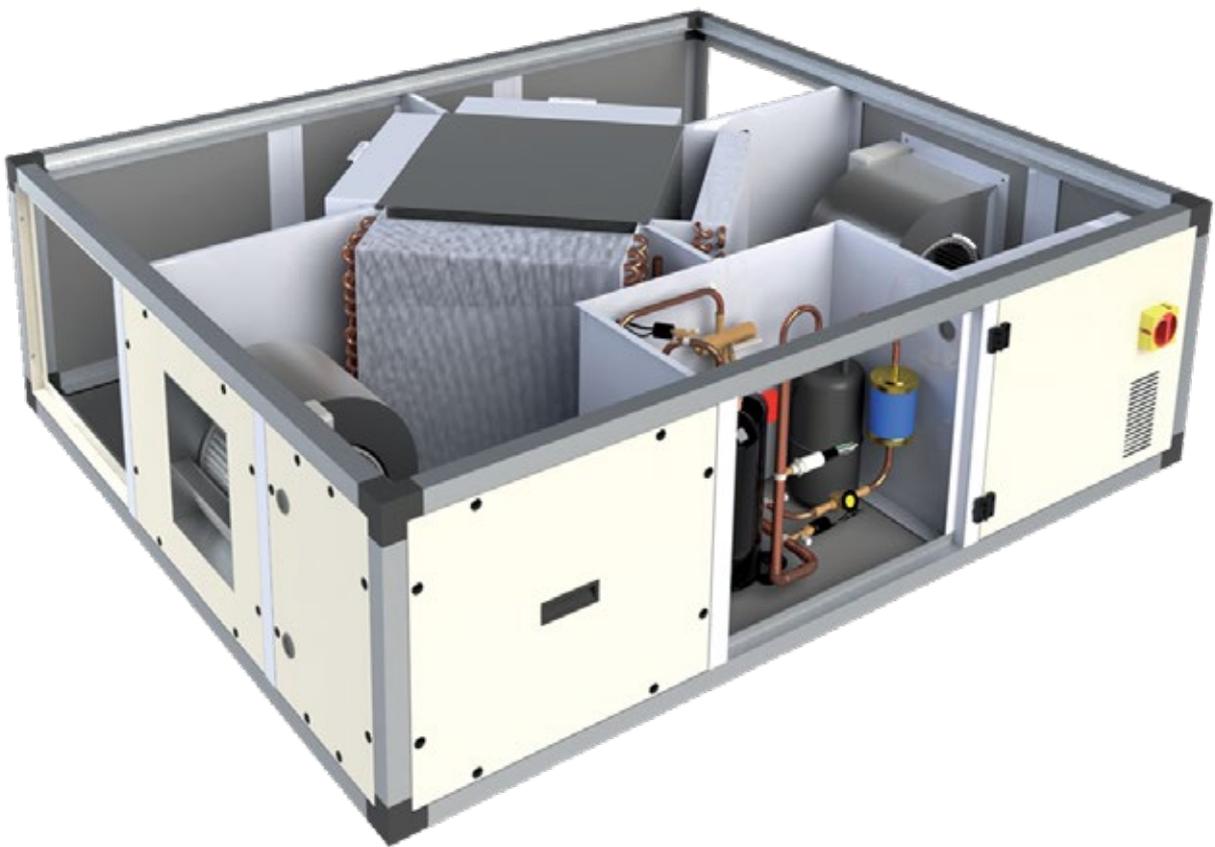


MiniAir MAP-HP & HPI*

Heat recovery unit combined to heat pump system

Installation, Operating and Maintenance

*HPI : with Inverter compressor



Important

Before performing any operation of the machine carefully read, understand and follow all instructions listed in this manual

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1. SYMBOLS USED

The machine has been designed and manufactured according to the current norms and consequently with mechanical and electrical safety devices designed to protect the operator or user from possible physical damage. Residual risks during use or in some intervention procedures on the device are however present. Such risks can be reduced by carefully following manual procedures, using the suggested individual protection devices and respecting the legal and safety norms.

The most important information concerning safety and proper use of the machine are accompanied by some symbols to make them highly visible:

	Warning
	Danger
	Danger risk of electric shock
	Attention only authorised staff
	Prohibition

2. WARNINGS AND GENERAL RULES

	This instruction book is an integral part of the appliance and as a consequence must be kept carefully and must ALWAYS accompany the appliance even if transferred to other owners or users or transferred to another plant. If damaged or lost, request another copy from the Manufacturer.
	Repair and maintenance interventions must be carried out by authorised staff or staff qualified according to that envisioned by this book. Do not modify or tamper with the appliance as dangerous situations can be created and the appliance manufacturer will not be liable for any damage caused.
	After having removed the packaging, ensure the integrity and completeness of the content. If this is not the case, contact the Company that sold the appliance.
	The appliances must be installed by enabled companies which, at the end of the job issues a declaration of conformity regarding installation to the owner, i.e. in compliance with the Standards in force and the indications supplied in this book.
	Any contractual or extracontractual liability of the Manufacturer is excluded for injury/ damage to persons, animals or objects owing to installation, regulation and maintenance errors or improper use.

We remind you that the use of products that employ electrical energy and water requires that a number of essential safety rules be followed, including:

	This appliance must not be used by children and unaided disabled persons.
	It is prohibited to touch the appliance when you are barefoot and with parts of the body that are wet or damp.
	It is prohibited to perform any maintenance or cleaning operation before having disconnected the appliance from the mains electricity network, by positioning the plant master switch at «off»
	It is prohibited to modify the safety or adjustment devices without the manufacturer's authorisation and precise instructions
	It is prohibited to pull, detach or twist the electrical cables coming from the unit even if it is disconnected from the electrical mains
	It is prohibited to climb onto the unit, sit on it and/or rest any type of object on it.
	It is prohibited to spray or jet water directly onto the unit.
	It is prohibited to open the doors for accessing the internal parts of the appliance without first having switched off the master switch of the «system».
	It is prohibited to disperse, abandon or leave the packing materials within the reach of children, as they are a potential source of danger

IMPORTANT NOTES

The units are designed and built exclusively for:

- internal installation, except to use specific option for outdoor installation;
- for air treatment in the civil environments, incompatible with toxic, explosive, inflammable and corrosive (chlorinated and saline included) gases.

Therefore it cannot be used in those environments where the air is mixed and/or altered by other gaseous composites and/or solid particles.

The use of the same for different purposes from those envisioned, not conform to that described in this manual, will make any direct and/or indirect liability of the manufacturer automatically become null and void.

3. TECHNICAL SPECIFICATIONS

3.1 GENERAL CHARACTERISTICS

- Frame made from extruded Anticorodal 63 aluminium alloy bars, connected by 3-way reinforced nylon joints.
- Sandwich panels, 23 mm thickness, galvanized sheet metal inner skin and precoated sheet metal outer skin; 45 kg/m³ density foamed polyurethane as heat and sound insulation.
- Filtering sections at both air intakes complete with ISO 16890 COARSE 55% efficiency cell filters, (G4 EN779), extractable from both lower and side removable panels.
- Direct driven double inlet EC motor centrifugal fans with dedicated driver.
- First step of energy recovery (static type) by air-to-air crossflow aluminium heat exchanger; lower drain tray, estende to the whole area of heat treatment.
- Second step of energy recovery (dynamic type) by air-to-air heat pump system (R410A for all sizes - Inverter driven compressor for MAP-HPi version) composed of electric driven compressor (rotating or scroll type depending on unit size), evaporating and condensating reversible Cu/Al finned coils, electronic expansion valve, liquid receiver and separator, 4-way reversible valve, high and low pressure switches, biflow freon filter, liquid indicator.
- Built-in electric box to control power loads, NTC temperature sensors on both air circuits, electronic controller to control room temperature, heating/cooling mode, defrost cycles and timer control system; built in control panel.
- Display control and new electrical box optimized for better heat dissipation and increased accessibility for the operator; also facilitated the connection to main board for the accessories.
- Logic control specially designed for reducing electrical consumption and adjusting the working capacity to temperatures, humidities and the ambient crowding (option); alternative possibility for thermoregulation in function of return/ambient temperature or supply temperature fixed point.
- Modbus RTU PCB interface (optional) for supervision of the operative parameters in real time.

3.2 GENERAL DATA MAP-HP

MODEL		35E	60E	100E	150E	230E	320E	450E
Nominal air flow	m ³ /h	350	500	1000	1500	2300	3200	4500
Supply ESP	Pa	270	270	295	290	365	265	270
Return ESP	Pa	245	245	240	230	305	195	205
Sound pressure level (1)	dB (A)	59/47/52	64/50/55	62/49/54	67/54/57	65/51/59	68/54/59	70/56/59
OPERATING LIMITS								
Limit operating temperatures (2)	°C / %	☼ Min -10°C OUT & Min 19°C 50% IN (6) *** Min -20°C OUT & Min 19°C 50% IN (7)						
	°C / %	☼ MAX 38°C 50% OUT & MAX 27°C IN						
Airflow change range	%	-10%... +10%						
UNIT ELECTRICAL FEATURES								
Power supply		230V / 1 Ph / 50 Hz				400V / 3 Ph / 50 Hz		
Full load amperage (2)	A	5,3	9,0	13,2	20,2	10,0	15,4	16,8
HEATING CAPACITIES (3)								
Static recovery efficiency	%	62	51	50	50	50	50	50
Total heating capacity	W	3580	5790	9410	14390	21190	30260	36010
Heat pump capacity	W	1740	2960	5010	7690	11090	16300	17300
COP globale / Unit COP (4)	W / W	10,9	9,6	9,2	8,6	8,9	9,9	12,6
Supply air temperature	°C	24	23	22	22	22	22	18
COOLING CAPACITIES (5)								
Static recovery efficiency	%	56	50	50	50	50	50	49
Total cooling capacity	W	2210	3450	5840	8720	12830	18390	21440
Cooling capacity	W	1810	2860	4890	7270	10580	15310	16990
Unit EER (4)	W / W	4,2	3,9	4,2	3,9	3,9	4,1	5,0
Supply air temperature	°C	19	20	20	20	20	20	21
REFRIGERANT CIRCUIT								
Refrigerant		R410A						
Circuits number		1	1	1	1	1	1	1
Refrigerant filling	Kg	1,5	1,5	2,6	3,0	3,2	3,6	3,8
CO ₂ equivalent	Ton	3,1	3,1	5,4	6,2	6,6	7,5	7,9

(1) Sound pressure level calculated at 1 m far from: ducted air outlet / air intake / compressor box.

(2) At nominal airflow rate

(3) Outside air at -5° 80% RH; room air at 20°C 50% RH

(4) Fan motor input not included

3.2 GENERAL DATA MAP-HPI

MAP - HPI		35 E	60 E	100 E	150 E	230 E	320 E	450 E
Nominal air flow rate	m ³ /h	350	600	1000	1500	2300	3200	4500
External static pressure Supply ⁽¹⁾	Pa	270	285	295	290	365	265	270
External static pressure Return ⁽¹⁾	Pa	215	215	240	230	305	195	205
Electrical power supply	V/ph/ Hz	230 / 1 / 50-60				400 / 3+N / 50		
Full load amperage	A	5,5	9,0	13,0	20,0	10,0	16,0	18,0
OPERATING LIMITS								
Winter operation Minimum outdoor temperature		- 10 °C / -20 °C ⁽²⁾						
Winter operation Standard version Minimum indoor temperature		+ 19 °C / 50%						
Summer operation Maximum outdoor temperature		+ 38 °C / 50%						
Summer operation Maximum indoor temperature		+ 27°C						
HEATING CAPACITIES								
Total heating capacity ⁽³⁾	kW	3,4	5,7	9,8	14,3	20,8	29,6	35,6
Heat pump capacity		1,7	3,0	5,1	7,4	10,1	15,3	16,6
COP ⁽⁴⁾		10,3	8,9	9,4	9,6	12,6	10,6	13,8
Static recovery efficiency	%	62	51	50	50	50	50	50
Supply air temperature	°C	23,5	23,2	24,1	23,	21,5	23,0	19,0
COOLING CAPACITIES								
Total cooling capacity ⁽⁵⁾	kW	2,2	3,6	6,3	9,0	13,4	19,4	21,9
Cooling capacity		1,8	3,0	5,3	7,5	11,0	16,2	17,7
EER ⁽⁴⁾		4,7	4,3	4,5	4,3	5,6	4,7	5,9
Static recovery efficiency	%	54	50	50	50	50	50	49
Supply air temperature	°C	18,5	19,6	19,6	19,9	19,6	19,5	21,2
REFRIGERATION CIRCUIT								
Number of circuits		1						
Refrigerant		R410						
Refrigerant load	kg	1,5	1,5	2,6	3,0	3,2	3,6	3,8

(1) At nominal airflow rate

(2) With mixing chamber option (RMS)
Nominal airflow rate and 40% fresh air maximum

(3) Outdoor air temperature : -5°C / 80% RH
Ambient air temperature : 20°C / 50% RH

(4) Fan motor input not included

(5) Outdoor air temperature : 32°C / 50% RH
Ambient air temperature : 26°C / 50% RH

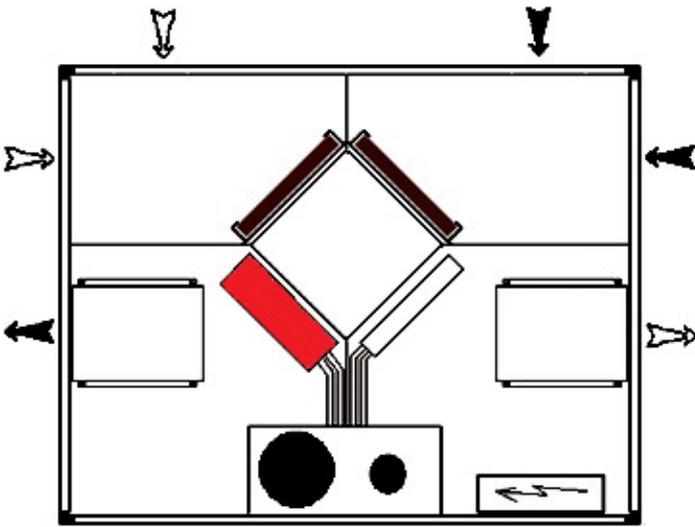
3.3 AIRFLOW CONFIGURATIONS - MAP-HP

Top views

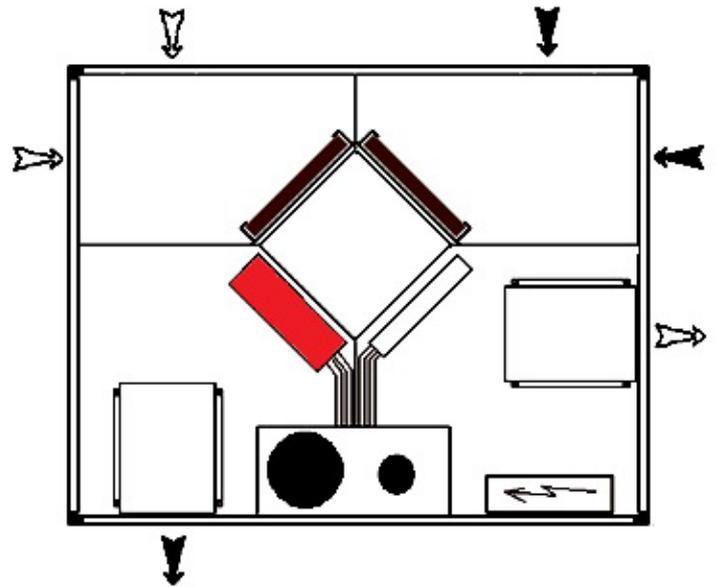
According to air duct layout, unit air intakes and air outlets can match up to 4 plant configurations (01, 02, 1S, 2S) as shown below, each of which to be specified at ordering.



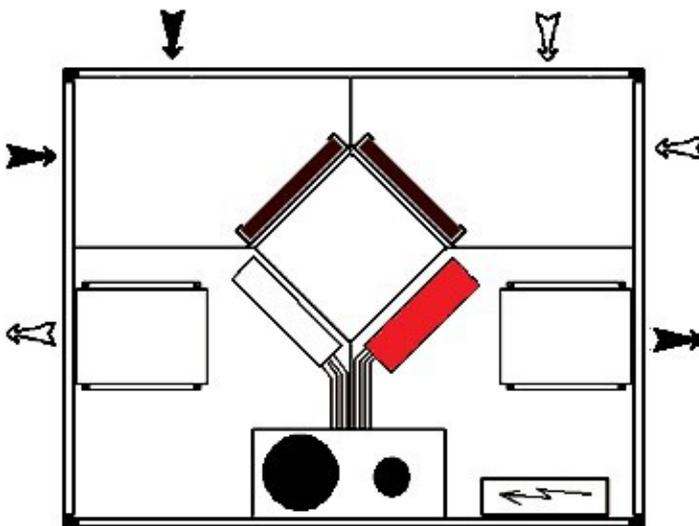
CONFIGURATION TYPE 01
(Standard Type)



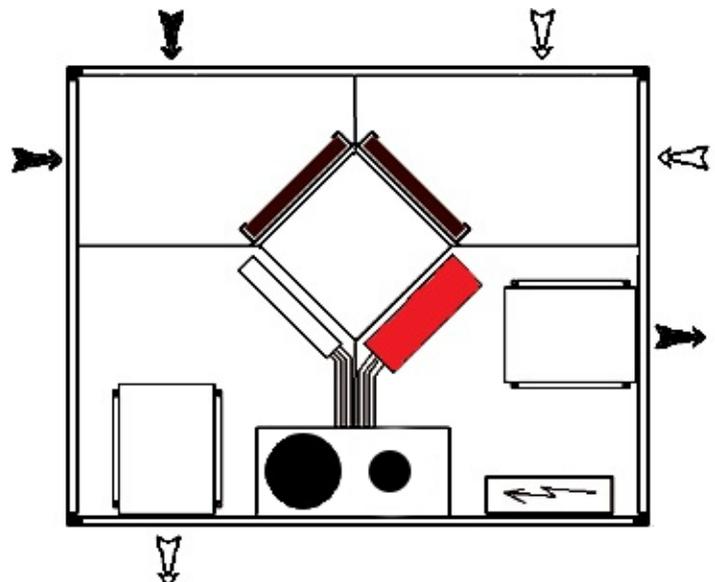
CONFIGURATION TYPE 02



CONFIGURATION TYPE 1S



CONFIGURATION TYPE 2S

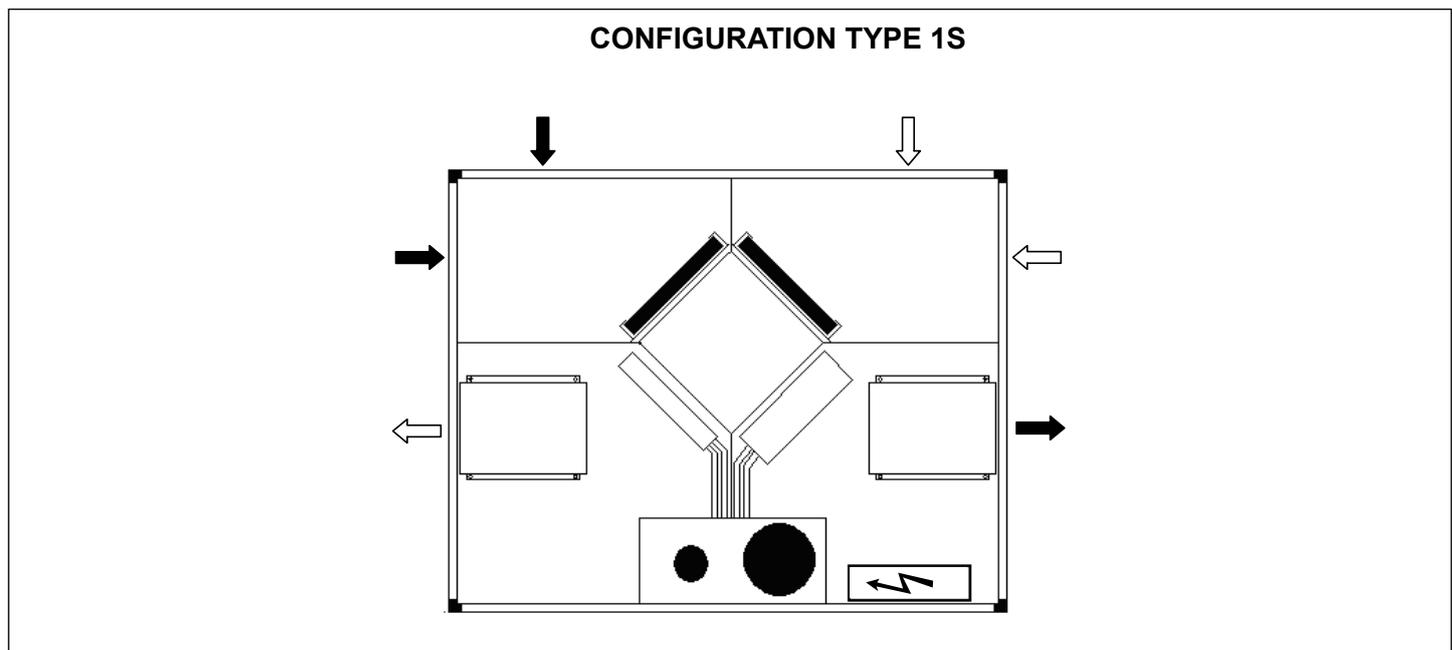
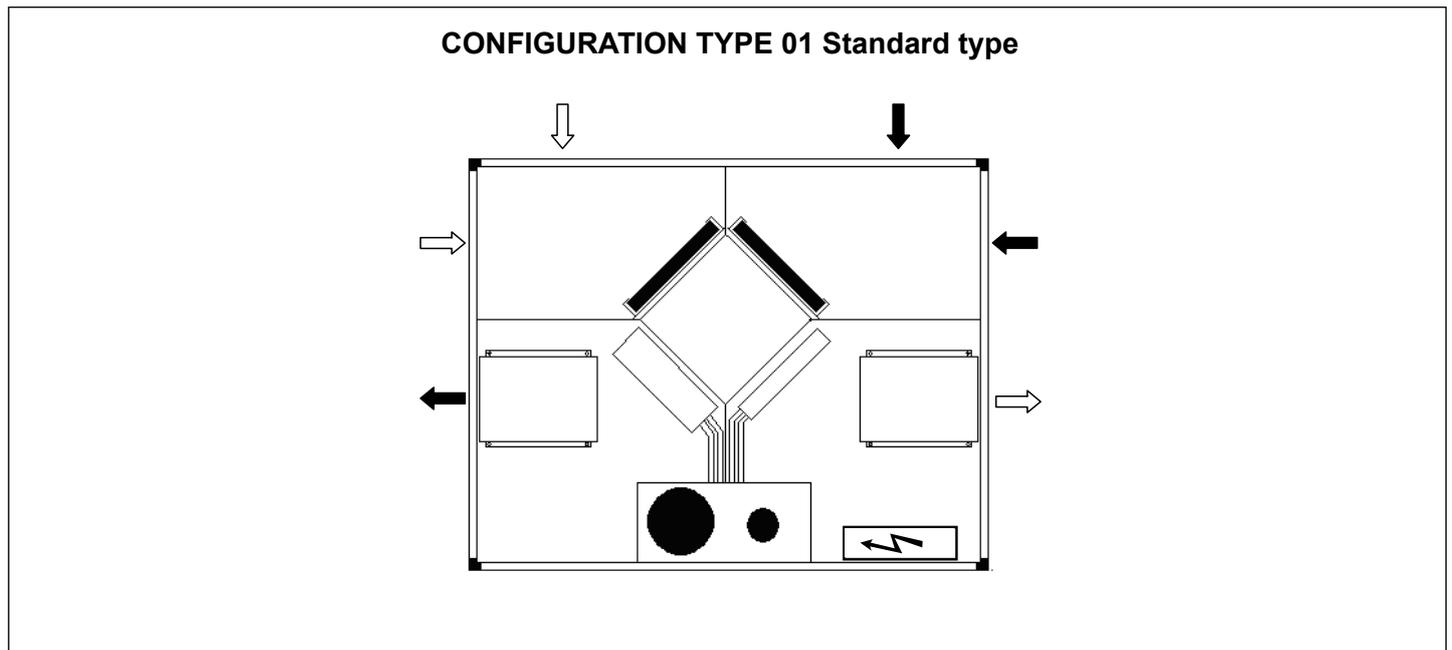


The air intakes can be layed in-line or at 90° by changing closing panels each other.

3.3 AIRFLOW CONFIGURATIONS - MAP-HPI

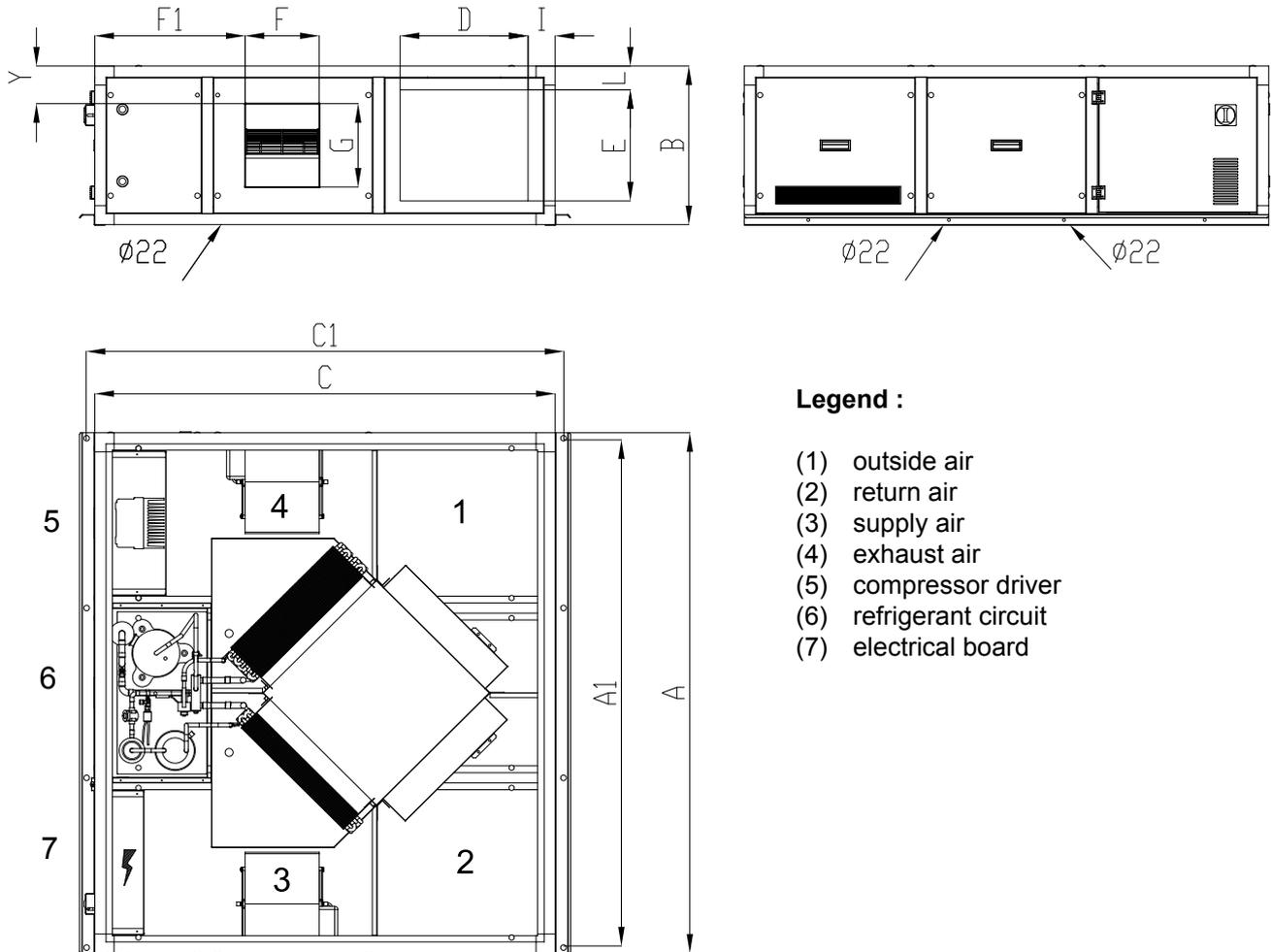
Top views

According to air duct layout and available technical spaces, one of four possible unit configurations can be chosen, as shown below; air intakes can be easily set so that in-line or 90° layout can be matched, by moving a side closing panel on jobsite also



The air intakes can be layed in-line or at 90° by changing closing panels each other.

3.4 DIMENSIONS AND WEIGHTS



Legend :

- (1) outside air
- (2) return air
- (3) supply air
- (4) exhaust air
- (5) compressor driver
- (6) refrigerant circuit
- (7) electrical board

MINIAIR MAP-HP & MAP-HPI		35 E	60 E	100 E	150 E	230 E	320 E	450 E
A	mm	1540	1540	1840	1840	2040	2040	2240
B		370	370	410	500	550	650	710
C		1240	1240	1440	1440	1690	1690	1890
A1		1495	1495	1795	1795	1995	1995	2195
C1		1294	1294	1494	1494	1744	1744	1944
D		300	300	400	400	500	500	600
E		210	210	210	310	410	510	510
F		232	232	233	233	299	332	332
F1		458	458	703	470	571	500	604
G		115	115	264	264	264	291	291
I		85	85	85	85	85	85	85
L		80	80	80	75	70	70	80
Y		90	90	55	118	120	180	180
Weight	kg	122	125	185	228	267	281	329

4 - TRANSPORT



4.1 PACKAGING

- The heat recovery unit and its accessories lay on pallets and are wrapped with multilayer protective film which must remain integral until assembly.
- Units and their accessories are usually packed together inside cardboard boxes, to be kept intact until installation. For technical reason, accessories or parts not mounted inside the basic unit can be packed apart and fixed outside or inside the unit

4.2 HANDLING AND TRANSPORT

- Handle the packed unit by using proper means according to the current regulation and depending on the unit weight, shown on this manual
- Avoid uncontrolled rotations
- Take care of loading/unloading operations; all units shall be loaded and stored on the truck by interposing suitable spacers in order to protect all protruding parts (such as handles, water connections, etc.)

4.3 CONTROL AND RECEIPT

On receipt of the unit please control all parts in order to check that they have not been damaged during transport. Any damage must be communicated to the carrier, affixing the reserve clause on the way bill, specifying the type of damage.

4.4 STORAGE

In the case of prolonged storage, keep the machines protected from dust and away from sources of vibrations and heat. **The manufacturer declines all liability for damage caused to bad draining or no protection from atmospheric agents.**

5 - INSTALLATION AND START-UP

5.1 DEFINITIONS

CUSTOMER :

The customer is the person, the agency or the company who bought or rented the unit

USER / OPERATOR :

The operator or user is the physical person who uses the unit for the purpose for which it was designed

SPECIALISTIC STAFF :

It is composed by the physical trained persons, able to recognize any danger due to the proper and improper use of the unit and able to avoid or repair it.

5.2 SAFETY STANDARDS

The Manufacturer declines all responsibility for the failure to comply with the Safety and Accident-prevention Standards described below.

It also declines all liability for damage caused by improper use of the heat recovery unit and/or modifications performed without authorisation.

- Specialised staff must perform installation.
- Wear suitable and accident-prevention clothing during installation, for example: goggles, gloves etc. as indicated in the current regulation
- During installation operate in complete safety, clean environment and free from obstructions.
- Respect the laws in force, in the country in which the machine is installed, relative to use and disposal of packaging and the products used for cleaning and maintenance of the machine, as well as complying with that recommended by the producer of these products.
- Before starting the unit, check the perfect integrity of the various components of the entire plant.
- Do not touch moving parts or intervene between these.
- Do not perform maintenance and cleaning until the electric line has been connected.
- The maintenance and replacement of damaged or worn parts must only be performed by specialised staff and

following the indications given in this manual.

- The spare parts must correspond to the requirements defined by the Manufacturer.
- If the heat recovery unit must be dismantled, follow the envisioned antipollution standards.

Note : When using the heat recovery unit, the installer and user must consider and solve all risks connected to the plant.

For example, risks deriving from the entry of foreign bodies or risks due to the conveying of dangerous inflammable or toxic gases at a high temperature.



5.3 PRELIMINARY INFORMATION

- Work while meeting the current safety regulations, ensuring sufficient space to move and the cleanliness of jobsite
- Wear protective clothing and personal protective equipment (glasses, gloves, etc.)
- Move the packed section as close as possible to the place of installation
- Don't place tools or other jobsite equipment over the packed unit
- Don't use the unit as a store of yard tools
- Don't touch moving parts and don't use them as supports
- Check the full integrity of all unit components



5.4 INSTALLATION LOCATION AND UNIT POSITIONING

- Unit has been designed to be placed inside; the outdoor installation is possible respecting the nominal working conditions and using the accessories "Rain cover protection" and "Rain hood kit"
- Place the unit over a solid support structure, suited to unit weight; always interpose proper anti-vibration devices between the unit and the supports (see fig. 1). Avoid rigid connections, they are source of mechanical transmission of vibrations
- Adjust the height of support points so that a 3 mm slope on the water outlet side is possible; this will help condensate water to flow out
- Place the unit so that the water condensate outflow can be easy and keep at least 80mm free for the installation of the syphon
- Don't install the unit where there could be flammable gases, acidic or corrosive substances, which may irreparably damage the internal components of the unit
- Leave a gap space of min 500 mm (see fig. 2) between the unit side and the closest obstacles, according to the unit configuration
- **In case of false ceiling installation, provide suitable lower opening panels to enter fan and filter sections; furthermore, provide lower opening for air ventilation of compressor driver.**

The non-compliance of the gap spaces may lead to the inaccessibility to unit components, making them impossible for any maintenance.

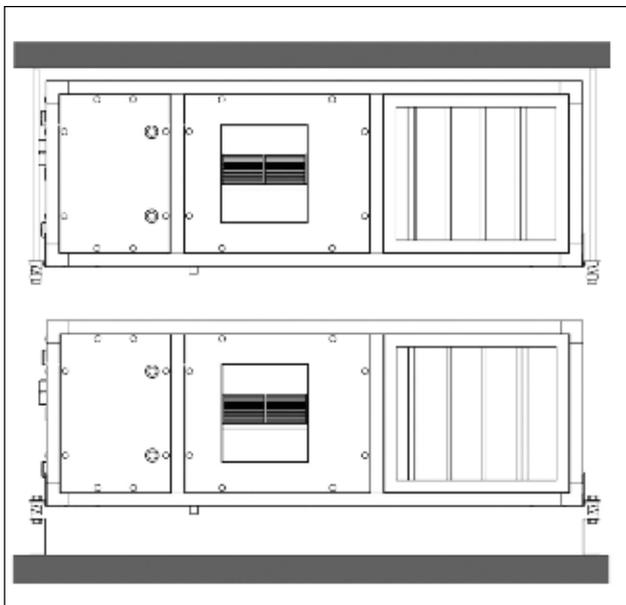


Figure 1

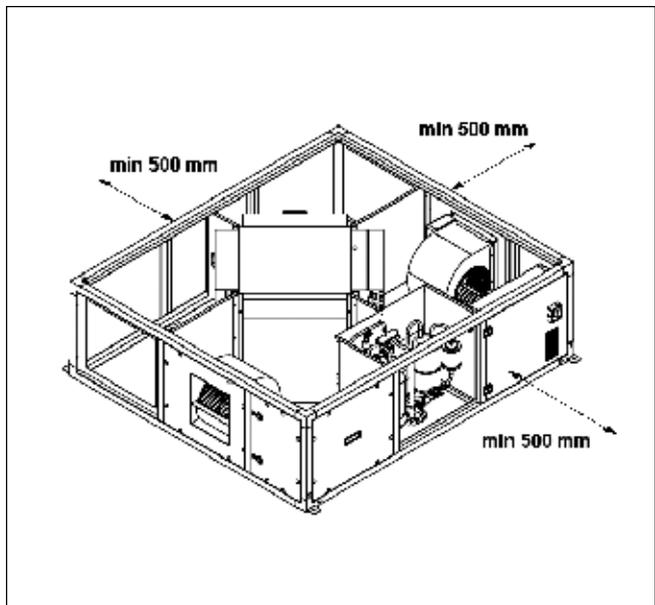


Figure 2

5.5 CONNECTION TO AIR DUCTS

- Size air ducts depending of air plant and unit external static pressure (including possible additional air resistances due to duct sections, sound attenuators, etc.); air resistance higher than unit ESP causes a reduction of airflow rate and a consequent reduction of heat pump efficiency
- Use insulated as far as possible ducts, to reduce heat loss, to mitigate the noise into the room and to prevent condensation
- Avoid abrupt deviations or curved air ducts on unit air outlets
- Interpose anti-vibration and flexible connections between unit and air ducts, anyway, ensure electrical continuity between unit structure and air duct (if metallic)
- Avoid air supplied directly into the room and air expelled directly into the atmosphere; prefer short or long duct connection
- Compare unit sound level to the required room acoustic comfort and, if necessary, install suitable sound attenuators

5.6 WATER CONNECTIONS

- For each outlet, the condensate pipeline shall be provided with a syphon to win the air underpressure at outlet
- Each syphon shall be sized according to instructions on fig. 3
- Each syphon shall be provided with a cap for cleaning or shall be easy to remove; prime each syphon before starting up
- Condensate pipeline shall have a fall out
- Check that pipeline doesn't stress condensate outlet connection

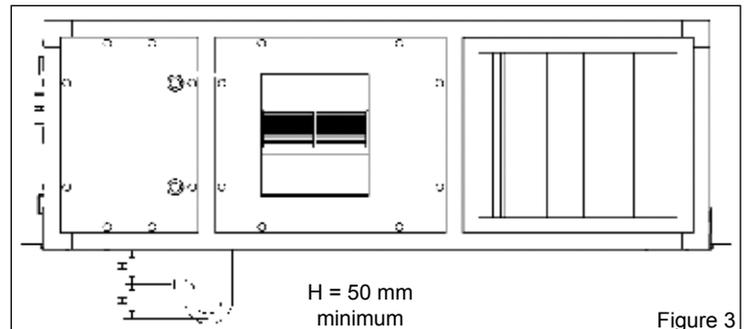


Figure 3

5.6.1 SBFR section hydraulic connections

- The installation and connection operations of the pipes are operations that can compromise the good functioning of the plant or worse, cause irreversible damage to the machine. These operations must only be performed by specialised staff
- The section with water coil is supplied with "male" connections with gas threading
- Tightening must be performed carefully to prevent damage to the copper collectors in the coil
- The route of the pipes must be studied in a way not to create obstacles if the unit coil is extracted
- Water inlet/outlet must be such to allow countercurrent heat exchange: follow the indications of the WATER INLET and WATER OUTLET plates
- Envision a high vent valve and a low discharge valve
- Clamp the pipes adequately to the outside of the section to prevent the weight being unloaded onto the coil
- When connection has been made, push the external gasket well against the panel to prevent seepage of air
- Insulation must be flush to the panel in order to prevent the danger of condensation
- Envision anti-freeze device
- Envision on-off valves to isolate the coil from the rest of the circuit in the case of extraordinary maintenance
- In the case of installation in zones with particularly cold climates, empty the plant for long standstill periods

5.6.2 Connection of the SBFR section condensate drain

- The stainless steel condensate drip tray has a drain with external diameter of 22 mm
- The drain system must have a suitable syphon in order to prevent the infiltration of odours or insects
- The syphon must finally have a cap for cleaning the lower part or must however allow quick disassembly for cleaning
- The route of the condensate drain pipe must always slope towards the outside
- Make sure that the condensate flow pipe does not stress the drain connection

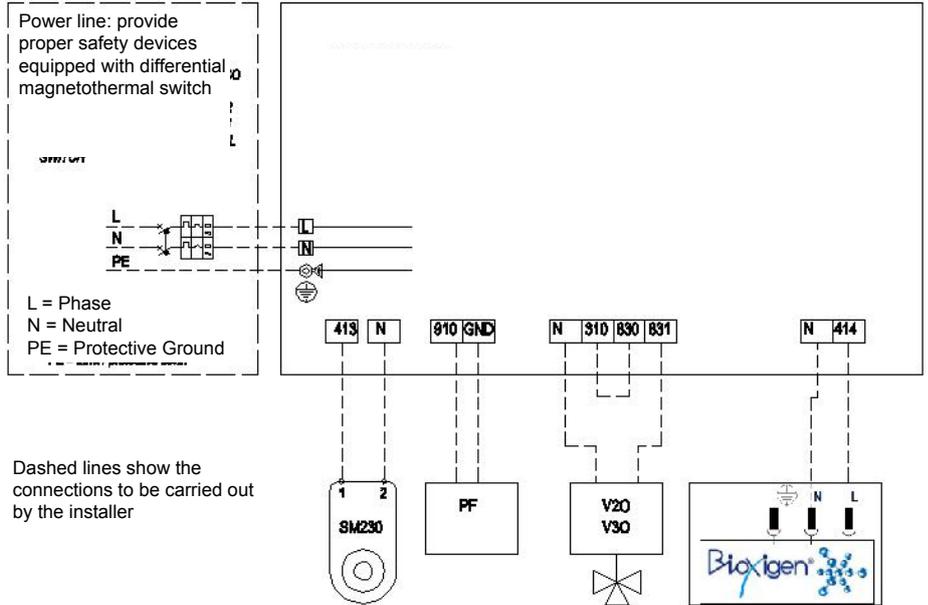
6 - ELECTRIC CONNECTIONS

- Before carrying out any service, check that main power supply is OFF
- All power lines shall be protected upstream by the installer
- Make sure that electrical features shown on unit plate are compatible with ones of power line
- It's not allowed to use adapters, power strips and/or extension cords
- Make connections for the basic unit and for the possible options by gauge cables for the power while meeting the current regulations, according to the electrical wiring diagrams supplied with this unit and this handbook
- Use the cable holes on unit front panel to connect the built-in electrical board

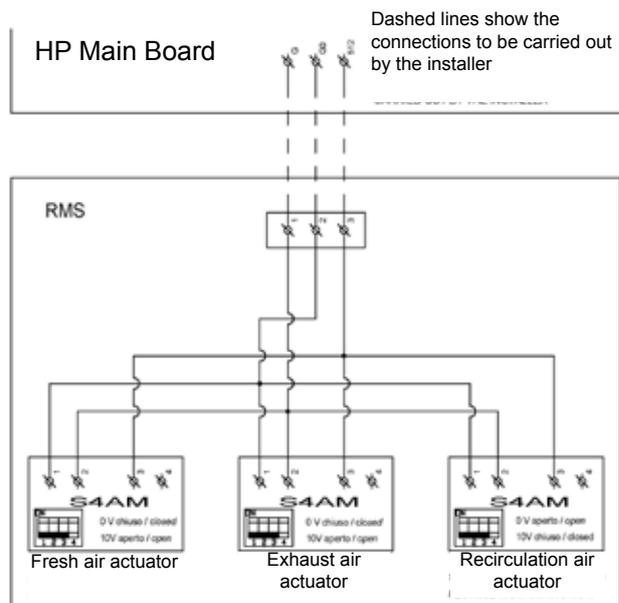
WIRING DIAGRAM

MAP-HP 35 / 60 / 100 / 150

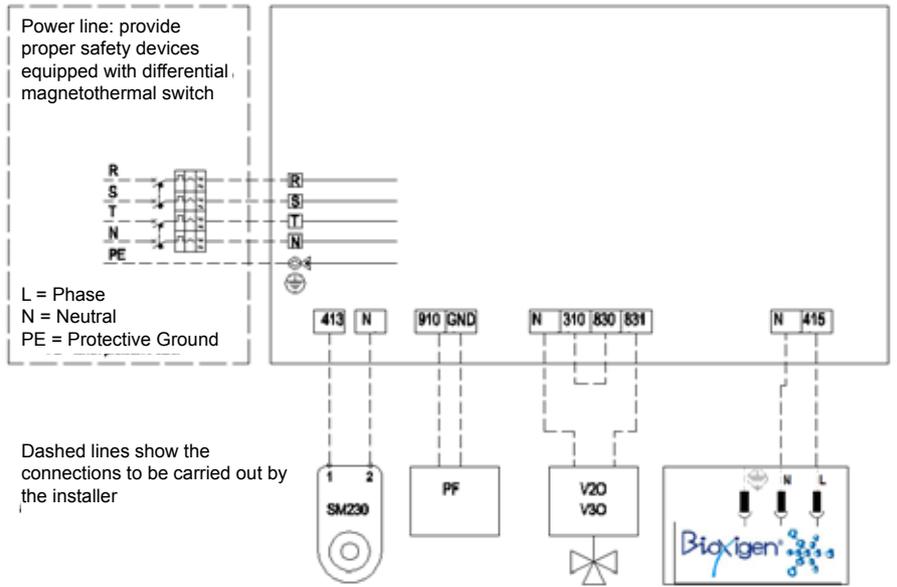
(WITH SM230, PF, V2M, V30, BIOX)



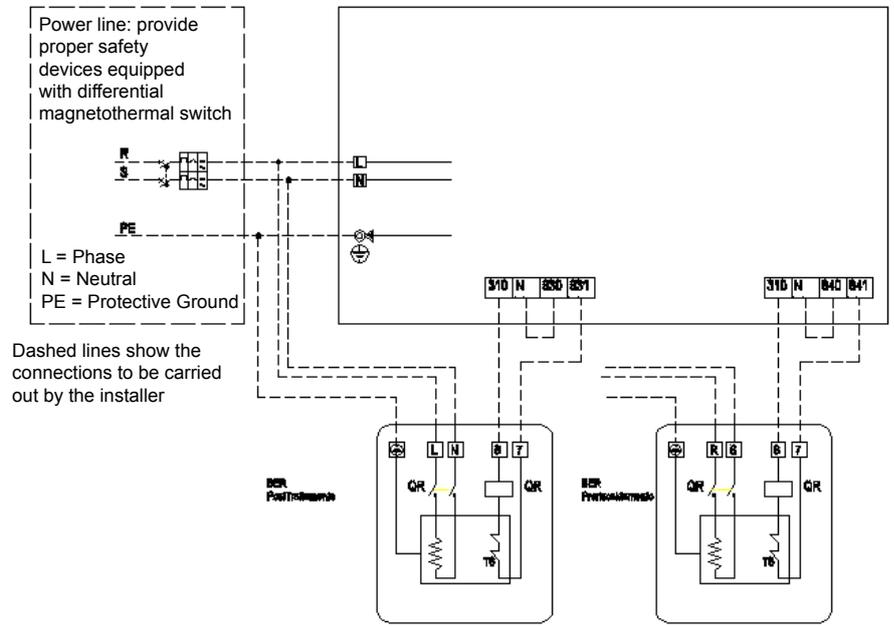
Wiring Diagram RMS Option



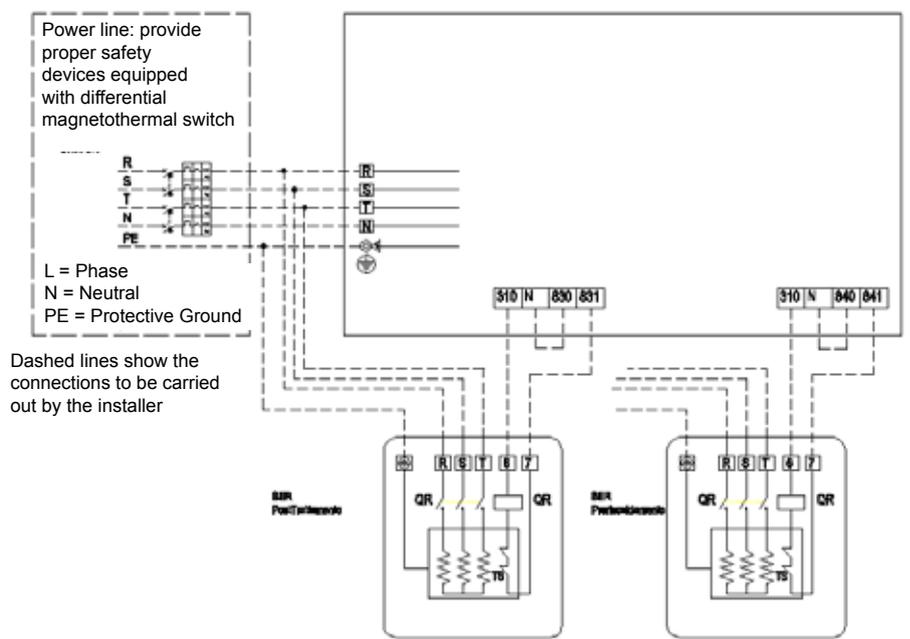
Wiring Diagram
MAP-HP 230/320/450
 (WITH SM230, PF, V2M, V3O, BIOX)



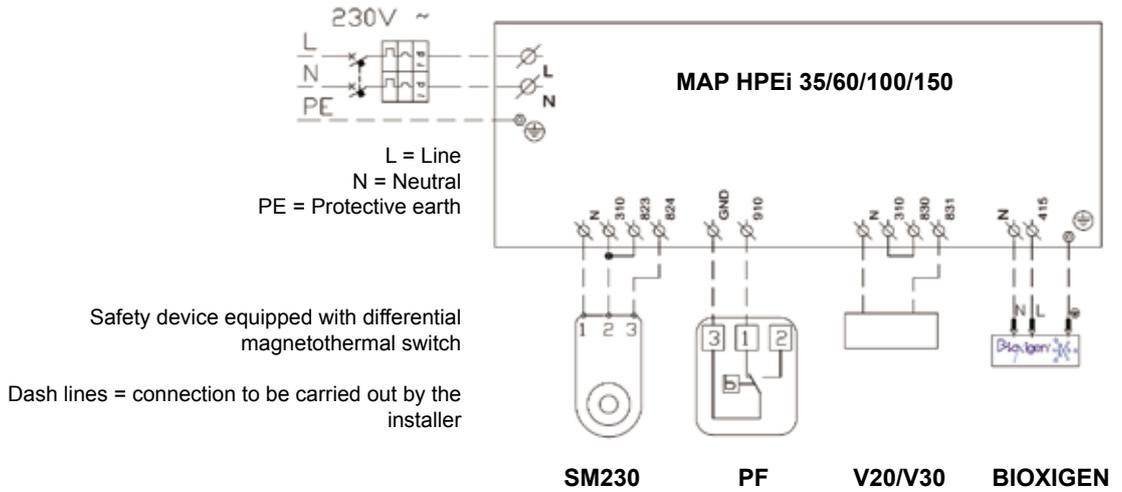
Wiring Diagram
MAP-HP 35/60/100/150
 (with BER)



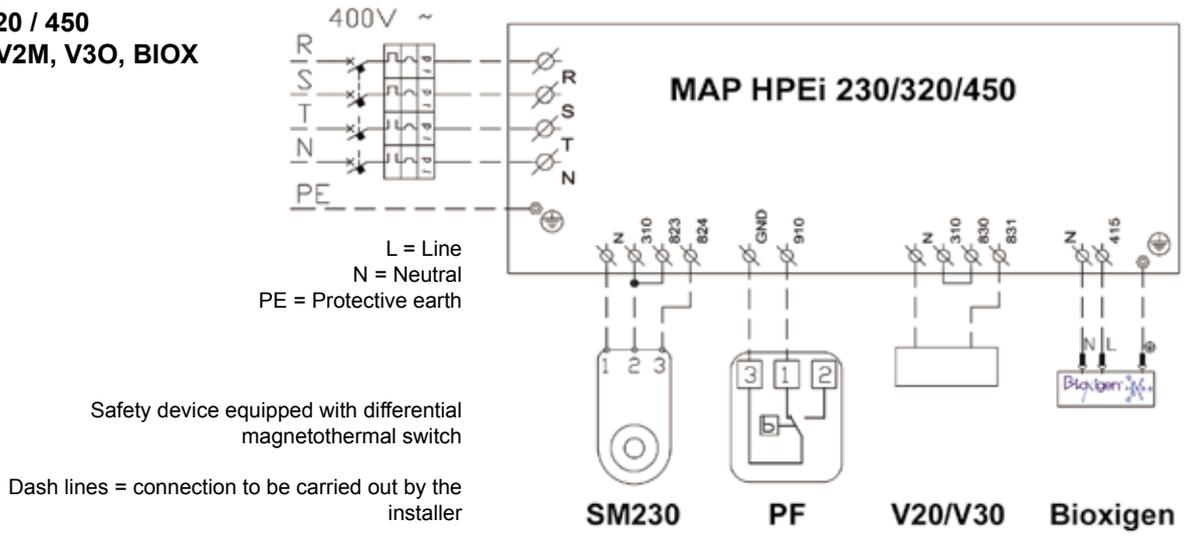
Wiring Diagram
MAP-HP 230/320/450
 (with BER)



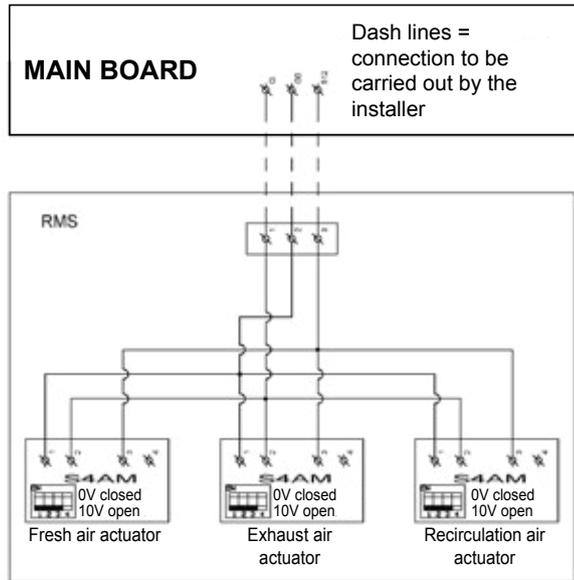
WIRING DIAGRAM
MAP-HPEI 35 / 60 / 100 / 150
WITH SM230, PF, V2M, V30, BIOX



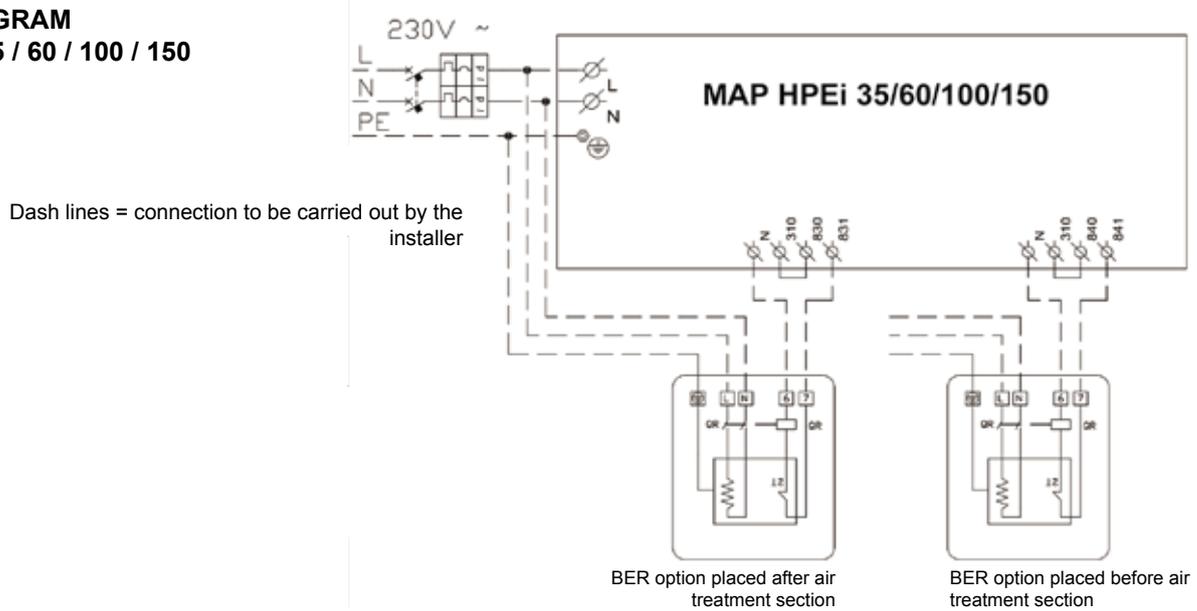
WIRING DIAGRAM
MAP-HPEI 230 / 320 / 450
WITH SM230, PF, V2M, V30, BIOX



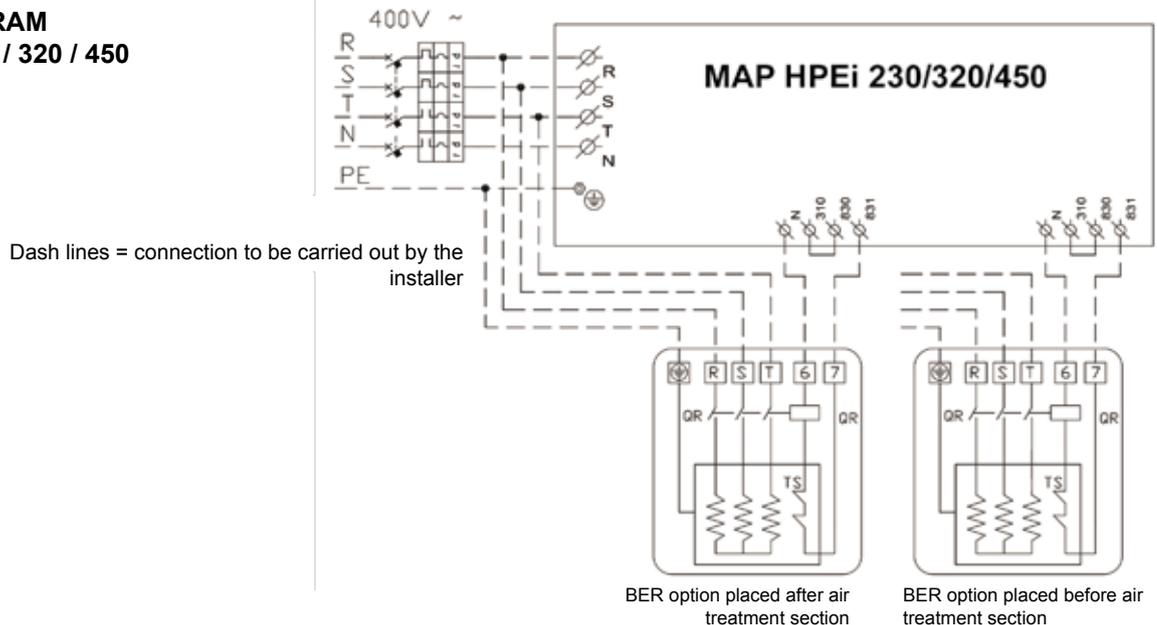
**WIRING DIAGRAM
MAP-HPEI WITH RMS OPTION**



**WIRING DIAGRAM
MAP-HPEI 35 / 60 / 100 / 150
WITH BER**



**WIRING DIAGRAM
MAP-HPEI 230 / 320 / 450
WITH BER**



7 - CONTROLS BEFORE START-UP



Check the following before starting the unit:

- Anchorage of the unit to the ceiling or the wall.
- Connection of the aeraulic ducts.
- Connection and continuity of the earth cable.
- Tightness of all electric clamps.

8 - ELECTRONIC CONTROL



8.1 MINIAIR MAP-HP

Unit controller is able to control room air temperature by heat pump on/off management, according to a preassigned control logic.

Airflow rate, needed for the right air renewal and adjusted at starting-up, is not controlled by unit electronics and shall be kept within volume range.

The control system consists of:

- Power card installed inside unit electrical board
- Remote control panel, provided with keyboard and LCD display

Terminal	Connection	Input/Output Type	Meaning
810-N	G-G0	Digital output	Power supply 24Vac
811-N	NO1	Digital output	Connection (phone cable) to User interface
812-N	NO4	Digital output	Compressor on
813-N	NO5	Digital output	Electric preheating
814-N	NO6	Digital output	Reverse cycle valve
815-N	NO7	Digital output	General alarm
816-N	B1	Digital output	Thermal integration- fan on
B1-GND	B2	Analog input	External air temperature
B2-GND	B3		Room air temperature
B3-GND	B4		Exhaust air temperature
B4-GND	ID1-GND		Supply air temperature
910-GND	ID2-GND	Digital input	Pressure filter switch
911-GND	ID3-GND	Digital input	Remote On/Off
912-GND	D4-GND	Digital input	Compressor protection
913-GND	ID5-GND	Digital input	DFan protection
914-GND	ID6-GND	Digital input	High pressure gas switch
915-GND	Y1-G0	Digital input	Low pressure gas switch
410-GND	Y2-VG0	Analog output	Supply fan speed control signal (EC fan type)
411-GND	Y3-VG0	Analog output	Exhaust fan speed control signal (EC fan type)
412-GND	J11	Analog output	Modbus serial connection

8.2 MINIAIR MAP-HPI

The standard unit works with constant air flow rate (sizes 100-450), with thermoregulation in function of room temperature.

Alternatively, thermoregulation in function of supply temperature is possible.

The unit controller is able to control automatically the room or supply temperature by modulating compressor capacity on heating, cooling, freecooling and free-heating modes, depending on temperature set point.

The controller consists of:

- master PCB inside the unit electrical box (with built in electronic expansion valve),
- compressor driver inside a specific ventilated compartment,
- LCD display control panel, provided with keyboard by which user can set and see set and sensor values.

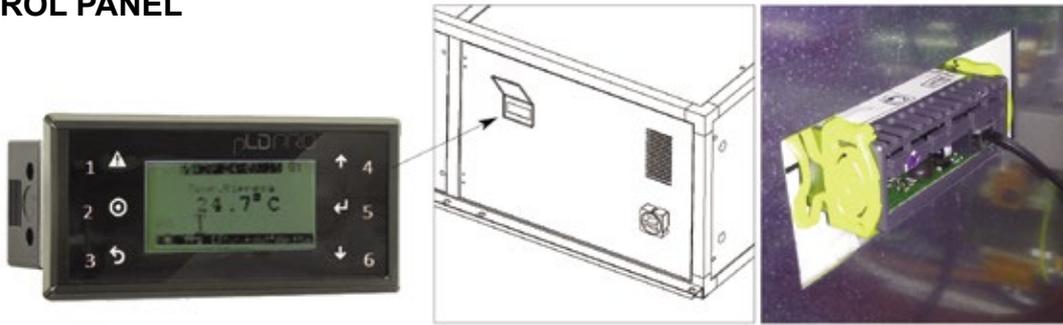
You can see at the following page the main components pictures.

Field sensors are:

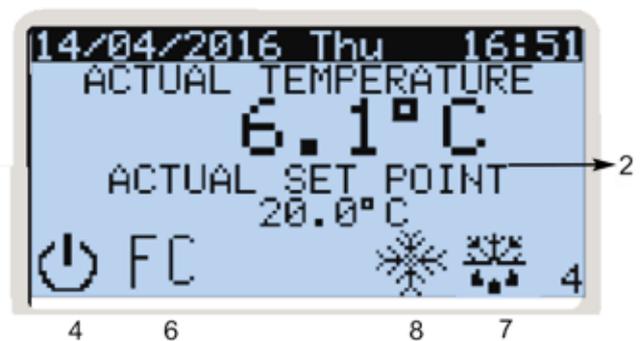
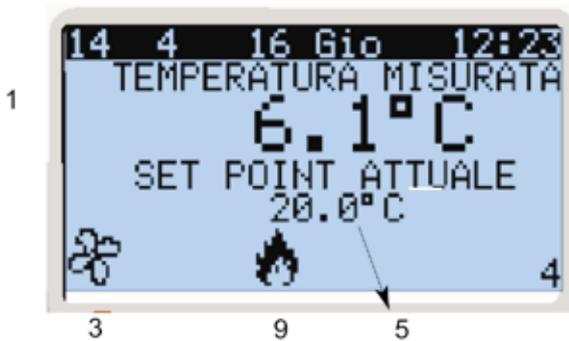
- 3 NTC air temperature probes;
- 1 NTC refrigerant temperature probe on compressor suction;
- 2 refrigerant circuit pressure transducers;
- 2 refrigerant pressure switches.

Connection	Wire number	Input/Output Type	Meaning
G-G0	G-G0	-	Power supply 24Vac
NO1	8011-GO (24V)	Digital output	Compressor
NO2	8030-8031		Thermal Integration
NO3	8013-GO (24V)		Fans Enable
NO4	8040-8041		Electrical preheater
NO5	8050-N1		Reverse cycle valve
NO6	8021-8022		Alarm
NO7	8023-8024		External/exhaust air damper
DI1	9011-GND	Digital input	Dirty filter pressure switch
DI2	9012-GND		Remote On-Off
DI3	9013-GND		Remote S/W
DI4	i-		Only recirculation
DI5	9015-GND		High pressure gas switch
DI6	9016-GND		Low pressure gas switch
DI7	9011-GND		Spare
B1	B1-GND	Analog input	External air temperature
B2	B2-GND		Return air temperature or CO2
B3	B3-GND		Supply air temperature or CO2
B4	B4-GND		After recover air temperature
B5	6011-GND		Suction gas temperature
B6	6012-VREF-		Suction gas pressure
B7	6013-VREF-		Condensation gas pressure
Y1	5010-GND	Analog output	Supply fan
Y2	5011-GND		Return air fan
Y3	5012-GND		Spare
Vref	Vref	-	Supply ratiometric probes
+Vdc	+Vdc	-	Active probes power supply

8.3 CONTROL PANEL



1.	Alarm visualization /Alarm reset	6.	Parameter list up-flow / Set value increasing
2.	Setting enter	7.	Sub list enter / Set value
3.	Setting exit	8.	Parameter list down-flow / Set value decreasing



1.	Current time/day	6.	Free cooling mode on
2.	Return air temperature	7.	Defrost mode on
3.	Unit running	8.	Cooling mode on
4.	Unit off	9.	Heating mode on
5.	Actual set point		

8.4 SETTING

Setting of parameters can be done through the Service menu, that can be reached by pushing the programming button (round circle symbol), which is located in central position at the left side of the screen. When the menu marked with the letters from A to H appears, the required entry can be selected by moving with the arrows up/down and pushing the button “enter” corresponding to the required entry.

MENU A : UNIT ON/OFF

By entering this menu it is possible (in page A01) to locally turn on/turn off the unit and to exclude/include the local control to allow the turning on/off through remote control, through monitoring or time slot. The local control will have the priority on all the other external interfaces as long as it remains included.

To exclude the local control, select “yes” in the entry “exclude local control”.

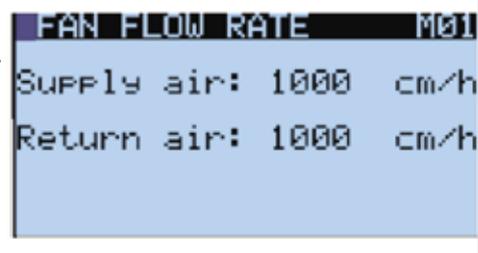
On page A02 you can select temperature control mode between: AUTOMATIC, SUMMER, WINTER.

Changing the speed or airflow (from size 100 upwards) happens by pressing the down arrow key on the main page. At this point, the page where the two delivery and recovery fans are indicated with the relative speed or air flow rate expressed as a cm/h. To change that value, move the cursor over it and change the value with the up / down arrow keys and confirm with “enter”.

In case of use of CO2 probe, fan flow regulation is moving automatically in running range to keep CO2 value at set point (MAP-HPi only).

MAP-HPi

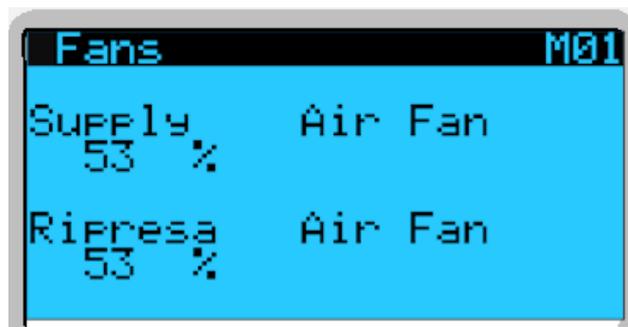
Screen M01 where is possible to change fans from size 100 and over.



	Size	Minimum airflow rate [m ³ /h]	Maximum airflow rate [m ³ /h]	Nominal airflow rate [m ³ /h]
MAP-HPi	35	300	420	350
	60	390	720	600
	100	641	1205	1000
	150	959	1820	1500
	230	1490	2770	2300
	320	2080	3840	3200
	450	2925	5400	4500

MAP-HP

Screen M01 where is possible to change fans speed for EC units.



Unit	Flow rate	Volts at flow rate	Minimum airflow rate	Volts at min airflow rate	"Maximum airflow rate"	Volts at maximum airflow rate
MAP-HP	350	-	-	-	-	-
	600	-	-	-	-	-
	1000	23	930	20	1070	26
	1500	41	1395	36	1605	46
	2300	60	2139	53	2461	67
	3200	75	2976	68	3424	82
	4500	88	4185	81	4815	96

When the blinking cursor is positioned top left, by pushing the “arrow down” you can move to the following page of the selected menu. All the pages of the menus are marked by a code in top right position, which specifies with the first letter the menu (in this case A) and with 2 digits the number of the page.

By entering page A02, there are 2 possible options:

- Temperature control mode :

It allows to chose among Automatic (default), Hot, Cold, Ventilation only modes. The unit is equipped with a regulation logic that controls all the actuators to produce hot/cold air, by comparing the different temperature probes. By using this menu entry, it is possible to make the unit work only with the hot/cold actuators or to exclude them.

- Running mode :

It allows to select the operating mode between heat recovery unit and UTA. In the heat recovery operating mode (default), when the comparison between internal and external temperature allows it, the unit does not use the actuators to produce heat/cold, because the heat recovery unit should be able to reach the needed thermal requirements. On the other hand, in UTA operating mode, the unit activates also the heat/cold actuators even when the heat recovery should be sufficient to reach the required set point.

MENU B : SET POINT

This menu allows to program the required temperature set point.

MENU C : CLOCK

This menu allows to set the current time and date, and to enter the pages for programming the time slots, if the operating of the unit with turning on/off by time slots is selected.

MENU D : INPUT/OUTPUT

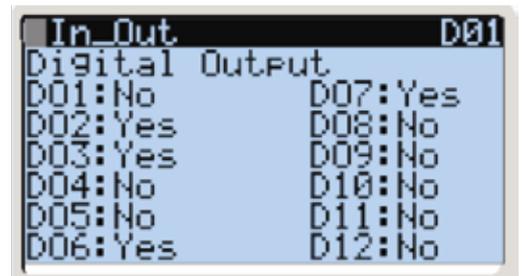
By entering this menu it is possible to visualize the condition of all the inputs/outputs of the unit. The outputs on/off are marked by the symbols DOx, where x stands for the number of the output, whereas DIx identifies the on/off inputs.

The proportional outputs are marked by the symbols Aox, whereas the proportional inputs (as for example the temperature probes) are identified by the symbols AIx.

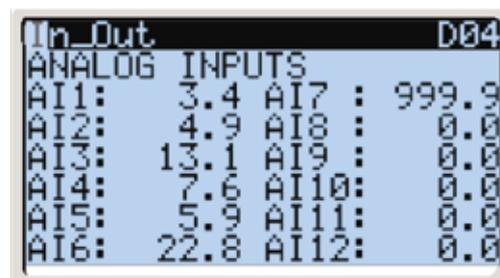
For the correct meaning of each of them, please see the specific electrical wiring diagram.

As an example, here are two screens of **D** menu :

D01	Digital Output 01	Compressor on
D02	Digital Output 02	Thermal integration
D03	Digital Output 03	Fans on
D04	Digital Output 04	Electric preheating
D05	Digital Output 05	Reverse cycle valve
D06	Digital Output 06	Alarms
D07	Digital Output 07	Unit on/bioxigen/IO air dampers



AI1	Analog input 01	External air temperature
AI2	Analog input 02	Room air temperature or CO ₂ probe
AI3	Analog input 03	Supply air temperature or CO ₂ probe
AI4	Analog input 04	Air temperature after recover
AI5	Analog input 05	Suction compressor temperature
AI6	Analog input 06	Suction compressor pression
AI7	Analog input 07	Condensation pressure



MENU E : LIST OF ALARMS

This menu allows to visualize the last 50 registered alarm messages.
 This menu allows to set the date and the hours and if selected the:

MENU F : SUBSTITUTION OF THE BOARD

This menu is reserved to the manufacturer.

MENU G : SERVICE

This menu and the corresponding subordinate menus allow to set the different operating parameters. See the below table.

Menus G and H : the pages of these menus are marked by 2 letters and 2 numbers, where the second letter specifies the subordinate menu, so for example Ga01 stands for page 01 of the subordinate menu "a" of the menu G.

The menu is protected by the "0000" password

MENU H : MANUFACTURER

This menu is reserved to the manufacturer.

OPERATIVE LISTS & SUB-LISTS STRUCTURE

Main list	Secondary lists	Sub-lists	Meaning	
A. Unit ON/OFF	A01 -A02	-	Unit switch on mode / Operating	
B. Setpoint	B01 - B02	-	Temperature setpoint	
C. Clock/Band	C01	-	Current time/day	
	C02	-	DST time enabling (summer time)	
	C03	-	Time band set	
	C04	-	Weekdays	
	C05	-	Special days	
D. I/O Info	D11-D02-D10	-	Analog inputs display	
	D05-D13	-	Analog outputs display	
	D14	-	Digital inputs display	
	D15-D16-D17	-	Digital outputs display	
E. Alarm memory	E--	-	Alarm recorder	
G. Service level	Language set		Selectable language	
	Information	Gb01 - Gb02	Info about controller & interface	
	Summer/Winter	Gc01	Forced heating/cooling mode	
	Time counter	Gd01	Fan running time	
	BMS configuration	Ge01 - Ge02	Modbus protocol	
	Service setting	Ga01		Time counter set
		Gb01 - Gb02 - Gb03		Sensor balancing
Gc01 - Gc12			Control parameters	
H. Manufacturer level	Configuration	Ha02 - Ha06	System configuration	
	b. I/O configuration	Hb02	Digital input configuration	



Master PCB



BLDC compressor driver

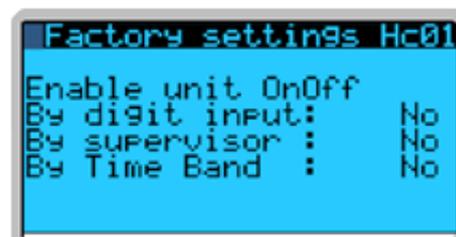
OPERATIVE LISTS & SUB-LISTS STRUCTURE

Function	Window	List	Sub-list	Meaning	Possible set
Mini setpoint	Gc01	G. Service level	f. Service setting c. Regulation	Mini setpoint value (°C)	13 ÷ 35
Maxi setpoint				Maxi setpoint value (°C)	17 ÷ 35
A0 Value				Set Point histeresys	0 ÷ 5
A1 Value				Integration hysteresis	0 ÷ 5
Min/Max fans speed	Gc08			Speed limit supply and exhaust fans	0 ÷ 100
Defrost set point	Gc10			Defrost setpoint	-10 ÷ 10
Defrost hysteresys	Gc10			Defrost hysteresis	-10 ÷ 10
Compressor activation	Gc12			Compressor activation	si no
Timeout low pressure alarm				Low pressure gas timeout	0 ÷ 300
Mini time compressor ON/OFF				Min time compressor ON/OFF	0 ÷ 5
Expansion valve activation	Gfc13	Expansion valve activation	si no		

8.5 REMOTE ON/OFF START UP OR TIME BANDS

To start up ON/OFF remote unit or operation of time bands, follow the instructions::

1. From the main screen press the key PRG (center button to the left) to enter the menu
2. Use down arrow key to move to the menu "Factory-H"
3. Press "enter"
4. Press 4 times the key "enter" if the password request and confirm the password "0000"
5. Use down arrow key to move submenu "c. Factory settings" and press "enter"
6. The Hc01 screen appers with the title " enable on-off unit"
7. With "enter" button move cursor under word NO in desired row and then change it in yes with arrow button, then press enter to confirm it
8. Press more time the key Esc for exit
9. From the main screen press the key PRG (center button to the left) to enter the menu
10. Enter to menu "A. On/Off unit"
11. Press YES for the voice "Exclusion of local command"



At this point it's possible to command the input unit (see circuit diagram for the connections) or by time bands.

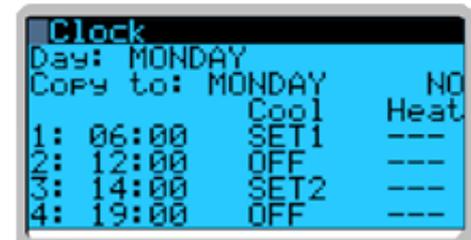
Pay attention that only after you enable the previuos procedure will be able to see the pages that allow setting time bands..

Following the procedure for setting the time bands:

1. From the main screen press the key PRG (center button to the left) to enter the menu.
2. Use down arrow key to move to the menu "C. Clock/Time bands".
3. Then the page that follows to set current time and time appears.
4. When the cursor blinking in the top left corner press the down arrow key.
5. After, allow to set the summer time
6. Press again the down arrow key enter in time zone setting page that appears as shown the figure.
7. Select in the "day" line: The day that want the time band.
8. For every simple day you can select up to two time band with two different set point called SET1 and SET2. An example in picture you can see monday setting: unit will switch on at 6:00 and work to 12.00 with SET1 set point. After that at 15.00 unit will switch on and work to 19.00 with set point SET2.



It is possible to copy the current day setting to other days by using the function "copy to:" that copies the current daytime settings to the target date in the "copy to : " line



8.6 ELECTRONIC EXPANSION VALVE AND INVERTER MANAGEMENT

They are managed by controller, based on the signals from temperature and pressure sensors in the refrigeration circuit; it's set properly by the Manufacturer and it usually doesn't require any change..

8.7 DEFROST MODE (ON HEATING MODE ONLY)

It is activated when suction pressure is kept lower than "Defrost set point" parameter for a min time. In this case, the control leaves the normal working logic, reverses refrigeration cycle and optionally switch fans off to avoid thermal thermal uncomfot; this situation will be kept until condensation pressure will be higher than "End Defrost pressure" parameter and for a max time anyway. Control will try to avoid a defrost cycle by switching on the electric pre-heater (if present).

8.8 BUILDING MANAGEMENT SYSTEM (MODBUS RTU PROTOCOL)

For setting features and data addressed management see specific document.

With the SCMB board accessory, the unit can become a slave modbus. The configuration parameters of communication port are available in G.Service list and e.BMS configuration sub list.

Deafault values are: slave address 1, speed 9600 bps, stop bit 2, data bit 8 (fixed).

The list and meaning of parameters can be found in the below table (software version for **MAP HPI = 1.1.001** / software version for **MAP-HP = 1.4.008**)

In case of different software version, some differences can occur in some parameters.

9 - MAINTENANCE



9.1 SCHEDULED MAINTENANCE

Preliminary information

- Lack of maintenance, from the simplest one, can degrade air and heat pump performances, with consequent worsening of room comfort
- **before carrying out any maintenance, make sure that basic unit and its possible options are not and can not be powered anyway; therefore, turn off in advance**
- Wear protective clothing and personal protective equipment (glasses, gloves, etc.)

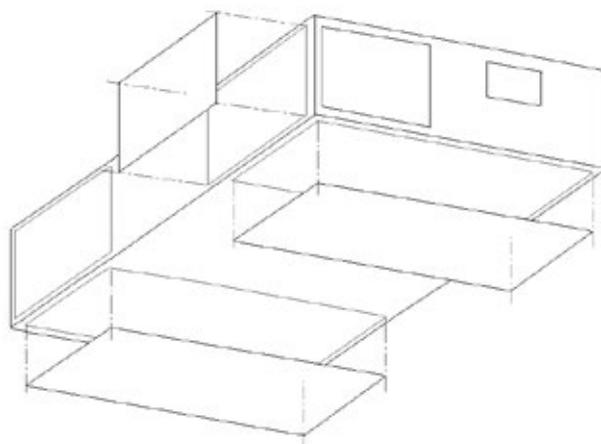
MONTHLY CHECKS

AIR FILTERS

Check timing of filter sections to ensure clean condition depends on many factors, related to outdoor and indoor air quality and daily working time, apparently not known in advance; therefore, it is suggested to use automatic control devices, like air filter pressure switches, which, once properly set, make the user informed about the right time to clean or replace the filters, avoiding unnecessary services or, in the worst case, excessive delay for servicing. It's possible to enter the filter sections through both lower and side removable panels, provided with handles (see figure); filter removal is done by unscrewing upper filter clamp (use an Allen wrench).

For G4 standard filter, clean with a vacuum cleaner or wash with common detergent and warm water, then, dry carefully; replace the filter after no more than 3 cleaning cycles.

For ePM1 70% (F7CF option) filter, don't clean and replace it when dirty, bag it properly and bring it to the special collection center, for the next incineration. Always remember to mount and lock the filter before the next unit switch on



CROSSFLOW HEAT RECOVERY

At filter checking, verify that all aluminium plates are clean.

SEMIANNUAL CHECKS

FANS

They can be checked by the lower removable panels; check that impellers and casings are fully clean. Impellers shall be free to run without any vibration or noise and electrical connections shall be intact and well tightened.

HEAT PUMP SYSTEM

Visually check the heat pump components by side removable panel, checking the cleaning condition of them and their containment walls; possible oil stains can be a symptom of leakage (see Unscheduled Maintenance). Make sure that all electrical connections are intact and well tightened.

DRAIN TRAYS

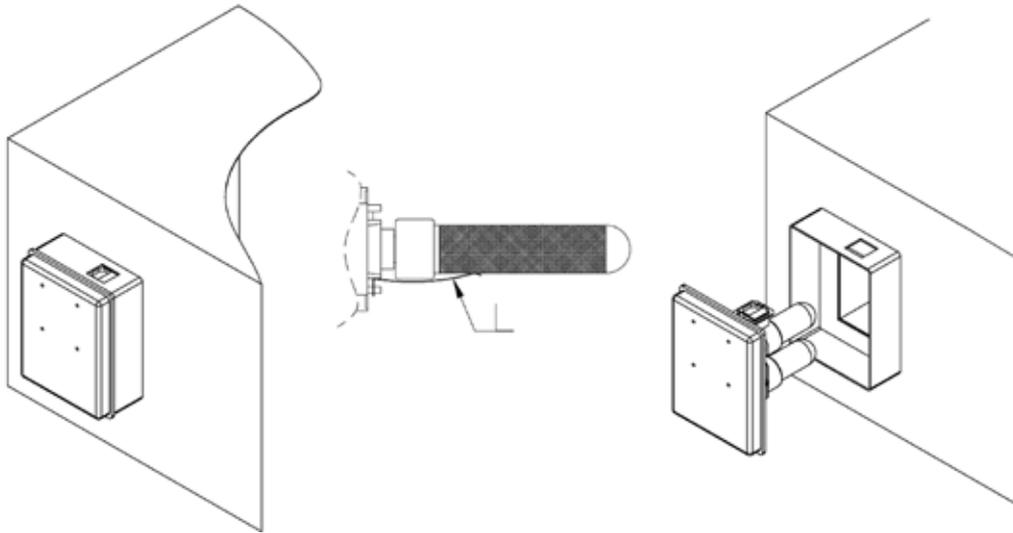
They can be checked by the lower removable panels; check that drain trays are empty and clean. At fans not running, in presence of water in the drain tray, it's possible that its syphon is not well sized or even missing.

BIOX SYSTEM (IF PRESENT)

Showing figure, unscrew the fixing screws of the cover of the protruding box and pull it by side until the quartz capacitors are out of the box; place all on a flatbed and gently unscrew each capacitor and remove the external net.

Clean the capacitor with a wet cloth and wash the net with a jet of hot water, then dry with a dry cloth. If a whitish film is over the metal grid, replace the capacitor tube (usually every 18-24 months), otherwise mount the net on the tube and make sure that it is well pressed by "L" tab against the capacitor glass.

Gently screw each capacitor in its support, lay the cover on the protruding box and screw the fixing screws.



PREHEATING AND HEATING/COOLING SYSTEMS (IF PRESENT)

For both water and electric type, check their cleaning condition which heat exchange efficiency is depending on. Make sure that all electrical connections are intact and well tightened.

9.2 UNSCHEDULED MAINTENANCE

It means all services requiring functional measuring checks and/or replacement of functional components (such as compressors, fans, electronic cards, etc.) due to unexpected failure or end of lifetime. Such operations shall be carried out by authorized service point only.

10 - TROUBLESHOOTING



TROUBLESHOOTING GUIDE

Failure	possible reason	What to do
1) Airflow rate is lower than duty one	Air filter(s) dirty	Clean or replace air filter(s)
	Plant air resistance too high	Check air plant project
	Adjusting dampers closed	Open the dampers and balance the plant
2) Airflow rate is higher than duty one	Internal component missing (filter ?)	Close the access panels
	Access panels open	Balance adjusting dampers
	Plant air resistance lower than expected	Check air plant project Reduce fan control signal
3) Heat pump performance is lower than expected	Not enough airflow rate	(See failure 1)
	Wrong expansion valve set	Contact service specialist
	Refrigeration circuit empty or not filled properly	Contact service specialist
4) Water condensate not discharged	Syphon wrong or missing	Install well-sized syphon

ALARM INSTRUCTIONS

Alarms table

Alarm Code	Description	Meaning	Solution
AI1	Clock board fault or not connected	Clock internal board fault	Change controller
AI2	B01 Probe fault or disconnected		Check probe and substitute it if necessary
AI3	B02 Probe fault or disconnected		
AI4	B03 Probe fault or disconnected		
AI5	B04 Probe fault or disconnected		
AI6	B05 Probe fault or disconnected		
AI7	B06 Probe fault or disconnected		
AI8	B07 Probe fault or disconnected		
AI14	Thermal protection compressor alarm	Thermal protection compressor switch off	Check fan and only after remove anomaly switch on thermal protection

ALARM INSTRUCTIONS

Alarms table

Alarm Code	Description	Meaning	Solution
AI16	Thermal fan protection alarm	Thermal protection fan switch off	Check the fans and rearm thermal switch only after remove the anomaly
AI17	High gas pressure alarm	High pressure gas switch activated	Check air flow rate to both flows, check gas pressure
AI18	Low gas pressure alarm	Low pressure gas switch activated	Check air flow rate to both flows, check gas pressure
AI24	Antifreeze alarm	Anti-freeze thermostat or anti-freeze probe intervention	
AI25	Too many defrost circuit 1	Too many defrost cycles in short time	Acknowledge alarm with alarm button to restart unit, check working air temperature of unit and check gas pressure in refrigerator circuit
AI27	Digital input alarm	Alarm from DI occurred	Check external alarm reason
AI28	Filter pressure switch alarm	Dirty filters	Clean filters
AI30	Internal memory alarm	Internal controller memory fault	Change controller

While starting-up on site, alarm codes related to the state of some digital inputs may be displayed; in that event, a reset of those inputs is needed (from NO to NC setting or viceversa, on Hb02 sub-list)

11 - DISPOSAL

This symbol indicates that this product must not be disposed of with household waste. Dispose of the unit properly according to local laws and regulations.

When the unit reaches the end of its useful life, contact the authorities for information on disposal and recycling possibilities; alternatively, it will be possible to request the free collection of the used equipment from the manufacturer.

Separate collection and recycling of the product at the time of disposal will help and conserve natural resources and ensure that the unit is recycled in a manner that protects human health and the environment.

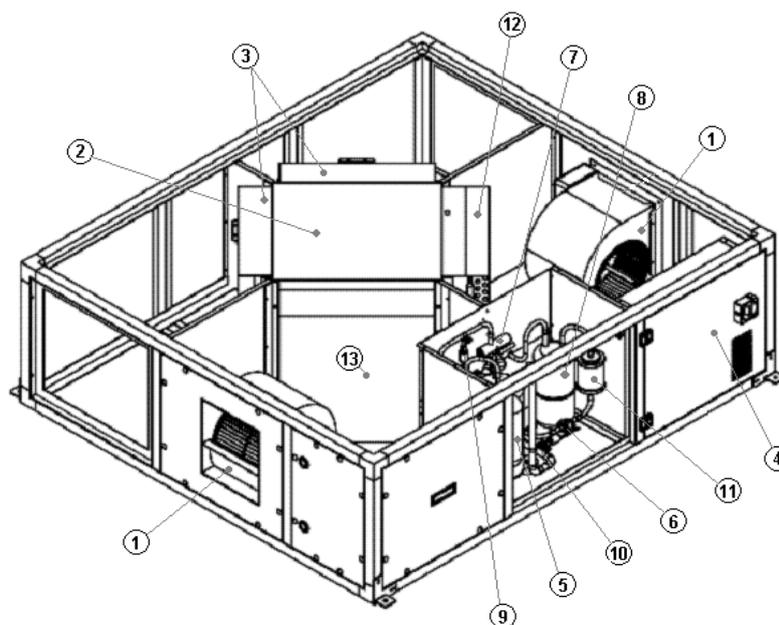
AEE registry code: IT16070000009428

The materials making heat recovery units are:

- Precoated steel sheet
- Aluminium
- Polyurethane
- Plastic
- Quartz glass
- Galvanized steel sheet
- Copper
- Polyethylene
- Stainless steel



SPARE PARTS



		CODE					
		MAP-HP & HPI 35/60	MAP-HP & HPI 100	MAP-HP & HPI 150	MAP-HP & HPI 230	MAP-HP & HPI 320	MAP-HP & HPI 450
1	EC motor fan	VTBLE133000A0170	VTDDM0807ECP0400		VTDDM0909ECP0400		VTDDM1010EC00920
2	Recovery exchanger	PR3000320339A060	PR4900360339A100	PR4900450339A150	PR6000490339A230	PR6000590339A320	PR8000660339530
3	Standard filter	CF0OZ25732098000	CF0OZ44736098000	CF0OZ44745098000	CF0OZ55750098000	CF0OZ55760098000	CF0OZ75765098000
4	Electric box	-	-	-	QE101CFRHP2300T1		
5	Compressor	COR410S089M23V00	COR410S119M23V00	COR410S229M23V00		COR410S429T40V00	
6	Electronic expansion valve	FRVTELE2V14FSAC1 + FRVTE2VSTA03210		FRVTELE2V18FSAC1 + FRVTE2VSTA03210	FRVTELE2V24FSFC1 + FRVTE2VSTA03210	FRVTELE3V35BSMC1 + FRVTE3VSTA03210	
7	4-way reversing valve	FRRV0V1408060100	FRRV0V1408060100	FRRV0V3412080800		FRRV0V6414080100	
8	Liquid receiver	RLV013004503SF10	RLV013004503SF10	RLV023004504SF10		RLV039004504SF10	
9	High pressure switch	CTPHAF410000FD00					
10	Low pressure switch	CTPLAF050000FD00					
11	Freon filter	FRFD03S083SMBF00			FRFD04S160SMBF00		
12	Supply air DX coil	BT252ECY026002NO	BT252ED0045002NO	BT252ED4045003NO	BT252ED6056005NO	BT252EDA056006NO	BT252EDC076006NO
13	Exhaust air DX coil	BT252EGD026002NO	BT252EGF045002NO	BT252EGK045003NO	BT252EGM056005NO	BT252EHW056006NO	BT252EGI076009NO
14	Compressor driver	MEINVPS212211200		MEINVPS216211200	MEINVPS218213400		

Due to LENNOX EMEA ongoing commitment to quality, the specifications, ratings and dimensions are subject to change without notice and without incurring liability.
Improper installation, adjustment, alteration, service or maintenance can cause property damage or personal injury.
Installation and service must be performed by a qualified installer and servicing agency.



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