like in the drawing above)

**D** : supply air at lower and left side looking at the electrical panel

Model		05	10	15	20	30	40
L	mm	1385	1505	1885	1885	2185	2185
H	mm	715	855	1065	1495	1495	1875
W	mm	365	405	490	490	625	625
X	mm	230	300	390	600	590	780
Y	mm	225	265	324	324	458	458
E	mm	70	70	83	83	83	83
F	mm	62.5	62.5	62.5	62.5	72.5	72.5
G	mm	130	130	160	170	170	170
D1	mm	1/2" M					
D2	mm	3/4" M	3/4" M	3/4" M	3/4" M	1" M	1" M
L1	mm	385	435	435	435	537	537
L2	mm	375	415	495	495	615	615
Weight (basic unit)	kg	90	115	190	260	330	395
Weight (CCS/CDX)	kg	28	31	35	42	52	58
Weight (PLM)	kg	21	23	26	30	39	44

### 3 – HANDLING, TRANSPORT AND STORAGE



#### 3.1 Packing

Each unit is put on bench and covered with cardboard packaging; the packaging shall remain intact until the moment of installation. It is allowed to stack up max one similar unit or a smaller one over the ground unit. Optional or optional sections not mounted for technical reason (for instance, in order to avoid damage of protruding parts) are supplied in fitted packing fixed externally or internally to the unit. Recycle and dispose of packing material in conformity with local regulations, be extremely careful not to damage the unit and the environment.



#### 3.2 Handling

Comply with the current safety regulations concerning the equipment to use when handling the unit or the required ways of operating. Use single protection devices as goggles, gloves, helmets... when handling the unit to avoid risk of injuries.

For the lifting, use hand pallet truck or forklift truck, by forking the bench (**fig. 2**). Each individual unit weight is shown in this manual (Chap. 2). While moving, try to avoid rotation without control.



Fig. 2



Check the weight of the unit before moving and handling. Handle the packed unit with care and avoid shocks and jolts; they may damage functional parts of the unit.

To safeguard persons and property, read the information on the packing that covers the unit before handling.

Also make sure to :

- Handle the unit to the installation place or to the store with the packaging intact
- Do not stack other objects on top of the unit

Before placing the unit, take into account overall dimensions and the technical spaces of the whole air system in order to make electric, air and water connections easy and accessibility unimpeded.

**Neglecting these aspects may decrease performance and operational life of the unit and therefore increase the operating costs and maintenance.**

Unit is designed to be installed **INSIDE** or **OUTSIDE** (roof cover needed), fixed to suitable supporting structures.

Before installing the unit be sure that :

- the location is in a safe accessible place
- the framework or the floor or the ceiling is adequate to support the weight of the unit and its possible options (see previous Chap. 2)
- support points are leveled and aligned
- installation place can't be subject to flooding
- fresh air intake and exhaust air outlet shall be free and not clogged (for instance, by snow, leaves, etc.)

### **3.3 Check at reception**

Upon reception of the unit, we suggest that a complete control is carried out, to verify that the unit is intact and complete, and no damage has been sustained during transport. Any eventual damage revealed must be communicated to the carrier, demonstrating the reserve clause within the transport documents, specifying the type of damage.

### **3.4 Storage**

In the event that received unit is not sent to installation place directly but stored, it shall be stored in its package in a dry place, far from sun, rain, heat sources, sand and wind.

Comply with the storage conditions given below :

- do not stack the units over the limit described on previous par. 3.1
- environment temperature range : min -20°C ÷ max +60°C

**The Manufacturer declines any responsibility for damage due to a bad storage.**

## **4 – INSTALLATION & CONNECTION**



### **4.1 Definitions**

**CUSTOMER** – The Customer is the person, activity or the society, that has bought or hired the unit, and intends to utilize the machinery for its intended use.

**USER / OPERATOR** – The User or Operator is the actual person that has been authorized by the Customer to utilize the unit.

**QUALIFIED PERSONNEL** - Defined as the person who has followed a relevant specific course of study, and so is able to understand the dangers derived from the use of the machinery, and in turn, due to this, are capable of solving major dilemmas.



### **Safety regulations**

**The Manufacturer declines any responsibility for failure to respect the Safety Regulations and the prevention as described below.**

**Furthermore, the Manufacturer declines any responsibility for damage caused by the improper use of the unit and/or modifications carried out without proper authorisation.**

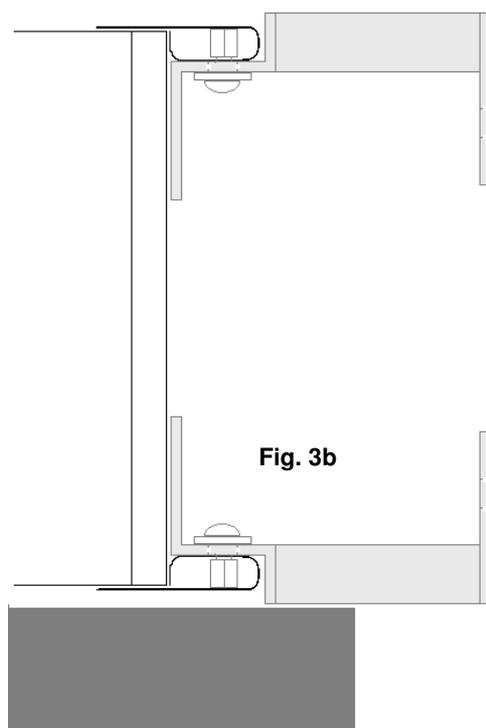
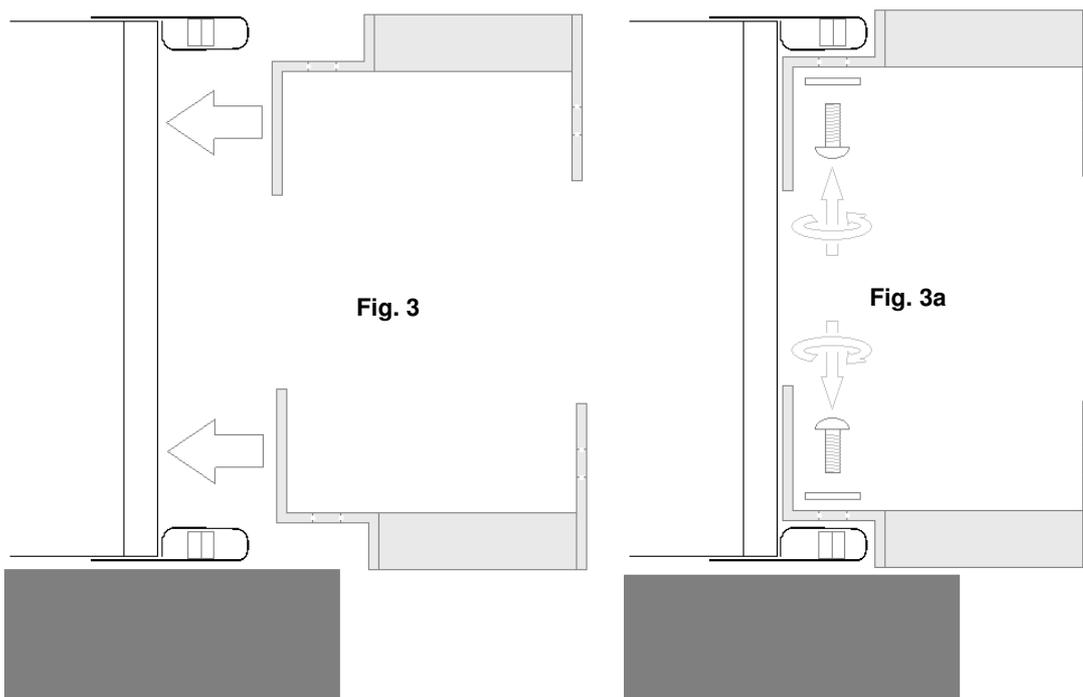
- **Qualified personnel must carry out the installation.**
- During the installation operation, use protective clothing.
- During the installation operate in absolute security, pollution free air and in an area free of obstructions.
- Respect the regulations in force in the country in which the apparatus is being installed. Specifically relative to its use, and to the disposal of packing and products used for the cleaning and maintenance of the unit. Respect the recommendations given by the producers of such products.
- Avoid contact with moving/rotating parts.
- **In the event of scheduled or not scheduled maintenance, first disconnect power supply.**
- The maintenance and the substitution of damaged or consumed parts must be carried out only by specialized personnel, following the indications found within this manual.
- Spare parts must correspond to the requirements specified by Manufacturer.

**N.B.** The installer and the user of the apparatus must take into account, and solve problems, connected with any other type of risk that may occur to the unit. For example, risks derived from the entrance of foreign bodies, or risks due to the presence of flammable or toxic gas.

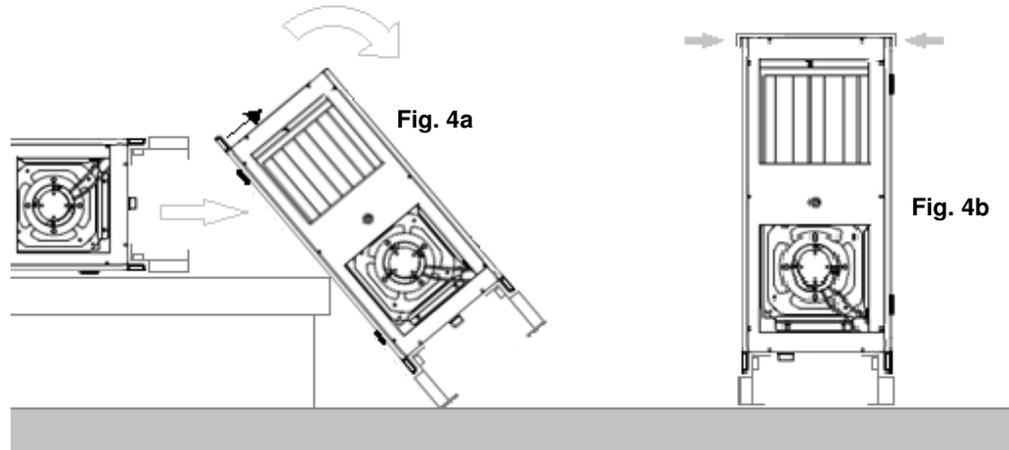


## 4.2 Preliminary operations

- Be sure of perfect functionality of all components of the unit.
- Check that unit is provided with installation instructions and with its ordered options.
- Move the unit and its possible optional sections to the installation place as close as possible.
- Do not put tools or weights inside the unit or on the top of it.
- In case of vertical version, unit is anyway delivered as horizontally layed on bench and provided with separate support feet & assembling kit (washers and M6 bolts, that need 4 mm Allen key); these feet shall be preventively bolted on the side of the unit as shown in the sequence of **figg. 3, 3a and 3b** :

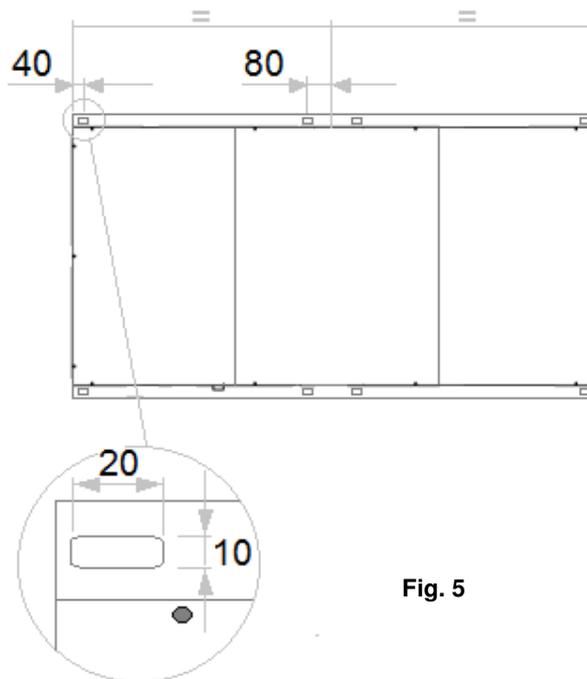


- Once support feet are mounted, unit shall be turn to be placed vertically; for this purpose, use the upper longitudinal bracket and operate as shown on **fig. 4a**. The rotation of the unit shall be done in complete safety condition.
- With roof cover (supplied to be mounted), once unit is in vertical position, remove the screws fixing the upper bracket and the same screws on the other upper side; do not use the bracket, put the roof cover on the top panels and, by reusing all the screws and the rubber washers supplied together with the roof cover, fix the roof cover (**fig. 4b**).



#### **4.3 Requirements of the place of installation and installation of basic unit**

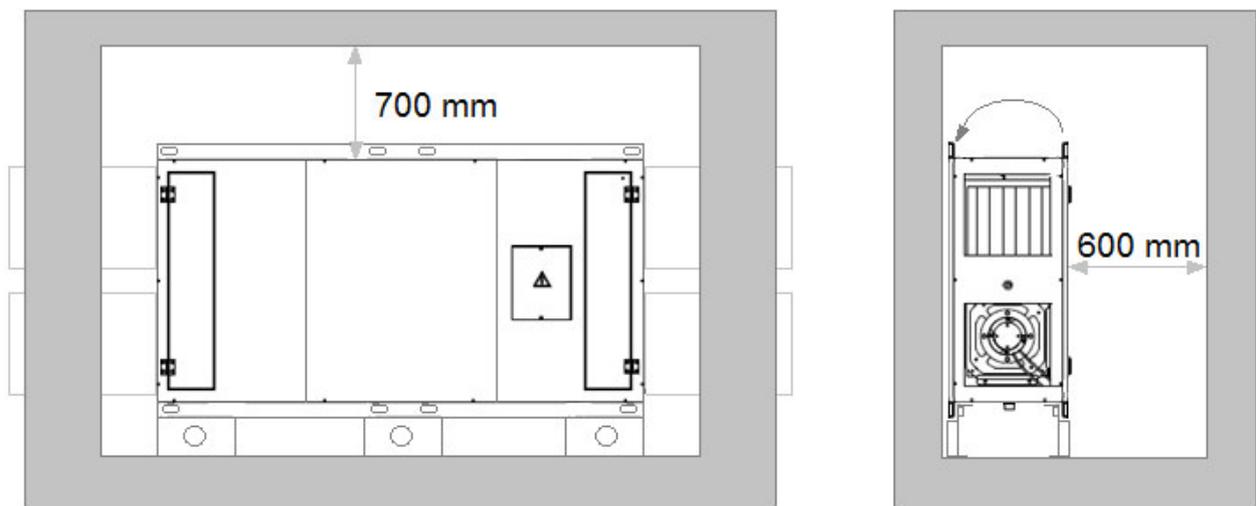
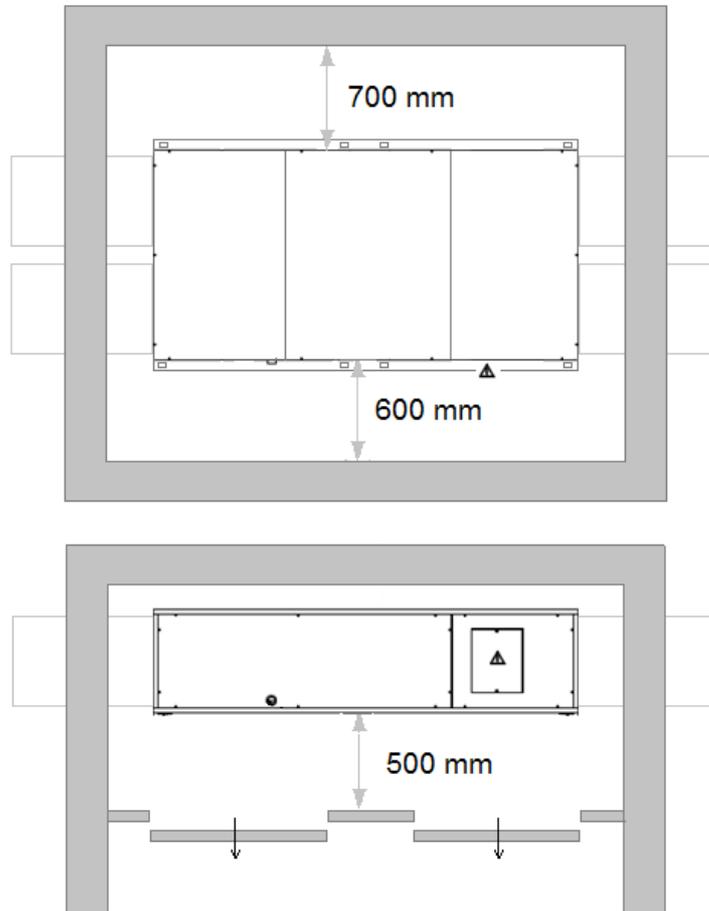
- Framework supporting the unit (and its possible options) shall be suitable to support the whole weight; position of supporting points (horizontal version) are shown on **fig. 5**.



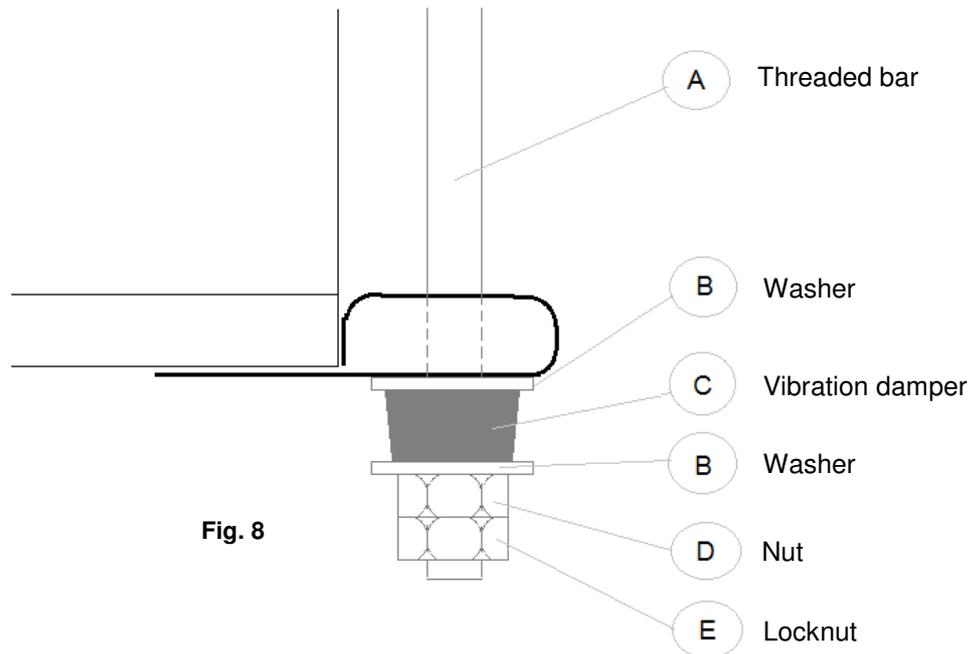
**Fig. 5**

HRS Model	N° of support points to be used
05	4 at corner points
10	4 at corner points
15	4 at corner points + 2 in the middle
20	4 at corner points + 2 in the middle
30	4 at corner points + 2 in the middle
40	4 at corner points + 2 in the middle

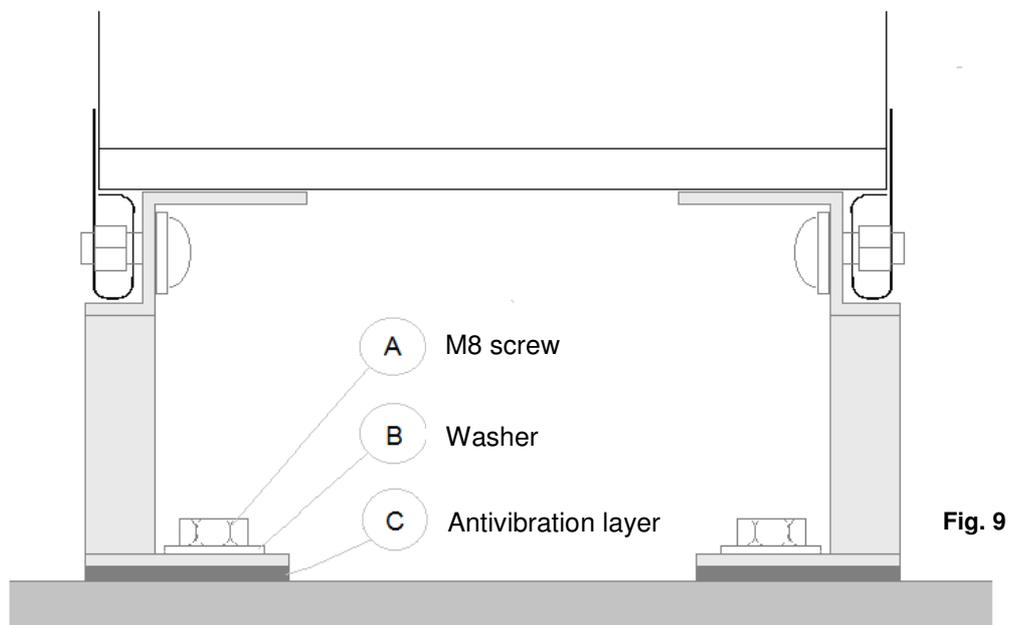
- Position the unit in a point where the condensation discharge may occur easily; give a 3° min slope towards the point of water discharge; this requirement applies to both horizontal and vertical version.
- Leave minimum gap spaces as shown on following **fig. 6 and 7**. They are needed for fully accessibility to the unit in order to carry out all services in safety condition.



- For horizontal version unit, use M8 threaded bars (or similar) crossing each supporting point of the unit bracket; always interpose vibration dampers between unit bracket and bars (**fig. 8**).



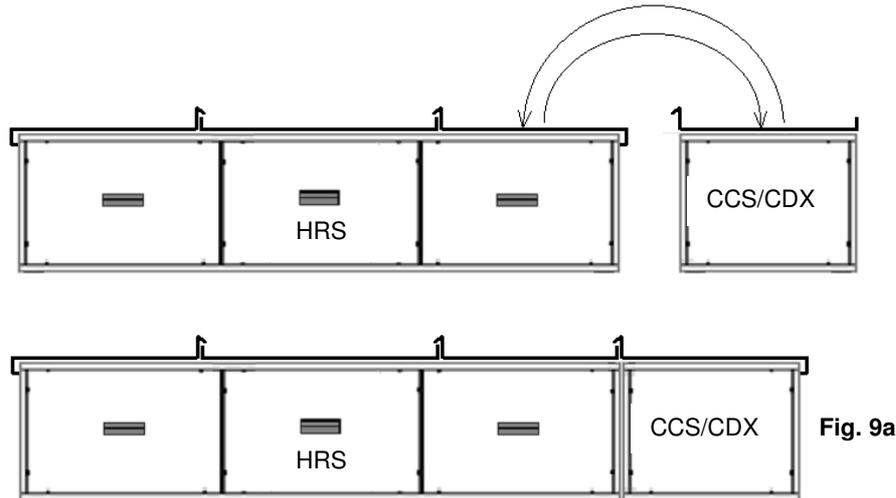
- **Be sure that unit is leveled both completely closed and with one side filter panel open; each side filter panel may be removed and remounted easily. If not, adjust opportunely the tightening on the bars.**
- For vertical version unit, fix the supporting feet to the floor (or to the supporting framework), by interposing an antivibration layer (**fig. 9**); if adjacent to a vertical wall, it is also suggested to block the upper bracket on it, **once moved on the opposite side to that of access doors** (see previous fig. 7).



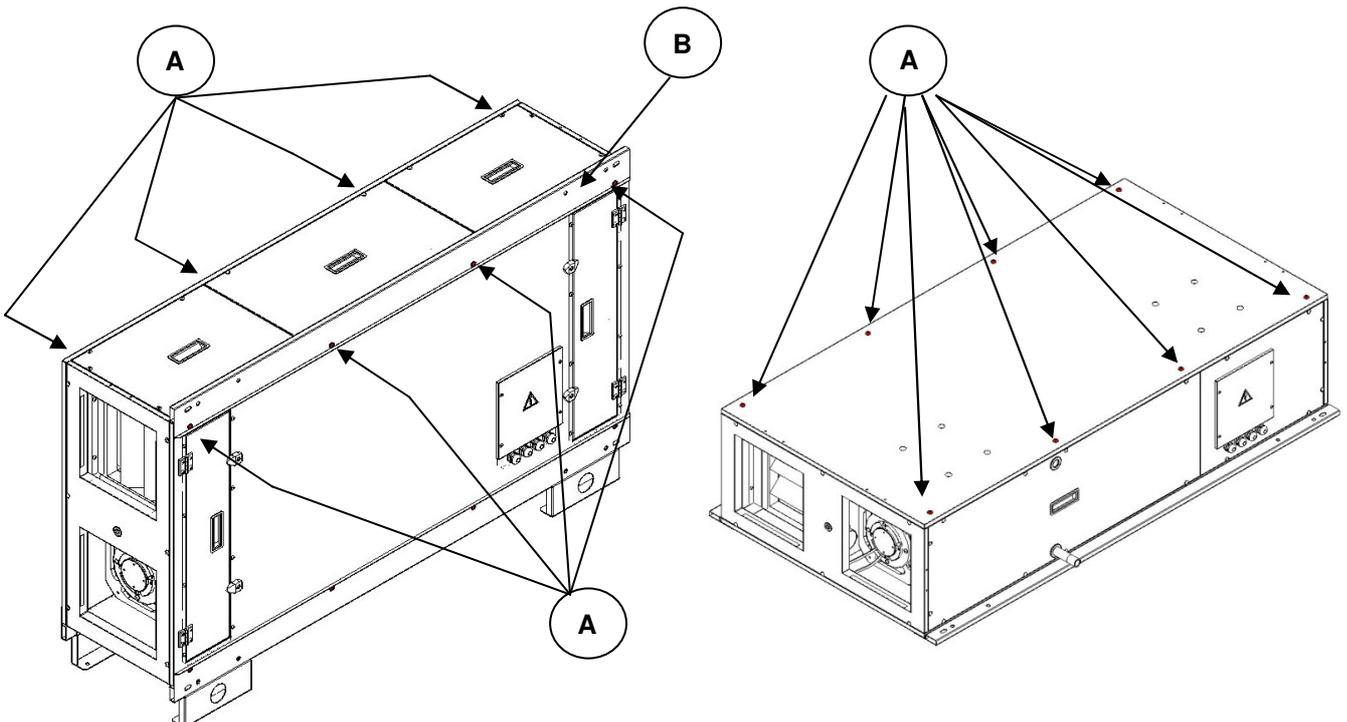


#### **4.4 Installation of roof cover (TPR-H, TPR-V, TPR-CH, TPR-CV)**

- In the event that roof covers are supplied apart to be mounted later than the unit and/or its external sections CCS/CDX, it is always possible to install them on the existing unit/sections.
- For external sections CCS/CDX, both horizontal and vertical version, it is supplied a roof cover which, before coupling unit and section according to the instructions of next 4.5, shall be interchanged with the unit roof element placed on the coupling side (**fig. 9a**).



- For mounting roof cover elements, preventively unscrew the M6 screws by a 4 mm Allen key (**A in fig. 9b**); further, on vertical unit, the upper bracket (**B**) shall be removed.
- As first, place the intermediate roof cover plate, fix it by screwing the same M6 screws, preventively provided with the special rubber washers supplied together with the roof covers.
- The jointing side of each end side roof plates shall be first hooked to the intermediate plate vertical protrusions by an about 45° rotation, then placed upon the upper panels and finally fixed by M6 screws with rubber washer.
- Complete the installation by sealing the connection lines between element and element.





#### **4.5 Installation and coupling of external sections CCS/CDX/PLM**

- The external sections are directly coupled to the basic unit by air intakes & outlets panels (by supply air/return air panel for CCS/CDX, by both panels for PLM, depending on PLM purpose); these sections are provided with brackets for ceiling mounting or support feet (supplied apart and to be mounted as shown in the sequence of figg. 3, 3a and 3b) for floor mounting. **Their weight shall not load the unit.**
- Sections are already equipped with a series of perimetric L stirrups with built-in M6 insert; they have to be coupled to free stirrups to be mounted on the unit in symmetrical positions, by using self-drilling screws kit (**fig. 10**). **This operation must be carried out before installing the unit.**
- Previously apply the gasket (supplied apart to be mounted) on the side of the external section to be coupled to the basic unit (**fig. 10**)
- For horizontal version section, use M8 threaded bars (or similar) crossing each supporting point of the section bracket; always interpose vibration dampers between section bracket and bars (fig. 8).
- For vertical version section, fix the supporting feet to the floor (or to the supporting framework), by interposing an antivibration layer (fig. 9); if adjacent to a vertical wall, it is also suggested to block the upper bracket on it.
- **In case of roof cover, unit side on which is installed will be free of coupling stirrups.**

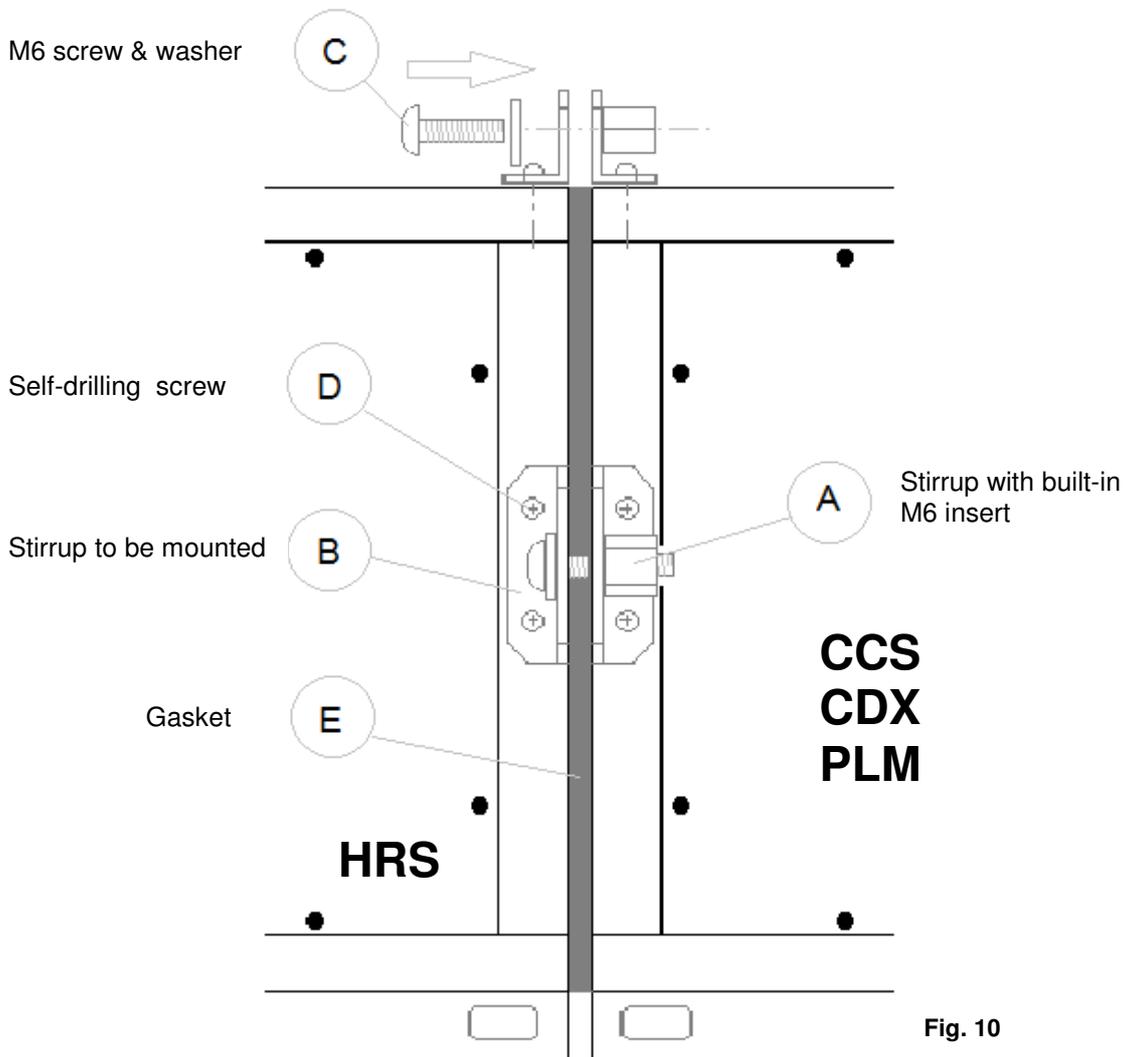


Fig. 10

#### 4.5.1 Air duct connection layout (multiport plenum PLM)

- PLM plenum is provided with n°10 possible air connections of which n° 6 closed by insulated plates (A) fixed by selfdrilling screws, as shown on **fig. 10a**.
- in order to get the desired air inlet/air outlet layout, move opportunely and block again the plates on the connections really not used; do this before positioning the plenum.

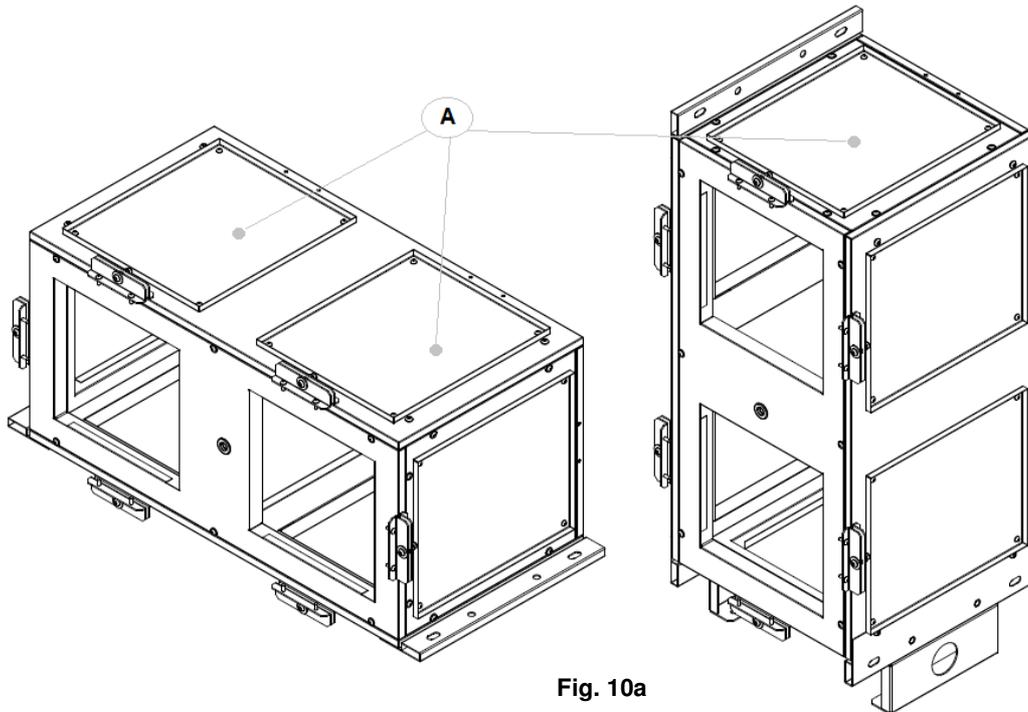


Fig. 10a

#### 4.6 Air duct connections



**IMPORTANT: DO NOT OPERATE THE UNIT IF FAN OUTLETS ARE NOT DUCTED OR NOT PROTECTED BY BY SAFETY GRID.**

- The air ducts must be correctly sized, in order to match unit external static pressure at duty airflow rate; take also into account the air pressure drop of possible options.
- In order to prevent water condensation and to reduce noise to the rooms, it is strongly suggested to install insulated air ducts or provide a duct insulation.
- Consider the need to install sound attenuators depending on unit sound level and the required acoustic comfort of the room to be treated.
- Between unit and air ducts always install suitable flexible joints; anyway, the electrical continuity must be ensured between air ducts (if metal type) and unit by a ground cable.
- **Air duct weight shall not load the unit or its possible external sections.**

#### 4.6.1 Installation of damper (SKR1, SKR2 supplied apart)

- Each damper is provided with holes on its coupling flange and supplied kit composed of adhesive perimetric gasket (A) and selfdrilling screws (B), as shown on **fig. 10b**.
- Apply the gasket all around the perimeter of the flange, place the damper in correspondence with the interested air intake/outlet so that its shaft is accessible and can't interfere with unit access doors or other functional elements, then fix by the selfdrilling screws.

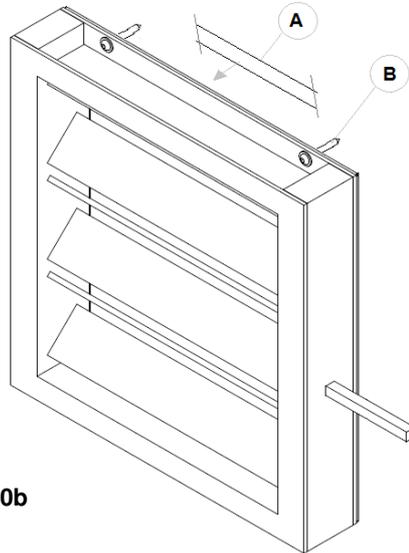


Fig. 10b



#### 4.7 Water and refrigerant connections

The installation and connecting of the piping is an operation that must be done correctly, otherwise it may compromise the performance of the system. At worst it may cause irreversible damage to the machine. These operations are to be effectuated by **qualified personnel**.

##### 4.7.1 Condensation outlet connection (HRS, CCS, CDX)

- Provide each point of condensation discharge with suitable drain trap, that shall be filled with water before starting up the unit.
- The drain trap shall be done as shown on **fig. 11**.
- The drain trap must have a tap for correct cleaning of the lower part, and must allow an easy disassembly.
- The path of the condensation drainage tube must always have a gradient toward external and shall not interfere with servicing
- Support the weight of discharge piping so as not to load the discharge junction on the unit/external section.

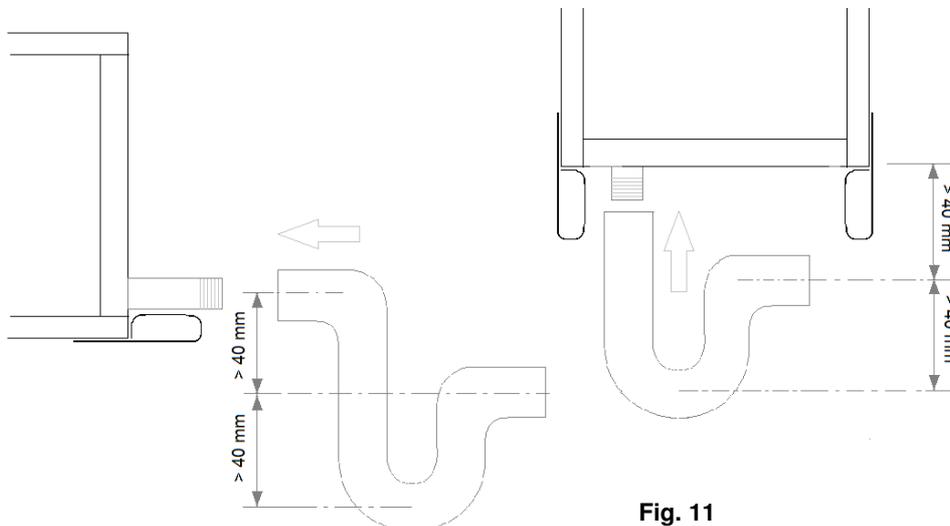


Fig. 11

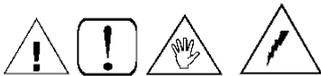
#### 4.7.2 Water coil connection (CCS)

- Water coil is provided with GAS male threaded connections.
- The tightening must be carried out with extreme care to avoid damage to the copper headers.
- The path of piping shall not interfere with scheduled and not scheduled maintenance operations.
- Follow instructions of **IN plate** and **OUT plate** to connect water inlet and water outlet respectively; different connections may lead to heating/cooling performance reduction. **To optimize the performance, air inlet side shall be opposite to water inlet side.**
- **Provide an air valve at the top of the piping (higher than unit top side), and a water discharge valve at the bottom of the piping.**
- Support water piping so as not to load the coil headers.
- Once connections are done, fix both annular external gaskets to avoid air leakage.
- In the event of operation at very low air temperature, fill the water circuit with antifreeze; the same shrewdness shall be carried out in the event of plant shut-off long periods at very low air temperature, if the water plant is not emptied.
- In the event of plant shut-off for scheduled or not scheduled maintenance, close the inlet and outlet manual cut off valves; furthermore, empty all the water drain trays.

#### 4.7.3 Direct expansion coil connections (CDX)

- Just use copper pipes suitable for R410A refrigeration and size them according to the following table; all pipes shall be preventively clean with nitrogen or dry air and shall be free from moisture.
- Freon coil is provided with welded plugs and filled and pressurized by nitrogen (**the upper plug is covered by insulation, it shall not be connected to the refrigerant circuit but sealed permanently**); while removing the plugs, be sure that coil is still pressurized, otherwise it could have leakage points. **In this event, do not repair the coil by yourself but ask for a spare section.**
- Go on welding the connections in a workmanlike.

CDX Model	ODS Connections [mm] Liquid line/Gas line
05	8/8
10-15-20	12/16
30	16/22
40	22/28



#### 4.8 Electrical connections

**Before starting any operation, be sure that main power supply is switched off. All power lines must be properly protected at the source by the installer.**

- Electrical connections to main board shall be carried out by **qualified personnel** only.
- Insure that voltage and frequency shown on CE unit plate match those of connecting power supply.

**Follow the connection of the unit and its accessories using adequate cabling for the power used, and respecting the country regulations. The dimensions of the cabling must be sufficient to support a voltage drop in start up phase inferior to 3% of the nominal.**

- For the main power supply of the unit and its possible accessories, the use of adapters, multiple plugs and extension leads shall be avoided.
- **It is the responsibility of the installer to insure that the installation of the unit is as close as possible to the main power supply, or sufficiently close to protect the electrical parts.**
- Connect the unit to an efficient power point, by using the glands near the electric box panel and the screw clamps (for connection to PCB) and spring clamps (for connection to terminal), inside the electric box.

## 5 – WIRING DIAGRAMS



Each unit is provided with internal wiring diagram, characterized by specific code. To match code and unit model see the following table :

HRS Model	Wiring diagram code
05	AMF0008070
10-15-20	AMF0008071
30-40	AMF0008072

In the back of electrical box panel it is also printed the basic unit external wiring diagram, connection to be carried out by the installer; wiring diagrams of options are shown on specific sections of HRS Control Manual (see next Chap. 6).

## 6 – ELECTRONIC CONTROL



Follow instructions of HRS Control Manual supplied with the unit (document code **MC00008**, valid for all HRS models).

## 7 – SCHEDULED AND NOT-SCHEDULED MAINTENANCE



**BEFORE SERVICING THE UNIT, SWITCH OFF THE MAIN POWER SUPPLY.**

- It is the responsibility of the User to carry out all types of maintenance operations.
- Only personnel previously trained and qualified may carry out maintenance operations.
- Should the unit require disassembly, hand and body protections are required.

Maintenance keeps unit efficiency, reduce the speed of deterioration over time and collect information and data to understand the efficiency of the unit and prevent failures. We suggest to prepare a booklet of installation according European legislation. Provide a machine book that allows you to track of the actions taken on the unit, so it will be easier to cadence adequately the various interventions and will facilitate a possible troubleshooting.

Please take note of: date, type of action, description of action, measurements performed, anomalies identified, alarms registered in the alarm history, etc. ...

### 7.1 Scheduled monthly check

#### 7.1.1 Air filters

Air filters are placed close to unit air inlets and are usually accessible :

- for horizontal unit, by lower hinged doors provided with recessed handles and kept closed by blocking devices (by these doors maintenance is both for filter and fan; **fig. 12a**)
- for vertical unit, by front hinged doors provided with recessed handles and kept closed by blocking devices (by these doors maintenance is both for filter and fan; **fig. 12b**)

Other special access to filter is also possible :

- for horizontal unit, by removing an end side panel provided with recessed handle (**fig. 13a**)
- for vertical unit, by removing an upper end panel provided with recessed handle (**fig. 13b**)

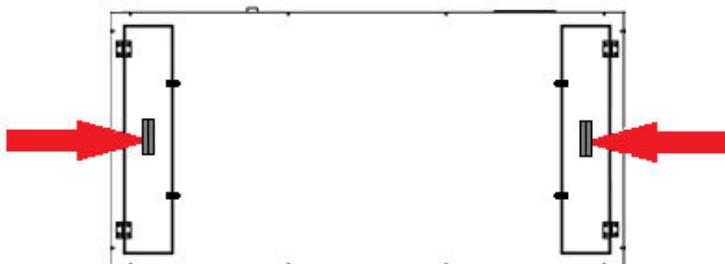


Fig. 12a

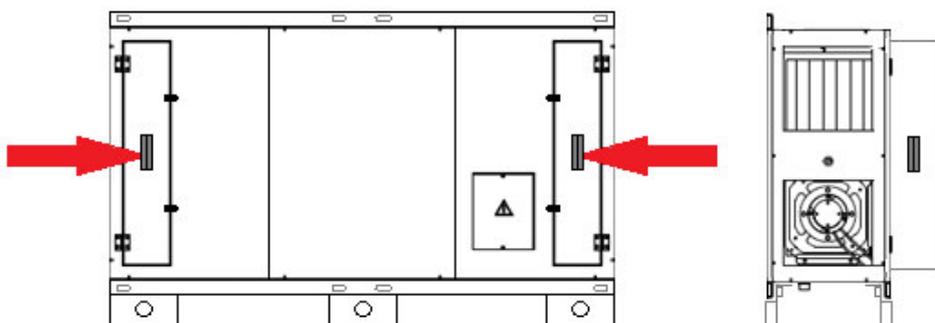
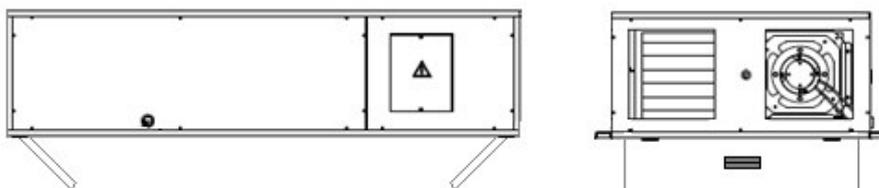
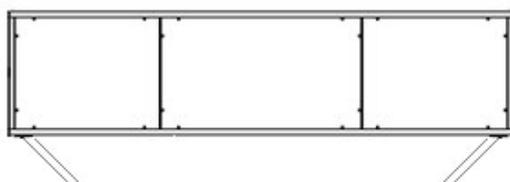


Fig. 12b



Once the door is open, the slipping of filter elements is prevented by a filter locking plate to be turned 90°(use a Phillips head screwdriver); after remounting filter elements, turn the locking plate in the opposite direction to the contact with filter frame, then block it (**fig. 12c**) :

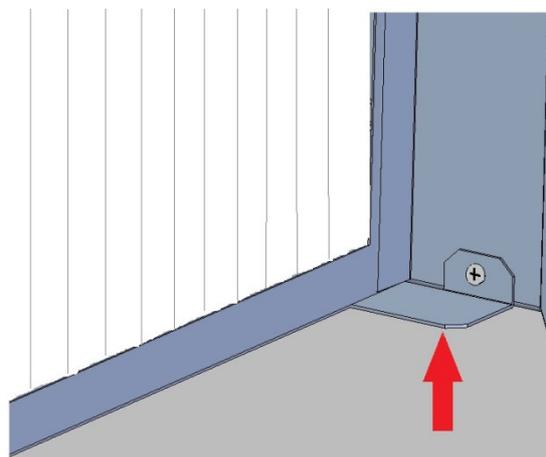


Fig. 12c

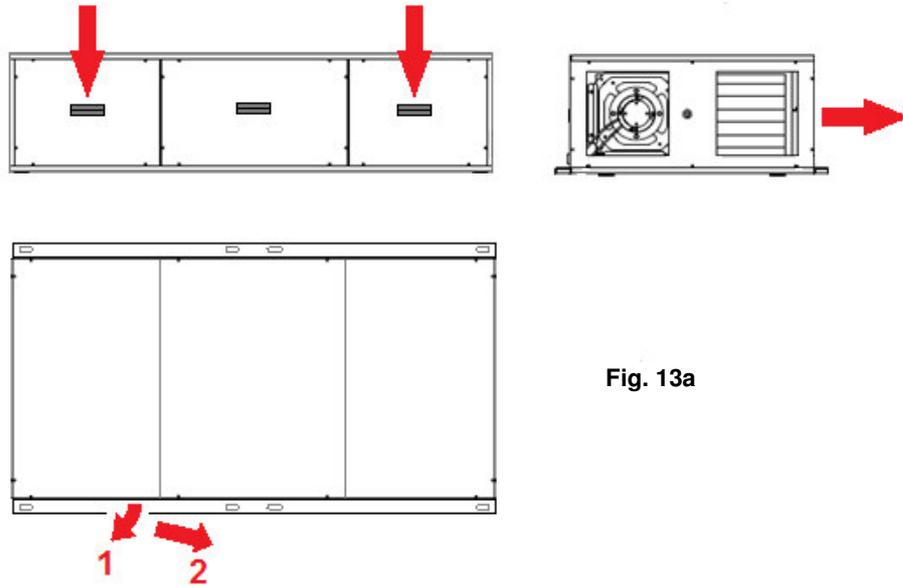


Fig. 13a

**Remove one end panel at a time** using an AW20 head tool to unscrew. For horizontal unit, once unscrewed, preventively turn the panel (1) and then remove it by side (2), in order to not interfere with the corner vertical supporting bar. For vertical unit, once unscrewed, directly move the panel upwards.

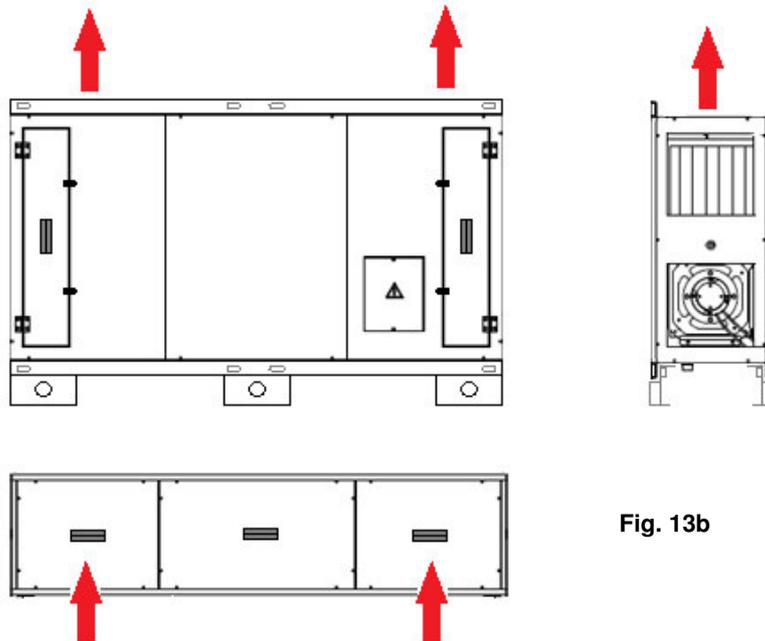


Fig. 13b

As standard equipment, unit is provided with compact filters (F7 class efficiency on fresh air intake, M5 class efficiency on return air intake); they are not cleanable, therefore, when dirty, they shall be replaced with new ones. Filters to be replaced shall be suitably packaged and brought to the nearest waste disposal. For an automatic check of filter condition it is suggested to use (optional) filter pressure switches.

## 7.2 Scheduled yearly check

Check all electrical devices, check that all electrical connections are well tightened. Similarly, check all mechanical and water connections.

### 7.2.1 Heat recovery

No particular maintenance operation is needed but the visual check of perfect cleaning and integrity of heat exchange surface. For this check it is needed to dismount, **one by one**, the panels for special access to filters (see previous 7.1.1).

### 7.2.2 Fans

Access to fan is as previously described for filter, by using hinged doors only (figg. 12a and 12b); check the perfect cleaning and the free rotation of the impeller.

## 7.3 Not scheduled maintenance

### 7.3.1 Removal and replacement of the fan

Enter fan section by the hinged door and unhook the fast plug.

Operate as described below (**fig. 14**) :

- 1) remove the fan stirrup (A) placed close to the door (use a Phillips head screwdriver)
- 2) gradually loosen the screws of the fan locking devices (B) using an 5 mm Allen key (just for HRS 15, 20, 30, 40) and drive the removal of the fan.

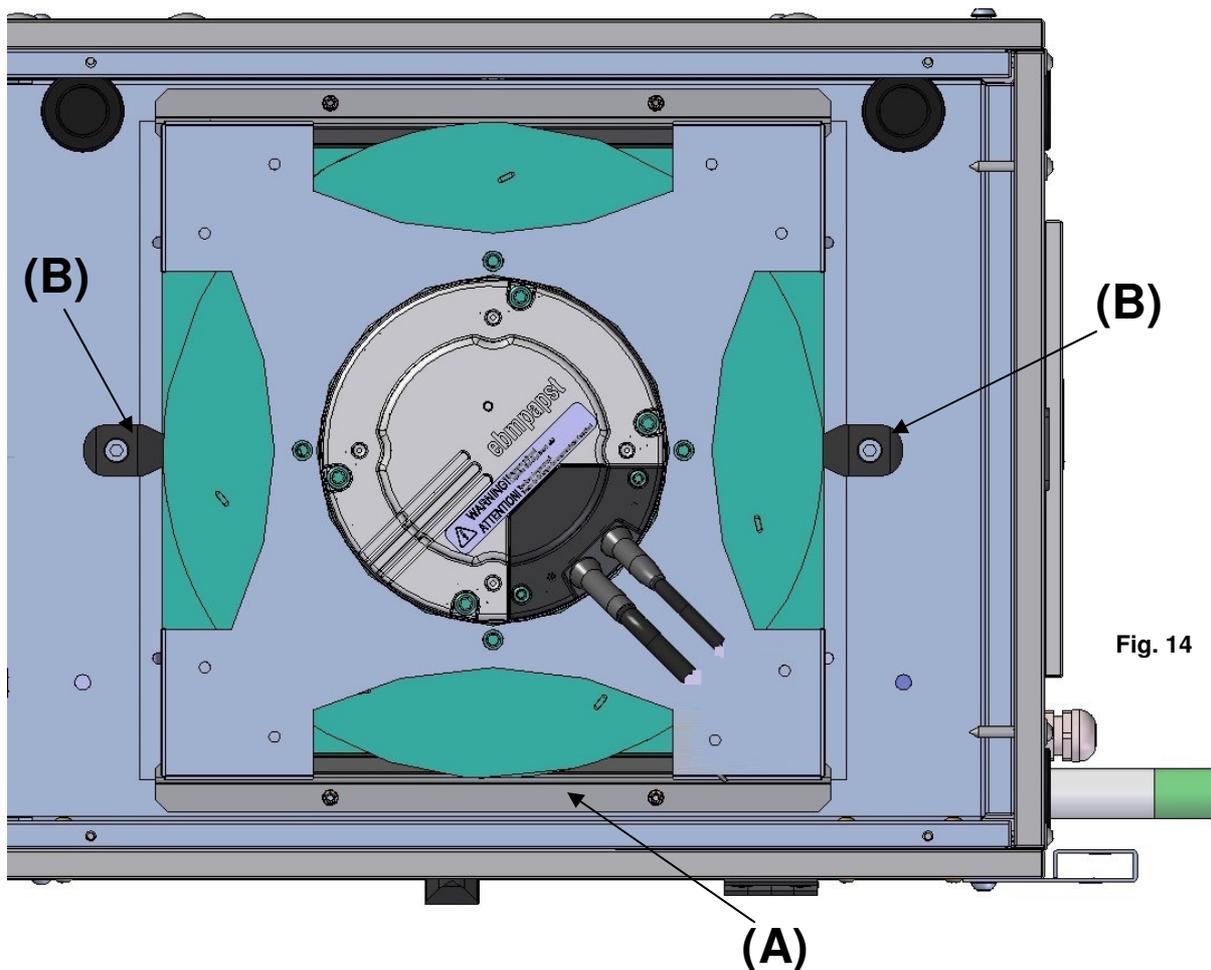


Fig. 14

For replacing the new fan, operate according to the opposite sequence.

### 7.3.2 Removal and replacement of by-pass actuator

By-pass device is inspected by removal of middle panel between the two end panels for special access to filters. To remove this panel operate as described below (**fig. 15**) :

- 1) dismount and remove one of the two end filter panels (figg. 13a e 13b)
- 2) loosen (but do not remove) the fixing screws of the second filter panel
- 3) unscrew and remove the fixing screws of the middle panel and remove it by side
- 4) screw the loosen screws

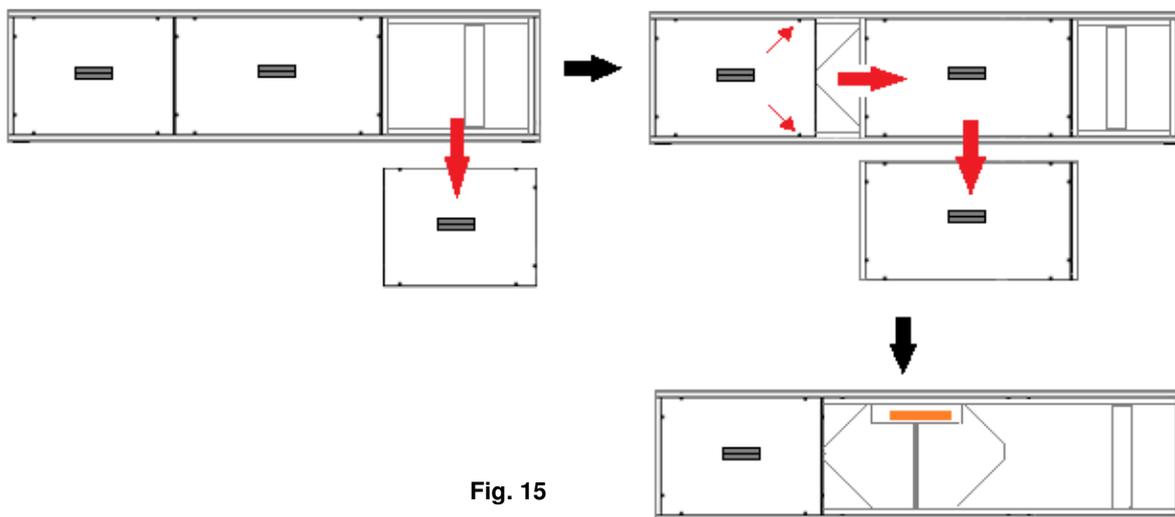


Fig. 15

To replace by-pass actuator preventively unhook the fast plug, placed inside the actuator space. Then (**figg. 16a e 16b**) :

- 1) loosen the damper shaft fixing bolt (C) (use 8 mm hex wrench)
- 2) unhook the actuator from its plastic lock (D)
- 3) lift the actuator up to make it free from damper shaft and remove it off complete with its cable.

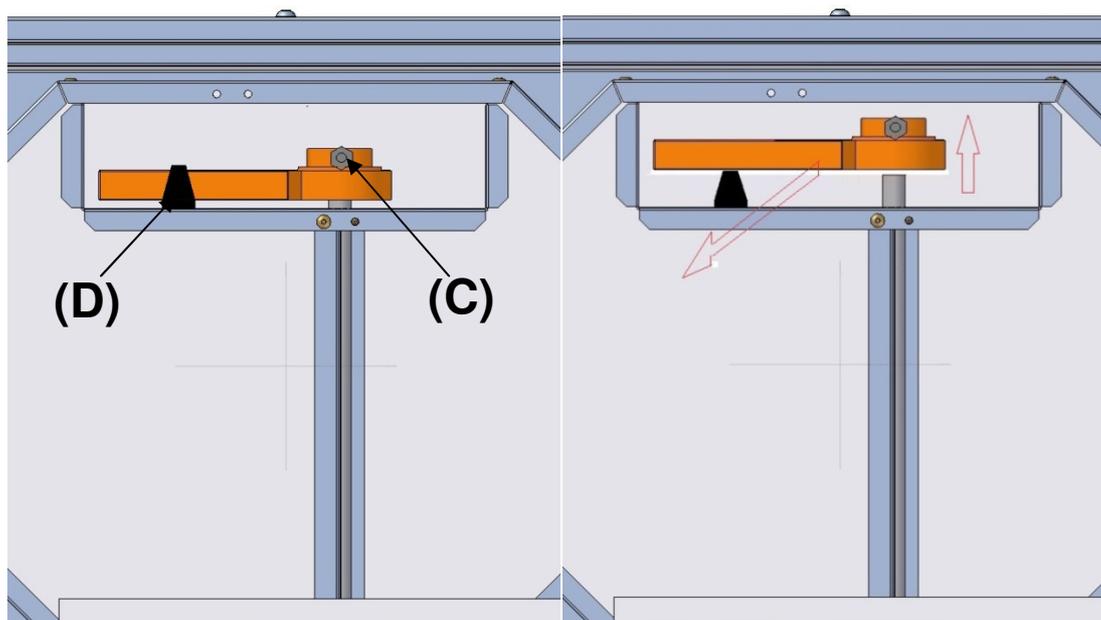


Fig. 16a

Fig. 16b

To install a new actuator operate according to the opposite sequence, taking care of keeping the same rotation range limits of the old actuator (eventually use the little magnet to make actuator rotation neutral). At re-mounting, fix the damper shaft to the actuator when by-pass duct is in closed position.

To re-mount the middle panel, operate as described below :

- 1) loosen (but do not remove) the fixing screws of the end panel already mounted
- 2) insert the middle panel and fix its screws and those loose of the adjacent filter panel
- 3) re-insert and fix the filter panel previously removed.

### 7.3.3 Manual reset of the internal electric heater(s); replacement of electric heater(s)

In the event of overtemperature of the resistive elements, a manual reset of the heater thermal protection could be needed. There are two release buttons (one suitable for horizontal unit, one for vertical unit), placed on the frame of the electric heater and they can be approachable by the end filter panels (fig. 17); to facilitate this service, a screwdriver can be used.

In case of replacing the heater operate as follows :

- 1) remove the middle panel also
- 2) disconnect the heater by the fast connector
- 3) by 5 mm Allen key remove the closure element of the sliding guide of the heater
- 4) remove the heater by side; depending on unit size, heater can be composed of 90°-articulated elements in order to operate within the gap spaces as described in previous 4.3
- 5) replace the heater with a new one following the opposite sequence

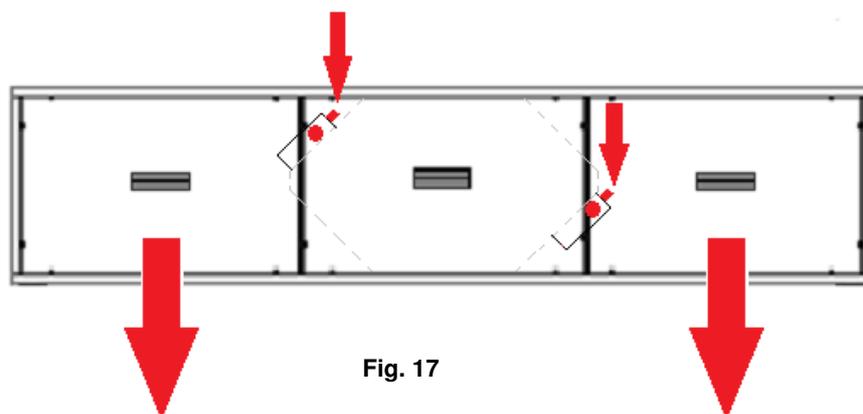


Fig. 17

### 7.3.4 Removal of roof cover (HRS vertical unit)

In the event of outdoor installation, access to upper panels is possible by preventive removal of the roof cover; this is fixed on each upper side by M6 screws, for which a 4 mm Allen key is needed (fig. 18).

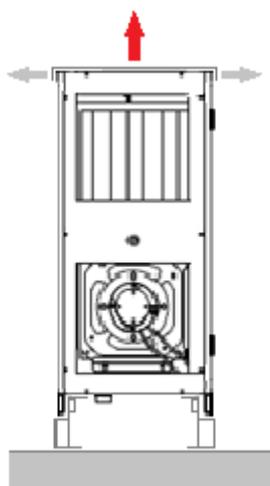


Fig. 18

## 8 – TROUBLESHOOTING



### 8.1 Failure searching and problem solving schedule

The follow table suggests possible solutions to face possible common detected failures; to solve errors or alarm conditions visualized by remote user interface, read HRS Control Manual.

Detected failure	Possible reason	Possible solution
Fans are not running	<ul style="list-style-type: none"> <li>No power supply</li> <li>Electrical connections wrong or loose</li> <li>Thermal protection on</li> <li>Fan speed signal missing</li> </ul>	<ul style="list-style-type: none"> <li>Switch on power supply</li> <li>Restore the right electrical connections</li> <li>Check the input current</li> <li>Check signal connection and setting</li> </ul>
Insufficient airflow	<ul style="list-style-type: none"> <li>Air filter dirty</li> <li>Air duct clogged</li> <li>Fan signal too low</li> </ul>	<ul style="list-style-type: none"> <li>Replace filter</li> <li>Check air plant (dampers closed ?)</li> <li>Adjust fan signal</li> </ul>
Insufficient heating/cooling performance	<ul style="list-style-type: none"> <li>Temperature setpoint not right</li> <li>Heat transfer fluid rate not right</li> <li>Heat transfer fluid temperature not right</li> <li>Airflow too low</li> <li>Defrost mode on</li> </ul>	<ul style="list-style-type: none"> <li>Adjust temperature setpoint</li> <li>Ensure the right fluid rate</li> <li>Ensure the right fluid temperature</li> <li>See above</li> <li>Wait for defrost cycle end</li> </ul>
Condensate discharge failed	<ul style="list-style-type: none"> <li>Discharge point clogged</li> <li>Drain trap missing or not suitable</li> </ul>	<ul style="list-style-type: none"> <li>Vacate the discharge point</li> <li>Install suitable drain trap</li> </ul>

## 9 – MATERIAL DISPOSAL



At the end of unit's lifetime, its components must be dismantled and disposed of respecting the operational regulations present in its country of installation.

The main materials used for building the unit are :

- Precoated galvanized steel sheet metal
- Galvanized steel sheet metal
- Aluminum
- Copper
- Polyester
- Polyethylene
- Glass wool
- Plastic



During disconnection of the unit, avoid gas leakage or liquid spillage on environment, especially if the water has additives like glycol. For dismissing and disposal, deliver the units to specialized centers according to your national laws.