

Air Handling Units



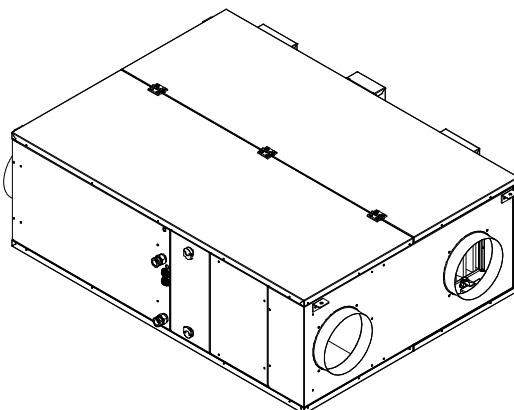
UC 501-MHE

Residential Dehumidifier with VMC System



TECHNICAL / INSTALLATION MANUAL

DUCTABLE AIR HANDLING UNIT FOR FRESH AIR VENTILATION AND HEAT RECOVERY mod. **UC 501-MHE**



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CONTENTS OF THE PACKAGING

The UC 501-MHE unit is packed onto a wooden pallet, and protected by a cardboard box.

The packaging contains:

- 1 UC 501-MHE unit;
- 1 use and maintenance manual.

Size of the packaging: 98x137x 53(h) cm;
Gross weight 115 kg

TRANSPORT AND STORAGE

IMPORTANT: The box must be transported on a pallet and handled using mechanical means; on-site handling and transport must be carried out by suitable means, taking into consideration the weight and dimensions of the packaging, so as to prevent the machine from being damaged or from falling. A fall of even just a few centimetres may damage the contents. The box must never be placed upside-down or overturned. If this happens, it must be put back in the correct horizontal conditions for at least three hours before installation.

Store the boxes in horizontal position and not upside down; up to 3 boxes can be stacked on top of one another. Acceptable environmental conditions: temperature $-10^{\circ}\text{C} \div 50^{\circ}\text{C}$, relative humidity less than 90%.



SAFETY WARNINGS

- The machine contains pressurized refrigeration gas. The room or area must be aired in the case of gas leakage from one or more machines.
- The gas in the machine may develop toxic components in the event of fire.
- Contact with the fan outlet may cause injury.
- Electrical connections must be carried out by qualified and skilled technicians as per the laws in force.
- Defects regarding pipework, hydraulic connections and shut-off valves may lead to dripping or splashing of water, with consequent damage to objects, as well as dangerous situations in the presence of electricity.
- Suitable lifting systems and Personal Protective Equipment (i.e. gloves, hard hats) must be used while handling the machinery during installation.

DESCRIPTION OF THE MACHINE AND USE

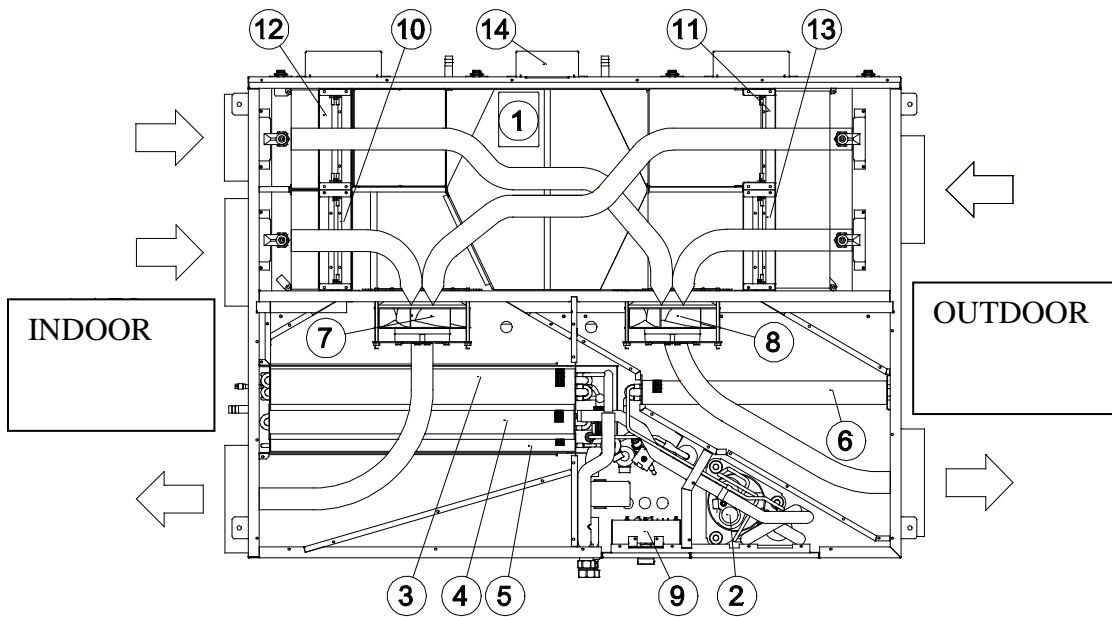
In combination with surface cooling system, the UC 501-MHE unit is able to perform air handling according to the different seasonal requirements and environmental well-being. Functions may be:

- fresh air ventilation, both during summer and winter, with high efficiency heat recovery;
- fresh air ventilation without heat recovery (free-cooling);
- air dehumidification during summer with temperature control over the air supplied into the room;
- summer cooling with or without dehumidification (using water from the radiant system);
- winter heating using hot water from the radiant system.

The galvanized sheet metal frame of the machine houses the finned coils for air handling, the refrigeration circuit for dehumidification, the extract air filter, the drain pan, the supply fan and the electrical control panel.

DESCRIPTION OF OPERATIONS

The following figure shows the machine layout, the main components and the air flows.



- 1 – Air to air heat exchanger
- 2 - Cooling compressor;
- 3 - Water finned coil;
- 4 - Cooling evaporator;
- 5 - Freon/air condenser;
- 6 - Freon/air discharge condenser;
- 7 - Air supply fan;
- 8 - Air exhaust fan;
- 9 - Electrical switchboard
- 10 - Room air recirculation damper;
- 11 - Fresh air intake damper;
- 12 - Stale air extract damper;
- 13 - Auxiliary air intake damper;
- 14 - Recovery bypass damper.

The air flow-rate can be set from the control panel. The fans are automatically set to the speed necessary to overcome the pressure drop in the ductwork.

The machine can work with two air flows: the one for the fresh air ventilation with heat recovery, involving the air to air counter-current heat exchanger (1), and the one for room air recirculation. The renewal and recirculation flows can be combined or not, as per the flow rate and type of treatment to be carried out on the incoming air.

There is also a duct which is controlled by a motorized damper and allows the intake of the outdoor air without passing through the heat exchanger. In this way, free cooling can take place. The bypass opens automatically when the appropriate input occurs and when the outdoor temperature is below the set limit.

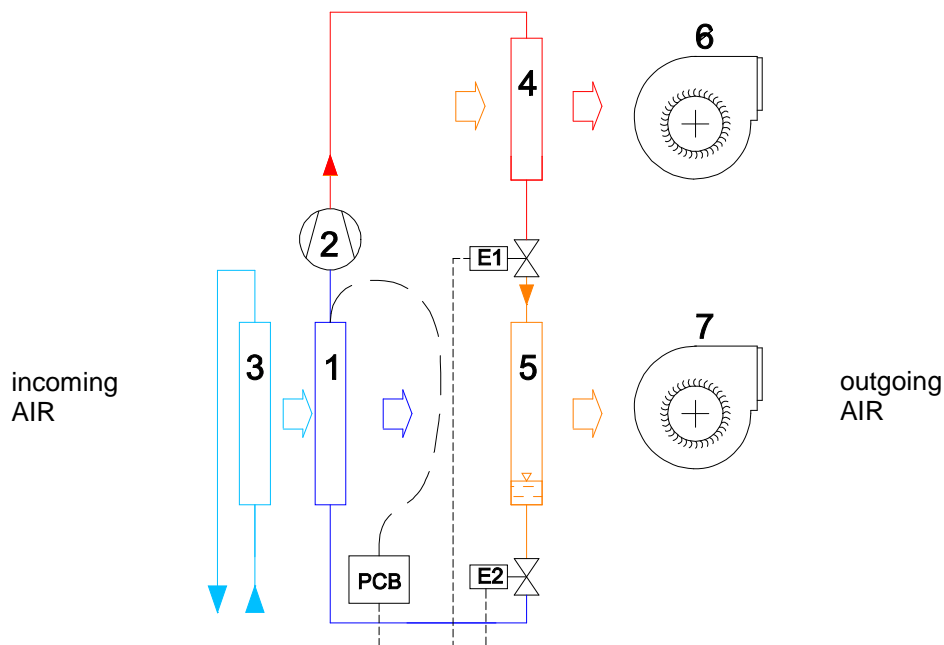
The following types of air handling can be carried out:

- Fresh air ventilation with high efficiency heat recovery, with possible winter heating or summer cooling;
- Fresh air ventilation with free-cooling, that is without heat recovery, both in summer and in winter;
- Air recirculation in winter, with possible heating;
- Air recirculation in summer, with cooling, dehumidification or cooling + dehumidification;
- Air recirculation with partial fresh air ventilation, together with all treatments provided for during recirculation.

Air flow rate can be set as follows:

- Air supply flow rate from 300 m³/h to 500 m³/h;
- Fresh air ventilation flow rate from 160 to 300 m³/h.
- Free-cooling flow rate from 160 to 300 m³/h.

OPERATION OF COOLING CIRCUIT



- 1 Cooling evaporator;
- 2 Cooling compressor;
- 3 Water finned coil;
- 4 Excess heat discharge condenser;
- 5 Freon/air condenser;
- 6 Air exhaust fan;
- 7 Air supply fan;
- PCB Printed Circuit Board;
- E1-2 Electronic expansion valve.

COOLING

The finned coil (3), which is connected to the radiant system, enables summer cooling and winter heating.

The temperature control over the outgoing air is carried out by the machine by means of the mixing valve in the water circuit.

DEHUMIDIFICATION AND COOLING

The finned coil (3) supplied with the water coming from the radiant system, cools down the air, while the cooling evaporator (4) performs further cooling and dehumidification.

The refrigeration circuit is made up of two condensers connected in parallel: in addition to the an air-cooled condenser (5) a second condenser is cooled by the outgoing air flow (6), thus releasing the condensation heat outwards. In carrying out this process the machine uses both exhaust stale air and an additional air flow coming from outside.

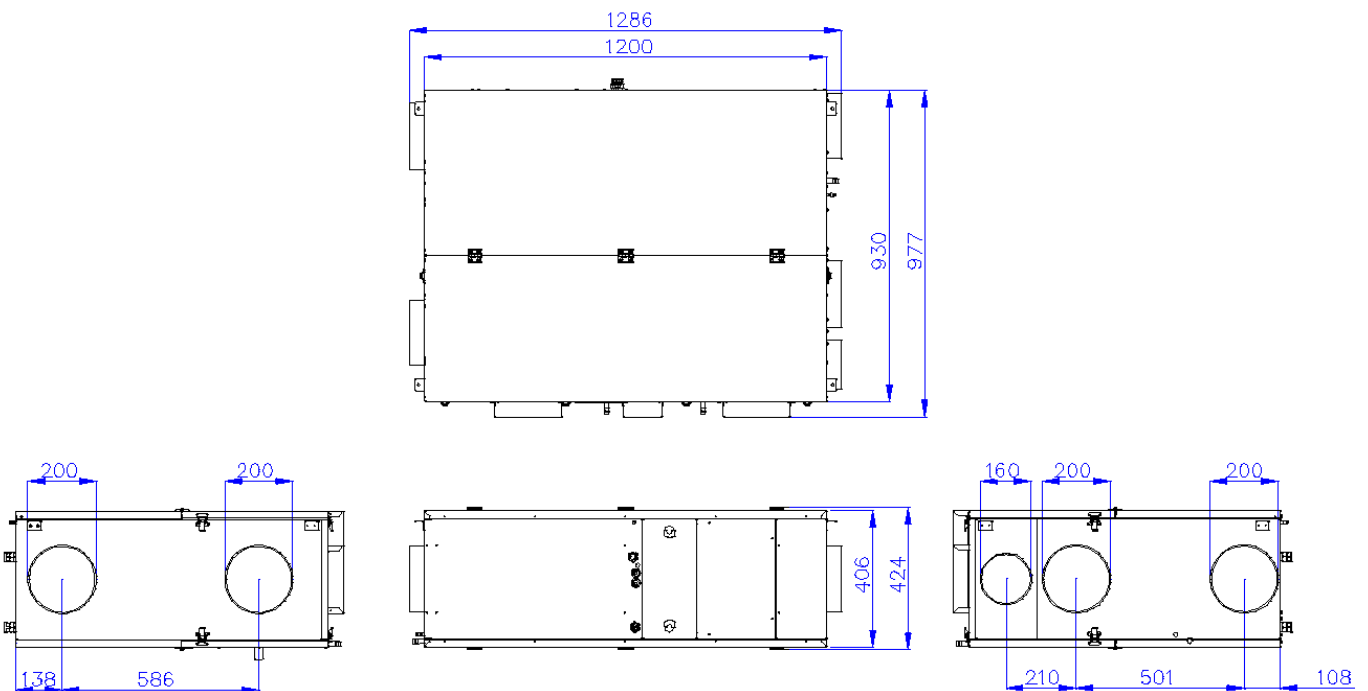
The two electronic expansion valves (E) allow to distribute the condensation heat between in the incoming and outgoing air in the desired proportion; this enables to have outgoing air at the desired temperature between maximum cold and neutrality.

The levels of outgoing air temperature that can be set are:

- Neutral summer temperature;
- Summer cooling temperature;
- Neutral winter temperature;
- Winter heating temperature.

PLEASE NOTE: the cooling system cannot be started up during winter or in fresh air ventilation mode only.

DIMENSIONS



INSTALLATION

SAFETY WARNINGS



Installation and maintenance must be carried out only by qualified personnel.

The machine must be protected from frost.

Hydraulic and electrical systems, along with the installation position, must comply with the safety rules and regulations in force in the country where the unit has been installed. Read the instructions in this manual carefully before working on the machine.



The sizing of the fixing system is the sole responsibility of the installer.



The machine contains pressurized refrigeration gas. The room or area must be aired in case of gas leakage from one or more machines. The gas in the machine may develop toxic components in the event of fire.



Do not remove the protection and safety devices.



This appliance is not suitable for the use in explosive or potentially explosive environments.



Defects regarding pipework, hydraulic connections and shut-off valves may lead to dripping or splashing of water, with consequent damage to objects, as well as dangerous situations in the presence of electricity.

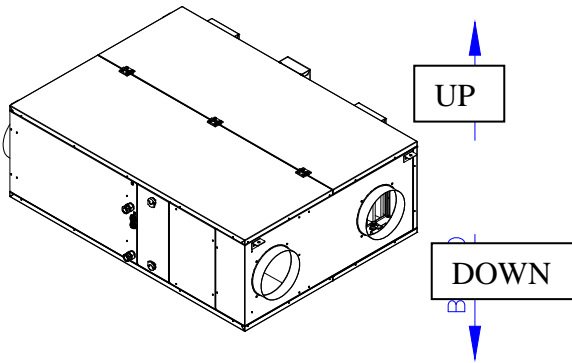
Requirements prior to installation

The following conditions must be in place before installing the machine:

- inflow and return pipework for the water from the radiant circuit shall be equipped with two shut-off valves for the disconnection of the line;
- drainage for condensed water; two separate siphons, each for its own drain, shall be installed to avoid the suction of air in the discharge pipe;
- the installer shall provide electric cables for the power supply, PE protective conductor (earthing conductor) and operating consent signals.

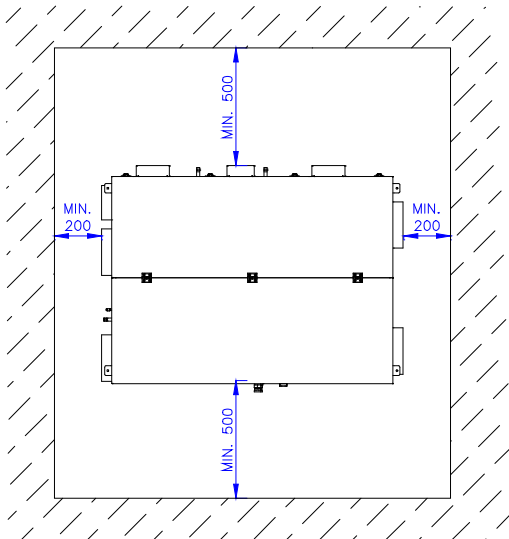
CONNECTIONS	CHARACTERISTICS	CONDITIONS
Refrigerated water	Temperature 15°C; Pressure 1.5 m w.g. Required water flow 500 l/hr	T min. 12°C, max. 18°C;
Power supply	10 A	230V – 50Hz - 1ph
Condensate drainage	Capacity 15 l / h, minimum gradient 3% Connection Ø 14 mm	3 connections required
Aeraulic ductwork	Minimum diameter as per the air sockets of the machine	The pressure drops of the ducts, summing the inflow and extract flows, must not exceed the available pressure of the unit

Positioning



The machine must be installed inside buildings, positioned horizontally. Operation in an inclined position of more than 1% may cause water leakage or may damage internal devices.

Minimum distances for installation



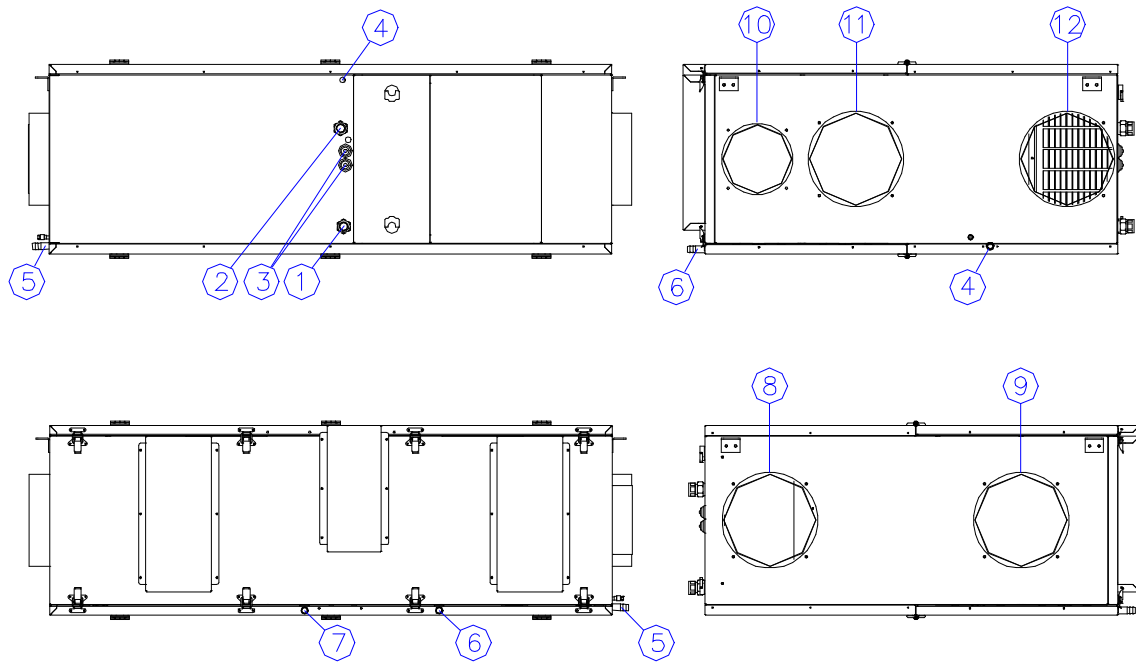
For correct maintenance or repair operations, there must be a free area around the machine according to the measurements shown in the figure below. These areas, including the space occupied by the machine, must be freely accessible for maintenance.



WHILE ESTABLISHING THE CORRECT AREA FOR INSTALLATION YOU SHALL TAKE INTO ACCOUNT THAT DURING ITS WORKING LIFE THE APPLIANCE MAY REQUIRE:

- **ROUTINE MAINTENANCE;**
- **REPLACEMENT OF COMPONENTS;**
- **REPLACEMENT OF THE WHOLE UNIT**

CONNECTIONS



KEY TO SYMBOLS

- 1 - Cold/hot water input; connection ¾" F
- 2 - Cold/hot water output; connection ¾" F
- 3 - Electrical input connections;
- 4 - Hydraulic circuit vent;
- 5 - Dehumidifier condensate drain; connection Ø 14 mm
- 6 - Winter condensate drain; ; connection Ø 14 mm
- 7 - Summer condensate drain; ; connection Ø 14 mm
- 8 - Stale air exhaust; (OUT) Ø 200 mm
- 9 - Outdoor air intake; (IN) Ø 200 mm
- 10 - Stale air extract; (EXT) Ø 160 mm
- 11 - Air recirculation intake; (REC) Ø 200 mm
- 12 – Air supply to the rooms; (SUP) Ø 200 mm

AIR FLOWS - FLUSSI ARIA



Fresh Air Inlet
Ingresso Aria Esterna



Exhaust Air
Espulsione aria



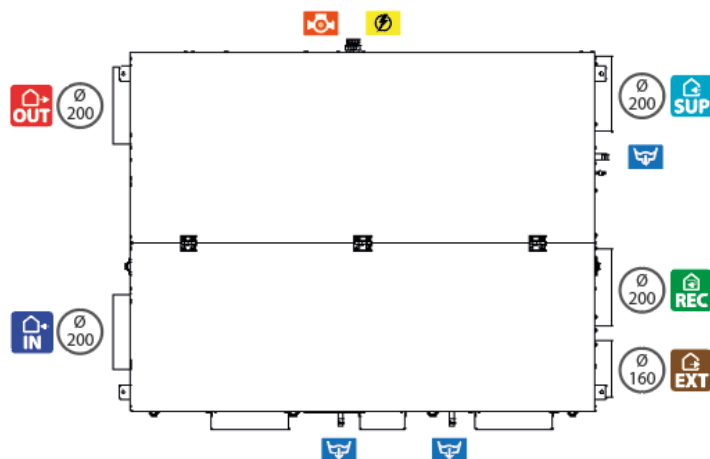
Stale Air Extraction
Estrazione aria viziata



Supply Air
Immissione Aria



Recirculation Air
Ricircolo Aria



Water circuit pipework connection

Shut-off valves must be inserted in the refrigerated water pipes in order to disconnect the system from the machine.

After connection to the system, a water tightness check must be carried out on both the connections and the machine in order to avoid any damage for the area below the machine.

Condensate discharge

There are three condensate drains: two drains are for the summer and winter recuperator condensate, one for the summer condensation of the dehumidifying section.

The condensate drains must not be connected directly to the sewer system since there could be unpleasant odours during the period when the machine is not used.



The condensation drain and the inlet and outlet pipes must comply with the standards and laws in force in the country of use.

The condensate pipeline (hose connector Ø 14 mm) shall be provided with a syphon, considering a flowrate of 15 l/h and minimum inclination, both to win the possible air underpressure at outlet and to avoid the entry of bad smells.



It is necessary to make the siphons on both drain lines using and choosing, as required, from the available RDZ condensate drain kits (SF-P / SF-M 13). According to the model chosen, respect the installation instructions given below.

- Syphon shall be sized according to instructions on below figure. It must not necessarily be positioned under the machine, but can be moved laterally and always positioned lower than the fitting unit drain.
- It shall be possible to easily disconnect the syphon on the unit and/or on the accessory in order to facilitate possible services; prime syphon before starting up.
- Check that pipeline doesn't stress condensate outlet connection.
- The condensate drain system should be adequately supported and suitably insulated if it passes through unheated spaces and voids (e.g. loft spaces) to prevent freezing.

Aeraulic connections

The machine is equipped with plastic spigots, which protrude about 4 cm and which make it possible the connection with flexible or rigid ducts. Spigots are equipped with gaskets to avoid air leaks and unpleasant noise.

Spigot diameters are as follows:

Supply (SUP) and Recirculation (REC) Ø 200 mm

Fresh air intake (IN) and air exhaust (OUT) Ø 200 mm

Stale air from bathroom/kitchen (EXT) Ø 160 mm

PLEASE NOTE: the real diameter of the air spigots is approximately 1-2 mm less than the nominal diameter.

ELECTRICAL CONNECTIONS



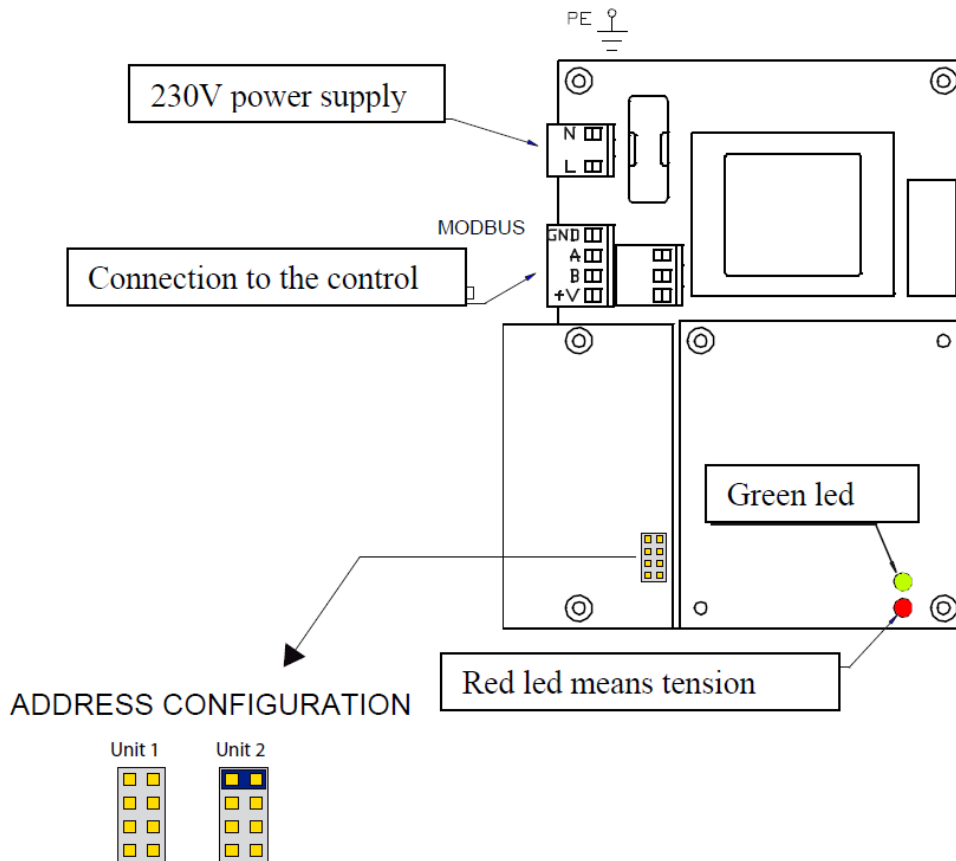
CONDUCTOR SECTION

The electric power supply line and the isolating devices must be decided by qualified staff responsible for the electrical design. In any case, the cable must have a minimum cross-section of 3x1,5 mm², F + N + PE.

The following diagram shows the terminals which are available for connections:

- the machine must be connected to an electric power supply;
- a 4-wire connection provides the control panel with both the 24VDC power supply and the serial communication. This connection cable must have a minimum cross-section of 0,5 mm² and must be shielded.

On-board electronic control panel



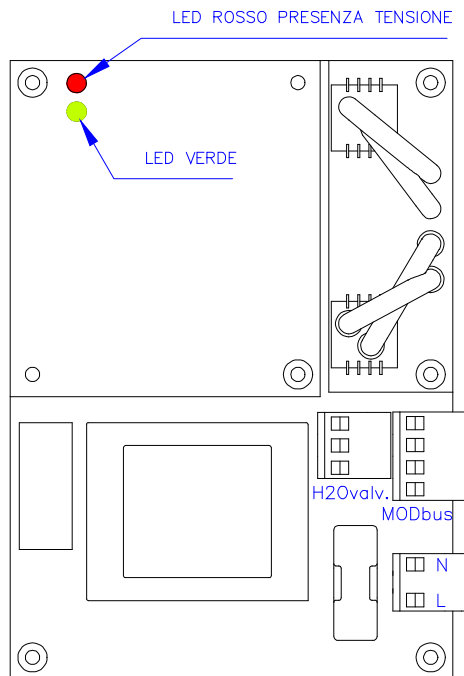
TECHNICAL DATA

Power supply	V/Ph/Hz	230 - 1 - 50
Weight	kg	105
Total dehumidification capacity (Outdoor temperature 35°C, 50% R.H.)	l/24h	74.1
	W	2090
Useful dehumidification capacity (referring to recirculation, room temperature at 26°C, 55% R.H.)	l/24h	31,2
	W	880
Refrigerant Gas Content R410a	Kg	0,450
Useful cooling capacity (referred to recirculation, room temperature at 26°C, 55% R.H.)	W	2580
Maximum electrical power use of compressor	W	780
Required water flow	l/hr	500
Water circuit load loss	kPa	11
Maximum cooling capacity required by water circuit (outdoor air at 35°, 50% R.H., max flow-rate in only Ventilation and Ventilation+Recirculation mode)	W	2050
Power consumption for the air supply fan (min - max)	W	20 - 160
Flow rate of the air supply fan (min - max)	m ³ /h	160 - 500
Available pressure of the air supply fan	Pa	260
Power consumption for the air exhaust fan (min - max)	W	20 - 160
Flow rate of the air exhaust fan (min - max)	m ³ /h	160 - 500
Available pressure of the air exhaust fan	Pa	260
Energy efficiency during winter operation (20°C - 50% R.H. indoor, -5°C - 80% R.H. outdoor)	flow rate 160 m ³ /h	91,70%
	flow rate 300 m ³ /h	87,50%
Energy efficiency in summer operation (26°C - 65% R.H. indoor, 35°C - 50% R.H. outdoor)	flow rate 160 m ³ /h	86,70%
	flow rate 300 m ³ /h	80,40%
Sound pressure level (Open field, distance of 1m)	dB(A)	48

START-UP AND COMMISSIONING

All hydraulic, aeraulic and electrical connections must be carried out before starting up the machine. Check the availability of refrigerated water and the absence of water leakage from the connections and from the machine.

The electronic control panel has a red LED and a green LED, which show the general status of the unit.



When the machine is powered up, the green LED lights up, remaining lit for about 90 seconds. During this period the control panel carries out some checks. Later, the red LED lights up, indicating the presence of voltage; the machine is therefore ready to receive input from the control panel and to perform the required functions.

PLEASE NOTE: After the start-up time of 90 seconds, the green LED is to be considered as input sent to the cooling compressor. If it is continuously lit, the compressor is functioning, if it is flashing, there is a request for operation but the compressor is not activated because it is waiting for the start timer or because there is some fault.

Functions that can be activated via digital inputs are:

- current season;
- fresh air ventilation with heat recovery (yes, no, automatic with time slots);
- summer dehumidification;
- summer cooling;
- winter heating;
- free-cooling;
- flow-rate attenuation compared to normal setting.

Settings that can be carried out on the keyboard are:

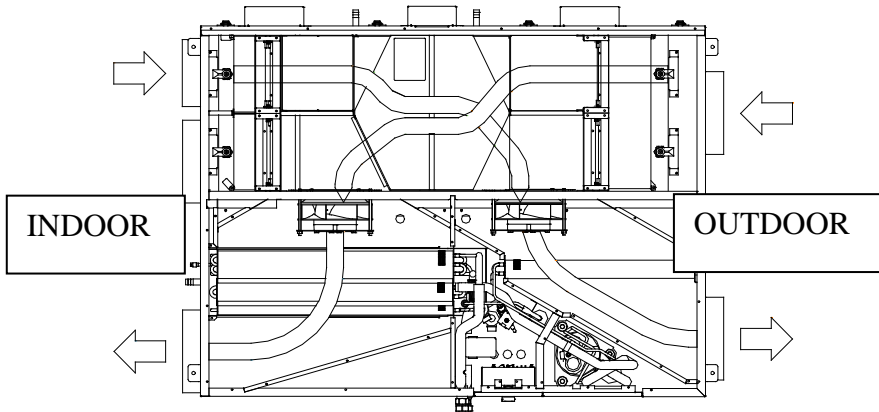
- activation of functions (as an alternative to digital input);
- current time;
- current season (as an alternative to digital input);
- flow rate for air supply in Ventilation and Ventilation+Recirculation mode;
- standard air supply temperature and air temperature for heating and cooling;
- automatic time slots for fresh air ventilation (max. 4);
- time slots for flow-rate attenuation (max. 4);

Machines equipped with a Control Panel can also read the levels of the temperature sensors which the machine is equipped with. These values can be useful in the testing phase or while verifying the correct operation.

Further details can be found in the manual: "UC 501-MHE Control Panel".

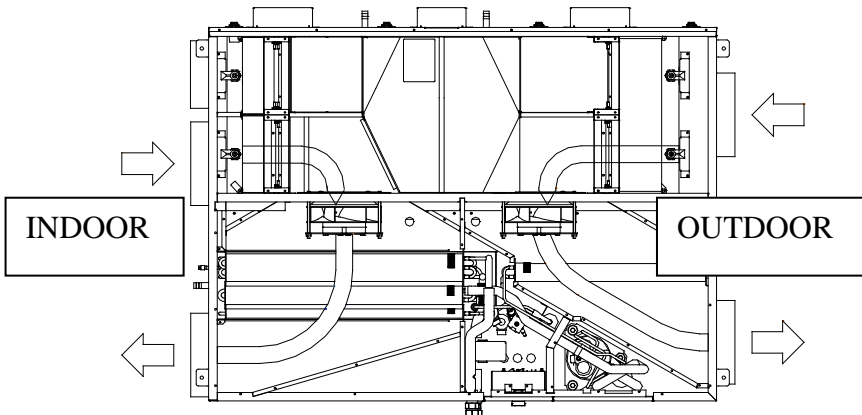
SUMMER OPERATING MODE

FRESH AIR VENTILATION



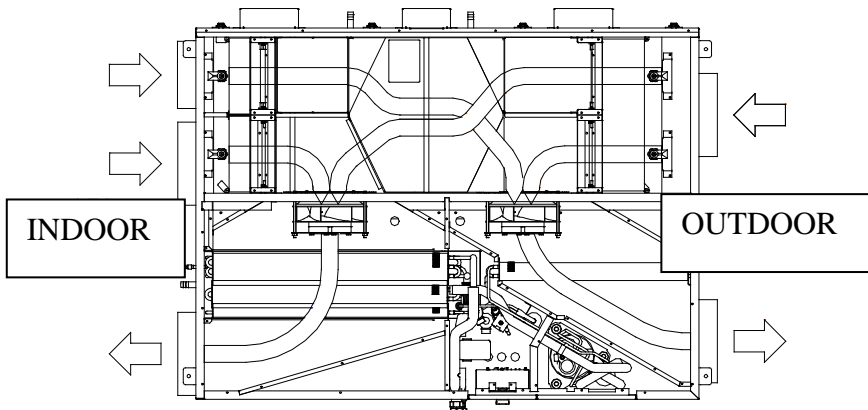
Both fans are running and carrying out fresh air ventilation: the outdoor air is cooled down by the heat exchanger by using the exhaust air first, and then by the refrigerated water circulating in the finned coil.

AIR DEHUMIDIFICATION



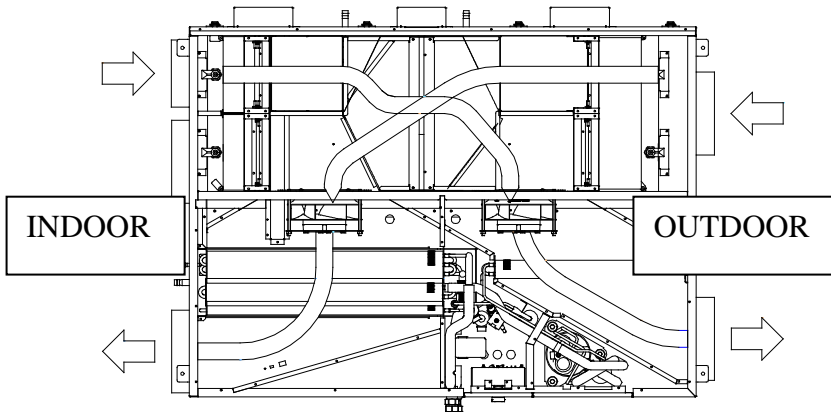
The compressor and the supply fan are running; the room air is dehumidified and supplied into the room at the set temperature. If excess heat must be removed, the exhaust fan intakes and expels an external air flow, which is warmed by the discharge coil.

**FRESH AIR VENTILATION + DEHUMIDIFICATION
FRESH AIR VENTILATION + SENSIBLE COOLING**



The compressor and both fans are running. The inflow air is treated by the whole group of coils. The air flow rate can be set from 300 to 500 m³/h, while the flow rate for the fresh air ventilation can be set from 160 to 300 m³/h.

HEAT RECOVERY BYPASS

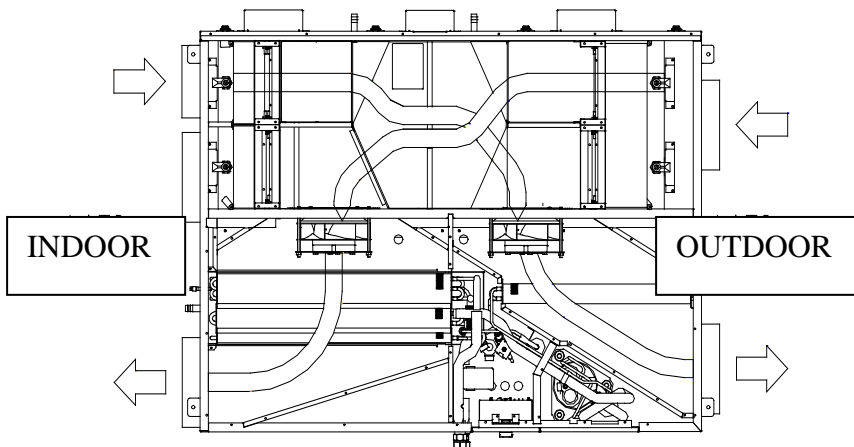


Both fans are running, the intake air damper is closed and the bypass damper is open. The inflow air is warmed up by the water coil.

The air flow rate can be set from 160 to 300 m³/h.

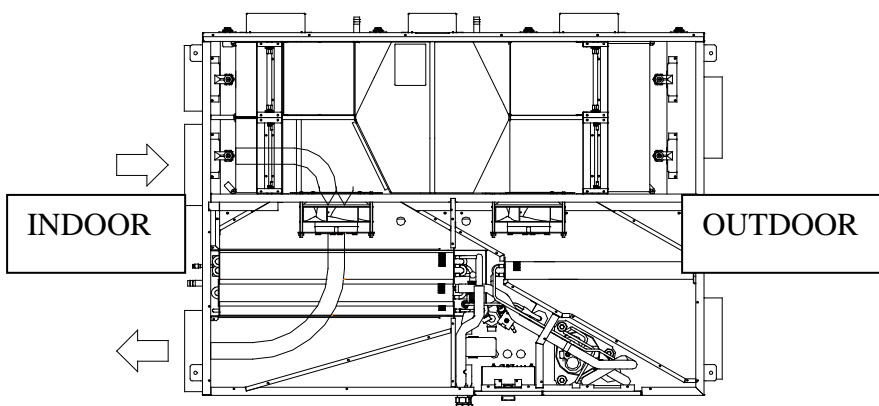
WINTER OPERATING MODE

FRESH AIR VENTILATION



Both fans are running and carrying out the fresh air ventilation; the outdoor air is warmed up by the heat exchanger first, by using the exhaust air, and then by the hot water circulating in the finned coil.

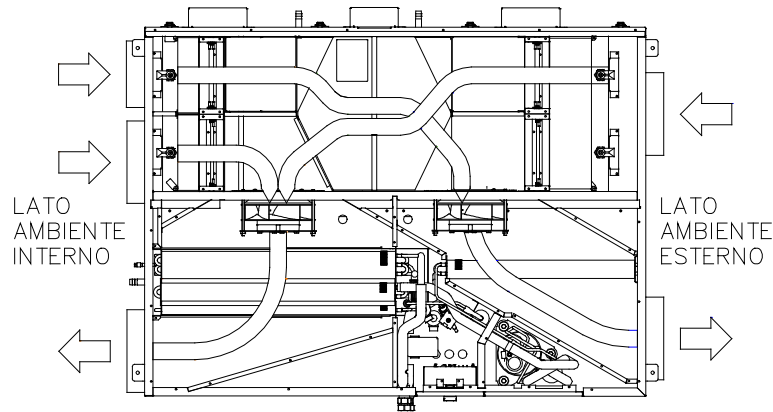
AIR RECIRCULATION



The supply fan is running; the room air extracted and supplied to the room again at the set temperature. The outgoing temperature is regulated by modulating the flow rate of the hot water circulating in the finned coil.

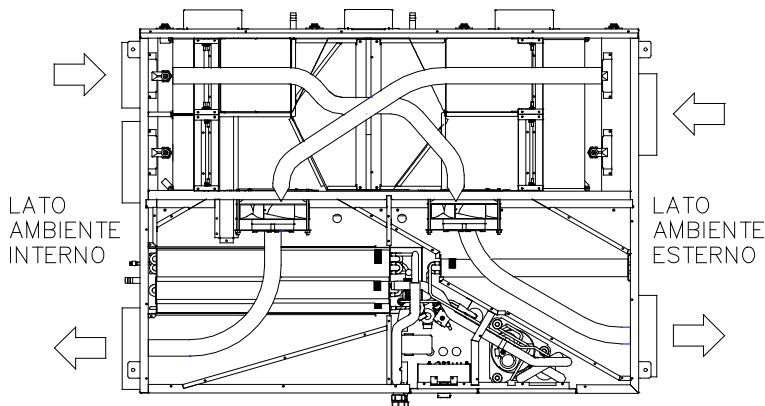
The flow rate for the supply air can be set from 300 to 500 m³/h

FRESH AIR VENTILATION + AIR RECIRCULATION



The fans are both running. The supply air is warmed up by the water coil. The intake air is pre-heated by the heat exchanger by using the exhaust air. The supply air flow rate can be set from 300 to 500 m³/h, while the flow rate for fresh air ventilation can be set from 160 to 300 m³/h.

WINTER FREE-COOLING



The fans are both running, the intake air damper is closed and the bypass damper is open. The water circuit of the finned coil is closed. The air flow rate can be set from 160 to 300 m³/h.

ROUTINE MAINTENANCE

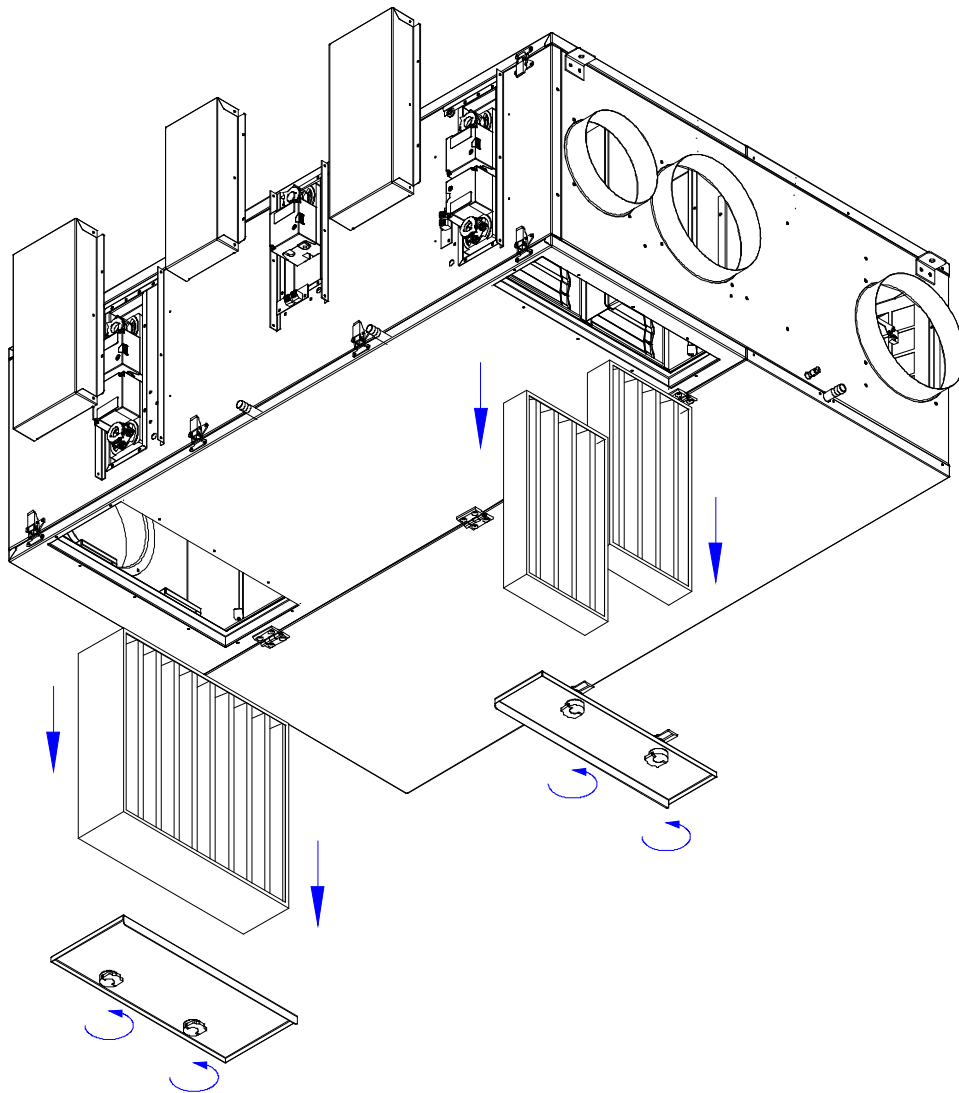
Routine maintenance involves the cleaning of the air filters.

The filters should be checked every 90 days.

To remove and clean the filters:

- unscrew the knobs that fix the filter cover, near the air spigots;
- remove the cover carefully;
- the filters can now be removed and cleaned using soap and water or by blowing with compressed air;
- N.B.: LET THE FILTERS DRY, in case of cleaning with water, before replacing them in the unit
- After a cycle of 3 consecutive cleanings the filter must be replaced. Contact RDZ for the purchase of new filters.

Please note: the filters are G4 class; if finer filtration is needed, or in case of very dusty air, the supplied filters could be inadequate. The system can be set up with air filters which shall be installed out of the machine, depending on the needs of the system.



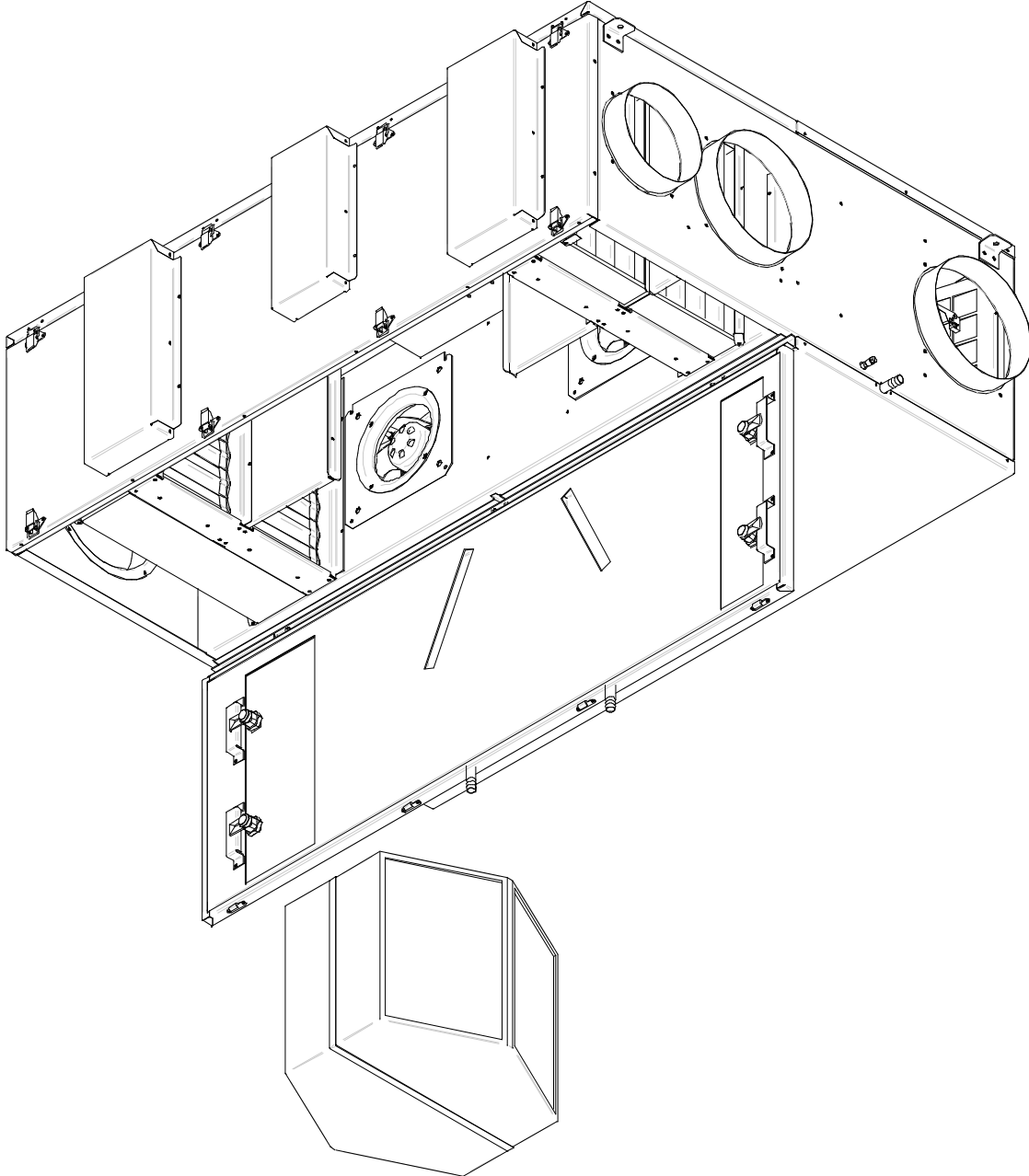
Removal of air filters

EXTRAORDINARY MAINTENANCE

Extraordinary maintenance involves the cleaning of the heat exchanger. The exchanger should be checked every two years.

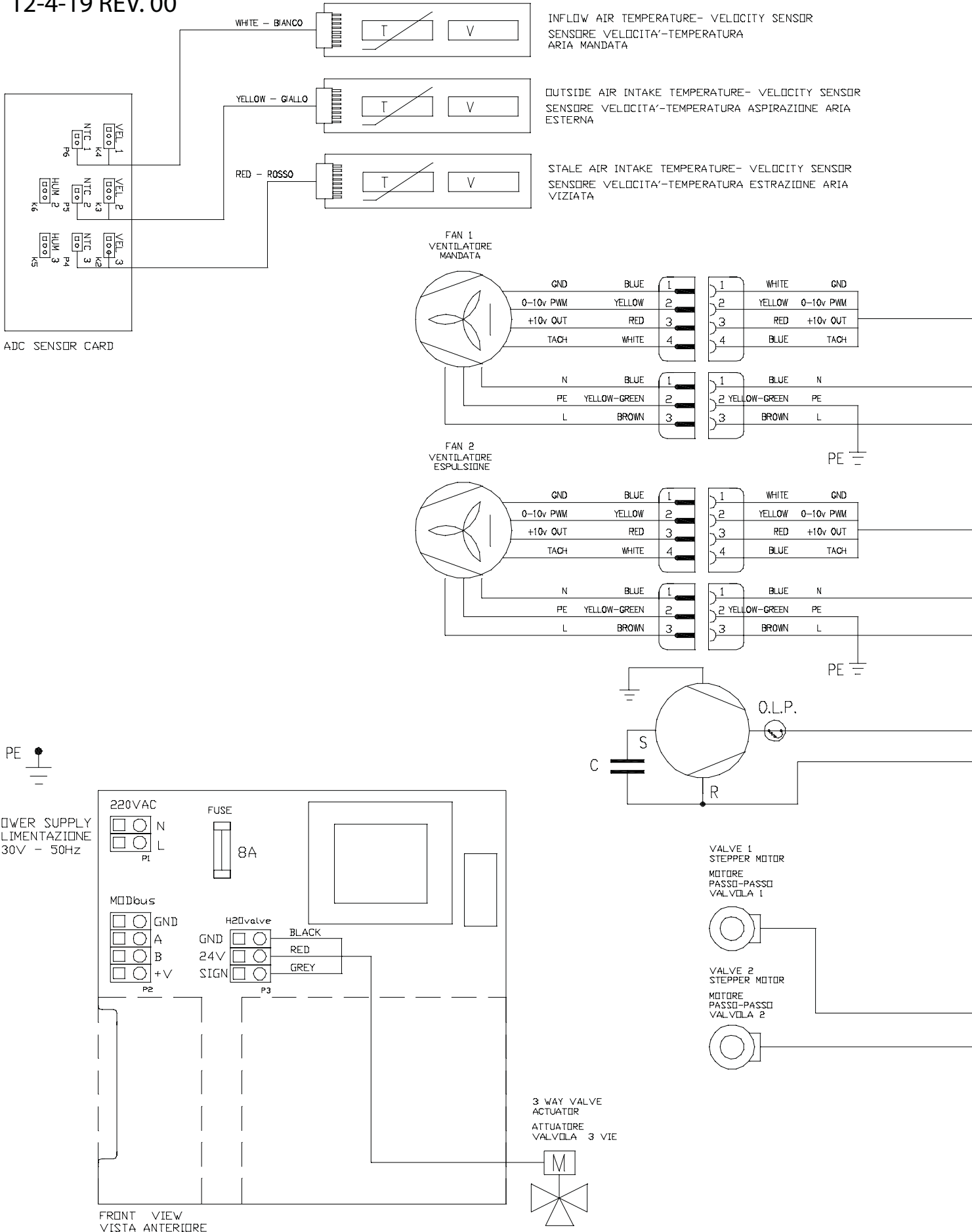
For removal and cleaning:

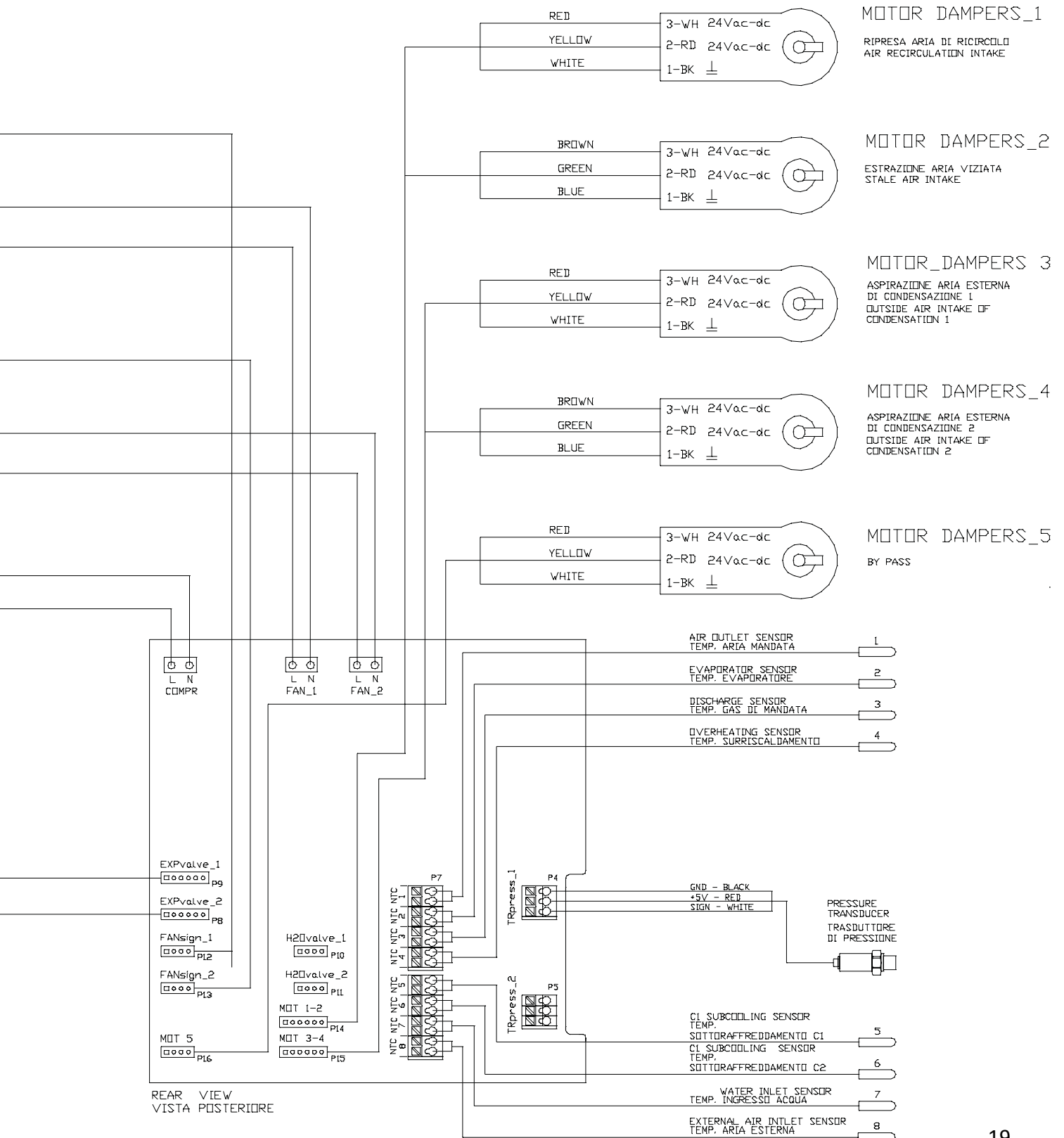
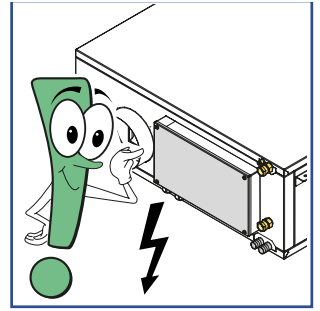
- Remove the air filter (see previous instructions)
- Open the panel downwards by using the 4 side hooks
- Remove the heat exchanger carefully:
- Cleaning can now be carried out using soap and water or by blowing with compressed air.



UC 501-MHE WIRING DIAGRAM

12-4-19 REV. 00







WARNINGS FOR THE CORRECT DISPOSAL OF THE PRODUCT

According to the provisions of the following European directives 2011/65/EU, 2012/19/EU, and 2003/108/CE, concerning the restriction of the use of certain hazardous substances in electrical and electronic equipment, as well as waste disposal.

The crossed out wheeled bins symbol on the equipment indicates that, at the end of its useful life, the product must be collected separately from general waste.

The refrigerating gas contained within it must be recovered separately by specialised personnel and sent to collection centres; the lubrication oil for the compressors must also be recovered and sent to collection centres; The structure and the various components, if they can no longer be used, must be demolished and divided up according to the type of product: this is particularly important for the copper and aluminium components, which are included in the machine in moderate quantities. Therefore, at the end of its useful life, the user must take the equipment to a designated electrical and electronic waste collection point, or return it to the dealer that, against the purchase of an equivalent appliance, it is obliged to collect the product for disposal free of charge.

Appropriate differentiated waste collection for subsequent recycling, treatment and environment-friendly disposal of the discarded equipment helps preventing possible negative environmental and health effects and encourages recycling of the component materials of the equipment.

Illegal disposal of the product by the user entails the application of sanctions provided by the regulations in force.

qr.rdz.it/?qr=P529



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