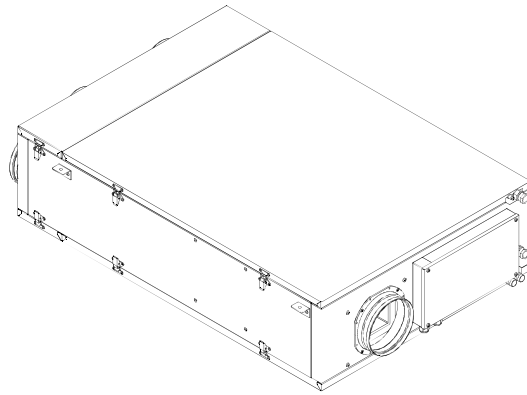


## **KDVRWY300 DUCT-TYPE AIR TREATMENT UNIT WITH AIR EXCHANGE AND HEAT RECOVERY**

12/2021



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## **PACKAGE CONTENT**

The KDVRWY300 unit is packed on wood pallets and protected by a carton box.

The package includes:

- 1 KDVRWY300 unit;
- 1 user and maintenance manual

Package dimensions: 820x1220x 540(h) mm;

Gross weight: kg 80

## **TRANSPORT AND STORAGE**

**IMPORTANT:** The parcel must travel on a pallet and be handled with mechanical means; handling on site must be carried out with equipment fit for the package weight and volume and in a way that prevents dents and falls: falls from just a few centimeters may damage the content. Never turn the parcel over or upside down; should this happen, put it back in horizontal position for at least 3 hours before installing the machine.

The parcels must be stored upright and in horizontal position, and up to three parcels can be stacked one on top of the other. Ideal environment conditions -10 °C ÷ 50 °C, relative humidity lower than 90%.



### **NOTE**

Manual handling must comply with the laws in force.

## **DESCRIPTION AND MAIN COMPONENTS OF THE UNIT**

When combined to a radiant cooling system, the KDVRWY300 unit can perform air treatment based on the seasonal and wellness requirements. Its functions include:

- air exchange, both in summer and winter, with at least 90% of heat recovery;
- air exchange with no heat recovery (with external accessory);
- summer dehumidification with adjustment of the delivery air temperature;
- summer cooling with no dehumidification through the radiant system water;
- winter air heating through the hot water of the radiant system.

The galvanized metal sheet frame of the unit contains the finned coils for air treatment, the cooling circuit for dehumidification, the vacuum air filter, the condensation collection tray, the delivery fan, the electric switchboard for control and management.

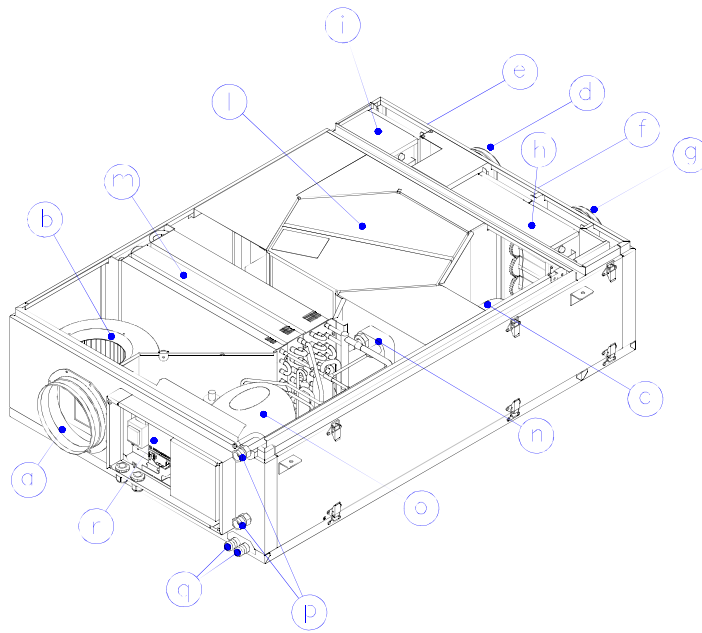


fig. 1

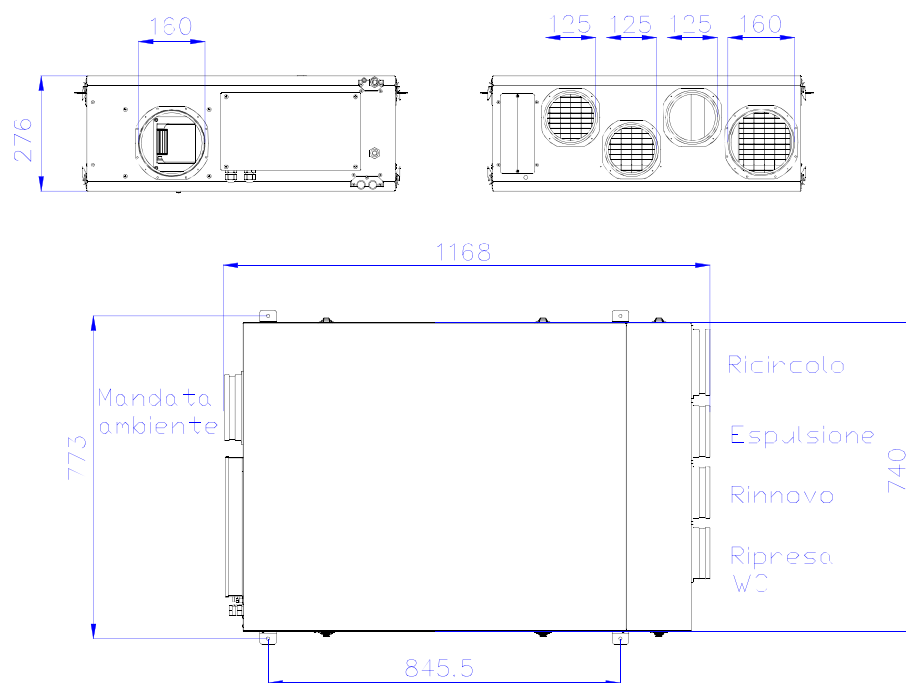
**LEGEND**

- a) Air delivery;
- b) delivery fan;
- c) ejection fan;
- d) foul air ejection;
- e) room air recirculation;
- f) exchange air vacuum;
- g) foul air vacuum;
- h) damper for separation from external environment;
- i) recirculation flow damper;
- l) heat recuperator;
- m) finned coils unit;
- n) plate exchanger;
- o) cooling compressor;
- p) hydraulic connections;
- q) condensation drains;
- r) electric board.

**Construction characteristics**

Cooling compressor	Hermetic, alternative monocylindrical
Cooling gas	R134a – 560g
eq. CO <sub>2</sub> (GWP = 1430)	0,80 t
Pre-cooling coil	Copper pipes (2 sets) and aluminum fins with hydrophilic treatment
Evaporation coil	Copper pipes and aluminum fins with hydrophilic treatment
Water connections	2 x 1/2" GAS female
Air filter	with synthetic-fiber filtering material - class G4 (EN 779:2002)

## DIMENSIONS



## INSTALLATION

### SAFETY NOTES



Installation and maintenance should be performed by qualified operators only. Hydraulic and electric systems as well as the installation sites should comply with the safety rules in force in the competent country. Before any intervention, read thoroughly the instructions of this user manual.



The machine contains pressurized cooling gas. Vent the room in case of gas leaks from one or multiple units. The gas contained in the units may create toxic components in case of fire.



Never alter the safety devices.



This appliance is not fit for use in explosive or potentially explosive atmospheres.



Defective pipes, hydraulic connections and check valves may cause water leaks or splashes that can damage the surrounding items and create hazardous situations wherever electricity is present.

### Preliminary requirements for installation

Before installing the unit, prepare:

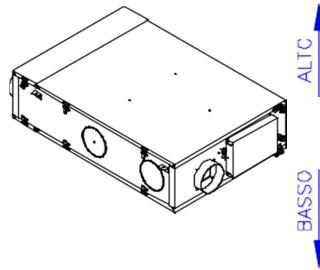
- the delivery and return water pipes of the radiant system with two shut-off valves for dissection of the line;
- the condensed water drain; two separate siphons are required, each for its own drain and to prevent air vacuum from the drain pipe;
- the electric supply wires, the PE protection wire (ground wire) and the operational input signals.

TYPE OF CONNECTION	CHARACTERISTICS	CONDITIONS
Chilled water	Temperature 15 °C; Hydraulic head 1,5 m w.c.	min. T 12 °C, max 18 °C;
Electric power	10 A	230V – 50Hz – 1ph
Condensation drain	Flow rate 15 l/h, Min slant 3%	2 siphons required $\Delta h = 40$ mm
Aeraulic ducts	Min diameter same as unit nozzles	The losses of pressure inside the ducts, by adding up the vacuum and the delivery for each flow, should not exceed the hydraulic head available for the unit

### Positioning

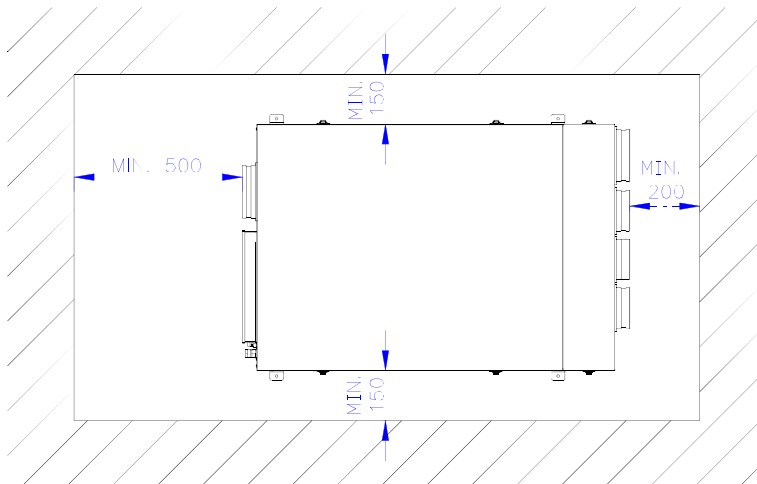
The unit must be installed indoor in horizontal position.

A slanted position exceeding 1% could cause water leaks and/or damage the internal devices.

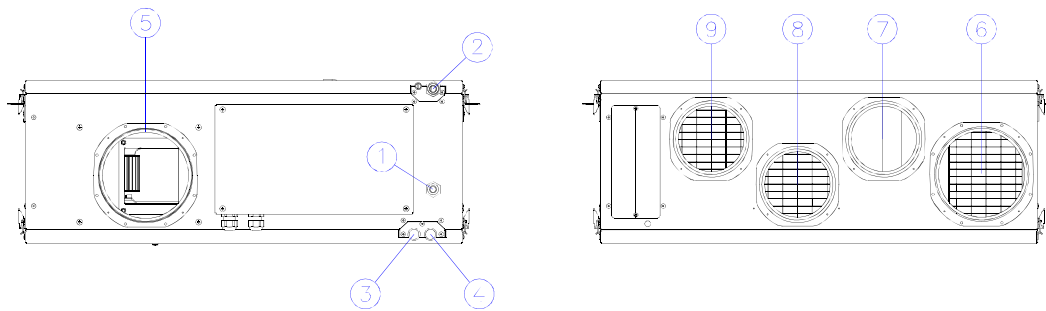


### Installation minimum distances

To properly maintain or repair it, provide enough free space around the machine according to the dimensions given in the picture below. These areas, including the one occupied by the unit, should be easily accessible.



## CONNECTIONS



### LEGEND

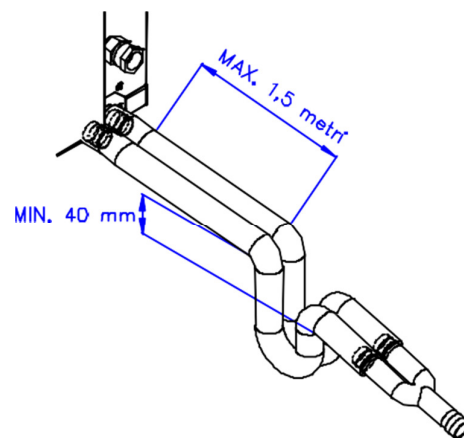
- 1 – chilled water inlet;
- 2 – chilled water outlet;
- 3 – summer condensation drain;
- 4 – winter condensation drain;
- 5 – room air delivery;
- 6 – room air recirculation
- 7 – foul air ejection;
- 8 – air exchange inlet;
- 9 – foul air vacuum;

### Connection of water circuit pipes

Insert shut-off valves inside the chilled water pipes to section the system from the machine. After connecting the circuit to the system, test the water seal of the connections and the unit to prevent damages to the area below.

### Condensation drain siphons

There are two condensation drains, one for summer and one for winter. They are essential to prevent air vacuum from hindering proper draining of any condensation; they should be installed separately near the unit drain ducts with a 40-mm min height.



## Aeraulic connections

The unit includes nuzzles with gaskets for connection of the ducts:

delivery and recirculation	Ø 160
air exchange and ejection	Ø 125
WC/kitchen recovery air	Ø 125

## ELECTRIC CONNECTIONS

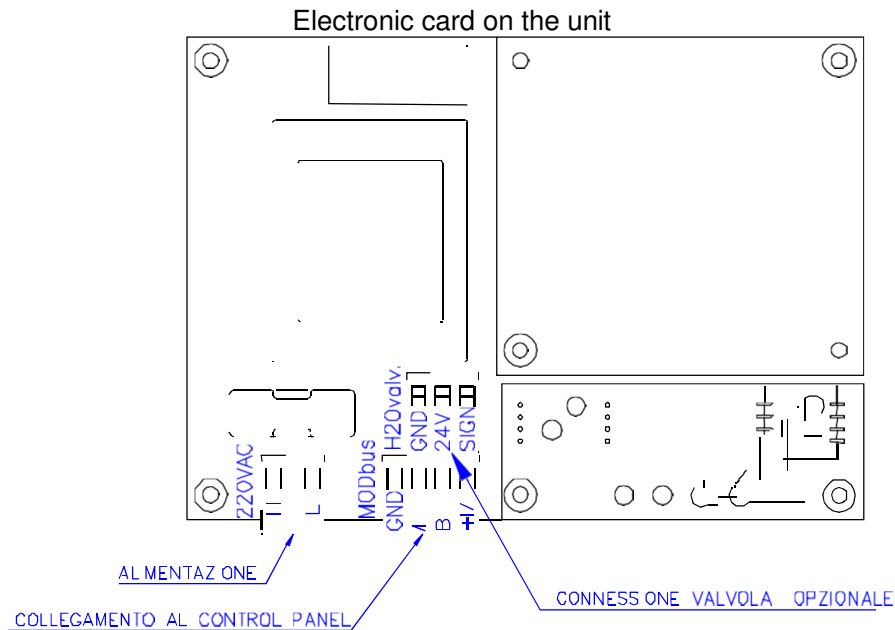


### WIRE SECTION

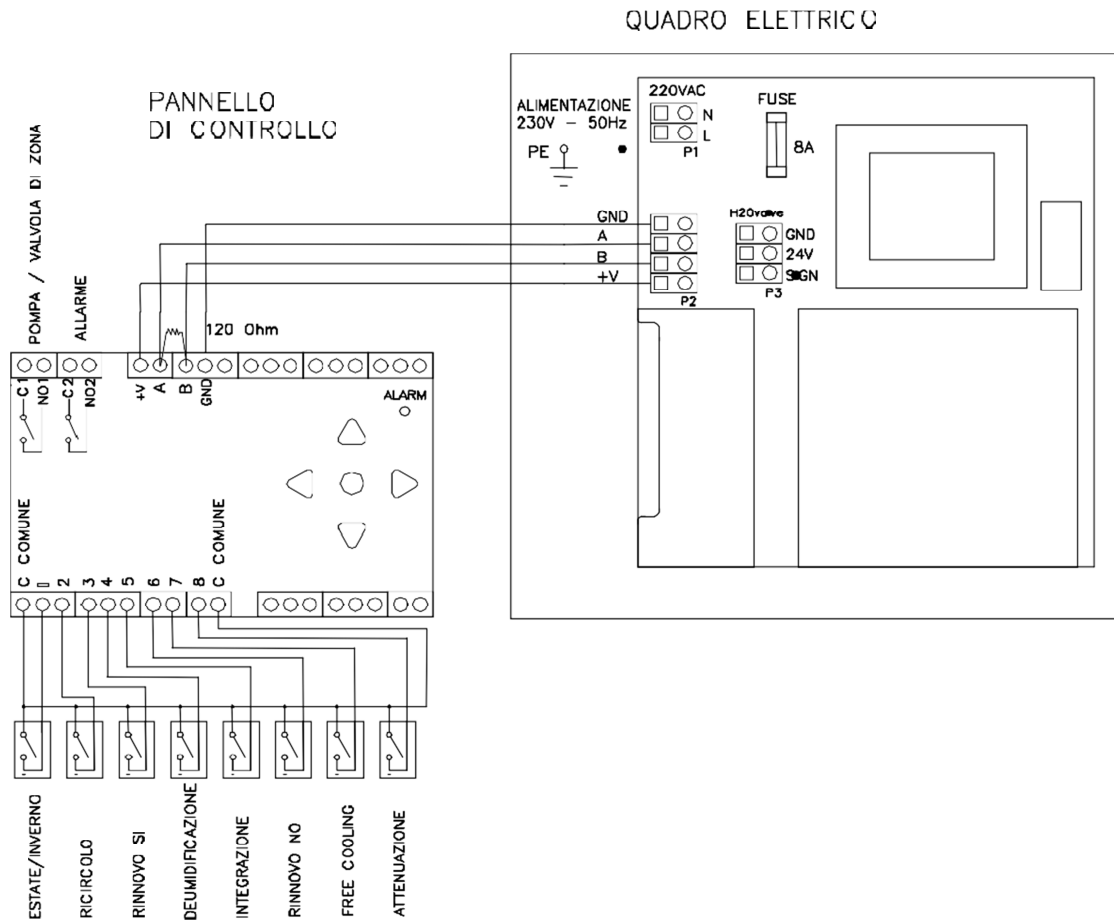
The electric supply line and the section devices must be planned by qualified electric planners; the wire must in any case feature a 3x1,5 sq. mm min section, F + N + PE.

The picture below shows the connection terminals available:

- The electric supply must be provided on the unit;
- The 4-thread connection to the control panel provides a 24V supply and serial communication. The wire connected to the control panel must have a 0,5-mm<sup>2</sup> min section; should the wire be longer than 25 meters it must be a shielded cable.



## CONTROL PANEL CONNECTION

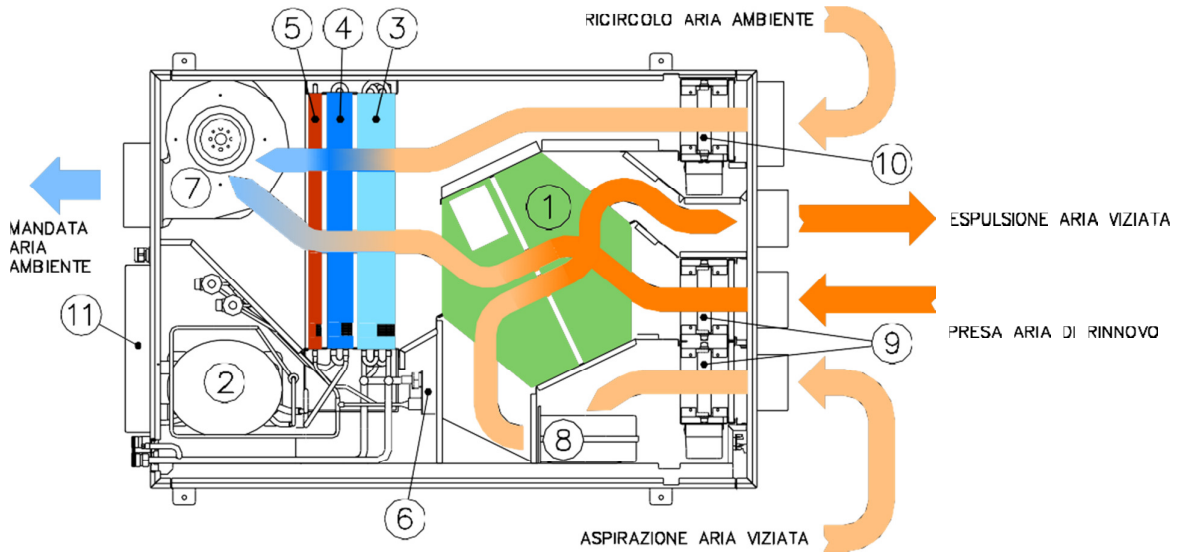


For proper operation of the serial communication line between the control panel and the KDVRWY300 unit, a 120 Ohm,  $\frac{1}{4}$  W, terminal resistance must be installed between terminals A and B of the control panel. This should be fitted with tape on the back of the control panel in the groove provided for the guide DIN.



## OPERATION DESCRIPTION

The picture below shows the unit plan with the main internal components and air flows.



- 1 - Air/air heat recuperator
- 2 - Cooling compressor;
- 3 - water-supplied finned coil;
- 4 - Cooling evaporator;
- 5 - Freon/air condenser;
- 6 - Freon/water plate condenser;
- 7 - Delivery fan;
- 8 - Ejection fan;
- 9 - Ejection and foul air vacuum damper (optional);
- 10 - Room air recirculation damper;
- 11 - Electric board.

## AERAILIC OPERATION

The air flow rates treated by the unit can be set through the control panel. The fans automatically reach the speed required to overcome the losses of pressure inside the ducts.

There can be two air flows inside the unit: the exchange air flow with heat recovery through the counter-current air/air recuperator (1) and the room air recirculation flow.

The exchange and recirculation flows can be either combined or kept separate based on the flow rates and the type of treatment desired for the inflow air.

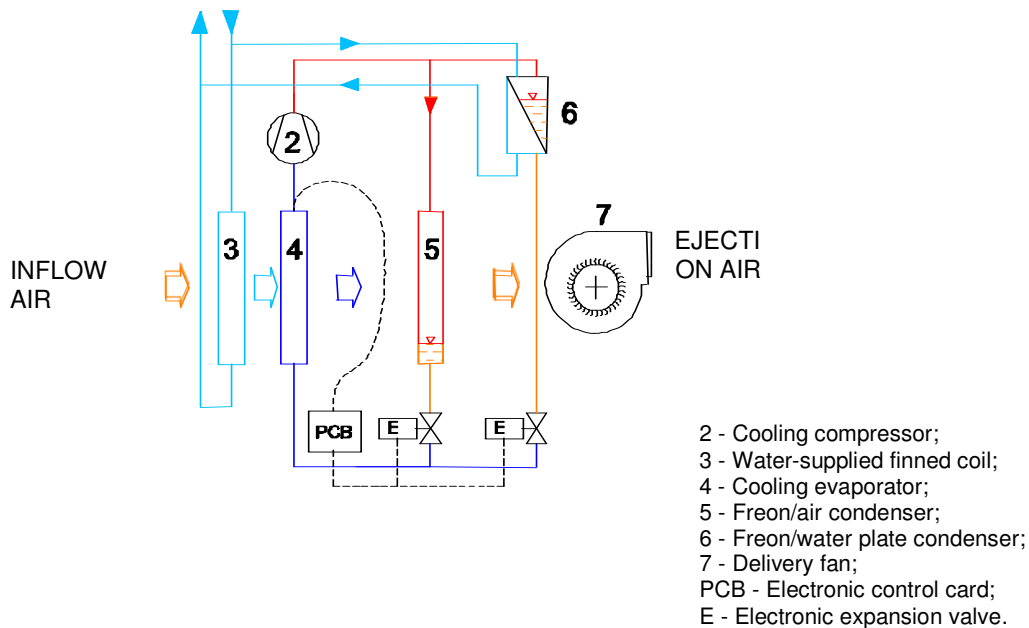
The following air treatments are available:

- Air exchange with optional winter heating or summer cooling;
- Winter air recirculation, summer cooling, summer dehumidification, summer cooling and dehumidification;
- Air recirculation with partial exchange, in addition to all the treatments provided for recirculation.

The air flows can be set on the following values:

- Inflow air, with variable recirculation rate: flow rate adjustable between 200 and 300 m<sup>3</sup>/h;
- Exchange air: flow rate adjustable between 80 and 160 m<sup>3</sup>/h.

## THERMAL-HYGROMETRIC OPERATION



### COOLING

The finned coil (3), connected to the radiant hydraulic system, provides summer cooling or winter heating; the output temperature can be set from the unit by adding an external mixing valve (supplied as accessory) or by adjusting the radiant system that controls the temperature of the delivery water.

### DEHUMIDIFICATION AND COOLING

The water-supplied coil (3) fed by the radiant system pre-cools the air; the cooling evaporator (4) provides air cooling and, in turn, dehumidification. The cooling circuit includes two condensers with parallel connection: in addition to the air-cooled condenser (5), a second plate condenser (6) disposes the water condensation heat.

The two electronic expansion valves enable to distribute the condensation heat between air and water as desired; this provides the inflow air at the desired temperature between max cold and neutrality.

The temperature values available for the delivery air are:

- Summer neutral temperature;
- Summer integration temperature;
- Winter neutral temperature;
- Winter integration temperature.

NOTE: The cooling circuit cannot be activated in winter and for the exchange-only function.

## TECHINCAL DATA

Electric power	V/Ph/Hz	230/ 1/50
Weight	kg	71
Total dehumidification capacity (external environment 35 °C, 50% R.H.)	l/24h	44,9
	W	1083
Useful dehumidification capacity (referred to recirculation, room at 26 °C, 55% R.H.)	l/24h	25,9
	W	625
Useful cooling capacity (referred to recirculation, room at 26 °C, 55% R.H.)	W	1050
Electric power absorbed by the compressor	W	460
Water flow rate required	l/h	400
Water circuit loss of pressure	kPa	8
Power absorbed by the delivery fan (min - max)	W	15 - 70
Delivery fan flow rate (min - max)	m3/h	80 - 300
Delivery fan useful hydraulic head	Pa	120
Power absorbed by the ejection fan (min - max)	W	15 - 30
Ejection fan flow rate (min - max)	m3/h	80 - 160
Ejection fan useful hydraulic head	Pa	100
Energy recovery during winter operation (20 °C - 50% internal r.h., -5 °C - 80% external r.h.)	flow rate 80 m3/h	95%
	flow rate 160 m3/h	91%
Energy recovery during summer operation (26 °C - 65% internal r.h., 35 °C - 50% external r.h.)	flow rate 80 m3/h	93%
	flow rate 160 m3/h	86%
Sound pressure level (in open field, distance 1m)	dB(A)	39
Quantity of R134a cooling gas	kg	0,56
Equiv. CO <sub>2</sub> (GWP = 1430)	t	0,80
Specific energy consumption (SEC) - Cold - Temperate - Warm	kWh/m <sup>2</sup> a	-76,13
		-38,40
		-4,16
SEC class	kWh/m <sup>2</sup> a	A

## PERFORMANCE

WINTER, heating (total flow rate 300m3/h)

Recirculation  
(300m3/h 20 °C 40%RH)

delivery water temp. °C	thermal power W	delivery air temp. °C
30	848	28,3
35	1274	32,5
40	1664	36,4
45	2138	41,0

Exchange + Recirculation  
(160m3/h -5 °C, 90%RH+ 140m3/h 20 °C, 40%RH)

delivery water temp. °C	tot. thermal power W	room thermal power W	delivery air temp. °C	power required by heat pump W
30	2164	811	28,1	983
35	2589	1235	32,3	1408
40	3021	1668	36,5	1840
45	3452	2099	40,8	2271

SUMMER, dehumidification/integration during recirculation (300m3/h)

room condition °C - %RH	delivery water temp. °C	cooling power				power required by water cooling		cooling compress or electric power total
		W* sensible	W latent	W latent	W l/day	W dehumidification	W int. max	
24 – 55	12	2128	1455	673	23,2	1129	2552	426
	15	1784	1305	479	16,5	954	2232	448
	18	1463	1172	291	10,1	785	1933	470
24 – 65	12	2372	1358	1014	35,0	1479	2800	428
	15	1967	1189	778	26,9	1264	2420	453
	18	1622	1051	571	19,7	1075	2098	476
26 – 55	12	2461	1574	887	30,6	1354	2889	428
	15	2022	1390	632	21,8	1119	2475	453
	18	1710	1265	445	15,4	950	2185	475
26 – 65	12	2740	1470	1270	43,9	1747	3171	431
	15	2324	1301	1023	35,3	1519	2780	456
	18	1896	1137	759	26,2	1275	2377	481

SUMMER, exchange + recirculation (160m3/h 35 °C 55% + 140 m3/h recirculation)

room condition °C - %RH	delivery water temp. °C	cooling power				power required by water cooling		cooling compress or electric power total
		W* sensible	W latent	W latent	W l/day	W dehumidification	int. max W	
24 – 55	12	3257	1866	1391	48,1	1953	3166	431
	15	2832	1694	1138	39,3	1720	2767	457
	18	2391	1525	866	29,9	1467	2351	482
24 – 65	12	3358	1818	1540	53,2	2107	3270	434
	15	2945	1654	1291	44,6	1877	2881	458
	18	2504	1488	1016	35,1	1621	2465	483
26 – 55	12	3369	1906	1463	50,5	2017	3375	434
	15	2952	1741	1211	41,8	1784	2982	458
	18	2511	1575	936	32,3	1529	2567	484
26 – 65	12	3523	1870	1653	57,1	2212	3530	435
	15	3086	1699	1387	47,9	1965	3118	460
	18	2640	1534	1106	38,2	1703	2697	485

SUMMER, exchange + recirculation (160m3/h 35 °C 55% + 140 m3/h recirculation)

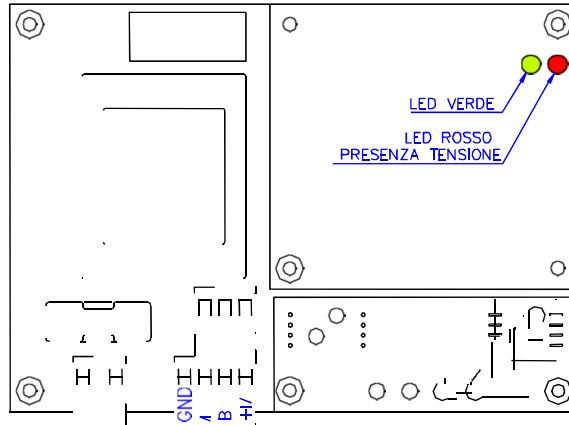
room condition °C - %RH	delivery water temp. °C	cooling power referred to the internal environment**			
		total* sensible	W latent	W latent	W l/day
24 – 55	12	1626	1239	387	13,4
	15	1203	1068	135	4,7
	18	761	899	-138	-4,8
24 – 65	12	1984	1195	789	27,3
	15	1571	1031	540	18,7
	18	1131	865	266	9,2
26 – 55	12	2027	1392	635	21,9
	15	1611	1227	384	13,3
	18	1169	1061	108	3,7
26 – 65	12	2473	1361	1112	38,4
	15	2037	1190	847	29,3
	18	1590	1025	565	19,5

\*The total cooling power comes from the recovered heat, the pre-treatment coil and the direct expansion coil.  
 \*\*The cooling power referred to the internal environment is generated by the difference between the inflow air enthalpy and the room air enthalpy. Negative values indicate that the unit cannot sustain the desired conditions even without internal loads.

## START UP AND TESTING

Before starting up the unit, carry out all hydraulic, aeraulic and electric connections. Also make sure chilled water is available and that there are no water leaks from the connections and unit.

Check the tension on the electronic card: a red led will turn on when tension is present.



As soon as the tension is available, a solid green led will turn on for 90 seconds along with the red one. The unit will be ready to receive the control panel inputs and perform the required functions.

After 90 seconds, the green led will confirm the input sent to the cooling compressor: a solid light indicates that the compressor is controlled when active, a flashing one means a request of operation is in progress but the compressor is not controlled yet because it is on hold or malfunctioning.

The functions available through digital inputs are:

- current season;
- exchange with heat recovery (yes, no, automatic with time slots);
- dehumidification;
- cooling in winter;
- heating in winter;
- attenuation of air flow rates versus normal settings;

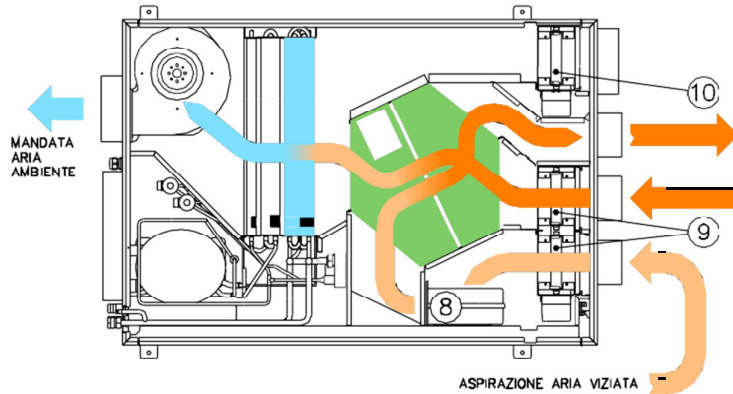
The settings available on the keypad are:

- function activation (as an alternative to digital input);
- current time;
- current season (as an alternative to digital input);
- delivery and exchange air flow rates
- normal and integration delivery temperature for each season;
- time slots for automatic exchange (max 4);
- time slots for flow rate attenuation (max 4).

The operator can also read the values of the unit temperature sensors which are useful during testing or when checking the correct operation. For more details, refer to the “CONTROL PANEL” section of this manual.

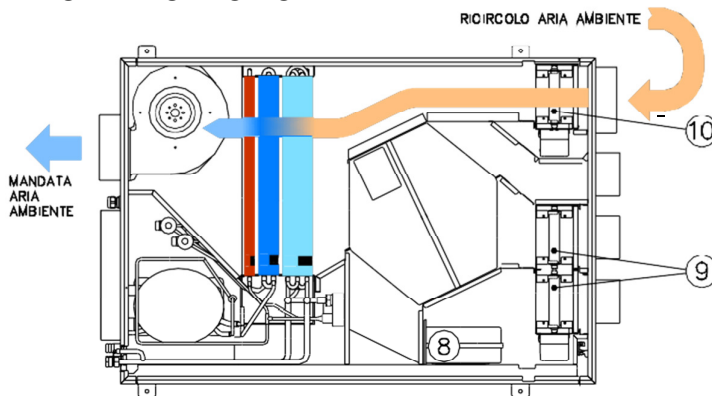
## SUMMER OPERATION MODES

### EXCHANGE ONLY



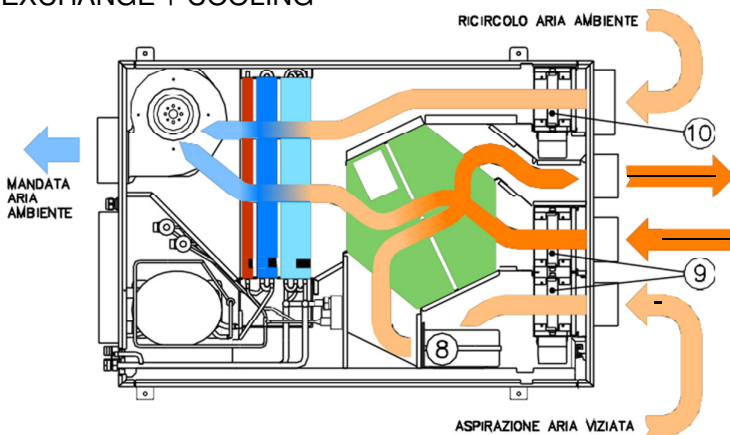
Damper 10 is closed, damper 9 (when available) is open, both fans are ON and the water-supplied coil cools the exchange air. The flow rate can be set between 80 and 160 mc/h. The water flow rate can be adjusted through an external 3-way valve (optional).

### DEHUMIDIFICATION ONLY



Damper 10 is open, damper 9 (when available) is closed, the ejection fan is OFF and the compressor is ON and the entire coil unit treats the air. The air flow rate can be set between 80 and 300 mc/h.

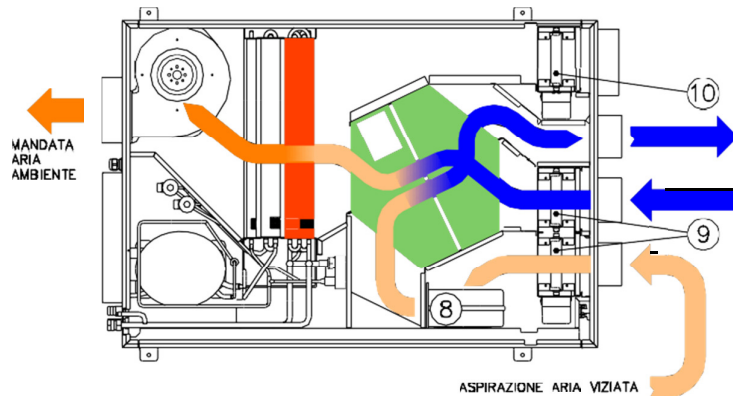
### EXCHANGE + DEHUMIDIFICATION EXCHANGE + COOLING



Damper 10 is open and modulating, damper 9 (when available) is open, both fans are ON, the compressor is ON and the entire coil unit treats the inflow air. The air flow rate of the inflow air can be set between 160 and 300 mc/h, while the exchange rate can be set between 80 and 160 mc/h.

## WINTER OPERATION MODES

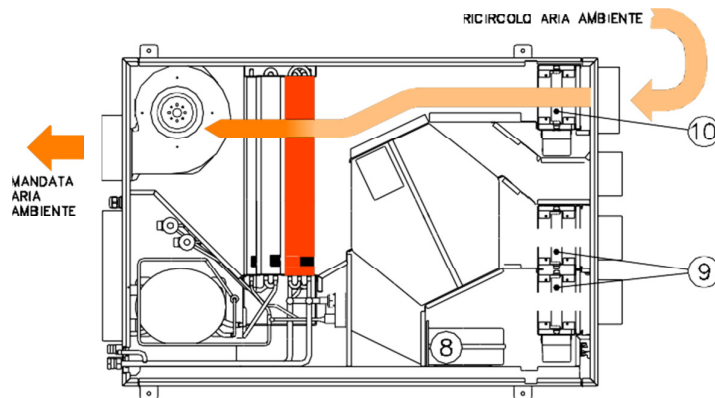
### EXCHANGE ONLY



Damper 10 is closed, damper 9 (when available) is open, both fans are ON and the water-supplied coil heats the exchange air. The air flow rate can be set between 80 and 160 m<sup>3</sup>/h.

The water flow rate can be adjusted through an external 3-way valve (optional).

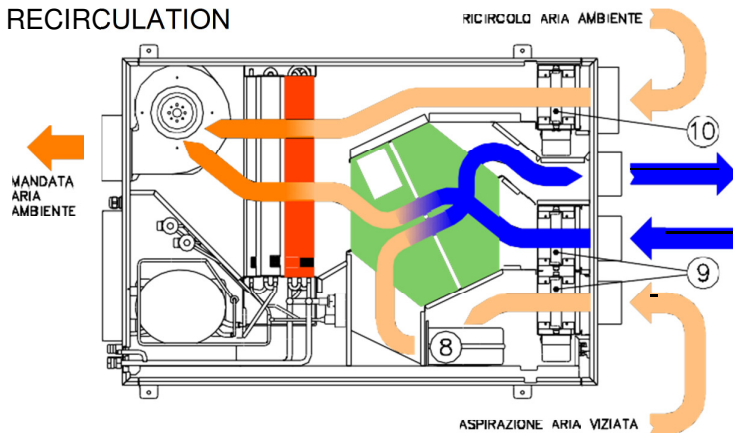
### RECIRCULATION ONLY



Damper 10 is closed, damper 9 (when available) is open, both fans are ON and the water-supplied coil heats the exchange air. The air flow rate can be set between 80 and 160 mc/h.

The water flow rate can be adjusted through an external 3-way valve

### EXCHANGE + RECIRCULATION



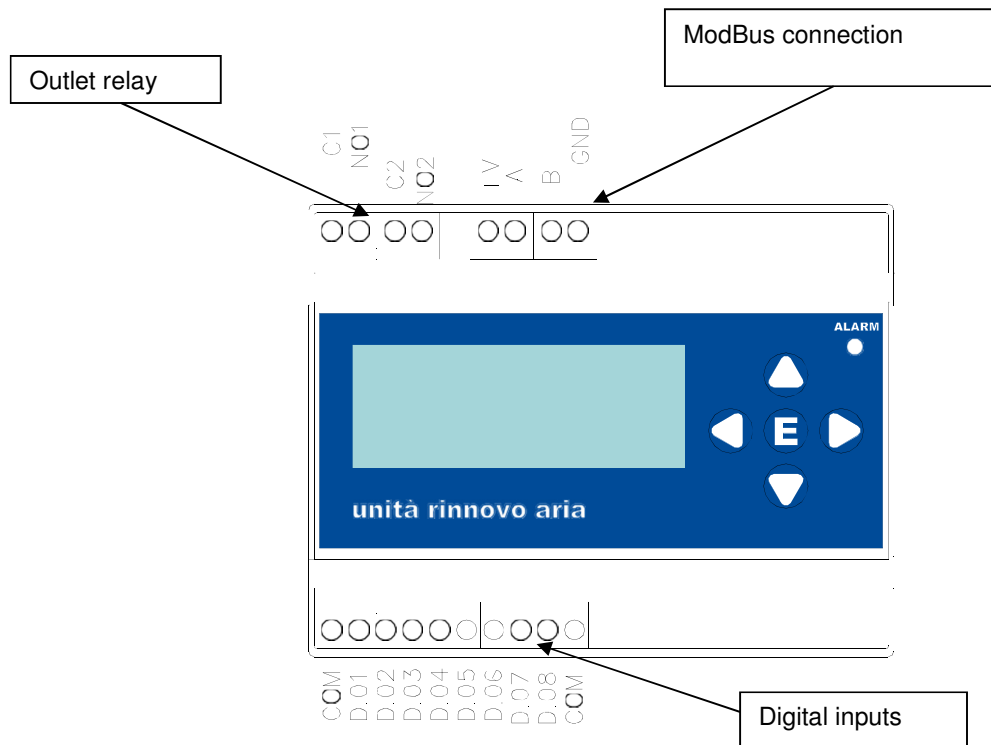
Damper 10 is open and modulating, damper 9 (when available) is open, both fans are ON, and the water-supplied coil heats the inflow air. The air flow rate of the inflow air can be set between 160 and 300 m<sup>3</sup>/h while the exchange rate can be set between 80 and 160 m<sup>3</sup>/h.

## CONTROL PANEL

The remote control panel should be installed on a guide DIN in a wall-mount electric board; the space encumbered corresponds to 6 modules.

The control panel includes 3 terminal strips for:

- connection of the unit with 4 threads to feed the panel (24VDC) and enable serial communication with the electronic card;
- the digital inputs of the various functions;
- the two digital relay outlets that activate a circulation pump and a failure signal.



## CONTROL PANEL CONNECTION

**ModBus CONNECTION:** this should be performed using a shielded 4-thread wire, section 0,5mm<sup>2</sup>; insert the terminal resistance in A and B. Thread V+ provides a 24V feed to the panel.

## OUTLET RELAY

- C01-NO1: 250V AC – 5A relay that activates when water circulation is required, useful to control the pump.
- C02-NO2: 250V AC – 5A relay that activates when a signal turns ON, useful to provide an alarm signal from remote.



## DIGITAL INPUTS

COM: terminal shared by all inlets;

DI01: season, 1 = summer, 0 = winter, when the season is set through a digital input instead of a key pad;

DI02: room fan activation input; this is not an operational mode but enables to keep the room air flowing;

DI03: exchange input

DI04: dehumidification input;

DI05: cooling input in SUMMER or heating in WINTER;

DI06: exchange stop, it enables to stop an exchange set or programmed, e.g. with DI03 or time slots. This inlet, when connected through DI03 to a 3-position selector, type 0-1-2, provides 3 options: exchange ON, exchange OFF, AUTOMATIC exchange through time slots.

DI08: flow rate attenuation input.

## OPERATIONAL MODES

Note: The operational modes for KDVRWY300 depend on the external accessories that have been assembled.

**Exchange:** Air exchange with the corresponding flow rate, using the heat recuperator;

**Cooling:** Displayed when summer is selected; the dehumidification cooling compressor is turned ON and the delivery temperature will be the one provided for the cooling (or integration) settings.





**Heating:** Displayed instead of cooling when winter is selected; the delivery temperature, obtained through the water-supplied coil, is the one provided for winter integration.

Note: An external setting valve (optional) must be included to add integration to the KDVRWY300 unit.

**Dehumidification:** The dehumidification cooling compressor is turned ON and the delivery temperature will be the one provided for operation with neutral air; **Attenuation:** The unit works with the attenuation flow rates which are set by default on values lower than normal operation to reduce aerualic noise. This function is convenient if the user wants the unit to work during resting times

## HOW TO USE THE CONTROL PANEL




The control panel is provided with five buttons:

-  to enter a new screen or move to the right; to return to the
-  previous screen or move to the left; to move up or increase the
-  selected value;
-  to move down or decrease the selected value;
- E** to confirm a modified value or to access a new submenu selected.

## ACTIVATION

The initial screen when the unit is OFF will be the following:

Unit OFF
Press a button to turn ON
Status >OFF



To change from “OFF” to “ON” press  or ; press E to confirm the status and move the triangle cursor to the upper line. To move back to the previous screen press 

Unit status screen



The initial screen displayed when the unit is ON will be the following:

current time	current season
10:35	Summer
Exchan	NO
Cooling	NO
Dehumidification	
↓ NO Attenuation	NO
Freecooling	NO

Initial screen

The initial screen shows information such as the time, the setting season and the list of functions with their corresponding operational status. Every function includes the (YES/NO) caption to show when it is ON or OFF. To display all the functions scroll the screen using  or . Should one or more flashing captions appear, refer to chapter “MANUAL CONTROLS”.

## HOW TO SCROLL THROUGH THE SCREENS

Use the  button to access a screen and the  button to move back.

## MENU SCREEN

From the initial screen press  or **E** to access the menu screen:

```
Manual
controls
Exchange
Times
Attenuation Times
Settings

```

Menu screen

## MANUAL CONTROLS



The unit functions can be activated through the keypad instead of digital inputs by entering the desired function and operational duration.

### NOTES:

- **Manual controls are prioritized over digital inputs and activations provided for by the time slots;**
- **When a manual control is active the caption on the initial screen flashes.**

```
> Manual
  Controls
  Exchange
  Times
  Attenuation Times
  Settings



```

Move the cursor to the manual control line using  or  and press **E**.

```
MANUAL          Durat
Exchange >--    -
Cooling--       -
Dehumid. --     -
Attenuation     -

```

Manual control screen

Place the cursor on the line of the control to be set using  or ; after pressing **E**, the user can activate the control (displayed by "YES"), lock the control (displayed by "NO") or cancel the setting (confirmed by two dashes).

After confirming the setting with **E**, the control duration will be displayed with the default value of 1 hour; this value can also be changed by pressing **E** to select the value with the arrows. The duration values may be increased up to 96 hours, the subsequent value is **cont.** which stands for continuous operation.

```
MANUAL          Durat
CONTROLS:      ion
Exchange       01:15
Dehumid. --    01:00
Attenuation    -

```

### Example


The settings shown in the picture are:

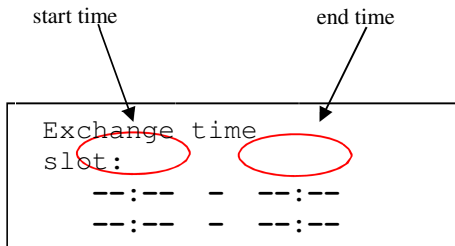
- The exchange function will remain active for 1 hour and 15';
- The cooling function will be interrupted for 1 hour, notwithstanding the time slot and digital inputs. The captions will flash.

## TIME SLOT SETTING



The user can set time slots for the automatic activation of exchange and air flow rate attenuation; attenuation is a convenient function to reduce the noise from air movement.

### HOW TO SET A TIME SLOT

From the menu screen, select “Exchange hours” or “Attenuation hours” based on the desired function and press 



There are 4 time slots, each with a start time and an end time on the same line.



To set a time slot, move the cursor on the start time and press **E**: the screen will display a time that can be changed using  and ; press **E** again to confirm.


Repeat the same procedure to set the end time; once both times have been defined, the time slot will be set.




### HOW TO DELETE A TIME SLOT

To delete a time slot, set the start and end time on the same value, the times will be deleted and the line will display dashes only.

### HOW TO SET THE CURRENT TIME OR SEASON

**Changing the current time:** from the setting menu, select “Set time”; use the **E** button to select the hour or minutes and then change the time using  and .

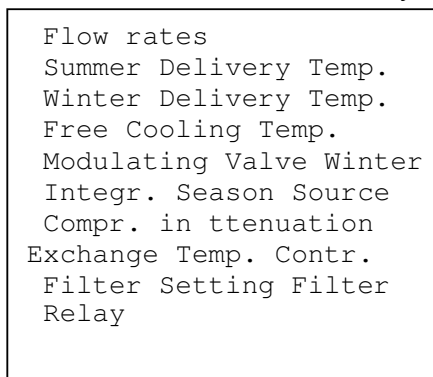
Press **E** once again or to confirm the desired value 

**Changing the current season:** from the setting menu, select “Set season”; the current value is immediately displayed and can be changed using  and ; to confirm the change press **E** again 

## TECHNICAL SETTINGS

To access the technical settings menu enter the 4-digit password; use the number buttons one at a time, then press **E** to display the technical settings menu.

The captions below are all submenu entries. Select any caption and press **E** to display the operational screen of the selected entry.



**Flow rates:** This menu entry is the flow rate submenu.

Flow rate Norm:		
Att.: Exch.	80	
	120	200
FreeC.	-	-

The setting can be entered separately:

- exchange flow rates (Exch.) from 80 to 160 m<sup>3</sup>/h;
- room flow rates (Room), from 200 to 300 m<sup>3</sup>/h;

All flow rates can be set in the normal (Norm.) or attenuation mode (Att.).

**Summer Delivery Temp.:** Air delivery temperatures in summer mode, one for the neutral air function and one for the cooling integration function.

**Winter Delivery Temp.:** Air delivery temperatures in winter mode, one for the neutral air function and one for the heating integration function.

NOTE: Winter temperatures can be modified only when the winter integration is enabled and the modulating valve is available.

**Modulating valve:** This entry enables to confirm the presence of the external 3-way modulating valve on the chilled water circuit to adjust the delivery temperature in summer even when the compressor is OFF, or in winter when the winter integration is enabled.

**Winter integration:** To enable winter integration. If the modulating valve is provided, the winter delivery temperature can be adjusted, while only the hydraulic pump control relays can be activated if there is no modulating valve.

**Season source:** To decide if the season must be entered by digital input or keypad;

**Compress. in Att.:** To decide if the compressor must be ON or OFF during attenuation. Generally, the attenuation function is used to reduce the noise from the unit; in this case it can be useful to stop the compressor.

**Exch. Temp. Contr. (enabled/disabled):** This function allows to deactivate the input relay for water circulation. It is useful when the relay is used to control the water circulation in the unit and interrupt it during exchange only.

**Filter setting:** This sets a procedure to control the air filter cleaning.

Filter Setting
Interv.: 150 h
Percentage:120 %

The user can define an interval in hours for the actual ventilation and a percentage between 110% and 150%, referred to a standard condition of the fan flow rate.

At the end of the interval, the unit resumes exchange standard operation at a 120 m<sup>3</sup>/h flow rate and makes sure the fans do not exceed the setting speed percentage versus the initial conditions.

The initial conditions are acquired through the filter reset procedure which is displayed as the last entry on the menu screen.

No code alarm is displayed when the filters are dirty but a caption appears on the first line, "Filter cleaning".

**Filter relay (enabled/disabled):** This enables the activation of the alarm relay when the controller reads one or multiple clogged air filters.

## FILTER RESET

Filter Reset Procedure Active
-------------------------------------

Using the **E** button on this screen, the user can activate the procedure which consists in:

- Starting the unit in the exchange mode with a flow rate of -- m<sup>3</sup>/h;
- Measuring and saving the speed of the fans that will be used as reference to evaluate any future clogging of the air filters.

The procedure must be carried out after every cleaning or replacement of the air filters, or when starting up the unit for the first time.

## DIAGNOSTICS

The control panel displays the alarm and failure signals sent by the electronic card on the unit. There are two types of messages and they are all coded with a multiple of 2:

- Failure messages signaling a failing sensor;
- Alarm messages signaling an anomalous operational condition.

### Failure messages

Message	Meaning
Sens. Failure: 1	Delivery air temperature probe NTC1 disconnected or short-circuited
Sens. Failure: 2	Cooling evaporator temperature probe NTC2 disconnected or short-circuited
Sens. Failure: 4	Condenser B undercooling temperature probe NTC6 disconnected or short-circuited
Sens. Failure: 8	Overheating temperature probe NTC4 disconnected or short-circuited
Sens. Failure: 16	Condenser A undercooling temperature probe NTC6 disconnected or short-circuited
Sens. Failure: 32	Delivery water temperature probe NTC7 disconnected or short-circuited
Sens. Failure: 64	Compressor temperature probe NTC3 disconnected or short-circuited
Sens. Failure: 256	Cooling pressure transducer damaged
Sens. Failure: 512	Differential pressure sensor for exchange air

## Alarm messages

Message	Meaning
Alarm: 1	Unit with no cooling gas - permanent alarm
Alarm: 2	Stoppage for max cooling pressure - permanent alarm
Alarm: 4	Stoppage for compressor high temperature
Alarm: 8	BUS communication error
Alarm: 32	Stoppage for high temperature of delivery water
Alarm: 64	Stop of room delivery fan
Alarm: 128	Stop of ejection fan
Alarm: 256	Anti-freezing protection intervention – permanent alarm

Should a permanent alarm turn on, the unit will stop and will not restart until the alarm is deleted by unplugging the machine. An exception is made for the anti-freezing alarm (128) where the user can reactivate the unit by changing the current mode: for example, if the machine was in the “exchange” mode when the alarm was set off and there is no longer a freezing risk, just enter the “integration” input to restart the unit.

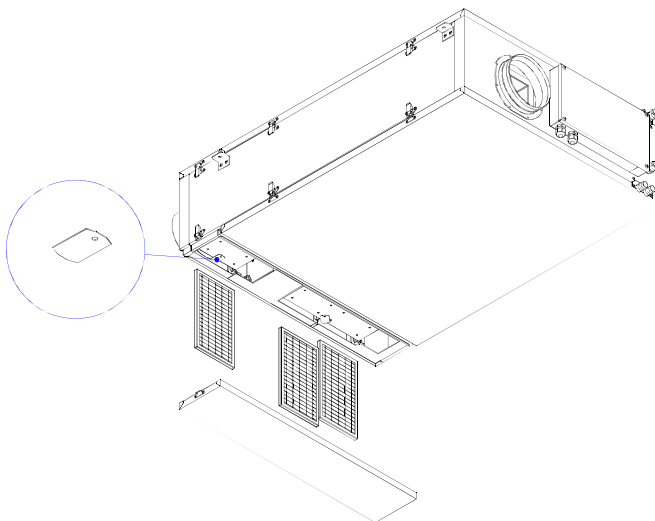
The other alarms are self-deleted when the related issue is solved. The control panel displays only one message; in case of multiple alarms, the displayed message will show a number equivalent to the sum of the numbers of the corresponding alarms. Example: failure number 34 corresponds to failure 32 plus failure 2.

When there is an alarm and a failure, the two messages flash alternatively on the display. Whenever there are alarms or failures, the unit enters a provisional or partial operational mode to provide, whenever possible, the residual functions without compromising its safe use.

## MAINTENANCE

Periodical maintenance consists of cleaning the air filters. To remove and clean the filters:

- Disconnect and remove the filter lid from the opposite side of the hydraulic and electric supply;
- Turn the metal plates that block the filters;
- Remove and clean the filters with water and soap or blow them out with compressed air.





#### **IT - AVVERTENZE PER IL CORRETTO SMALTIMENTO DEL PRODOTTO**

Questo prodotto rientra nel campo di applicazione della Direttiva 2012/19/UE riguardante la gestione dei rifiuti di apparecchiature elettriche ed elettroniche (RAEE). L'apparecchio non deve essere eliminato con gli scarti domestici in quanto composto da diversi materiali che possono essere riciclati presso le strutture adeguate. Informarsi attraverso l'autorità comunale per quanto riguarda l'ubicazione delle piattaforme ecologiche atte a ricevere il prodotto per lo smaltimento ed il suo successivo corretto riciclaggio.

Si ricorda, inoltre, che a fronte di acquisto di apparecchio equivalente, il distributore è tenuto al ritiro gratuito del prodotto da smaltire. Il prodotto non è potenzialmente pericoloso per la salute umana e l'ambiente, ma se abbandonato nell'ambiente impatta negativamente sull'ecosistema. Leggere attentamente le istruzioni prima di utilizzare l'apparecchio per la prima volta.

Si raccomanda di non usare assolutamente il prodotto per un uso diverso da quello a cui è stato destinato, essendoci pericolo di shock elettrico se usato impropriamente.

Il simbolo del bidone barrato, presente sull'etichetta posta sull'apparecchio, indica la rispondenza di tale prodotto alla normativa relativa ai rifiuti di apparecchiature elettriche ed elettroniche.

L'abbandono nell'ambiente dell'apparecchiatura o lo smaltimento abusivo della stessa sono puniti dalla legge.

#### **EN - IMPORTANT INFORMATION FOR CORRECT DISPOSAL OF THE PRODUCT**

This product falls into the scope of the Directive 2012/19/EU concerning the management of Waste Electrical and Electronic Equipment (WEEE). This product shall not be disposed in to the domestic waste as it is made of different materials that have to be recycled at the appropriate facilities. Inquire through the municipal authority regarding the location of the ecological platforms to receive the product for disposal and its subsequent correct recycling. Furthermore, upon purchase of an equivalent appliance, the distributor is obliged to collect the product for disposal free of charge. The product is not potentially dangerous for human health and the environment, but if abandoned in the environment can have negative impact on the environment. Read carefully the instructions before using the product for the first time.

It is recommended that you do not use the product for any purpose rather than those for which it was intended, there being a danger of electric shock if used improperly.

The crossed-out wheeled dustbin symbol, on the label on the product, indicates the compliance of this product with the regulations regarding Waste Electrical and Electronic Equipment.

Abandonment in the environment or illegal disposal of the product is punishable by law.

**GIACOMINI S.p.A.**

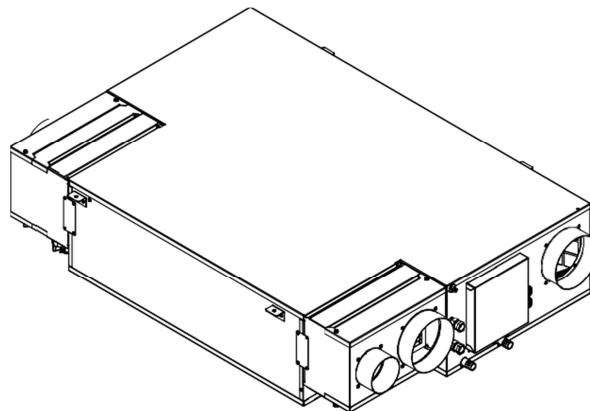
**Via per Alzo, 39 - 28017 San Maurizio D'Opaglio (NO) - ITALY**

**+39 (0)322 923111 [www.giacomini.com](http://www.giacomini.com)**



## **KDVRAY360 DUCT-TYPE AIR TREATMENT UNIT WITH AIR EXCHANGE AND HEAT RECOVERY**

05/2022



### **INDEX**

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## **PACKAGE CONTENT**

The KDVRAY360 unit is packed on wood pallets and protected by a carton box.

The package includes:

- 1 KDVRAY360 unit;
- 1 user and maintenance manual

Package dimensions:           cm 93x137x 43(h);

Gross weight:                   kg 98

## **TRANSPORT AND STORAGE**

**IMPORTANT:** The parcel must travel on a pallet and be handled with mechanical means; handling on site must be carried out with equipment fit for the package weight and volume and in a way that prevents dents and falls: falls from just a few centimeters may damage the content. Never turn the parcel over or upside down; should this happen, put it back in horizontal position for at least 3 hours before installing the machine.

The parcels must be stored upright and in horizontal position, and up to three parcels can be stacked one on top of the other. Ideal environment conditions -10 °C ÷ 50 °C, relative humidity lower than 90%.



### **NOTE**

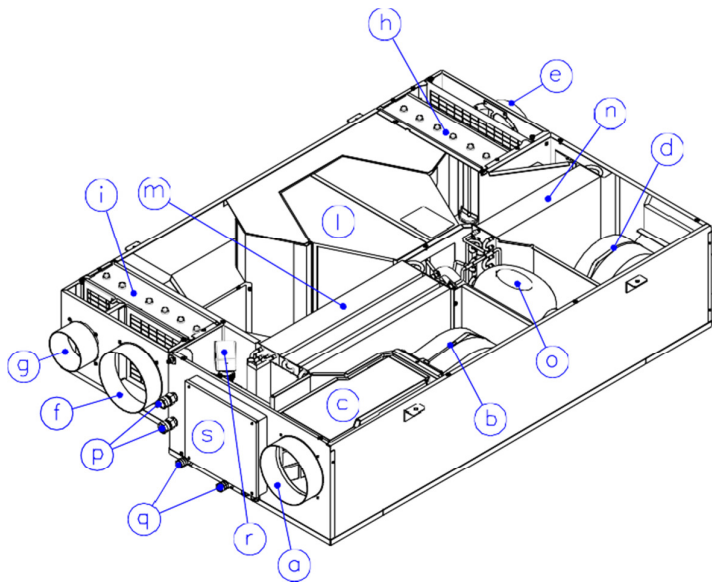
Manual handling must comply with the laws in force.

## **DESCRIPTION AND MAIN COMPONENTS OF THE UNIT**

When combined to a radiant cooling system, the KDVRAY360 unit can perform air treatment based on the seasonal and wellness requirements. Its functions include:

- air exchange, both in summer and winter, with high-efficiency heat recovery;
- air exchange with no heat recovery (free-cooling);
- summer dehumidification with adjustment of the delivery air temperature;
- summer cooling with or without dehumidification (through the radiant system water);
- winter air heating through the hot water of the radiant system.

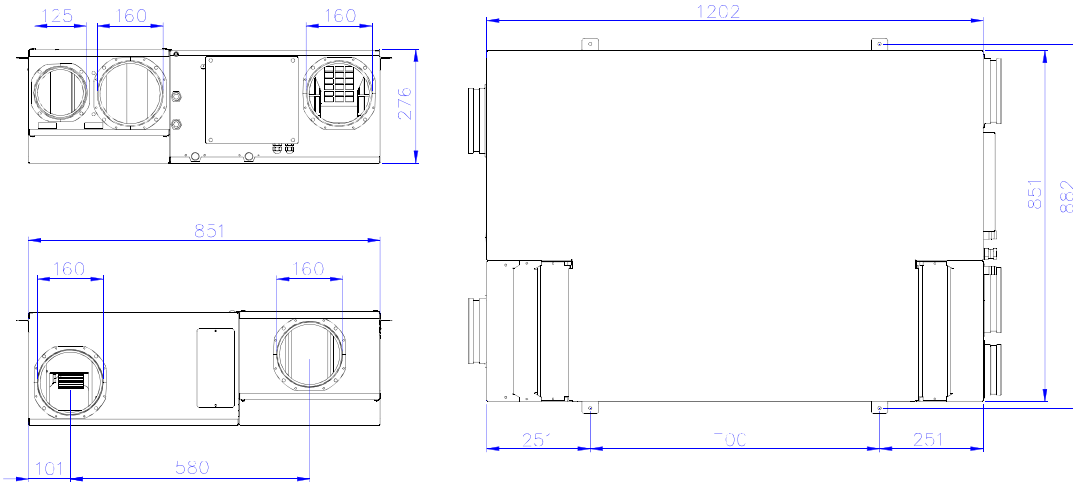
The galvanized metal sheet frame of the unit contains the finned coils for air treatment, the cooling circuit for dehumidification, the vacuum air filter, the condensation collection tray, the delivery fan and the electric switchboard for control and management.



#### LEGEND






- a) air delivery;
- b) delivery fan;
- c) ejection fan;
- d) foul air ejection;
- e) room air recirculation;
- f) exchange air vacuum;
- g) foul air vacuum;
- h) damper for separation from external environment;
- i) recirculation flow damper;
- l) heat recuperator;
- m) finned coils unit;
- n) plate exchanger;
- o) cooling compressor;
- p) hydraulic connections;
- q) condensation drains;
- r) water flow rate control valve;
- s) electric board.

## DIMENSIONS



## INSTALLATION

### SAFETY NOTES

-  Installation and maintenance should be performed by qualified operators only. Hydraulic and electric systems as well as the installation sites should comply with the safety rules in force in the competent country. Before any intervention, read thoroughly the instructions of this user manual.
-  The machine contains pressurized cooling gas. Vent the room in case of gas leaks from one or multiple units. The gas contained in the units may create toxic components in case of fire.
-  Never alter the safety devices.
-  This appliance should not be used in explosive or potentially explosive environments.
-  Defective pipes, hydraulic connections and check valves may cause water leaks or splashes that can damage the surrounding items and create hazardous situations wherever electricity is present.

### Preliminary requirements for installation

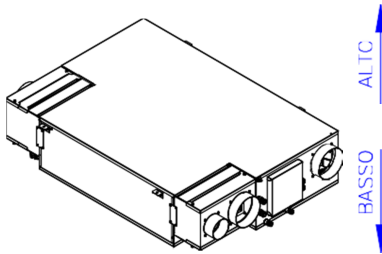
Before installing the unit, prepare:

- the delivery and return water pipes of the radiant system with two shut-off valves for dissection of the line;
- the condensed water drain; two separate siphons are required, each for its own drain and to prevent air vacuum from the drain pipe;
- the electric supply wires, the PE protection wire (ground wire) and the operational input signals.

TYPE OF CONNECTION	CHARACTERISTICS	CONDITIONS
Chilled water	Temperature 15 °C; hydraulic head 1,5 m w.c.	min. T 12 °C, max 18 °C;
Electric power	10 A	230V – 50Hz – 1ph
Condensation drain	Flow rate 15 l/h, min slant 3%	2 siphons required $\Delta h = 40$ mm
Aeraulic ducts	Min diameter same as unit nozzles	The losses of pressure inside the ducts, by adding up the vacuum and the delivery for each flow, should not exceed the hydraulic head available for the unit

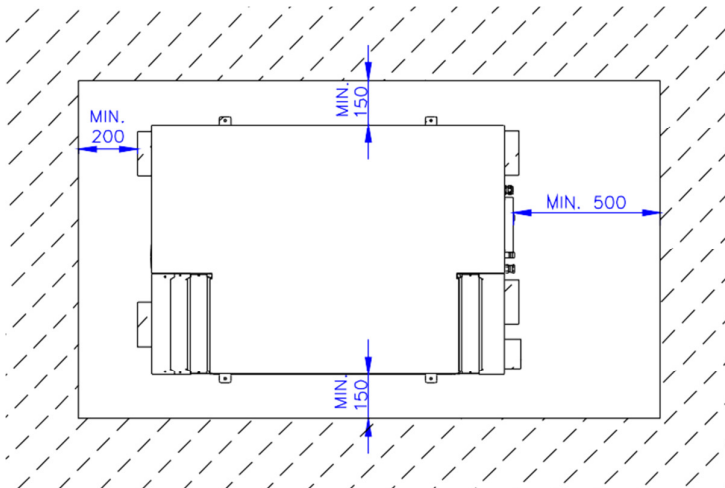
### Positioning

The unit must be installed indoor in horizontal position. A slanted position exceeding 1% may cause water leaks and/or damage the internal devices.

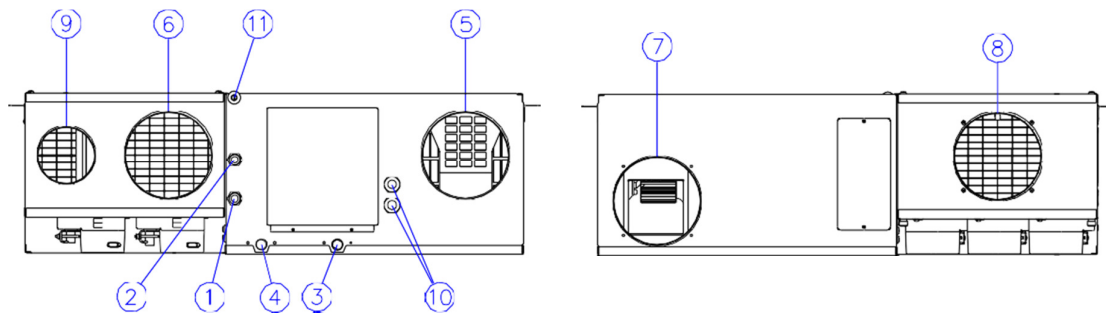


### Installation minimum distances

To properly maintain or repair it, provide enough free space around the machine according to the dimensions given in the picture below. These areas, including the one occupied by the unit, should be easily accessible for maintenance.



## CONNECTIONS



### LEGEND

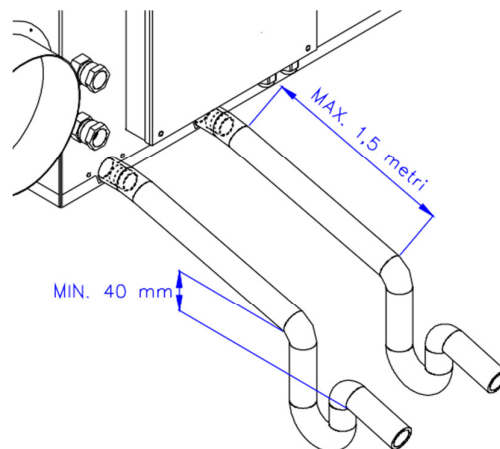
- 1 – cold/hot water inlet;
- 2 – cold/hot water outlet;
- 3 – summer condensation drain;
- 4 – winter condensation drain;
- 5 – room air delivery;
- 6 – room air recirculation
- 7 – foul air ejection;
- 8 – air exchange inlet;
- 9 – foul air vacuum;
- 10 – electric wire inlet;
- 11 – hydraulic circuit vent;

### Connection of water circuit pipes

Insert shut-off valves inside the chilled water pipes to section the system from the machine. After connecting the circuit to the system, test the water seal of the connections and the unit to prevent damages to the area below.

### Condensation drain siphons

There are two condensation drains, one for summer and one for winter. They are essential to prevent air vacuum from hindering proper draining of any condensation; they should be installed separately near the unit drain ducts with a 40-mm min height.



## Aeraulic connections

The unit is provided with plastic nozzles with gaskets, jutting out for about 4 cm to fit the flexible or rigid ducts; these must be equipped with gaskets to prevent air leaks and undesired noise. Nozzle diameters:

delivery and recirculation            Ø 160

air exchange and ejection            Ø 160

WC/kitchen recovery air            Ø 125

NOTE: The actual diameter of the nozzles is approx. 1 mm shorter than the nominal diameter

## ELECTRIC CONNECTIONS



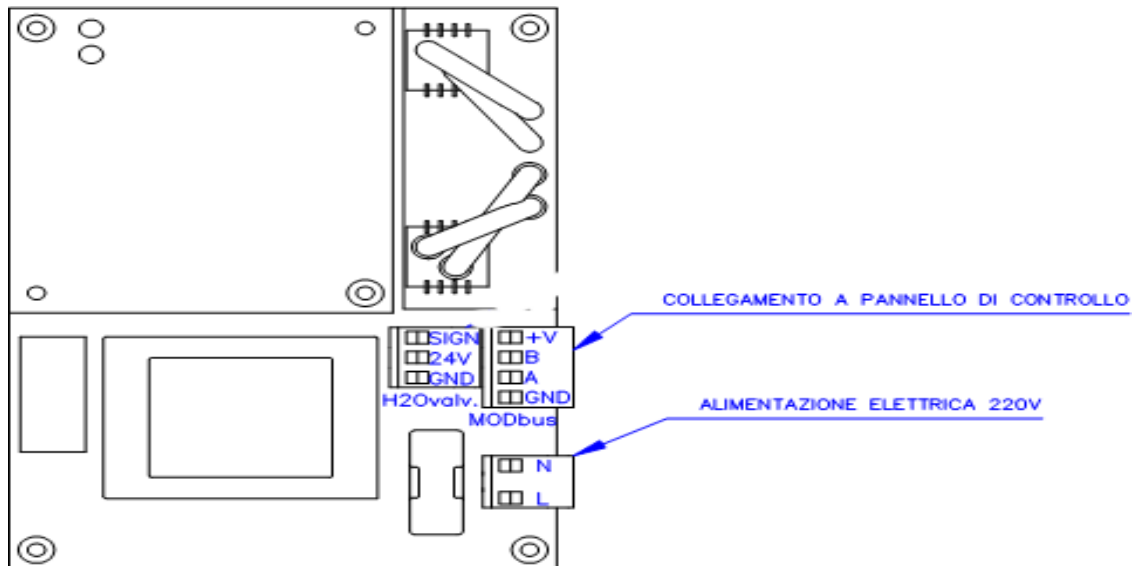
### WIRE SECTION

The electric supply line and the section devices must be selected by qualified electric planners; the wire must in any case feature a 3x1,5 sq. mm min section, F + N + PE.

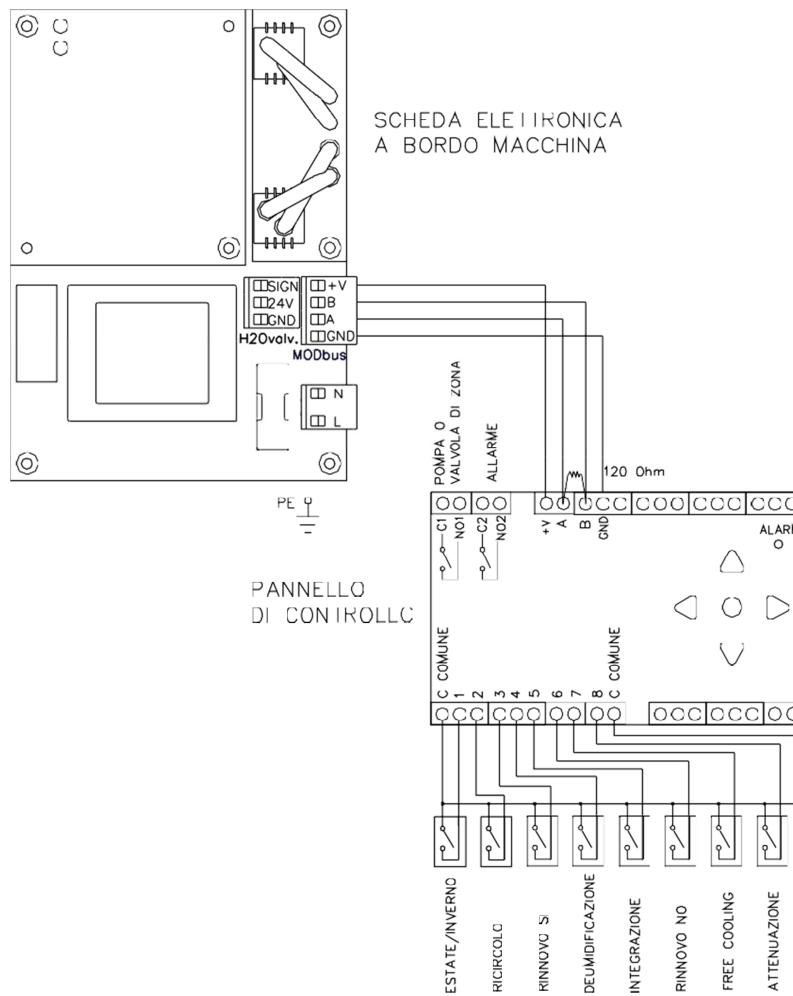
The picture below shows the connection terminals available:

- The electric supply must be provided on the unit;
- The 4-thread connection to the control panel provides a 24VDC supply and serial communication. This should be a shielded wire with a 0,5-sq. mm. min section.

Electronic card on the unit



## CONTROL PANEL CONNECTION

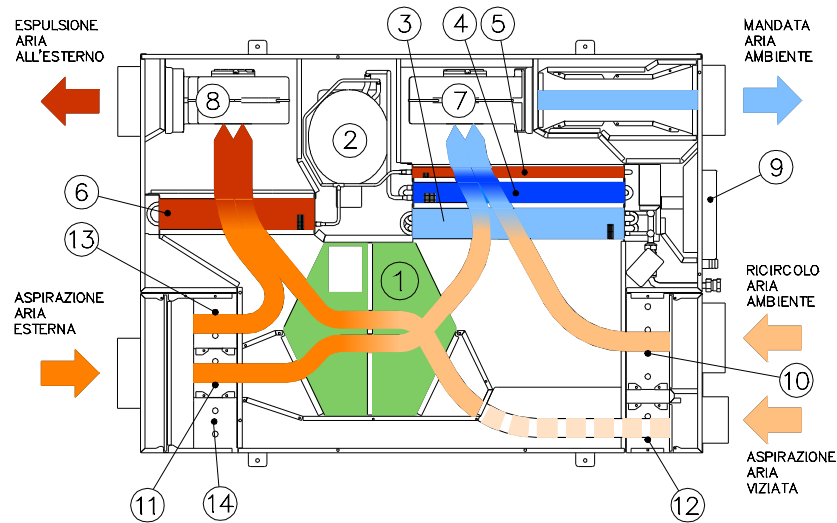


Should the serial communication line between the control panel and the KDVRAY360 unit be longer than 25 m, a 120 Ohm, ¼ W, terminal resistance must be installed between terminals A and B of the control panel. The resistance should be fitted with tape on the back of the control panel, in the groove provided for the guide DIN.



## OPERATION DESCRIPTION

The picture below shows the unit plan with its main internal components and air flows.



- 1 - Air/air heat recuperator
- 2 - Cooling compressor;
- 3 - water-supplied finned coil;
- 4 - Cooling evaporator;
- 5 - Freon/air condenser;
- 6 - Freon/air exhaust condenser;
- 7 - Room delivery fan;
- 8 - Ejection fan;
- 9 - Electric board
- 10 - Room air recirculation damper;
- 11 - Exchange air vacuum damper;
- 12 - Foul air vacuum damper;
- 13 - Auxiliary air vacuum damper;
- 14 - Recuperator bypass damper.

## AERAUIC OPERATION

The air flow rates treated by the machine can be set through the control panel. The fans automatically reach the speed required to overcome the duct losses of pressure

There can be two air flows inside the unit: the exchange air flow with heat recovery through the counter-current air/air recuperator (1) and the room air recirculation flow.

The exchange and recirculation flows can be either combined or kept separate based on the flow rates and the type of treatment desired for the inflow air.

The unit also includes a duct controlled by a motorized damper to vacuum the external air without passing through the recuperator. This enables to exploit, when available, the free-cooling shares of external air. The bypass turns on automatically when the corresponding signal activates and the external temperature is within the setting limits.

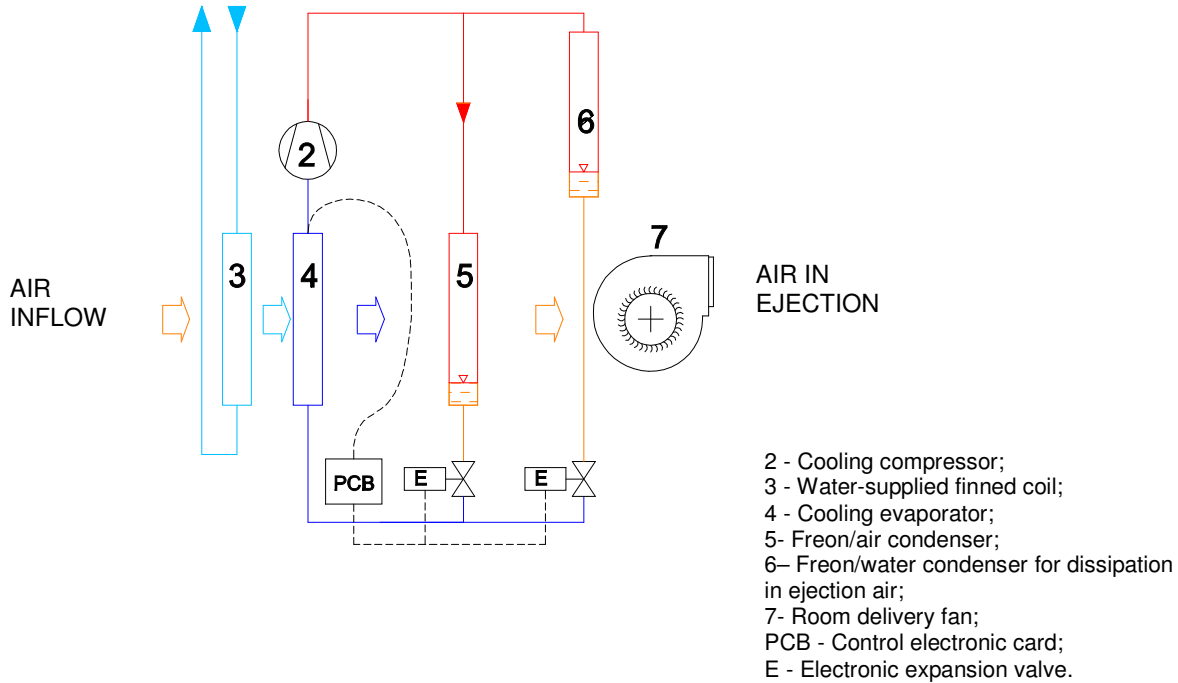
The following air treatments are available:

- air exchange with high efficiency heat recovery, optional winter heating or summer cooling;
- free-cooling air exchange, that is with no heat recovery, both in summer and winter;
- air recirculation in winter with optional heating;
- summer air recirculation with cooling, dehumidification or cooling and dehumidification;
- air recirculation with an exchange share, in addition to all the treatments provided for recirculation.

The air flows can be set on the following values:

- inflow air, flow rate adjustable between 220 m<sup>3</sup>/h and 360 m<sup>3</sup>/h;
- exchange air, flow rate adjustable between 90 and 220 m<sup>3</sup>/h.
- free-cooling, exchange flow rate adjustable between 90 and 220 m<sup>3</sup>/h.

## COOLING CIRCUIT OPERATION



- 2 - Cooling compressor;
- 3 - Water-supplied finned coil;
- 4 - Cooling evaporator;
- 5- Freon/air condenser;
- 6- Freon/water condenser for dissipation in ejection air;
- 7- Room delivery fan;
- PCB - Control electronic card;
- E - Electronic expansion valve.

### COOLING

The finned coil(3) connected to the radiant hydraulic system provides summer cooling and winter heating.

The inflow temperature is set directly by the unit through the mixing valve in the water circuit.

### DEHUMIDIFICATION AND COOLING

The finned coil (3) fed by the radiant system water precools the air while the cooling evaporator (4) provides subsequent cooling and therefore air dehumidification.

The cooling circuit includes two condensers with parallel connection: in addition to the air-cooled condenser (5), an additional condenser cooled by the ejected-air flow (6) disposes the condensation heat outside. For this process, the unit exploits the ejected foul air and an additional integration flow of external air.

The two electronic expansion valves (E) enable to distribute the condensation heat between the inflow air and the ejection air as desired; this provides the inflow air at the desired temperature between max cold and neutrality.

The temperature values available for the delivery air are:

- summer neutral temperature;
- summer integration temperature;
- winter neutral temperature;
- winter integration temperature.

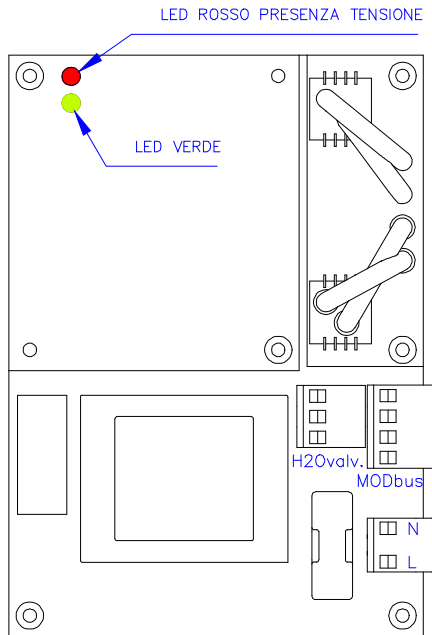
NOTE: The cooling circuit cannot be activated in winter and for the exchange-only function.

## TECHINCAL DATA

Electric power	V/Ph/Hz	230/1/50
Weight	kg	85
Total dehumidification capacity (external environment 35 °C, 50% R.H.)	l/24h	56
	W	1620
Useful dehumidification capacity (referred to recirculation, room at 26 °C, 55% R.H.)	l/24h	25
	W	723
Useful cooling capacity (referred to recirculation, room at 26 °C, 55% R.H.)	W	1460
Nominal electric power absorbed	W	820
Electric power absorbed by the compressor	W	470
Water flow rate required	l/h	360
Water circuit loss of pressure	kPa	12
Power absorbed by the delivery fan (min - max)	W	40 - 170
Delivery fan flow rate (min - max)	m <sup>3</sup> /h	90 - 360
Delivery fan useful hydraulic head	Pa	200
Power absorbed by the ejection fan (min - max)	W	40 - 170
Ejection fan flow rate (min - max)	m <sup>3</sup> /h	90 - 360
Ejection fan useful hydraulic head	Pa	200
Energy recovery during winter operation (20 °C - 50% internal r.h., -5 °C - 80% external r.h.)	flow rate 90 m <sup>3</sup> /h	91%
	flow rate 220 m <sup>3</sup> /h	87%
Energy recovery during summer operation (26 °C - 65% internal r.h., 35 °C - 50% external r.h.)	flow rate 90 m <sup>3</sup> /h	89%
	flow rate 220 m <sup>3</sup> /h	82%
Sound pressure level (in open field, distance 1m)	dB(A)	42

## START UP AND TESTING

Before starting up the unit, carry out all hydraulic, aeraulic and electric connections. Also make sure chilled water is available and that there are no water leaks from the connections and unit. The electronic card has a red led and a green led that show the general status of the unit.



When tension is available, the green led turns on for about 90 seconds while the card performs the controls. Then the red led turns on to indicate that there is tension; the unit will be ready to receive the control panel inputs and perform the required functions.

**NOTE:** After 90 seconds from activation, the green led is intended as the input sent to the cooling compressor: if the led is solid, it means the compressor is controlled when on; if the led flashes, it means there is an operation input but the compressor is not on yet, as it is waiting for the start timer or there may be a failure.

The functions available through digital inputs are:

- current season;
- exchange with heat recovery (yes, no, automatic with time slots);
- dehumidification in summer;
- cooling in winter;
- heating in winter;
- free-cooling;
- attenuation of air flow rates versus normal settings;

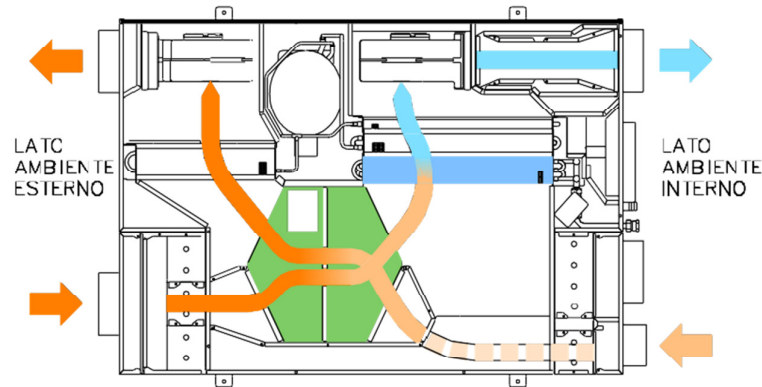
The settings available on the keypad are:

- function activation (as an alternative to digital input);
- current time;
- current season (as an alternative to digital input);
- delivery and exchange air flow rates
- normal and integration delivery temperature for each season;
- time slots for automatic exchange (max 4);
- time slots for flow rate attenuation (max 4).

The operator can also read the values of the unit temperature sensors which are useful during testing or when checking the correct operation. For more details, refer to the "CONTROL PANEL" section of this manual.

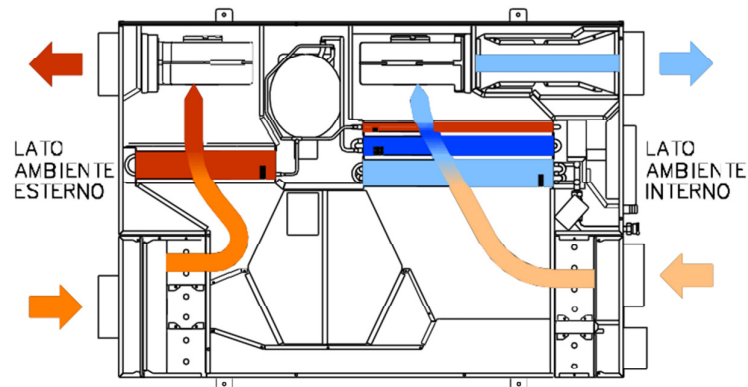
## SUMMER OPERATION MODES

### EXCHANGE ONLY



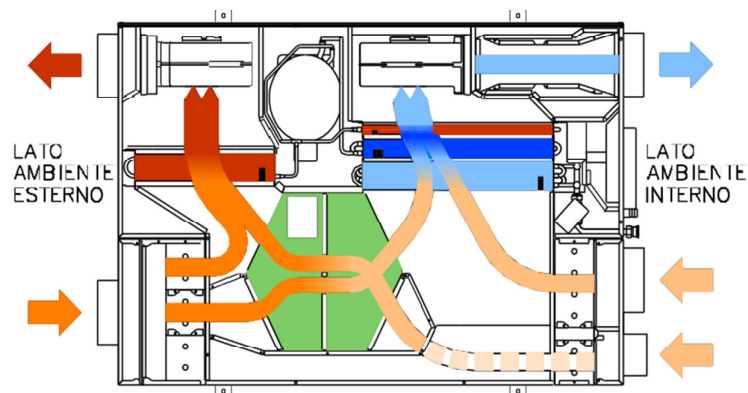
Both fans are working and perform air exchange: the external air is chilled first by the recuperator through the ejected air and then by the chilled water of the finned coil

### DEHUMIDIFICATION ONLY



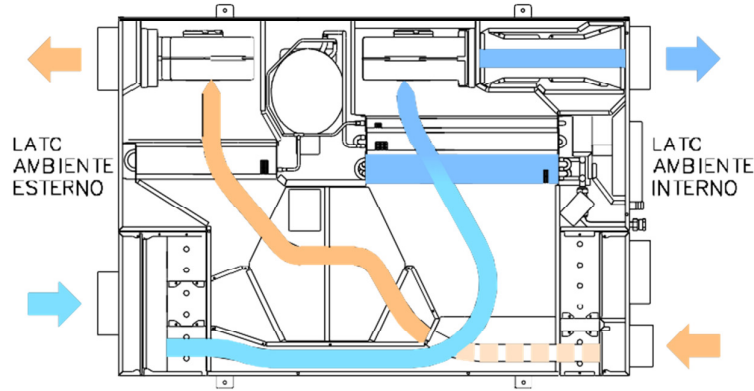
The compressor and the delivery fan are working; the room air is dehumidified and released at the setting temperature. Should it be necessary to dispose the exceeding heat, the ejection fan vacuums and ejects the external air flow heated by the exhaust coil.

### EXCHANGE + EXCHANGE DEHUMIDIFICATION + COOLING



The compressor and both fans are ON. The entire coil unit treats the air. The air flow rate of the inflow air can be set between 220 and 360 mc/h, while the exchange rate can be set between 90 and 220 mc/h.

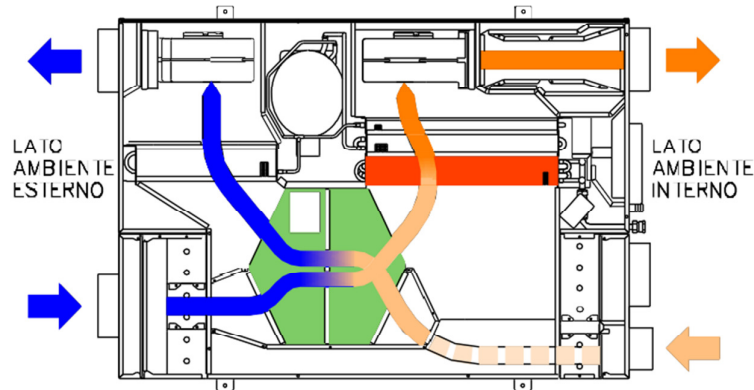
## HEAT RECUPERATOR BYPASS



Both fans are working, the damper of the inflow external air is closed and the bypass damper is open. The chilled water coil treats the inflow air. The air flow rate can be set between 90 and 220 mc/h.

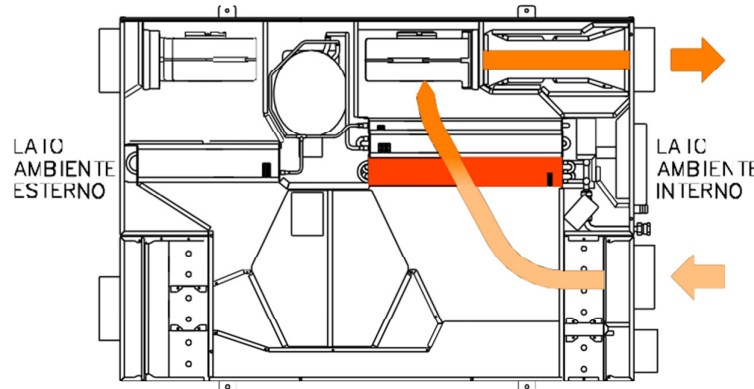
## WINTER OPERATION MODES

### EXCHANGE ONLY



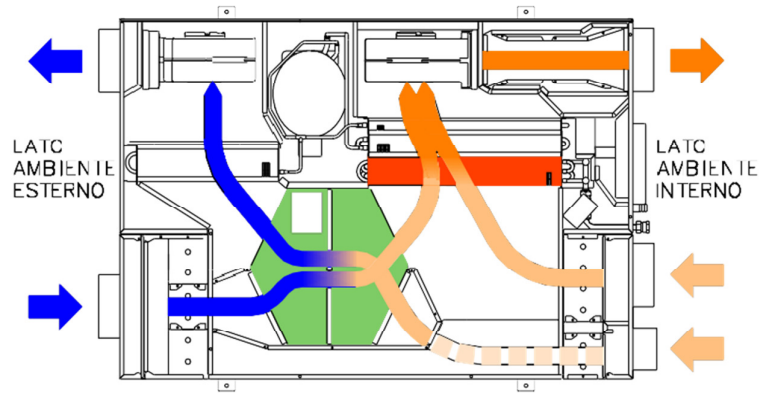
Both fans are working and perform air exchange: the external air is heated first by the recuperator through the ejected air and then by the hot water circulating inside the finned coil

### RECIRCULATION ONLY



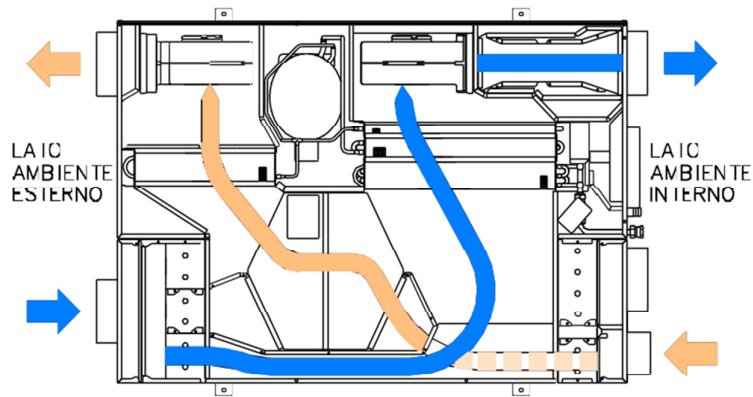
The delivery fan is on; the room air is vacuumed and at the setting temperature  
The inflow temperature is set by modulating the flow rate of the finned coil hot water.  
The inflow flow rate can be set between 90 and 360 mc/h.

## EXCHANGE + RECIRCULATION



The fans are both on. The inflow air is heated by the water-fed coil. The exchange air is preheated by the ejected air through the recuperator. The inflow air flow rate can be set between 90 and 360 m<sup>3</sup>/h, while the exchange share can be set between 90 and 220 m<sup>3</sup>/h

## WINTER FREE-COOLING



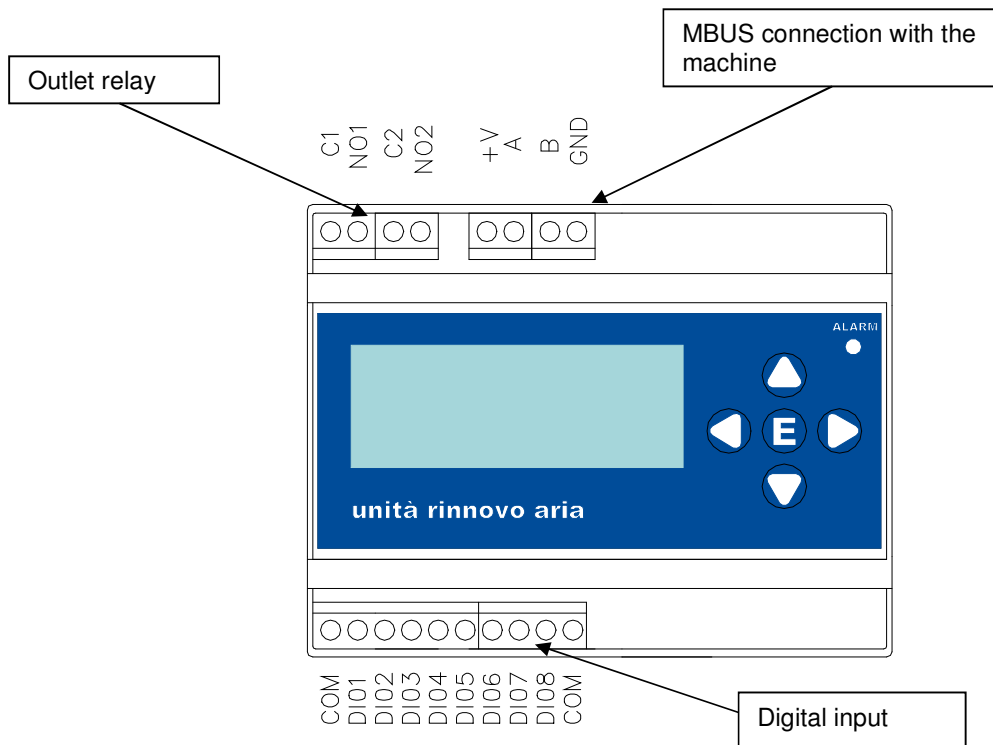
The fans are both working, the damper of the inflow external air is closed and the bypass damper is open. The finned coil water circuit is closed. The air flow rate can be set between 90 and 220 m<sup>3</sup>/h.

## CONTROL PANEL – INSTALLATION AND USE

The remote control panel should be installed on a guide DIN in a wall-mount electric board; the space encumbered corresponds to 6 modules.

The control panel includes 3 terminal strips for:

- connection of the unit with 4 threads to feed the panel (24VDC) and enable serial communication with the electronic card;
- the digital inputs of the various functions;
- the two digital relay outlets that activate a circulation pump and a failure signal.



**MODBUS CONNECTION:** the connection is carried out with 4 threads, 2 for the 24VDC supply to the panel e 2 for serial communication. Use a shielded wire with a 0,5-sq. mm. section.

### OUTLET RELAY

- C01-NO1: 250V AC – 5A relay that activates when water circulation is required, useful to control the pump.
- C01-NO2: 250V AC – 5A relay that activates when a signal turns ON, useful to provide an alarm signal from remote.



## FUNCTIONS AVAILABLE FOR AIR TREATMENT

- **Exchange:** Air exchange with the corresponding flow rate, using the heat recuperator;
- **Cooling:** Displayed when summer is selected; the dehumidification cooling compressor is turned ON and the delivery temperature will be the same provided for the cooling integration settings. Cooling can also be provided with chilled water only and the compressor off.
- **Heating:** Displayed instead of cooling when winter is selected; the delivery temperature, obtained through the water-supplied coil, is the one provided for heating integration. The inflow air temperature is set by a valve modulating the coil water flow.
- **Dehumidification:** The cooling compressor is activated for dehumidification and the delivery temperature will be the same provided for neutral air operation;
- **Free-cooling:** Air exchange with the same flow rate of free-cooling without using the heat recuperator. In addition to the digital input signal, the free-cooling function requires an external temperature within the technical setting limits.
- **Attenuation:** The unit works with the same flow rates of attenuation set by default on lower values compared to normal operation to reduce noise. This function is convenient if the user wants the unit to work during resting times

## DIGITAL INPUTS

- COM: terminal shared by all inlets;
- DI01: season, 1 = summer, 0 = winter, when the season is set through a digital input instead of a key pad;
- DI02: room fan activation input; this is not an operational mode but enables to keep the room air flowing;
- DI03: exchange input;
- DI04: dehumidification input;
- DI05: cooling input in SUMMER or heating in WINTER;
- DI06: exchange stop, it enables to stop an exchange set with DI03 or time slots. This input, when connected through DI03 to a 3-position selector, type 0-1-2, provides 3 operation options: exchange ON, exchange OFF, AUTOMATIC exchange through time slots.
- DI07: free-cooling input signal (when the external temperature is within the setting range);
- DI08: flow rate attenuation input signal; this enables to reduce the air flow rates based on the technical settings without changing the functions active in a specific moment. This input is useful to prioritize the reduction of aerial noise versus HVAC performance, for example at night.

## HOW TO USE THE CONTROL PANEL

The control panel is provided with five buttons:

- ▶ to enter a new screen or move to the right; to return to the
- ◀ previous screen or move to the left; to move up or increase the
- ▲ selected value;
- ▼ to move down or decrease the selected value;
- E to confirm a modified value or to access a new submenu selected.

## ACTIVATION

The initial screen when the unit is OFF will be the following:

Unit OFF  Press a button to turn ON
Status >OFF

To change from “OFF” to “ON” press ▼ or ▲; press E to confirm the status and move the triangle cursor to the upper line. To move back to the previous screen press ◀

Unit status screen

The initial screen when the unit is ON will be the following:

current time	current season
10:35	Summer
Exchan	NO
Cooling	NO
Dehumidification	
↓ NO Attenuation	NO
▼ Freecooling	NO

The initial screen shows information such as the time, the setting season and the list of functions with their corresponding operational status. Every function includes the (YES/NO) caption to show when it is ON or OFF. To display all the functions scroll the screen using ▼ or ▲. Should one or more flashing captions appear, refer to chapter “MANUAL CONTROLS”.

Initial screen

## HOW TO SCROLL THROUGH THE SCREENS

Use ▶ to access a screen and ◀ to move back.


## DEACTIVATION

From the initial screen press  to access the menu screen:

```

Manual
controls
↓ Exchange
Times
Attenuation Times
    
```


Menu screen

Select "Settings" and press 

```

Unit Deactivation
Set the Time Set
the Season
    
```

Setting Screen

To turn the unit off, select "unit deactivation" and press 

## MANUAL CONTROL SCREEN



The unit functions can be activated through the keypad instead of digital inputs by entering the desired function and operational duration.

NOTE: Manual controls are prioritized over digital inputs and activations provided by the time slots;

```

MANUAL           Time
CONTROLS:
  Exchange   >--  -
  COOLING    --   -
  Dehumid.   --   -
  Attenuati  --   -
    
```

Manual control screen

After selecting the manual controls on the menu screen, move the cursor on the line of the desired control using  or ; press **E** to confirm the function ("YES"), block the function ("NO") or cancel the setting (two dashes).

After confirming the setting with **E**, the control duration will be displayed with the default value of 1 hour; this value can also be changed by pressing **E** to select the value with the arrows.

**NOTE: When setting a function manually, the caption on the main screen for the corresponding function will flash.**

```

MANUAL           Durati
CONTROLS:        on
  Exchange       01:15
  Dehumid.  --  01:00
  Attenuation    -
    
```

### Example


The settings shown in the picture are:

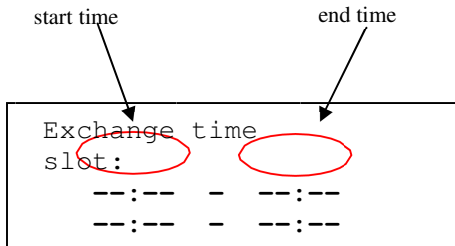
- The exchange function will remain active for 1 hour and 15';
- The cooling function will be interrupted for 1 hour, notwithstanding the time slot and digital inputs.

## TIME SLOT SETTING



The user can set time slots for the automatic activation of exchange and air flow rate attenuation; attenuation is a convenient function to reduce the noise from air movement.

### HOW TO SET A TIME SLOT

From the menu screen, select “Exchange hours” or “Attenuation hours” based on the desired function and press 



There are 4 time slots, each with a start time and an end time on the same line.




To set a time slot, move the cursor on the start time and press **E**: the screen will display a time that can be changed using  and ; press **E** again to confirm.




Repeat the same procedure to set the end time; once both times have been defined, the time slot will be set.

### HOW TO SET A TIME SLOT

To delete a time slot, set the start and end time on the same value, the times will be deleted and the line will display dashes only.

### HOW TO SET THE CURRENT TIME OR SEASON

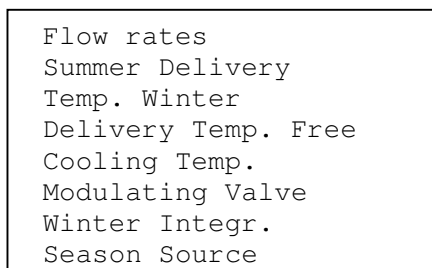
**Changing the current time:** from the setting menu, select “Set time”; use the **E** button to select the hour or minutes and then change the time using  and . Press **E** once again or  to confirm the desired value

**Changing the current season:** from the setting menu, select “Set season”; the current value is immediately displayed and can be changed using  and ; Press **E** once again or  to confirm the desired value

## TECHNICAL SETTINGS

To access the technical settings menu enter the 4-digit password; use the number buttons one at a time, then press **E** to display the technical settings menu.

The captions below are all submenu entries. Select any caption and press **E** to display the operational screen of the selected entry.



**Flow rates:** This menu entry is the air flow rate submenu.

Flow rate	Norm.	Att.
Exch.	140	90
Room	240	200
FreeC.	220	180

The setting can be entered separately:

- exchange flow rates (Exch.) from 90 to 220 m<sup>3</sup>/h;
- room flow rates (Room), from 220 to 360 m<sup>3</sup>/h;

All flow rates can be set in the normal (Norm.) or attenuation mode (Att.).

**Summer Delivery Temp.** Air delivery temperatures in summer mode, one for the neutral air function and one for the cooling integration function.

**Winter Delivery Temp.** Air delivery temperatures in winter mode, one for the neutral air function and one for the heating integration function.

**Temp. Free-Cooling:** temperatures that limit the free-cooling mode.

F.C. External Temp.:	
MinWinter:	8 °C
MaxWinter:	20 °C
MaxSummer:	25 °C

The Free-Cooling mode fails:

- below MinWinter;
- above MaxWinter;
- above MaxSummer in summer.

**Season source:** To decide if the season must be entered by digital input or keypad;

**Compress. in Att.:** To decide if the compressor must be ON or OFF during attenuation. Generally, the attenuation function is used to reduce the noise from the unit; in this case it can be useful to stop the compressor.

## DIAGNOSTICS

The control panel displays the alarm and failure signals sent by the electronic card on the unit. There are two types of messages and they are all coded with a multiple of 2:

- Failure messages signaling a failing sensor;
- Alarm messages signaling an anomalous operational condition.

### Failure messages

Message	Meaning
Sens. Failure: 1	Delivery air temperature probe NTC1 disconnected or short-circuited
Sens. Failure: 2	Cooling evaporator temperature probe NTC2 disconnected or short-circuited
Sens. Failure: 4	Condenser B undercooling temperature probe NTC6 disconnected or short-circuited
Sens. Failure: 8	Overheating temperature probe NTC4 disconnected or short-circuited
Sens. Failure: 16	Condenser A undercooling temperature probe NTC6 disconnected or short-circuited
Sens. Failure: 32	Inflow water temperature probe NTC7 disconnected or short-circuited
Sens. Failure: 64	Compressor temperature probe NTC3 disconnected or short-circuited
Sens. Failure: 256	Cooling pressure transducer damaged
Sens. Failure: 512	Differential pressure sensor for exchange air
Sens. Failure: 1024	Differential pressure sensor for ejection air

### Alarm messages

Message	Meaning
Alarm: 1	Unit with no cooling gas - permanent alarm
Alarm: 2	Stoppage for max cooling pressure - permanent alarm
Alarm: 4	Stoppage for compressor high temperature
Alarm: 8	BUS communication error
Alarm: 32	Stoppage for high temperature of inflow water
Alarm: 64	Failure of room delivery fan
Alarm: 128	Failure of ejection fan

Should a permanent alarm turn on, the unit will stop and will not restart until the alarm is deleted by unplugging the machine.

The other alarms are self-deleted when the related issue is solved.

The control panel displays only one message; in case of multiple alarms, the displayed message will show a number equivalent to the sum of the numbers of the corresponding alarms.

Example: failure number 34 corresponds to failure 32 plus failure 2.

When there is an alarm and a failure, the two messages flash alternatively on the display.

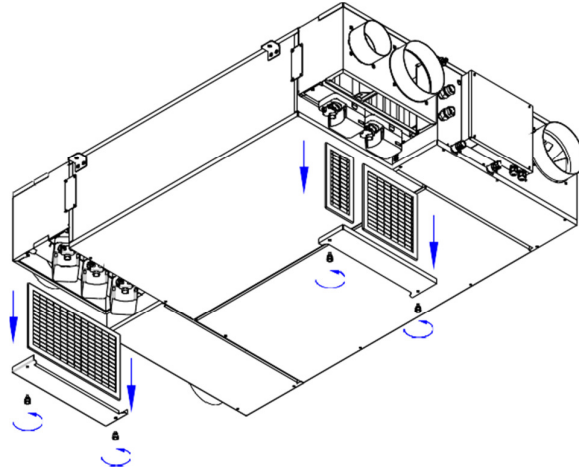
Whenever there are alarms or failures, the unit enters a provisional or partial operational mode to provide, whenever possible, the residual functions without compromising its safe use.

## MAINTENANCE

Periodical maintenance consists of cleaning the air filters. To remove and clean the filters:

- unscrew the knobs that lock the filter lid near the vacuum nozzle;
- remove the lid carefully;
- the filters can be removed and cleaned with water and soap or blown with compressed air.

Note: The filters included are class G4 filters; for enhanced filtering or in presence of very dusty air, the included filters may not be suitable. Install air filters outside the unit based on the system needs.



Remove the air filters.

## DEMOLITION AND DISPOSAL

In case of demolition of the dehumidifier, remember that it contains a cooling circuit, cooling gas and polyester; these substances must never be disposed in the environment but recycled according to the regulation in force.

The unit contains the following materials:

- plastic components;
- electronic components;
- single- or dual-insulation electric threads;
- expanded polymeric materials;
- steel, copper and aluminum.

Comply with the regulations in force for disposal.



#### **IT - WARNINGS FOR PROPER DISPOSAL OF THE PRODUCT**

This product falls under the scope of the Directive 2012/19/EU concerning the management of Waste Electrical and Electronic Equipment (WEEE). This product should not be disposed with domestic waste as made of multiple materials that may be recycled at proper facilities. Contact the municipal authority for the ecological platforms that accept, dispose and properly recycle this type of product.

Note: upon purchase of an equivalent appliance, the distributor must collect the disposed product free of charge. The product is not potentially dangerous for human health and the environment, yet it may have a negative impact of the latter if disposed inappropriately. Carefully read the instructions before using the appliance for the first time.

Never use the product for purposes different from those provided for as improper use may cause electric shocks.

The crossed-out wheeled dustbin symbol on the product label proves compliance with the regulations on Waste Electrical and Electronic Equipment.

Improper or abusive disposal of this product is punishable by law.

#### **EN - IMPORTANT INFORMATION FOR CORRECT DISPOSAL OF THE PRODUCT**

This product falls into the scope of the Directive 2012/19/EU concerning the management of Waste Electrical and Electronic Equipment (WEEE). This product shall not be disposed in to the domestic waste as it is made of different materials that have to be recycled at the appropriate facilities. Inquire through the municipal authority regarding the location of the ecological platforms to receive the product for disposal and its subsequent correct recycling. Furthermore, upon purchase of an equivalent appliance, the distributor is obliged to collect the product for disposal free of charge. The product is not potentially dangerous for human health and the environment, but if abandoned in the environment can have negative impact on the environment. Read carefully the instructions before using the product for the first time.

It is recommended that you do not use the product for any purpose rather than those for which it was intended, there being a danger of electric shock if used improperly.

The crossed-out wheeled dustbin symbol, on the label on the product, indicates the compliance of this product with the regulations regarding Waste Electrical and Electronic Equipment.

Abandonment in the environment or illegal disposal of the product is punishable by law.

**GIACOMINI S.p.A.**

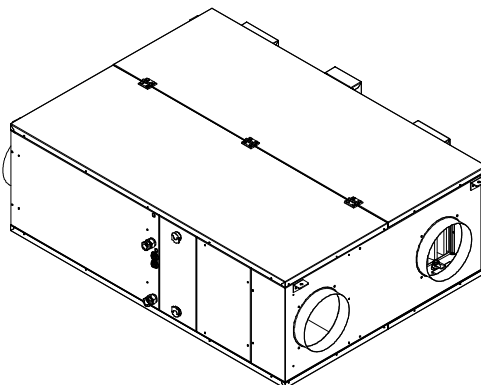
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**tel. +39 0322 923111 - [www.giacomini.com](http://www.giacomini.com)**



AIR HANDLING UNIT FOR FRESH AIR VENTILATION, HEAT RECOVERY AND DEHUMIDIFICATION, MODEL **KDVRAY500**

05/2022



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## PACKAGE CONTENT

The unit is packed on a wooden pallet and protected by a cardboard box.

The packaging contains:

- 1 KDVRAY500 unit;
- 1 use and maintenance manual.

Package size:           cm 98x137x53(h);  
Gross weight:           kg 115

## TRANSPORT AND STORAGE

The package shall be transported on pallets and moved by mechanical means; site handling must be carried out by appropriate means; a small drop of a few centimeters can damage the machine; the package shall never be put overturned; if it happens it is necessary to put it back in horizontal position and wait for 3 hours before starting the machine; storing the packages in a horizontal position; the stack must be of not more than three pieces.

Permissible ambient conditions: temperature between -10°C and +50°C, relative humidity less than 90%.



### SAFETY WARNING

- The machine contains pressurized refrigerant gas. In the event of a gas leak from one or more machines, ventilate the room.
- In case of fire the gas contained in the machines can develop toxic components.
- To move the machine during the installation phases use suitable lifting systems and PPE (for example: gloves, helmet).

## MACHINE DESCRIPTION AND INTENDED USE

In a radiant cooling system, the machine KDVRAY500 carries out the air treatment according to the needs of the season and environmental wellbeing.

The possible functions are:

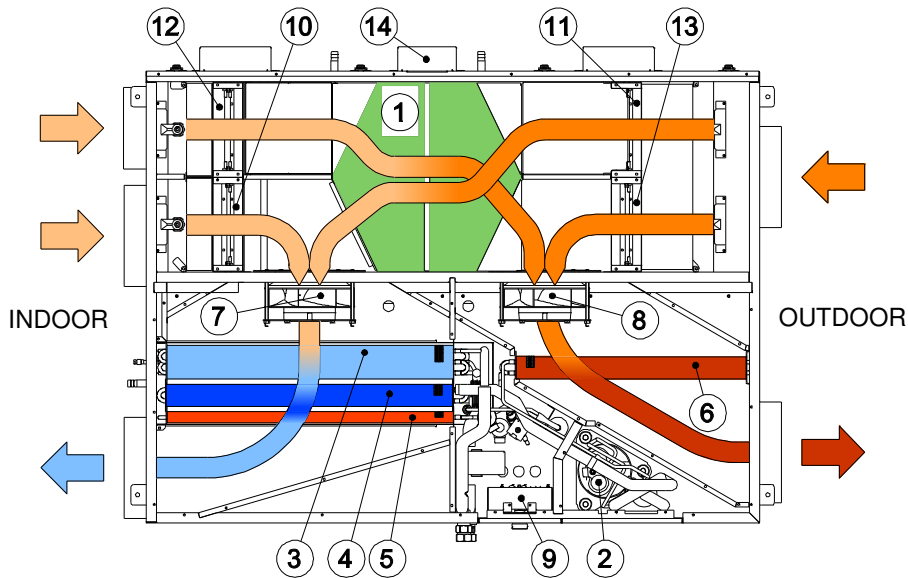
- summer and winter air renewal with high efficiency heat recovery
- air change without heat recovery (free cooling)
- summer dehumidification with adjustable air outlet temperature
- air cooling with chilled water and refrigerant direct expansion
- air heating with the radiant system hot water.

Outside air flow-rate and partial recirculation mode can be set accordingly.

Air renewal flow-rate from 160 to 300 m<sup>3</sup>/h can be set and detected automatically through a user interface.

### Components

The following figure shows the machine from above, the main components and the air flows inside it.



- 1 - Heat recovery exchanger
- 2 - Compressor
- 3 - Water coil
- 4 - Evaporator coil
- 5 - Condensing coil
- 6 - Condensing coil for external heat transfer
- 7 - Inflow fan
- 8 - Discharge fan
- 9 - In key
- 10 - Ambient air recirculation damper
- 11 - Fresh air intake damper
- 12 - Stale air intake damper
- 13 - Supplementary air intake damper
- 14 - Recuperator bypass damper

The air flow rates treated by the machine can be set from the control panel. The fans automatically move to the speed necessary to overcome the pressure drops in the ducts. There can be two air flows in the machine: that of renewal with heat recovery, through the counter-flow air / air recuperator (1), and that of recirculation of the ambient air. The renewal and recirculation flows can be combined or not, depending on the flow rates and the type of treatment to be carried out on the injected air.

There is also a duct, controlled by a motorized shutter, which allows the intake of external air without passing through the recuperator. It is thus possible to exploit, if present, the free contributions of outdoor air cooling. The bypass is activated automatically when there is the appropriate consent and the outside temperature is within the set limits

The following air treatments can be carried out:

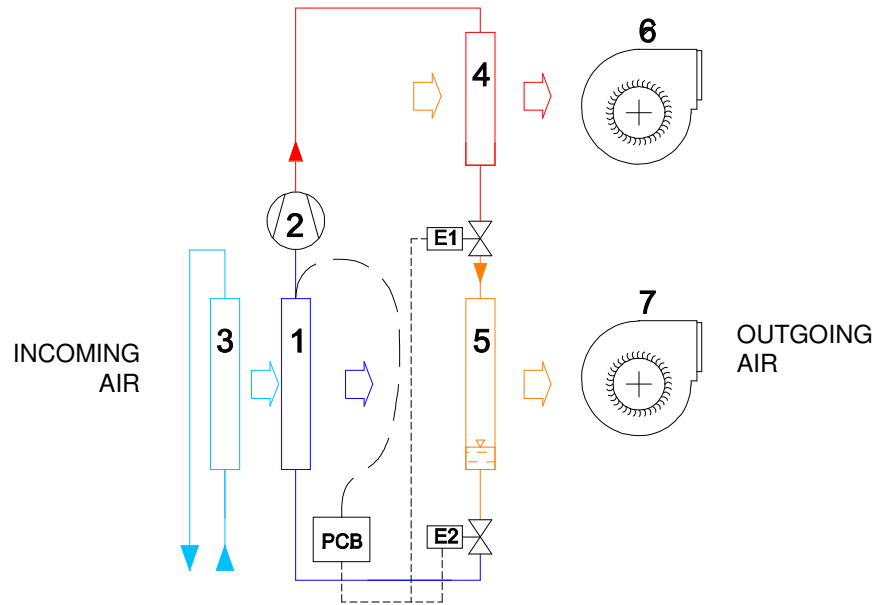
- air renewal with high efficiency heat recovery, with possible winter heating or summer cooling;
- air renewal with free-cooling, without heat recovery, both in summer and in winter;
- air recirculation in winter, with possible heating;
- air recirculation in summer, with cooling and dehumidification;
- air recirculation with a renewal share, together with all the treatments provided for recirculation.

The air flow rates can assume the following values:

- ambient flow rate settable from 300 mc/h up to 500 mc/h;
- fresh air, flow rate settable from 160 up to 300 mc/h.
- free-cooling, renewal flow rate settable from 160 to 300 mc/h.

Please note: the ambient flow rate is equal to the sum of renewal flow plus recirculation flow.

### 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.

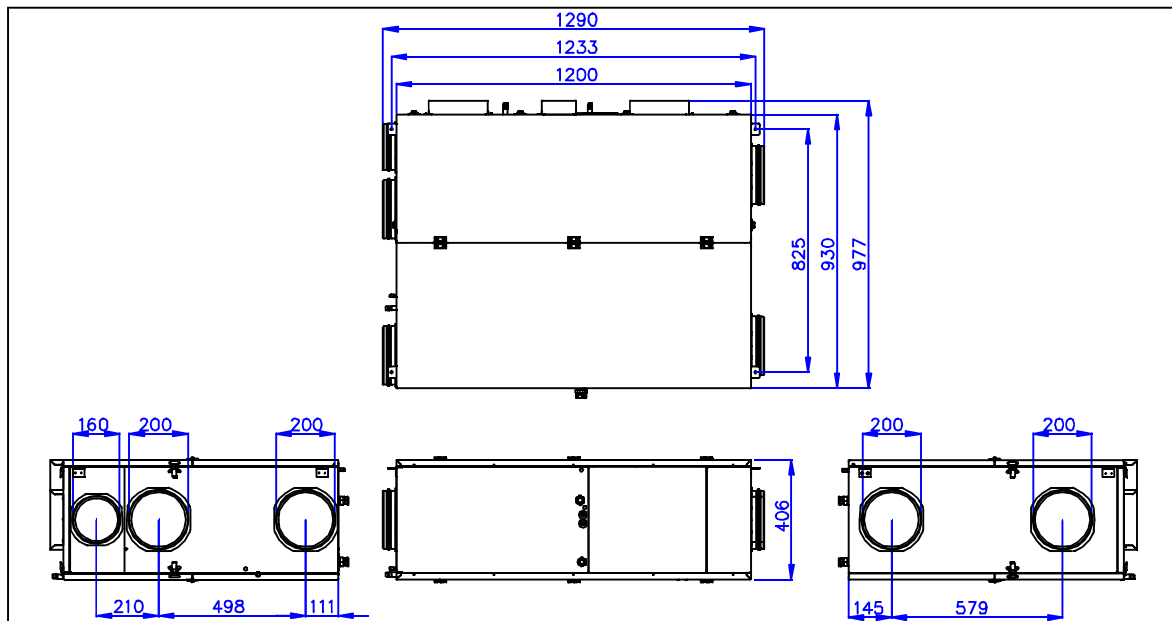
The two electronic expansion valves (E) allow to distribute the condensation heat between in the incoming and outgoing air in the requested proportion; this enables to have outgoing air at the desired temperature between maximum cold and neutrality.

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

### DIMENSIONS



## POSITIONING AND FIXING



### SAFETY WARNINGS

- Before working on the machine, carefully read the instructions given in this manual.
- Installation and maintenance must be carried out by qualified personnel only. Throughout installation, make sure that the equipment is not connected to the electrical mains.
- The machine shall be installed only inside the building and it must be protected from frost.
- The plumbing, electrical and installation sites must comply with the safety standards in force in the competent Territory.
- This appliance is not suitable for use in explosive or potentially explosive atmospheres.



**The choice of the fixing system is under the sole responsibility of the installer.**



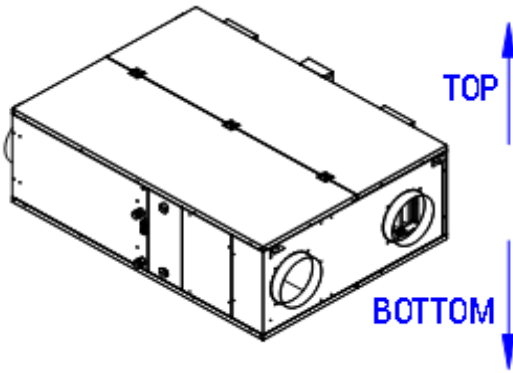
- Do not modify the machine safety devices.
- Contact with the fan outlet can cause injury.
- The electrical connections must be carried out by qualified personnel according to local law.
- Defects in the pipes, plumbing connections and shut-off valves can give rise to dripping water, with consequent damage to things and dangerous situations in the presence of electricity.
- After filling the system with water, it is advisable to check that not only the connections but also the machine hydraulic circuit are watertight, as these could be damaged during transportation or on site during installation; on this topic, the manufacturer will only be responsible for factory defects on the dehumidifier and under no circumstances accepts responsibility for indirect damage

### Preliminary requirements for installation

Before installing the machine it is necessary to prepare:

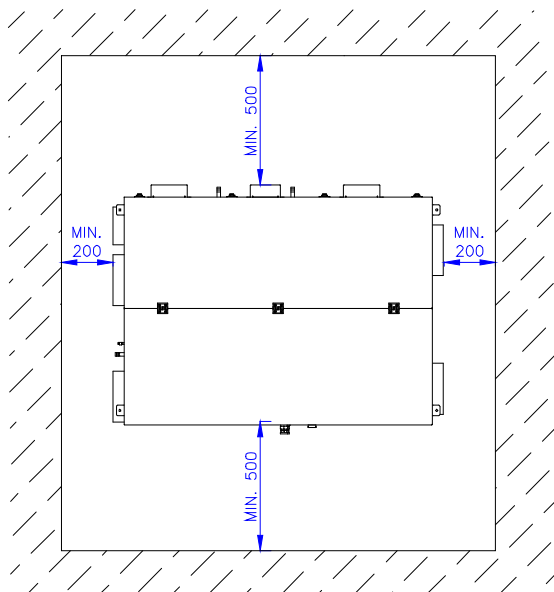
- the delivery and return pipes for the water of the radiant circuit with two shut-off valves for sectioning the line;
- the drain for condensed water; it is necessary to provide separate siphons, each for its own drainage, to avoid sucking in air from the drainage pipe;
- the electrical power cables, the PE conductor and the signal cable.

TYPE OF CONNECTION	FEATURES	RANGE
Chilled water	Temperature 15°C; Head 1,5 m w.c.	T min. 12°C, max 18°C;
Power supply	10 A	230V – 50Hz – 1ph
drainage	Flow 15 l/h, minimum slope 3%	3 pieces
Air ducts	Minimum diameter as per machine nozzles	The pressure drops of the ducts, adding the suction and delivery for each flow, must not exceed the available pressure of the fans



The machine must be installed inside buildings, in a horizontal position. Operation in an inclined position over 1% can lead to water leaks or damage to internal devices..

### Minimum space allowances



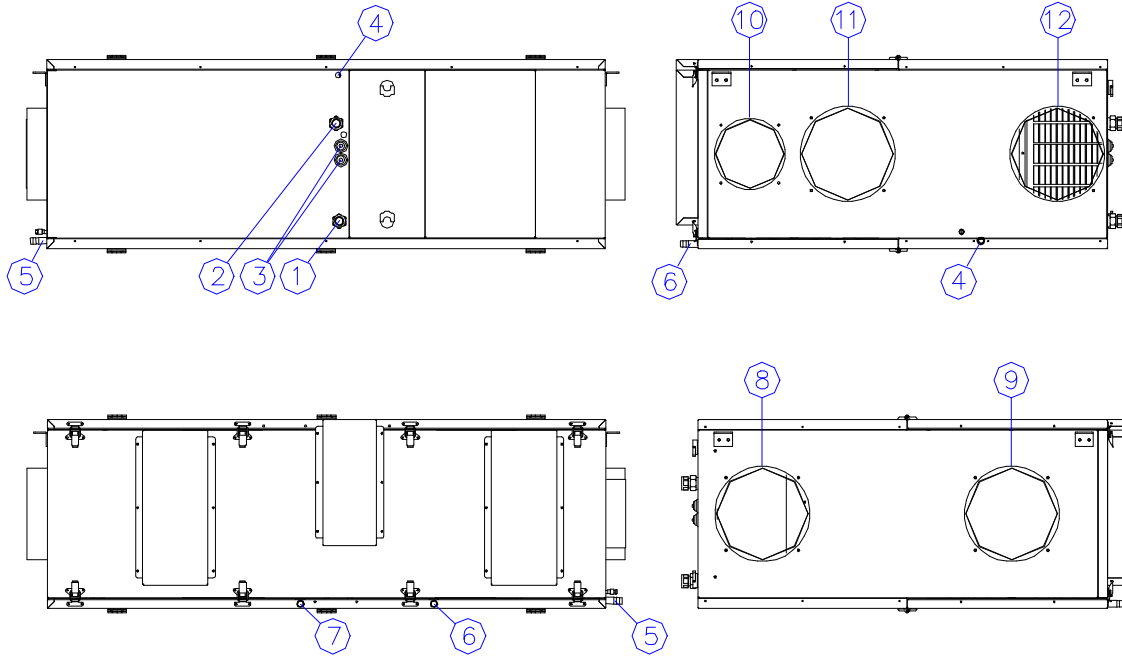
It is necessary to leave spaces free of obstacles around the machine according to the measurements indicated in the figure below. These spaces, including that occupied by the machine, must be freely accessible for maintenance or repairs.



**TO ESTABLISH THE CORRECT INSTALLATION PLACE YOU SHALL TAKE INTO ACCOUNT THAT DURING ITS WORKING LIFE THE APPLIANCE MAY REQUIRE:**

- ORDINARY MAINTENANCE;
- REPLACEMENT OF COMPONENTS;
- REPLACEMENT OF THE WHOLE UNIT

## CONNECTIONS



### KEY TO SIMBOLS

- 1 - water inlet;
- 2 - water output;
- 3 - electrical connections;
- 4 - hydraulic circuit vent;
- 5 – dehumidifier condensation drain;
- 6 – winter recovery condensate drain;
- 7 - summer recovery condensate drain;
- 8 – stale air exhaust;
- 9 - outdoor air intake;
- 10 - stale air extract;
- 11 - air recirculation intake;
- 12 - air supply to the rooms;

### 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 drain

There are three condensate drains: one for the the dehumidifying section, otehr two drains are for condensation from the recuperator, summer and winter. These two drains must have drain traps to prevent the suction of air which will avoid proper drainage of the condensate. The drain traps must be independent, with a minimum height difference of 40mm and must be installed nearby the machine.

Do not connect the condensate drains directly into the sewer system because in periods when the machine is not used there could be spread of unpleasant odours.



### Aeraulic connections

The machine is equipped with plastic nozzles with gaskets, which protrude about 4 cm and which make it possible the connection with flexible or rigid ducts, provided that they are equipped with gaskets to avoid air leaks and unpleasant noise. Spigot diameters are as follows:

supply and recirculation	Ø 200
fresh air intake and air exhaust	Ø 200
stale air from bathroom/kitchen	Ø 160

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

## ELECTRICAL CONNECTIONS



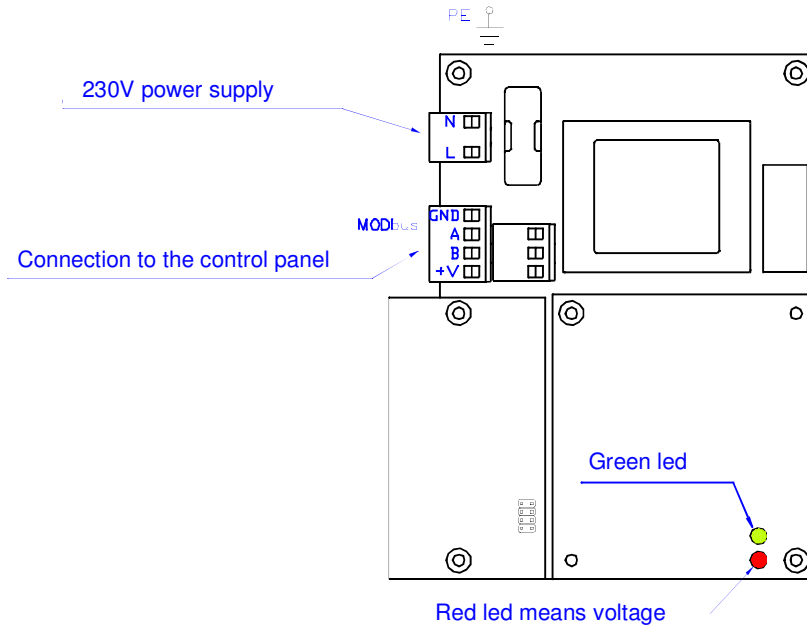
### CONDUCTOR SIZE

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 mm<sup>2</sup>, F + N + PE.

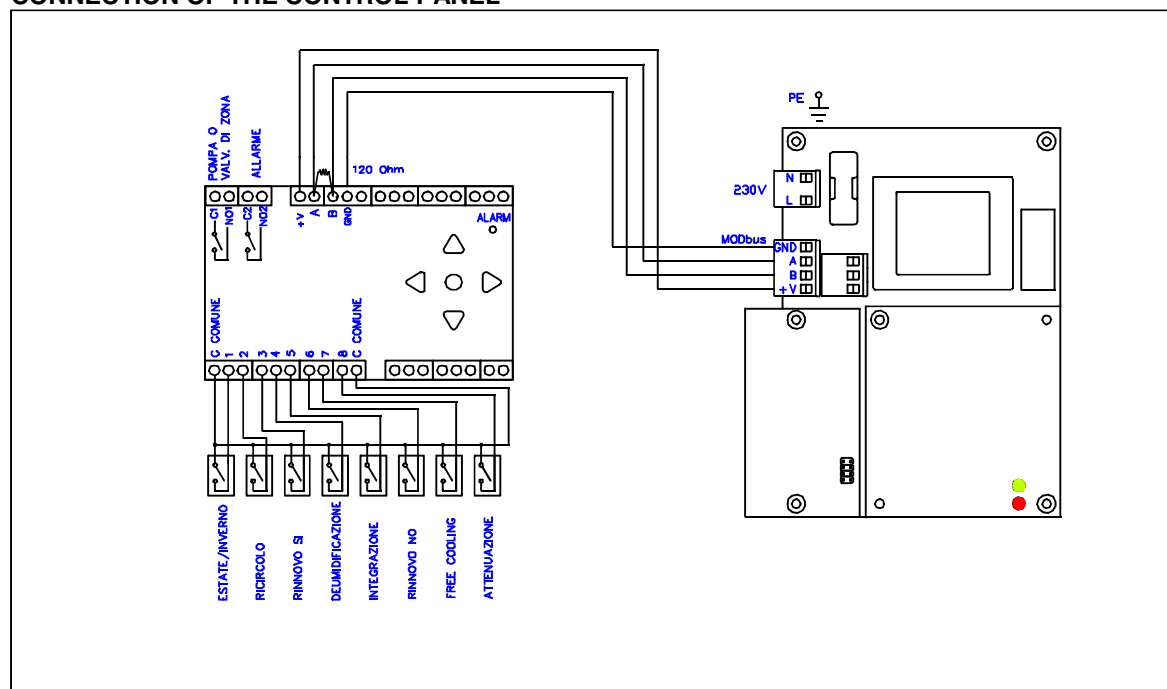
The following diagram shows the terminals which are available for connections:

- 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 mm<sup>2</sup> and must be shielded.

#### Electronic board onto the machine



### CONNECTION OF THE CONTROL PANEL



It is necessary to insert a termination resistance of 120 Ohm, 1/4 W, between terminals A and B of the control panel. The resistance is fixed with adhesive tape on the back of the control panel, in the recess for the DIN rail.

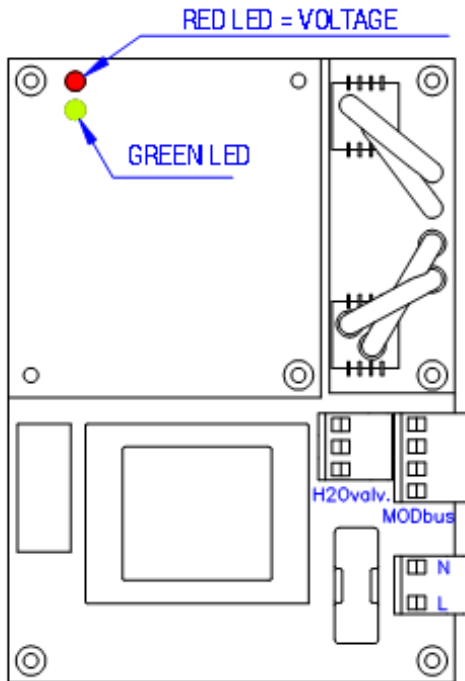
**TECHNICAL DATA**

Power supply	V/Ph/Hz	230/1/50
Weight	kg	105
Total condensation capacity (external air 35°C, 50% RH)	l/24h	74,1
	W	2090
Condensation capacity on recirculation (internal air 26°C, 55% RH)	l/24h	31,2
	W	880
Cooling capacity on recirculation (internal air 26°C, 55% RH)	W	2580
Rated electrical compressor power	W	780
Water flow rate	l/h	500
Pre-cooling water pressure drop	kPa	11
Max cooling capacity for water circuit (external air 35°C 50% RH, max. flow rate for delivery and intake)	W	2050
Power consumption of the inlet fan (min - max)	W	20 - 160
Inlet fan air flow rate (min - max)	mc/h	160 - 500
Available pressure, inlet fan	Pa	260
Power consumption of the discharge fan (min – max)	W	20 - 160
Discharge fan air flow rate (min - max)	mc/h	160 - 500
Available pressure, discharge fan	Pa	260
Energy recover, winter (20°C - 50% RH internal; 5°C - 80% RH external)	flow 160 mc/h	91,70%
	flow 300 mc/h	87,50%
Energy recover, summer (26°C - 65% RH internal; 35°C - 50% RH external)	flow 160 mc/h	86,70%
	flow 300 mc/h	80,40%
Acoustic rating at 1.5 m open field	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.

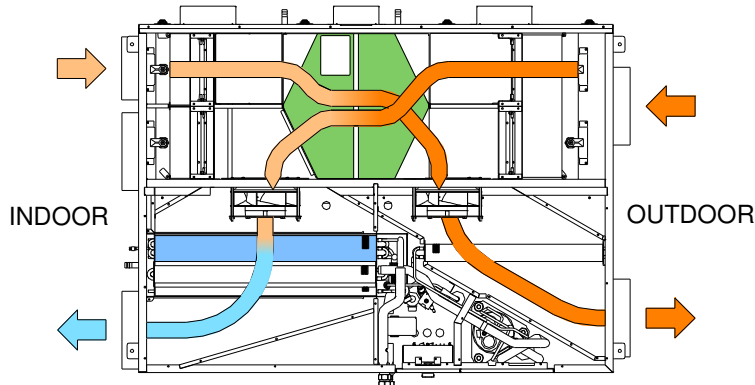
Settings that can be carried out on the keyboard are:

- 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);

It is possible to read the values of the temperature sensors that the machine is equipped with. For more details see the section "CONTROL PANEL" ahead in this document.

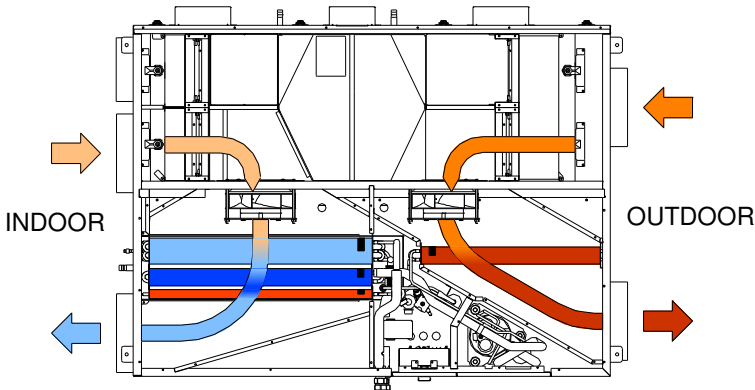
**SUMMER OPERATING MODE**

**FRESH AIR VENTILATION**



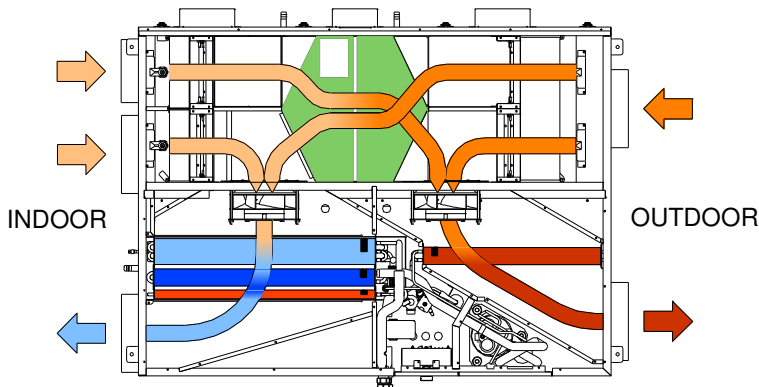
Both fans are running and carrying out fresh air ventilation: the outdoor air is cooled by the heat exchanger by using the exhaust air first, and then by the refrigerated water circulating in the finned coil.

**AIR DEHUMIDIFICATION ONLY**



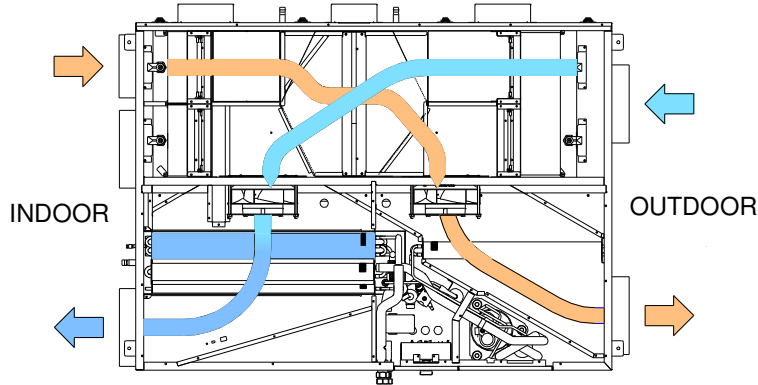
The compressor and the supply fan are running; the room air is dehumidified and supplied into the room at the requested temperature. A suitable amount of outdoor air is passed through the condenser finned coil by the exhaust fan if waste heat must be discarded.

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



The compressor and both fans are running. The air is dehumidified and supplied at the set temperature. If excess heat must be removed, the exhaust fan intakes and expels an external air flow. The air flow rate can be set from 300 to 500 m<sup>3</sup>/h, while the fresh air flow rate for ventilation can be set from 160 to 300 m<sup>3</sup>/h.

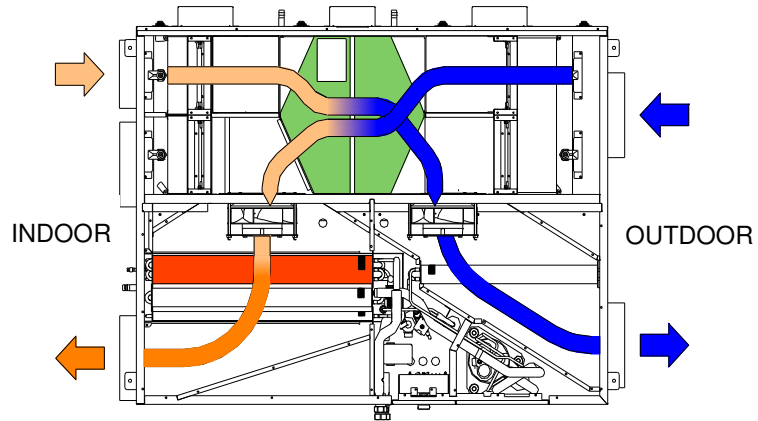
**RECOVERY HEAT EXCHANGER BYPASS**



The fans are both running, the intake air damper is closed and the bypass damper is open. The supply air can eventually be cooled by the chilled water coil water coil.  
The air flow rate can be set from 160 to 300 m<sup>3</sup>/h.

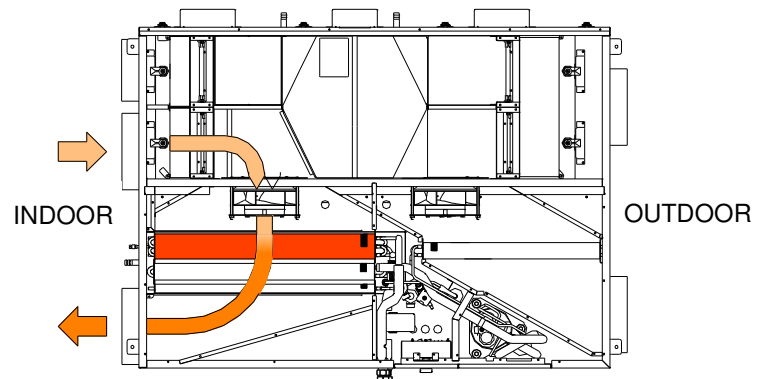
**WINTER OPERATING MODE**

**RENEWAL ONLY**



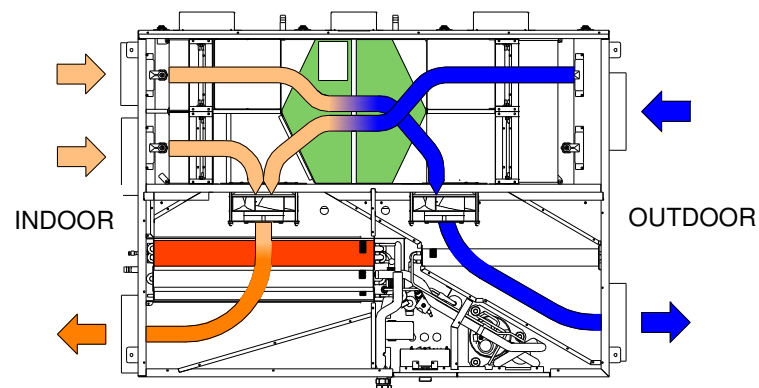
Fans are both running: cold outside air is heated first in the heat recovery exchanger using the exhaust air, then in the finned coil, where hot water rate is flowing. The air is fed back at the requested temperature.

**RECIRCULATION ONLY**



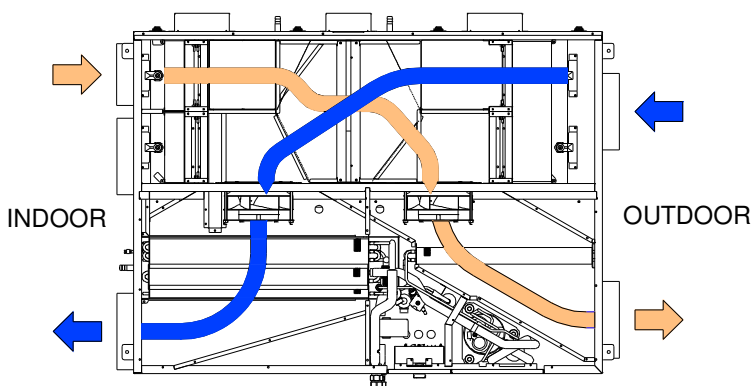
the supply fan is running,  
the indoor air is heated in the finned coil  
the supply air flow rate can be set from 300 to 500 m<sup>3</sup>/h.

RENEWAL + RICIRCULATION



The fans are both running. The intake air is heated in the recovery heat exchanger by means of the exhaust air, then air can be delivered at the requested temperature by the hot water coil. The supply air flow rate can be set from 300 to 500 m<sup>3</sup>/h, the renewal part of it can be set from 160 to 300 m<sup>3</sup>/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 m<sup>3</sup>/h.

## CONTROL UNIT - CONNECTIONS

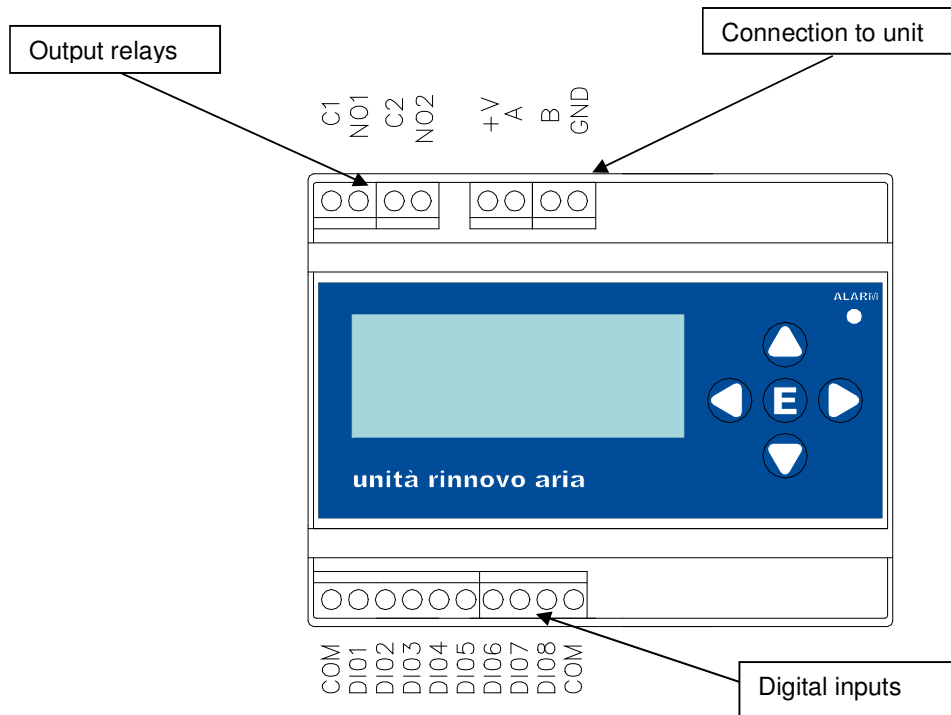
The control unit has to be placed into an electric panel and fixed on a DIN rail. The occupied space is 6 DIN modules.

### COMMUNICATION WITH HANDLING MACHINE

Connections between handling machine and control unit have to be made for energy supply (24VDC) and serial bus communication. Use a 4-wire shielded cable, minimum cross-section 0.5 mm<sup>2</sup>.

### OUTPUT RELAYS

- C01-NO1: relay 250V AC – 5A, is activated when water circulation is needed, it can be connected to a pump.
- C01-NO2: relay 250V AC – 5A is activated as alarm in case of fault.



**MODBUS CONNECTION:** the connection is made with 4 wires, 2 wires are used for the 24VDC power supply to the control panel, the other 2 are for serial communication. For connection, use a shielded cable, sect. minimum 0.5 mm<sup>2</sup>.



**DIGITAL INPUTS TERMINAL STRIP AND ENABLED FUNCTIONS**





- COM: common terminal for all digital inputs:
- DI01: season mode. The season mode is set as following: 1 = summer, 0 = winter, (note: season source must be set as DI instead of keyboard from menu). In winter mode the chiller part is disabled.
- DI02: recirculation consent; the inlet fan will be activate, recirculating the air. Recirculation can be managed with differentiated flow rates, according to the set programme schedule (“Normal” and “Economy” functions).
- DI03: renewal mode; renewal can be managed with differentiated flow rates, according to the set programme schedule (“Normal” and “Economy” functions).
- DI04: dehumidification mode (contact from the ambient humidity regulator). Together with the chiller circuit enabled and, unless the “renewal contact” is closed, the recirculation mode will start up by default. This function is only possible in summer season.
- DI05: integration mode (supplying sensible heat). In integration mode, unless the “renewal contact” is closed, the recirculation function will start up. The integration function acts differently according to the season:
  - o WINTER; the delivery air temperature is controlled by the winter integration temperature value;
  - o SUMMER; the delivery air temperature is controlled by the summer integration temperature.
- DI06: Stop renewal; it stops renewal mode with priority on DI03 and on time slots. It is useful in combination with a three contact switch. You can have three renewal modes:
  - o renewal ON (DI03 closed, DI06 open)
  - o renewal OFF (DI06 closed)
  - o renewal AUTOMATIC (by time slots, DI 03 and DI06 opened).
- DI07: free-cooling mode. If outside temperature is within the allowed range (see freecooling menu) the free-cooling mode activates the fans and opens the free-cooling damper to force the outside air through the bypass duct instead of passing through the exchanger.
- DI08: reduction mode. This function doesn’t start any component but if the unit is working it forces the air flow rate according to reduction mode settings.

## CONTROL PANEL – USAGE

By using the controller display it is possible:

- To change the parameters;
- To read the status of inputs and outputs at any moment;
- To detect the alarm type in case of malfunctioning.

To move through the various menu you can use the following buttons:

-  to enter the sub menu, or to move right;
-  to go back to the previous menu, or to move left;
-  to move up, or to increase the selected value;
-  to move down, or to decrease the selected value;
- E** to enter the sub menu, to edit an item or to confirm the edited value.

## TURNING ON THE MACHINE




When the machine is off the following screen appears:

```
Unit OFF

Press any key
to switch ON
```

```
Status
>OFF
```

Machine status screen

To switch from OFF to ON, press the button  or the button  ; pressing the button **E** status is confirmed and the cursor moves to the top row. to return to the previous screen press 



When the machine is on the home screen appears:

current time                      current season

```

10:35                      Summer
Renewal                      NO
Cooling                      NO
Dehumidifying              NO
Attenuation                  NO
Freecooling                  NO
```

Home screen


The home screen displays the current time, the current season and the list of operating modes with the corresponding operating status (Y/N) to view all the operating modes you need to scroll the screen with the buttons  or . A blinking operation mode means that the function was manually set (see setting manual commands).

### TURNING OFF THE MACHINE

From the home screen press  to move to the menu screen:


Manual Commands
Renewal Times
Attenuation Times
↓ Settings
Technical Settings

Menu screen

Select "Settings" and press 

Shutting down
Set Time
Set Season
Sensor Readback

Settings screen



On settings menu select "shutting down" and press  to move on machine status screen.



### MANUAL CONTROLS

Using the keyboard you can activate the machine functions overriding the digital inputs and, for renewal either attenuation, the time slots.

MAN.COMM.		Time
Renewal	>-	-
Cooling	-	-
Dehumid.	-	-
Attenuat.	-	-

Manual commands screen

Select on the menu screen "Manual Commands"; place the cursor on the command line to set using the button  or the button ; pressing the button **E** you can choose whether to enable (appears "Y") or inhibit (appears "N") the related function; you can either choose not to modify the function (appears "—").

Since the setting has been confirmed after pressing the **E** button, you need to set the duration time of the command. The default value is 1 hour, you can press first the button **E** and then the button  or the button  to modify the value.

**NOTE: the manual set function will appear blinking on home menu.**



MAN.COMM.		Time
Renewal	>Y	01:15
Cooling	N	01:00
Dehumid.	-	-
Attenuat.	-	-

Example:  
 the settings in the picture at left mean:  
 - the renewal command will remain active for 1 hour and 15 minutes  
 - the cooling command will be stopped for 1 hour.

### TIME SLOTS SETTING


The use of time slots allows the renewal function to start up automatically at the set times. As well you can do the same with attenuation mode function. Attenuation mode can be useful at night to decrease the wind noise, or when rooms are unoccupied;

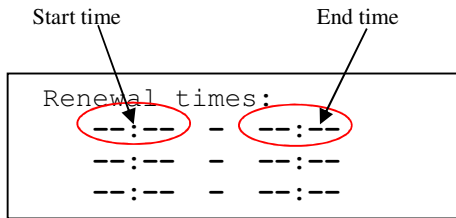
To set a time slot, position the cursor to the start time and press "E".

You will see a time that you can change pressing button  or button .



By pressing "E" the time is confirmed.

In the same way you can set the end time




To set a time slot, select "Renewal Times" or "Attenuation Times" from menu screen, and press 



Four time slots are available, each of which has a start time and an end time on a single line.

To set a time slot, move the cursor to the start time and press **E**: You will see a time that you can change pressing  button or  button. By pressing **E** the time is confirmed. The same procedure can be made to set the end time.

To delete a time slot you have to set the end time equal to the start time.

**Setting the clock:** on settings menu select "Set Time", press **E** to edit the value and use  or  to set the current time, then press **E** or  to confirm.

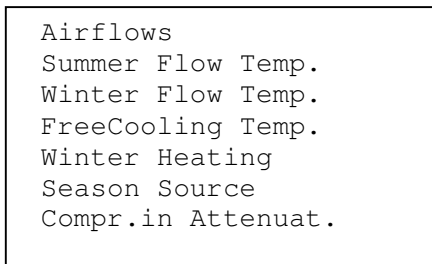
**Setting the season:** on settings menu select "Set Season", press **E** to edit the value and use  or  to set the current season, then press **E** or  to confirm.

**Setting the season:** on settings menu select "Set Season", press **E** to edit the value and use  or  to set the current season, then press **E** or  to confirm.

### TECHNICAL SETTINGS

To access the technical settings menu enter the password "2012" when requested.

On technical settings menu you will find a list of items; select the item you need to set and press **E**.



**Airflows rates:** you will find the following screen.

Airflow	Norm:	Att:
Renw.	260	200
Tot.	360	300
FreeC.	300	200

You can set:

- renewal airflow rate (Renw.), from 80 up to 160 mc/h;
- intake air flow rate (Tot.), from 200 up to 300 mc/h;

For each air flow rate you find a value (Norm.) used in standard operation and a reduced value (Att.) used in attenuation mode.

**Summer flow temperature:** you can set the delivery temperature on summer season, both for dehumidification mode or integration mode.

**Winter flow temperature:** you can set the delivery temperature on winter season, both for standard mode or heating integration mode.

**Freecooling temperature:** you can set the values range within freecooling mode will be allowed.

Ext.FreeC.Temp:	
Winter Min.:	8 °C
Winter Max.:	20 °C
Summer Max.:	25 °C

Freecooling function will be inhibited depending on the outside temperature:

- below Winter Min. value;
- above Winter Max value;
- above Summer Max. value.

**Season source:** you can choose whether set the season by digital input DI01 or by menu; in this case DI01 will have no effect.

**Compressor in attenuation:** you can choose whether let the compressor working together attenuation mode function or stop it. This can be useful when attenuation mode function is used to reduce machine noise.

## DIAGNOSTICS

- The control panel displays the alarm and fault messages communicated by the electronic board on the machine. The messages are all encoded with a multiple number of 2 and are of two types:
  - fault messages, indicate a malfunctioning sensor;
  - alarm messages, indicate an anomalous operating condition.

### Fault messages

Displayed	Meaning
Sensor Fault: 1	Delivery air temperature probe fault
Sensor Fault: 2	Evaporator temperature probe fault
Sensor Fault: 4	Undercooling temperature probe B fault
Sensor Fault: 8	Overheating temperature probe fault
Sensor Fault: 16	Undercooling temperature probe A fault
Sensor Fault: 32	Water temperature probe fault
Sensor Fault: 64	Compressor temperature probe fault
Sensor Fault: 128	Outside air temperature probe fault
Sensor Fault: 256	Coolant pressure transducer fault
Sensor Fault: 512	Failure on the flow sensor for air supply
Sensor Fault: 1024	Failure on the flow sensor for stale air
Sensor Fault: 2048	Failure on the flow sensor for renewal air

### Alarms messages

Displayed	Meaning
Alarm: 1	Refrigeration circuit low pressure alarm
Alarm: 2	Refrigeration circuit high pressure alarm
Alarm: 4	Compressore high temperature alarm
Alarm: 8	Serial bus comunication alarm
Alarm: 32	Water temperature alarm
Alarm: 64	Inflow fan alam
Alarm: 128	Discharge fan alarm

If the alarm is permanent, the machine stops and cannot restart until the alarm is cleared by cutting off the power supply to the machine.

The other alarms, on the other hand, cancel themselves when the cause that activated them is no longer there.

The control panel displays only one message; in the presence of several alarms, the message displayed will show a number equal to the sum of the numbers of the alarms present.

For example: a fault with the number 34 indicates the simultaneous presence of fault 32 and fault 2.

When there are multiple Errors, the total number will appear (Alarms with Alarms and Sensor Faults with Independent Sensor Faults).

## ROUTINE MAINTENANCE

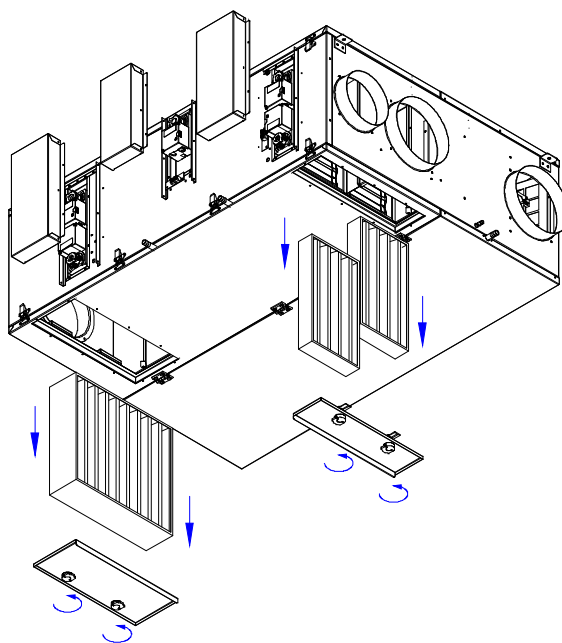
Routine maintenance involves the cleaning of the air filters.

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: periodic maintenance consists in cleaning the air 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.



Removal of air filters



#### IT - AVVERTENZE PER IL CORRETTO SMALTIMENTO DEL PRODOTTO

Questo prodotto rientra nel campo di applicazione della Direttiva 2012/19/UE riguardante la gestione dei rifiuti di apparecchiature elettriche ed elettroniche (RAEE). L'apparecchio non deve essere eliminato con gli scarti domestici in quanto composto da diversi materiali che possono essere riciclati presso le strutture adeguate. Informarsi attraverso l'autorità comunale per quanto riguarda l'ubicazione delle piattaforme ecologiche atte a ricevere il prodotto per lo smaltimento ed il suo successivo corretto riciclaggio.

Si ricorda, inoltre, che a fronte di acquisto di apparecchio equivalente, il distributore è tenuto al ritiro gratuito del prodotto da smaltire. Il prodotto non è potenzialmente pericoloso per la salute umana e l'ambiente, ma se abbandonato nell'ambiente impatta negativamente sull'ecosistema. Leggere attentamente le istruzioni prima di utilizzare l'apparecchio per la prima volta.

Si raccomanda di non usare assolutamente il prodotto per un uso diverso da quello a cui è stato destinato, essendoci pericolo di shock elettrico se usato impropriamente.

Il simbolo del bidone barrato, presente sull'etichetta posta sull'apparecchio, indica la rispondenza di tale prodotto alla normativa relativa ai rifiuti di apparecchiature elettriche ed elettroniche.

L'abbandono nell'ambiente dell'apparecchiatura o lo smaltimento abusivo della stessa sono puniti dalla legge.

#### EN - IMPORTANT INFORMATION FOR CORRECT DISPOSAL OF THE PRODUCT

This product falls into the scope of the Directive 2012/19/EU concerning the management of Waste Electrical and Electronic Equipment (WEEE). This product shall not be disposed in to the domestic waste as it is made of different materials that have to be recycled at the appropriate facilities. Inquire through the municipal authority regarding the location of the ecological platforms to receive the product for disposal and its subsequent correct recycling. Furthermore, upon purchase of an equivalent appliance, the distributor is obliged to collect the product for disposal free of charge. The product is not potentially dangerous for human health and the environment, but if abandoned in the environment can have negative impact on the environment. Read carefully the instructions before using the product for the first time.

It is recommended that you do not use the product for any purpose rather than those for which it was intended, there being a danger of electric shock if used improperly.

The crossed-out wheeled dustbin symbol, on the label on the product, indicates the compliance of this product with the regulations regarding Waste Electrical and Electronic Equipment.

Abandonment in the environment or illegal disposal of the product is punishable by law.

#### FR - AVERTISSEMENTS POUR L'ÉLIMINATION CORRECTE DU PRODUIT

Ce produit entre dans le champ d'application de la directive 2012/19 / UE relative à la gestion des déchets équipements électriques et électroniques (DEEE). L'appareil ne doit pas être jeté avec les ordures ménagères car il est fait de différents matériaux pouvant être recyclés dans des centres appropriés. Renseignez-vous auprès de l'autorité locale concernant l'emplacement des plateformes écologiques appropriées pour recevoir le produit pour sa destruction et son recyclage correct ultérieur. Il convient également de rappeler que, en cas d'achat d'un appareil équivalent, le distributeur est tenu de collecter le produit à détruire. Le produit n'est potentiellement pas dangereux pour la santé humaine et l'environnement, mais s'il est abandonné dans l'environnement, il a un impact négatif sur l'écosystème.

Lisez attentivement les instructions avant d'utiliser l'appareil pour la première fois. Il est interdit d'utiliser le produit pour un usage différent de celui auquel il était destiné, il y a risque de choc électrique si utilisé incorrectement.

Le symbole de la poubelle barrée sur l'étiquette de l'appareil indique sa correspondance produit à la législation relative aux déchets d'équipements électriques et électroniques.

L'abandon dans l'environnement de l'équipement ou l'élimination illégale de l'équipement est punissable par la loi.

#### DE - WICHTIGE HINWEISE ZUR KORREKTEN ENTSORGUNG DES PRODUKTS

Dieses Produkt fällt in den Anwendungsbereich der Richtlinie 2012/19/EU über die Entsorgung von Elektro- und Elektronik - Altgeräten (WEEE). Dieses Produkt darf nicht in den Hausmüll entsorgt werden, da es aus verschiedenen Materialien besteht, die in entsprechenden Einrichtungen recycelt werden müssen. Erkundigen sie sich bei ihrer Gemeinde nach dem Standort des nächsten Recyclinghofs bzw. der nächsten Annahmestelle, um das Produkt dem Recycling zuzuführen bzw. fachgerecht zu entsorgen.

Darüber hinaus ist der Händler verpflichtet, das Produkt beim Kauf eines gleichwertigen Geräts kostenlos zu entsorgen.

Das Produkt ist für die menschliche Gesundheit und die Umwelt potenziell nicht gefährlich. Diese können sich aber, falls sie in der Umwelt gelangen, negativ auf diese auswirken. Lesen Sie daher vor dem ersten Gebrauch des Produkts die Inbetriebnahme-, Bedienungs- und Entsorgungsanweisungen sorgfältig durch. Es wird empfohlen, dass Sie das Produkt nur für den vorgesehenen Zweck verwenden.

Bei unsachgemäßer Verwendung bzw. Fehlgebrauch besteht die Gefahr eines elektrischen Schlags.

Das Symbol der durchgestrichenen Mülltonne auf dem Etikett des Produkts weist auf die Konformität dieses Produkts zu den Vorschriften für Elektro- und Elektronik-Altgeräte hin. Das Ablagern in der Umwelt oder die illegale Entsorgung des Produkts ist strafbar.

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