DRU

VERY HIGH-EFFICIENCY HEAT RECOVERY UNIT

- ErP 2018
- Heat recovery efficiency above 90%
- Air flows from 100 to 500 m^3/h
- 5 sizes and 2 configurations available: vertical or horizontal for false ceiling installation

Air quality, and therefore its temperature, humidity and purity are key components for the general wellbeing inside a building. Especially in winter, when the opening of windows for air exchange results in significant heat loss, an integrated ventilation system is the best solution for maintaining thermal performance levels in the building as well as indoor air quality. Recent legislation on energy saving in buildings and new technological achievements in the field of thermal insulation and sealing of windows and doors, have made modern homes more comfortable in terms of heat and sound, but have transformed them into totally-sealed environments, with the risk of turning them into “harmful traps” due to the domestic production of pollution.
The basic principle is to make the building more than just well insulated, but also highly air-tight. An efficient mechanical ventilation system is essential for ensuring adequate change of air and a healthy atmosphere inside the premises. The renewal of air inside rooms is essential for proper sanitation and housing, and even the European Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the Energy Performance of Buildings cited the “need” for ventilation fans for standard use in buildings.
This “need” conflicts, however, with the shared worldwide need, and included in Italian Law 10/91 and with Legislative Decrees 192/05 and 311/06, to improve the energy performance of buildings in order to limit consumption. Controlled mechanical ventilation with a heat recovery unit from the DRU series is, therefore, an ideal solution for reducing the energy requirements of homes and at the same time improves the health and environmental quality of the air inside.

Publication: Technical bulletin Very high-efficiency heat recovery unit (DRU)

Regulatory Compliance

All controlled mechanical ventilation and DRU heat recovery units are tested before shipment. The Company's Quality System has been certified UNI EN ISO 9001 since 1996. In 2014 the Company was awarded UNI EN ISO 14001 Environmental Management certification. Over the years numerous certifications have been obtained for the various product ranges from the most important European bodies (TÜV, EUROVENT, Istituto Giordano, VKF-AEAI, GOST, Achilles JQS, etc.). More specifically, the controlled mechanical ventilation and DRU heat recovery units are designed and manufactured in accordance with the following reference provisions:

- Directive 2006/42/EU - Machinery
- Directive 2014/30/EU - Electromagnetic Compatibility (EMC);
- Directive 2014/35/EU Low Voltage Directive (LVD)
- Directive 2014/68/EU - PED
- Directive 2009/125/EU - EcoDesign
- Regulation (EU) No. 1254/2014 (ErP)

Application fields

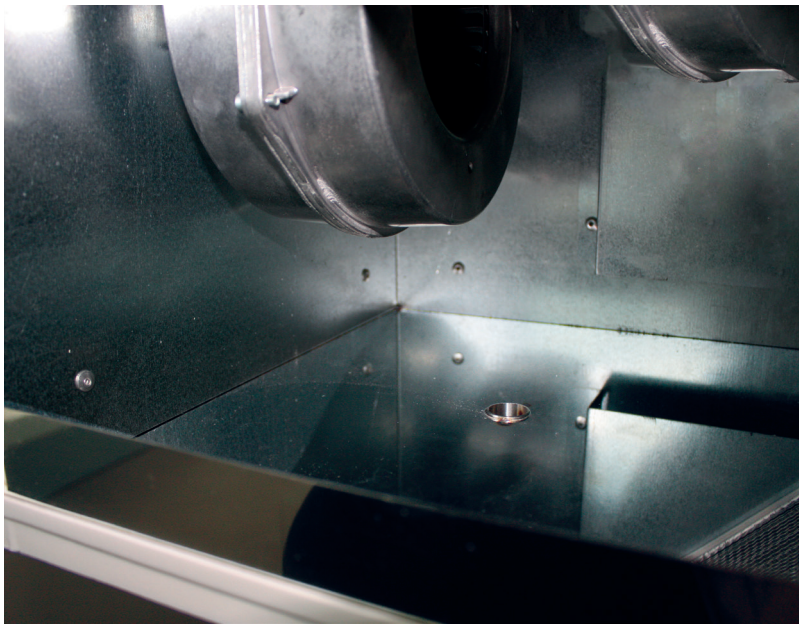

Tertiary


Single-family homes

Description of the Unit and main components

Operation

The air is canalized by a double pipeline distribution system, divided between fresh air drawn from outside (supply) and polluted air drawn from moist rooms and the kitchen (return). The pressure required to move air is supplied by the fans in the heat recovery unit. The two air streams are filtered and then sent to a cross flow heat recovery unit, where the outgoing air releases part of its heat (or extracts a part of it) to the outdoor renewal air, by means of the metal surfaces with excellent thermal conductivity. This handled air is further filtered and then sent into the environment along the network of ducts connected to appropriate diffusers.



Stainless steel pan for collecting condensate

G3 and F7 filters on the supply circuit

Advantages:

- Better air quality due to the continuous and gradual input of fresh air, taken from an area with a minimum of pollutants and filtered before being sent into the rooms.
- Energy savings on the total renewal air heating requirements.
- Protection of the house against attacks from mould and moisture.
- Maintenance of a high level of sound comfort, because the controlled mechanical ventilation avoids the necessity to open the windows to change the air. This is particularly important in very noisy areas, close to busy roads or railways.
- Contribution towards the reduction in environmental pollution.

Reduced consumption

In residential houses, about 70% of energy consumption (on average 160 kWh/m2a) is due to heating.
Heat loss through windows can be up to 50% of total heat loss of a building and for this reason it is highly advantageous to use a mechanical ventilation system which not only provides the necessary change of air but also allows more than 90% of heat recovery. This means significant savings on energy costs.

Air quality

Opening windows (whose value is difficult to calculate with regard to air renewal) has the sole effect of causing an enormous waste in terms of energy and therefore money, as well as allowing a range of pollutants and allergens to enter our homes with ease.
Recent research has also underlined that the concentration of many pollutants inside the house can be two to five times greater than outside and that our greatest exposure to pollutants occurs precisely within our own homes.

Protecting people

In Western Countries people spend, on average, 90% of their time indoors, and most of this time is spent at home. It is obvious that a correct ventilation system is essential to ensure excellent air quality, to ensure our health and wellbeing, preventing headaches, sleep disorders, irritability, allergies, exhaustion and the feeling of being out of sorts that is typical of “Sick Building Syndrome” (USA Environmental Protection Agency).

Property value

The installation of a controlled mechanical ventilation system with heat recovery also has a beneficial effect on the property:

- ensuring a market value greater than that of a building which does not have such a system;
- eliminating the visible and invisible damage caused by mould and humidity;
- maintaining the value of the property over time.

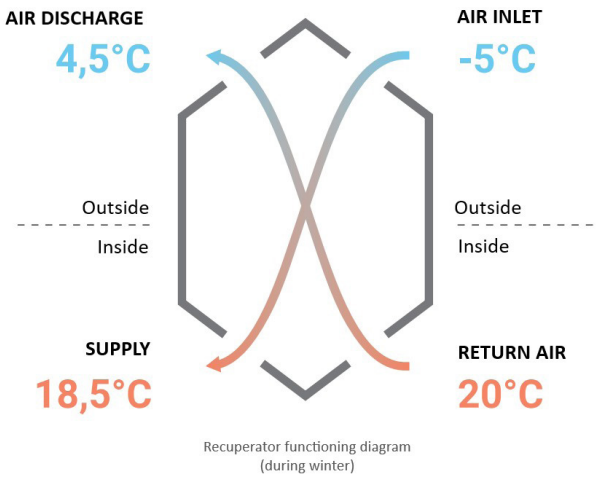
Nowadays, when buildings are placed on the real estate market, they need to have an energy performance certificate. This document provides purchasers and tenants with objective and transparent information on the characteristics and energy costs of the property.
A more efficient house in terms of energy will have a higher market value, since the lower running costs make it more attractive on the housing market.
If we also consider the progressive rise in prices of oil and gas, the most commonly used fuels for heating, it becomes obvious that the value of a property fitted with a heat recovery unit and therefore low energy consumption will increase at the same rate as the cost of the energy sources used to heat it. All this means that the value of the property will be maintained or increased.

Indoor pollutants

The following is a list of the main pollutants detected inside homes.

- Combustion products: these are due to the combustion processes required for heating, cooking, domestic hot water production, in addition to tobacco smoke, car exhaust fumes and kitchen hobs without a ventilation system.
- Microbiological agents: the growth of moulds and bacterial proliferation are caused by an excessive production of water vapour inside the home spaces due to normal human daily activities.
- Volatile organic compounds: the so-called VOCs are released by plants, detergents, solvents, pesticides, tobacco smoke, perfumes or products associated with cooking. They are believed to be responsible for many respiratory diseases and various allergic disorders.
- Particles: these are produced by combustion, but also by human activities inside the home, the presence of animals and the deterioration of home furniture materials. They can cause simple allergic reactions or even contain toxic substances (e.g. lead).
- Radon: this is a radioactive gas found everywhere on the earth's crust. The radiation it emits can damage human cells, beginning a carcinogenic process in the respiratory system. It can penetrate through cracks in house floors, floor-wall joints, heating and plumbing systems and gas and electricity piping and ducts.

Moreover, when people are in a confined environment the oxygen is consumed and the percentage of CO_2 increases (a main indicator of air quality). A system of controlled mechanical ventilation with heat recovery is a solution that can ensure a change of fresh filtered air, safe removal of stale air and its pollutants, and thus the provision of enormous benefits to individual health and well-being.



Recuperator functioning diagram
(during winter)

Environmental protection

The climate change we have been witnessing in recent years and the claims made repeatedly by the scientific world have prompted governments to agree on the need to define specific national, European and global environmental policies. The guidelines were drawn up in the Kyoto Protocol, under which 122 member countries pledged to reduce their emissions of six major greenhouse gases by at least five percentage points.

Heating installations contribute significantly to air pollution. The "Libro Bianco" compiled by F.IN.CO. and ENEA (year 2004) shows that 41% of total energy consumption in European Union member states is related with the residential and tertiary sectors.

Heating is by far the most significant component among these consumption items (57%). Reducing energy consumption thus entails a drastic reduction in emissions of greenhouse gases and pollutants.

With this in mind a more efficient use of energy and a reduction in wasteful use may certainly be seen as "the most effective source of renewable energy", the most immediate, the most accessible and most easily within reach of everyone and for that reason we are all called upon to adopt responsible choices and ways of behaviour.

Components

The DRU unit is available in 5 sizes, in both the vertical version and the horizontal version suitable for false ceilings.

Casing

The casing is made of a sandwich structure with external support in galvanised steel (pre-coated RAL 9010 in the vertical version) and internal support in galvanised steel; the insulating panel is in rubber.

Heat recovery unit

Heat recovery is obtained via cross-flow heat exchanger plates that use the stale air from inside the home to heat/cool the fresh air from outside. The two streams are in contact through metal walls that allow the heat exchange to take place, while keeping the two streams separate through special seals. This makes it possible to recover more than 90% and avoid the sort of heat loss that occurs with natural ventilation of the house and at the same time ensures a constant renewal of fresh air from outside.
The heat recovery unit has no moving parts and therefore ensures a very high level of reliability and safe operation, allowing low power consumption for the auxiliaries. The plates are made of aluminium because of its resistance to corrosion, ease as a construction material, incombustibility, long useful life and hygienic properties.

Electric fans

These are centrifugal fans, managed by electronic DC motors, with speed modulated by a 0-10 V input signal, directly coupled to the impeller. Combination of high performance with extremely low noise and low power consumption.

By-pass for freecooling DRU BPFC

In the summer, when the conditions are right, the DRU allows you to take advantage of freecooling. The path of the air is changed automatically by the regulator on the DRU through a damper that activates the heat recovery unit by-pass route.
The accessory includes two temperature sensors: one on the external air intake, the other on the return air outlet. It must be coupled with a COM SMP5500 regulator which automatically activates the damper, as soon as the right conditions occur.

Filters

The filters have efficiency: G3 and F7 EN-799. All filters are easily removable through the openings for periodic replacement.

Power supply

The DRU is powered with 230Vac 50Hz mains voltage.

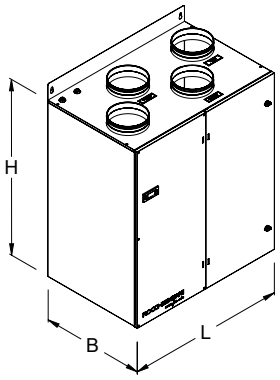
Differential pressure switches to report soiled filters

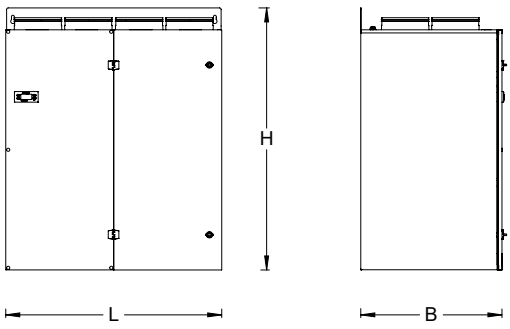
General technical data

DRU Model		10	15	25	35	50
Nominal air flow	m^3/h	100	150	250	350	500
External Static Pressure	Pa	120	130	240	160	150
Heat recovery unit						
Energy Efficiency (3)	%	81.9	87.1	85.6	83.6	83.3
Total Heat Recovery Capacity (3)	kW	0.2	0.3	0.4	0.6	0.8
Supply Air Temperature (3)	° C	27.1	26.8	26.9	27.0	27.0
Supply Air Humidity (3)	%	66.6	67.8	67.5	67.0	66.9
Energy Efficiency (2)	%	86.7	91.3	90.0	88.2	88.0
Total Heat Recovery Capacity (2)	kW	0.7	1.1	1.9	2.6	3.7
Supply Air Temperature (2)	° C	16.7	17.8	17.5	17.1	17.0
Sensible Energy Efficiency (4)	%	86.7	91.3	90.0	88.2	88.0
Fans						
Supply Fan Motor Rating	W	27	43	107	165	230
Supply Fan Nominal Current	A	2 x 0.27	2 x 0.32	2 x 0.90	2 x 1.30	2 x 1.80
Power supply	V/Ph/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Airflow Control		0..10V	0..10V	0..10V	0..10V	0..10V
Compliance EN 1254/2014 (5)		-				
Unit type		RVU/BVU				
Ventilation Control		Variable speed				
Heat Recovery		Cross flow				
Efficiency	%	81.9	87.1	85.6	83.6	83.3
Absorbed power (1)	kW	0.06	0.11	0.14	0.18	0.22
Specific Fan Power	$W/(m^3/h)$	0.37	0.54	0.29	0.33	0.46
Sound Pressure Level at 3m	dB (A)	36.0	37.0	35.0	36.0	37.0

Dimensions and weights

Dimensions						
B	mm	338	338	451	451	571
H	mm	612	772	772	772	772
L	mm	595	595	690	690	690
Weight	kg	28	28	39	40	50



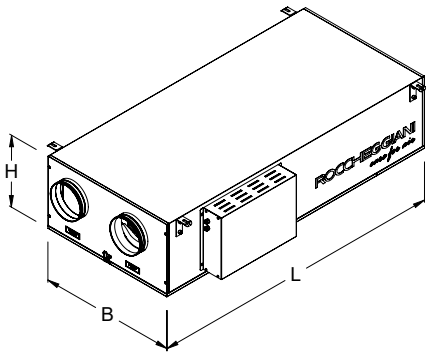


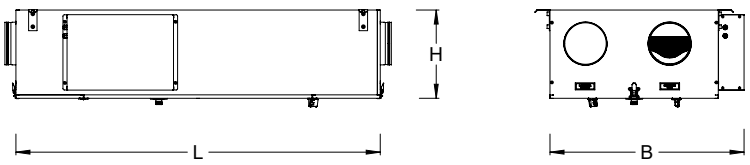
General technical data

DRU Horizontal Model		10 - OR	15 - OR	25 - OR	35 - OR	50 - OR
Nominal air flow	m^3/h	100	150	250	350	500
External Static Pressure	Pa	120	130	240	160	150
Heat recovery unit						
Energy Efficiency (3)	%	87.1	84.9	85.6	83.6	83.3
Total Heat Recovery Capacity (3)	kW	0.2	0.3	0.4	0.6	0.8
Supply Air Temperature (3)	° C	26.8	26.9	26.9	27.0	27.0
Supply Air Humidity (3)	%	67.8	67.3	67.5	67.0	66.9
Energy Efficiency (2)	%	91.3	89.4	90.0	88.2	88.0
Total Heat Recovery Capacity (2)	kW	0.8	1.1	1.9	2.6	3.7
Supply Air Temperature (2)	° C	17.8	17.3	17.5	17.1	17.0
Sensible Energy Efficiency (4)	%	91.3	89.4	90.0	88.2	88.0
Fans						
Supply Fan Motor Rating	W	27	43	107	165	230
Supply Fan Nominal Current	A	2 x 0.27	2 x 0.32	2 x 0.90	2 x 1.30	2 x 1.80
Power supply	V/Ph/Hz	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
Airflow Control		0..10V	0..10V	0..10V	0..10V	0..10V
Compliance EN 1254/2014 (5)		-				
Unit type		RVU/BVU				
Ventilation Control		Variable speed				
Heat Recovery		Cross flow				
Efficiency	%	87.1	84.9	85.6	83.6	83.3
Absorbed power (1)	kW	0.06	0.11	0.14	0.18	0.22
Specific Fan Power	$W/(m^3/h)$	0.37	0.54	0.29	0.33	0.46
Sound Pressure Level at 3m	dB (A)	36.0	37.0	35.0	36.0	37.0

Dimensions and weights

Dimensions						
B	mm	491	491	600	600	600
H	mm	252	252	316	316	316
L	mm	925	925	1300	1300	1300
Weight	kg	29	30	43	44	46



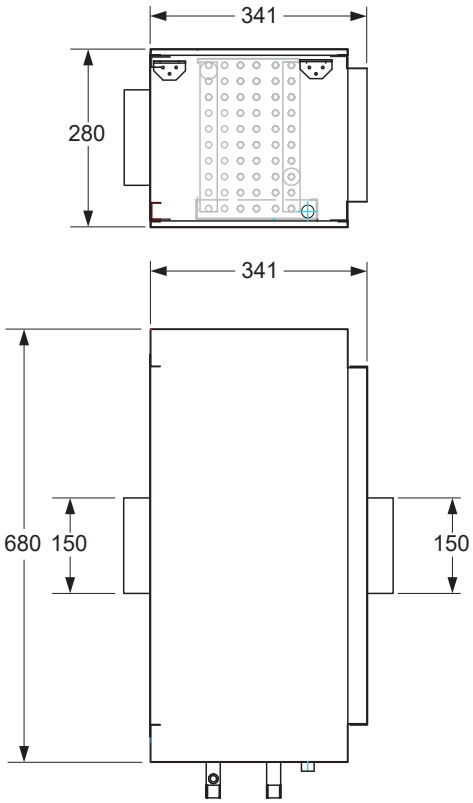


Description and dimensions of accessories

The base unit includes the heat recovery and filtering sections.
In addition to these functions, you can complete the base unit with additional air handling sections, such as heating, cooling and reheating sections that can be installed downstream of the air supply section according to procedures described below.

DRU BPAG progressive by-pass for antifreeze function

The DRU can also be equipped on board with a modulating progressive by-pass with antifreeze functions. This option is advisable in the event of installations with frequent very low outdoor temperatures.
A temperature sensor placed on board measures the ejected air temperature. The control checks that the ejected air temperature never goes below 0°C to avoid the freezing of the recovery unit, choking the fresh air flow on the recovery unit and so temporarily reducing its efficiency.



DRU BE electric reheating module

The DRU BE optional module can be supplied if one intends to have the re-heating function and water is not available.
It consists of a circular module with diameter of Φ 150 mm, inside which the heating element is housed. The electric heating element requires a 230 V power supply and is equipped with a safety thermostat. It is available with power from 0.5kW to 3 kW, with single stage, 2-stage or modulating versions. The electric heating element may be controlled by the regulator.

DRU-BPT post handling module

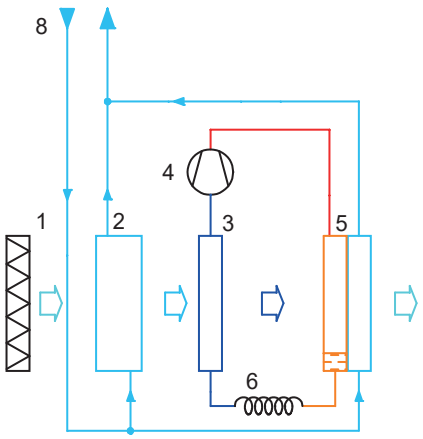
The post-handling module with water coil DRU-BPT is supplied whenever heating and/or cooling is required downstream of the recovery unit.

DRU DCS26 dehumidifier

The DCS26 dehumidifier is a cooling circuit machine designed to give an important contribution to dehumidification, especially when associated with radiant cooling systems.
Cooling systems use water chilled at a temperature of 15 to 20°C, which is enough to obtain the desired room temperature but not suitable for dehumidification.
Water-chilled cooling circuit dehumidifiers enable you to keep room humidity at optimum values (55-65%), with the following benefits:

- they use the available chilled water of the radiant panel system;
- they handle air without modifying its temperature and therefore without interfering with the work of the radiant panels and their regulation system.

The picture below outlines the operation of the DRU DCS26 module.
The air, filtered through the filtering section (1), undergoes a pre-cooling by means of the chilled water exchanger (2) coming from the radiant system collector (8). The use of chilled water to pre-cool the air is fundamental for the process efficiency, as in this way it is possible to minimise the use of electrical power of the cooling compressor (4).
Then the air is dehumidified going in sequence through the finned coils of a cooling circuit: the real dehumidification takes place in the first coil (3), the post-heating (through the heat generated by the cooling circuit) takes place in the second battery (5). The coil (5) is equipped with a second row, called “post-handling”, which is placed directly after the cooling circuit condenser and has the function of reducing the temperature of the air ejected by the machine to a value not higher than the inlet air.



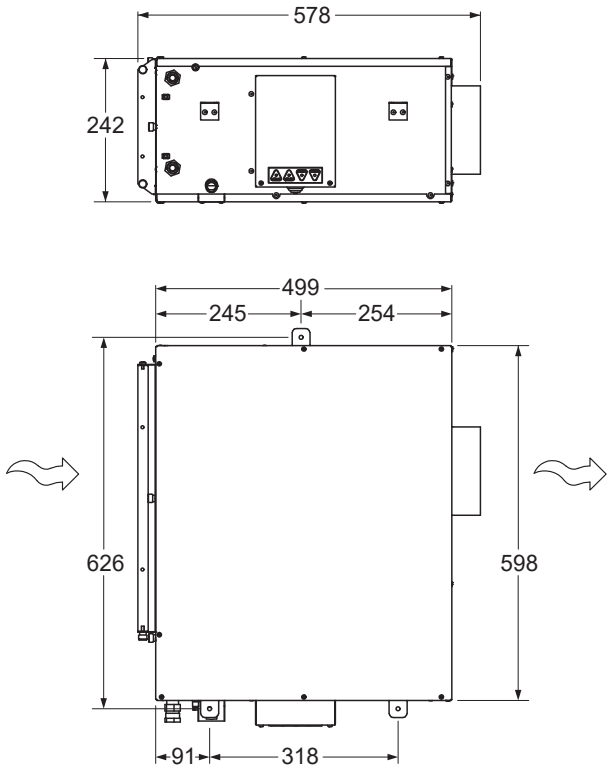
Description of main components

Structure: panels made of galvanised metal panels lined internally with sound-proofing material made of open-cell polyurethane foam

Filtering section: filtering structure made of galvanised metal panels; G3-type filter that can be removed from all sides of the module.

Cooling circuit: made of copper pipes, finned coils in aluminium with copper pipes, alternative cooling compressor with 10 cc-piston; humidity filter

Hydraulic circuit: made of copper pipes, with finned coil in aluminium and copper pipes, for pre-handling and post-handling of air.

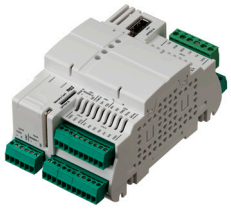


Electronic control

The DRU unit can be fitted with the Roccheggiani RIR integrated regulation system. This consists of an on-board control panel plus a room terminal with touch screen.

RIR Regulation

The RIR regulation system enables full control over all possible DRU configurations. According to the various configurations, the on-board control panel is provided with a kit consisting of 3 temperature probes, two differential pressure switches which raise an alarm for soiled filters, a bypass damper actuator and a touch screen terminal to be installed in the room. This element is provided with a temperature and relative humidity probe. The temperature probe is for display purposes only, whereas the humidity probe can be used (for activating the dehumidifier) as an alternative to a humidistat if the terminal is installed in the room that needs to be controlled.
It is also available in a terminal touch screen version with flush mounting (absence of temperature and relative humidity probes). If there are additional sections to the basic heat recovery unit, such as post-handling sections and/or a pre-handling section, the related temperature probes are duct-fitted and are supplied together.



The following can be fitted as regulation accessories:
- CO2 return probe;
- relative humidity probe for return air and/or room to control the ventilation and the dehumidifier if present;
- humidistat to control the dehumidifier if present.

The main features are as follows:
- Constant/variable speed: minimum, medium, maximum and automatic speeds can be selected. Automatic speed is available when there are handling coils or a CO2 probe or a relative humidity probe. These three modes are alternatives to each other.
- Regulation based on the return air temperature.
- Winter heating/summer cooling (H2O valve) (2-pipe system).
- Only winter heating (H2O valve) (2-pipe system).
- Only summer cooling (H2O valve) (2-pipe system).
- Only winter heating (2-stage electric coil).
- An electric preheating section on fresh air can be added. This feature excludes the presence of an electric heating coil and vice versa.
- Control of the dehumidification module with refrigeration circuit and water. Choosing this module excludes the possibility of adding water/electric post-handling modules and vice versa.
- Programming time periods

The RIR regulation is provided with the following external connections:
- Ethernet: Bacnet IP, Modbus TCP Master/Slave, Webserver, Ftp Client/Server, SNTP;
- CANBus: CANopen;
- RS485: Modbus RTU or BACnet MS/TP;
- there is a slot for an SD micro memory card that can be used to record data or for storing on Webserver;
- USB programming portals;
- Plug-in RS-232: ASCII (optional);
- Plug-in RS-485: Modbus RTU (optional);
- Plug-in RS-485: Modbus RTU - BACnet MSTP (optional);
- Plug-in LONWORKS: LON (optional);
- Plug-in CANBus: CANopen (optional).

Regulation RAC1

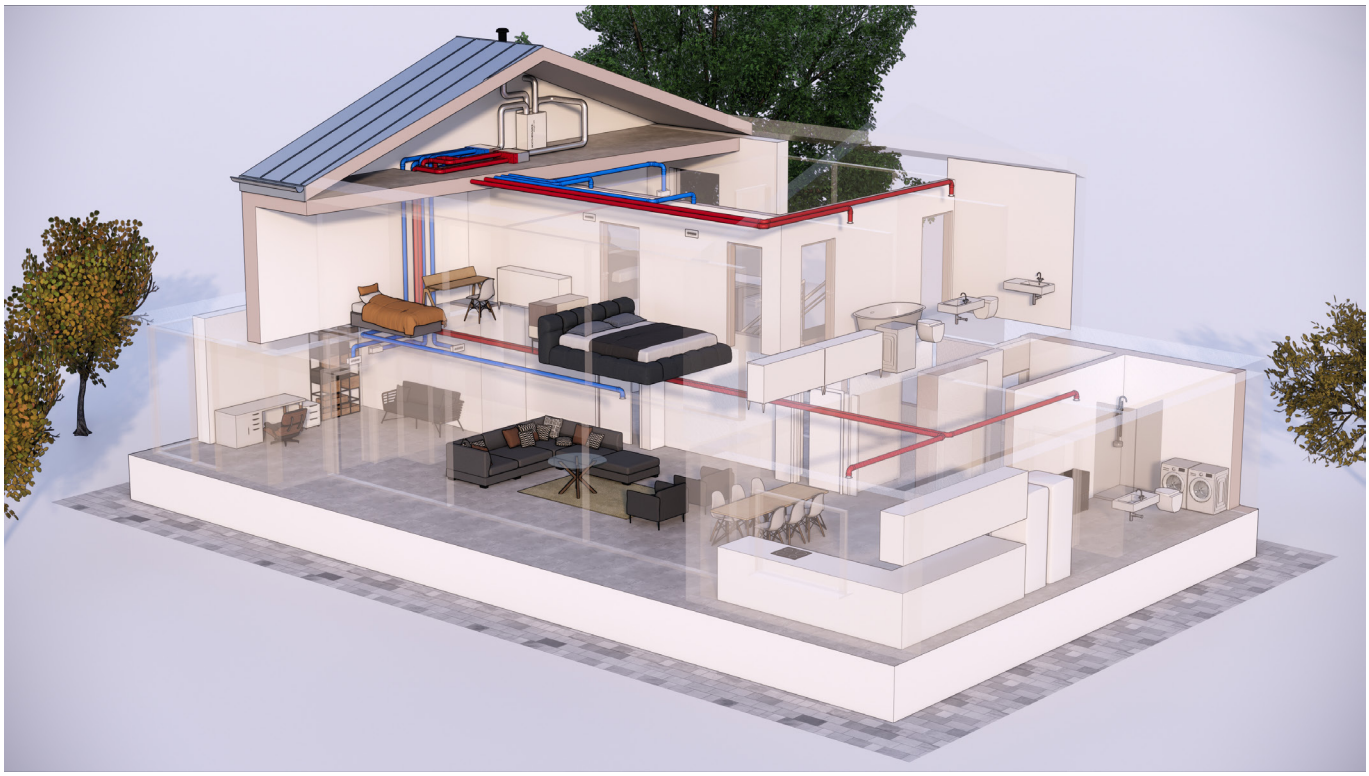
The choice of regulator can be based on the following table.

			REGULATION RAC1															
		REGULATOR CODE	REG-AMB-V0 / REG-AMB-V0-M				REG-AMB-V1 / REG-AMB-V1-M								REG-AMB-V2 / REG-AMB-V2-M			
	I/O	REGULATOR MODEL	AHU-0xCSH1(3)				AHU-1xCSH1(3)								AHU-2xCSH1(3)			
CONTEMPORARY FUNCTIONS	AO	CONTROL 0-10V VENTILATION(1)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	AO	CONTROL 0-10V HOT VALVE	•	•	•	•												
	AO	CONTROL 0-10V COLD VALVE	•	•	•	•	•	•	•	•	•	•	•	•				
	AI	DISCHARGE TEMPERATURE PROBE (for recovery unit antifreeze ON/OFF)	•				•				•				•			
	AI	EXTERNAL TEMPERATURE PROBE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	AI	SUPPLY TEMPERATURE PROBE	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	AI	RETURN TEMPERATURE PROBE		•				•				•				•		
		ROOM TEMPERATURE PROBE (INSIDE THE REGULATOR)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
		ROOM HUMIDITY PROBE (INSIDE THE REGULATOR)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	AI	ACTIVE CO2 PROBE (0-10V)			•				•				•				•	
	AI	ACTIVE HUMIDITY PROBE (0-10V)				•				•				•				•
	DO	HEAT REC. UNIT BYPASS ON/OFF FOR FREE-COOLING/FREE-HEATING	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	DO	ELECTRIC COIL ON/OFF ONE STAGE					•	•	•	•					•	•	•	•
	DO	EXTERNAL DAMPER/S(2) ON/OFF									•	•	•	•	•	•	•	•
	DI	SELECTABLE BETWEEN: remote season change, remote ON/OFF, generic alarm, generic filter contact, supply filter contact, return filter contact, total shut down alarm contact, fan alarm contact	•	•	•	•	•(4)	•(4)	•(4)	•(4)	•	•	•	•	•(4)	•(4)	•(4)	•(4)
	DI	SELECTABLE BETWEEN: remote season change, remote ON/OFF, generic alarm, generic filter contact, supply filter contact, return filter contact, total shut down alarm contact, fan alarm contact	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

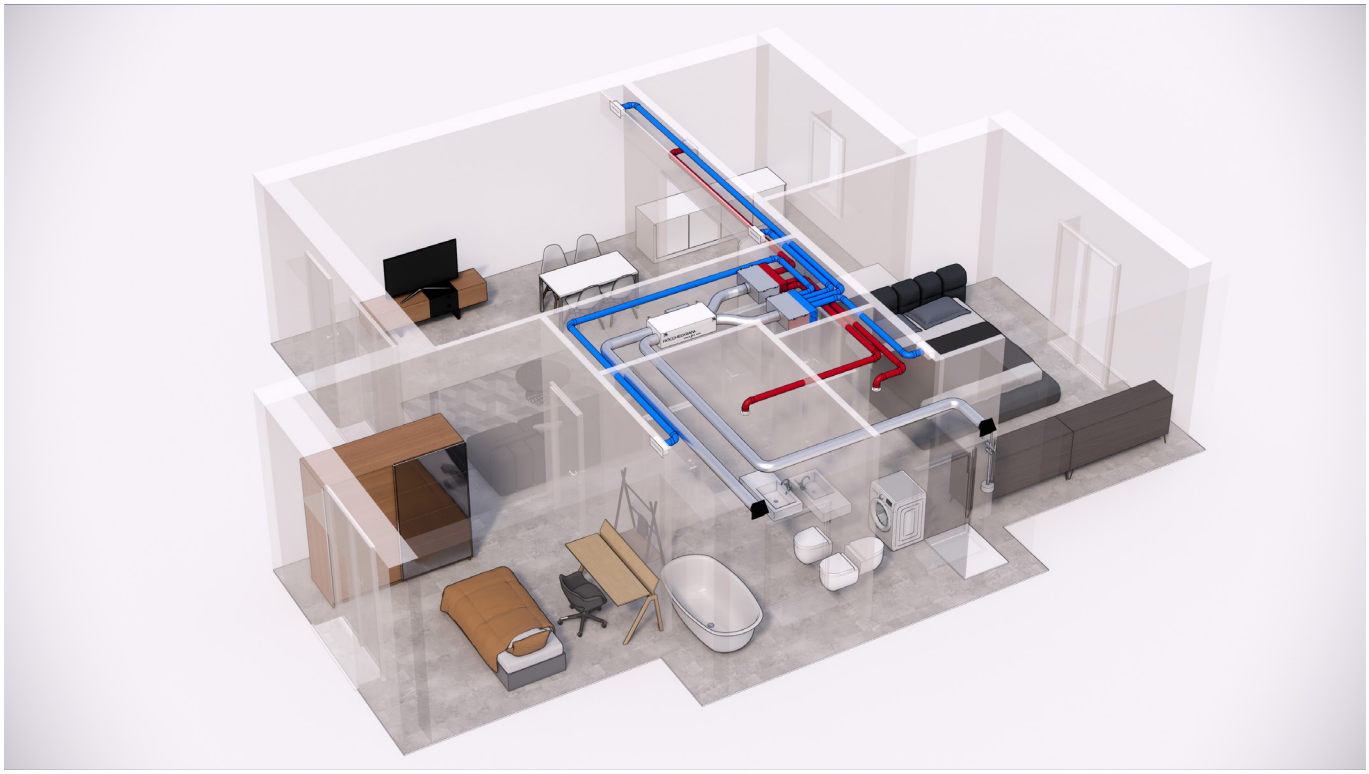
Presentation of the plant engineering system

Air distribution system

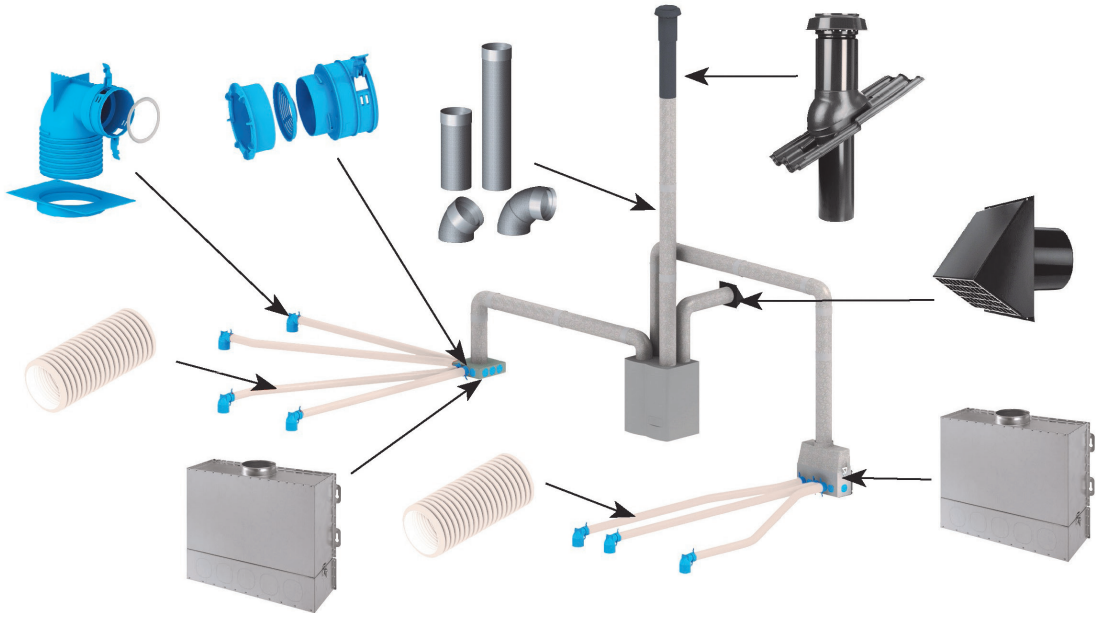
Roccheggiani offers a wide range of accessories for the construction of the whole air distribution system in any environment and to meet any requirement.



Example of DRU installation (vertical)



Example of DRU installation (horizontal)



Air distribution accessories

Ducts

The dual system of ducts used to move discharge air and return air, consists of high density corrugated DRU CP series polyethylene round pipes, with a double wall, specially designed for air distribution.
They are perfect for installation in walls and ceilings and false ceilings and ensure extremely low pressure drops, mechanical stability, absolute absence of corrosion, low weight, easy handling, fitting and cleaning.
The ducts have an antibacterial and antistatic inner layer to ensure the air sterility.
If the space for distribution is modest, Roccheggiani can supply polyethylene corrugated pipes with oval section and external dimensions of 50x130 mm.

For larger diameters, spiral or flexible metal ducts can be used or rigid synthetic ducts:
- SZ spiral ducts
- SZC double-wall insulated spiral ducts
- TA aluminium flexible ducts
- TA ISO insulated aluminium flexible ducts
- EPP polypropylene rigid ducts

DRU CP050130 corrugated pipes			
Section	External diameter (mm)	Internal diameter (mm)	Flow capacity (m^3/h)
Round	75	63	40
Round	90	76	60
Flat	50 x 130	-	40

Connection systems

The connections for polyethylene ducts are made of polyethylene and are designed specifically for our corrugated pipes.
They guarantee excellent airtightness and a secure coupling.
Assembly is simple and quick. Sleeves, pressed curves and tapes in aluminium are available for round, rigid and flexible ducts.

Fresh air and discharge air intakes and outlets

Roof and wall options are provided for fresh air and discharge air intakes and outlets.
With the Roccheggiani air distribution system, all noise transmission between rooms is avoided, because each duct is dedicated to a single space with no communication with other spaces as no branching is used.
In an ecological perspective, all plastic materials used to make the air distribution network are fully recyclable.

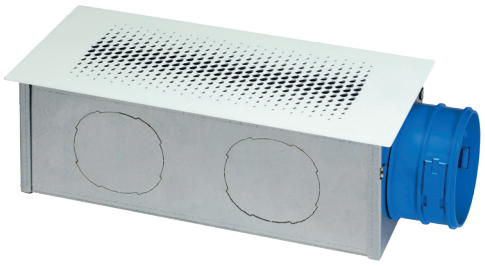
Sizing software

Roccheggiani has a software dedicated to the sizing of the distribution system. The software generates a complete and detailed report of all components to be used, divided up for each specific room, so as to make the installer's task so much easier during the assembly phase.
The output generated by the software is absolutely essential in helping to achieve a perfectly-sized system.

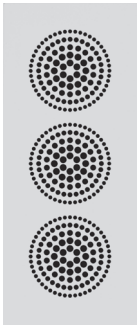
Supply/return grilles + PLMR-M or PLMR-M-O plenum

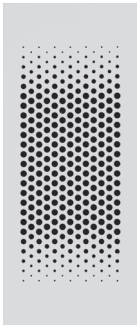
The new supply/return grilles consist of:

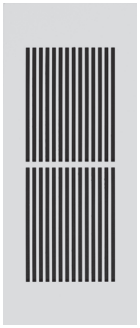
- Painted steel screen (standard white RAL 9010) or stainless steel with brushed finish.Dim. 340x150 mm. There is a wide available range of screens to choose from with various visually-appealing finishes.
- Secure fixing of the grille onto the PLMR-M plenum using adjustable magnets (allows quick and effective installation without screws as well as optimum grille positioning, regardless of any misalignment of the plenum)
- Plenum box made of galvanised sheet iron, designed for pre-cut round quick connections, compatible with DRU CP75 or DRU CP90 corrugated pipes (or flat DRUCPO50130 pipes on the PLMR-M-O low version).
- The plenum already includes a quick coupling for corrugated pipes (when ordering, the pipe diameter needs to be specified); it can take up to 2 connections



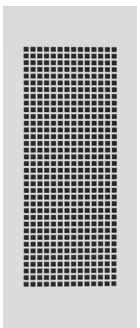
RFL			IRO			DLI			PES		
[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)
50	3	21	50	3	21	50	2	21	50	3	21
60	4	22	60	4	21	60	3	21	60	4	21
70	5	23	70	5	21	70	4	21	70	5	22
80	7	24	80	6	22	80	5	22	80	6	23
90	8	25	90	7	24	90	6	23	90	7	24
100	10	28	100	8	25	100	7	25	100	8	26
110	12	30	110	10	28	110	8	27	110	9	29
120	14	32	120	12	30	120	10	30	120	10	32

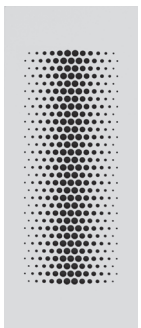




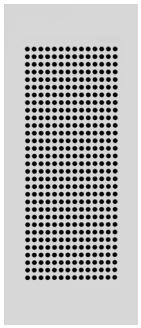


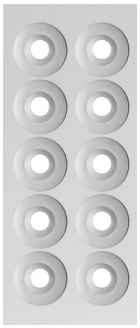
DFL			RSQ			DRL			IRV		
[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)
50	3	21	50	2	21	50	4	21	50	3	21
60	4	22	60	3	21	60	6	21	60	4	21
70	5	23	70	4	22	70	7	22	70	5	22
80	6	24	80	5	23	80	9	24	80	6	23
90	8	25	90	6	24	90	11	26	90	7	24
100	9	27	100	7	25	100	13	29	100	9	26
110	11	30	110	8	27	110	16	33	110	10	28
120	13	33	120	10	29	120	19	35	120	12	31

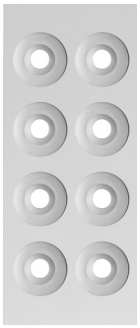




RR0			UG10			UG8		
[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)	[mc/h]	dP	dB (A)
50	3	21	50	15	25	50	15	25
60	4	21	60	21	26	60	22	29
70	5	22						
80	6	23						
90	7	24						
100	9	26						
110	11	29						
120	13	31						

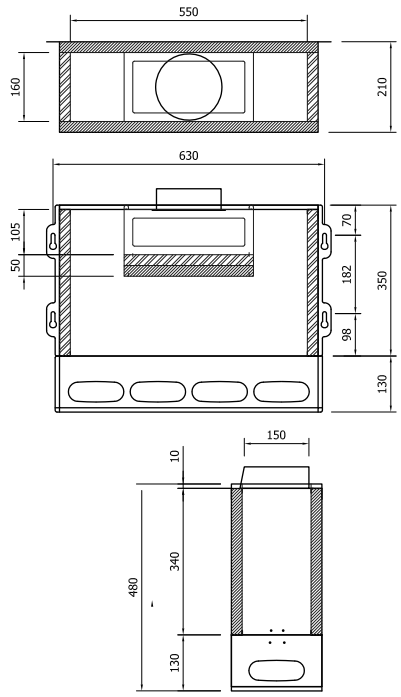




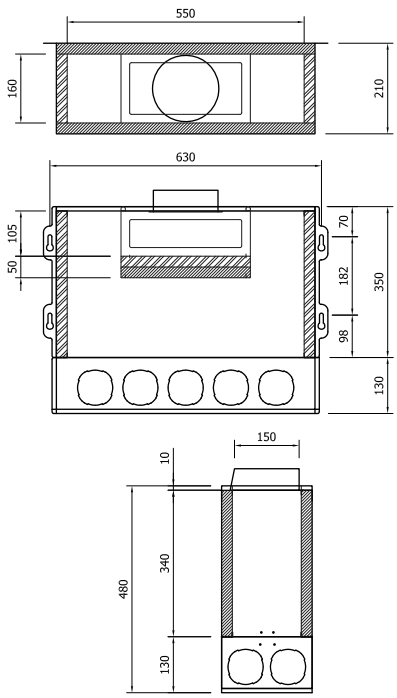


Distribution boxes

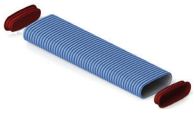
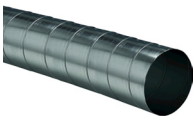
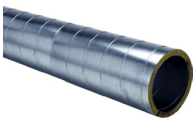
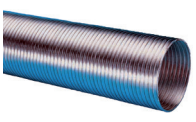
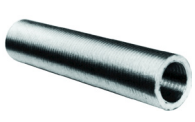
- The new distribution boxes for the supply and return network are made of galvanised steel that are fully insulated and sound-proofed inside with mineral wool and perforated sheet. They also have a noise-absorption section to reduce the noise from the machine.
- The distribution box has up to 24 round (DDC-U) connections or 18 oval (DDC-O) connections that can be positioned on any side of the box. Connections are laser-etched and during installation only the ones required are actually opened. A specific airflow regulator, calibrated according to prior plant sizing, is applied to each connection.
- Each regulator maintains the proper airflow in each individual environment. The connection couplings between the corrugated pipes and distribution boxes allow quick and easy assembly, ensuring a perfect seal. They are specially designed for this application and to house the flow regulator.
- The box consists of 2 easily-connected elements to allow simple inspection or cleaning.



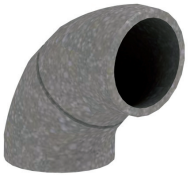
DDC-O



DDC-U

Accessories			
	Article	Description	Application
	**CP75**	Double-wall corrugated HDPE pipes, internal diameter 63 mm, external diameter DN 75 mm. Antibacterial coating on internal surface (supplied in 50 m rolls).	Maximum air flow rate: 40 m^3/h
	**CP90**	Double-wall corrugated HDPE pipes, internal diameter 76 mm, external diameter DN 90 mm. Antibacterial coating on internal surface (supplied in 50 m rolls).	Maximum air flow rate: 60 m^3/h
	**CPO50130**	Flexible flat double-wall corrugated pipe made of HDPE. Height 50 mm, width 130 mm Vertical bending radius 150 mm, horizontal bending radius 260 mm. Antibacterial and anti-static coating on internal surface (supplied in 20 m rolls).	Maximum air flow rate: 40 m^3/h
	**CPO50130**	Flexible flat double-wall corrugated pipe made of HDPE. Height 50 mm, width 130 mm Vertical bending radius 150 mm, horizontal bending radius 260 mm. Antibacterial and anti-static coating on internal surface (supplied in 20 m rolls).	Maximum air flow rate: 40 m^3/h
	**SZ**	Spiral circular rigid duct in galvanised sheet Standard joint with sleeve	Main ducts for the distribution and return of air. Φ 125 mm for DRU 10 - 15 Φ 160 mm for DRU 25 - 35
	**SZC**	Double-wall insulated rigid spiral ducts in galvanised sheet Joint with double sleeve.	Main ducts for the distribution and return of air. Φ 125-180 mm for DRU 10 - 15 Φ 150-200 mm for DRU 25 - 35
	**TA**	Flexible aluminium duct with simple seaming, thickness 0.10 mm	Main ducts for the distribution and return of air. Φ 125 mm for DRU 10 - 15 Φ 160 mm for DRU 25 - 35
	**TA ISO**	Insulated flexible duct with aluminium inner and outer wall. Inner and outer wall thickness 0.10 mm	Main ducts for the distribution and return of air. Φ 125-180 mm for DRU 10 - 15 Φ 160-200 mm for DRU 25 - 35

EPP	Synthetic anti-condensation duct for connection between the fresh air intake to the DRU and from the DRU to discharge. Diameter Φ 150 and Φ 180 mm. Length 1000 mm and 500 mm	Main ducts for the distribution and return of air



EPP	45° and 90° bends for anti-condensation synthetic pipes with diam. Φ 150 and Φ 180 mm.	Main ducts for the distribution and return of air

EPP	Connection element for anti-condensation synthetic duct with diameter Φ 150 and Φ 180 mm.	Main ducts for the distribution and return of air

CPJ	DRU CP pipe to pipe connection, including sealing rings.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.

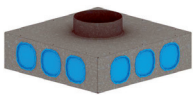
CC90	90° bends with connections for corrugated pipes DN 90 mm, including sealing rings.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.

TC	Straight connector for distribution terminal, including connection plate and sealing ring. Inner diameter terminal side Φ117 mm, external diameter terminal side Φ122 mm.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.

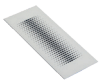
TC90	90° Connection for distribution terminal, including connection plate, sealing ring and dust cap.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.

T2C90	90° connector for two corrugated pipes DN 75 mm for distribution terminal, including connection plate, sealing ring and dust cap. Inner diameter terminal side Φ117 mm, external diameter terminal side Φ122 mm.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.

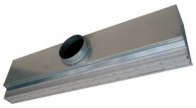
DDC-U	Sound-proofed distribution box in galvanised sheet steel with 24 connections for flat DN75 and DN90 corrugated pipes.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.



RBC	Return air box dim. 400x400x110 mm Φ 150 mm and 400x200x110 mm Φ 125 mm.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.
DBCC	Connection element with fittings for distribution box - corrugated pipe DN 75 and DN 90 mm, including sealing ring.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.
DBCR	Air flow regulator	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.
DT	Protection cap against dust for pipes and connectors DN 75 and DN 90 mm.	Accessories for air distribution in each room that can be coupled with corrugated DRU CP pipe.
COT	Return air terminal for DRU CP	Max airflow on supply: 50 m^3/h. Max airflow on return: 75 m^3/h
DIT	Return air terminal for DRU CP	Max airflow on supply: 50 m^3/h. Max airflow on return: 75 m^3/h.
TUT	Distribution terminal unit for DRU CP	-
KWT	Distribution terminal unit for DRU CP	-

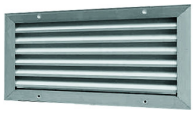


BMRV	Supply/return magnetic air vents in painted, galvanised steel or stainless steel, with galvanised steel connection plenum designed for quick connections with DN75 or DN90 (PLMR-M) corrugated pipes or low plenum designed for quick connections with flat (PLMR-M-O) 50x130 mm corrugated plate.	-



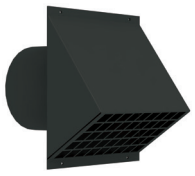
DIF1	Linear Induction diffuser with 1 slot for ceiling or wall installation, made with natural anodised aluminium profile which house the elements contained in manually rotatable slots that permit the radial orientation of the air flow. The diffuser can be supplied, upon request, with plenum box with round connection on the side.	Diffuser for supply of air to rooms Diffuser length L = 500 mm for air flow rates of about 30 m^3/h, ideal for areas with volume of 60 m^3. Diffuser length L = 700 mm for air flow rates of up to 60 m^3/h, ideal for areas with max. volume of 120 m^3.

OLS	Grille with visually-appealing cover for wall mounting. Dim. 350x130 mm.	Diffuser for supply of air to rooms Suitable for air flow rates of up to 60 m^3/h.



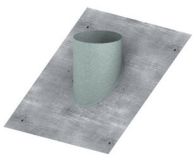
BR 25	Grille for return air with single row of fixed fins (pitch 25 mm). Frame and fins in aluminium and natural, anodised finish.	300x200 mm grille for return air. For air flow rates of up to 350 m^3/h.

BR 25 R	Grille for return air with single row of fixed fins (pitch 25 mm). Frame and fins in aluminium and natural, anodised finish. Air intake grille with wire mesh	300 x 300 mm grille for external mounting For air flow rates of up to 350 m^3/h.

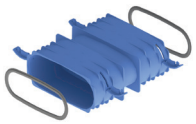
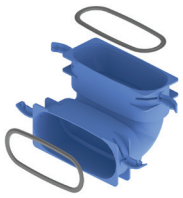


WT	Terminal for external wall diam. Φ 150 and Φ 180 mm with internal insulation. Available in black or white	Terminal for external wall mounting. Suitable for introduction of fresh air into the house.

RT	Roof terminal, with internal insulation to prevent condensation. Diameter Φ 150 mm with H = 365 mm and Φ 180 mm with H = 580 mm	Roof terminal suitable for air discharge from rooms. Suitable for applications on flat or inclined roofs with inclination from 18° to 62° (angle of inclination must be specified when ordering). It needs flashings and a seal collar



FRT	Flashing for installation of a roof terminal for pipes Φ 150 mm and Φ 180 mm.	Roof terminal suitable for air discharge from rooms. Suitable for applications on flat or inclined roofs with inclination from 18° to 62° (angle of inclination must be specified when ordering). It needs flashings and a seal collar

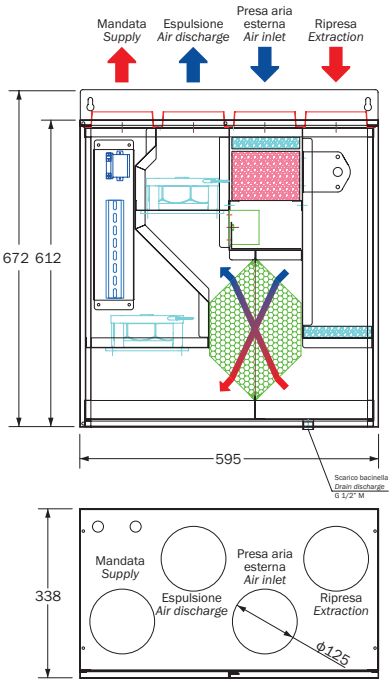
	**CPO-J**	DRU CPO50130 pipe-to-pipe connection, including seals	-
	**CPO-V90**	90° vertical bend for DRU CPO50130	-
	**CPO-O90**	90°horizontal bend for DRU CPO50130	-
	**DDC-O**	Sound-proofed distribution box in galvanised sheet steel with 18 connections for flat, corrugated pipes 50X130 mm.	-
	**DBCC-O**	Connection element with fittings for distribution box DDC-O and corrugated flat pipe CPO50130, including seals	-
	**DBCR-O**	Airflow regulator for CPO50130	-
	**CP90-O**	Connection for transformation from CP90 to CPO50130	-
	**TC90-O**	90° connection for flat corrugated pipe CPO50130 and distribution terminal, including connection plate, sealing ring and dust cap.	-

Product performance

DRU 10

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 100 m³/h	Efficiency	%	87.8	86.7	85	83
	Thermal recovery capacity	kW	0.9	0.7	0.6	0.4
	Fresh air temperature	°C	16.3	16.7	17	17.5
	R.H. of fresh air	%	11	16.7	24.9	26

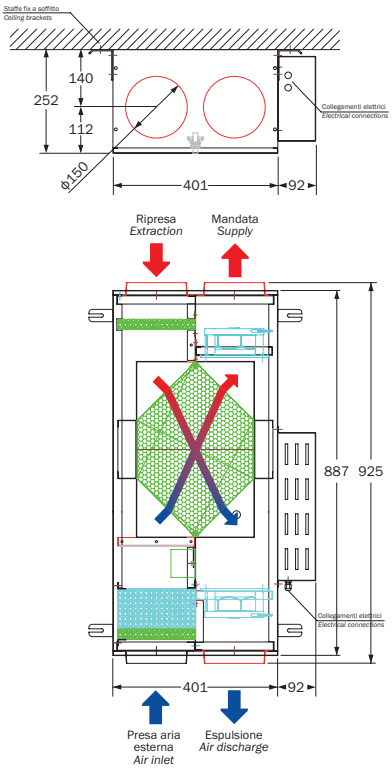
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 100 m³/h	Efficiency	%	81.9	81.9	81.9	81.9
	Thermal recovery capacity	kW	0.2	0.2	0.1	0.1
	Fresh air temperature	°C	27.6	27.1	26.7	26.2
	R.H. of fresh air	%	76.4	66.6	60.6	52.5



Horizontal DRU 10

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 100 m³/h	Efficiency	%	92.2	91.3	89.9	88.3
	Thermal recovery capacity	kW	0.9	0.8	0.6	0.4
	Fresh air temperature	°C	17.7	17.8	18	18.2
	R.H. of fresh air	%	10.1	15.5	23.4	24.7

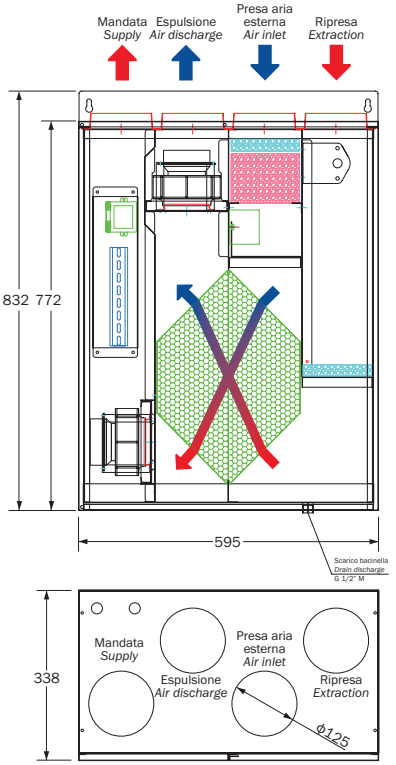
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 100 m³/h	Efficiency	%	87.1	87.1	87.1	87.1
	Thermal recovery capacity	kW	0.3	0.2	0.1	0.1
	Fresh air temperature	°C	27.2	26.8	26.5	26.1
	R.H. of fresh air	%	78.6	67.8	61.4	52.7



DRU 15

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 150 m³/h	Efficiency	%	92.3	91.3	89.9	88.3
	Thermal recovery capacity	kW	1.4	1.1	0.9	0.7
	Fresh air temperature	°C	17.7	17.8	18	18.2
	R.H. of fresh air	%	10.1	15.5	23.4	24.7

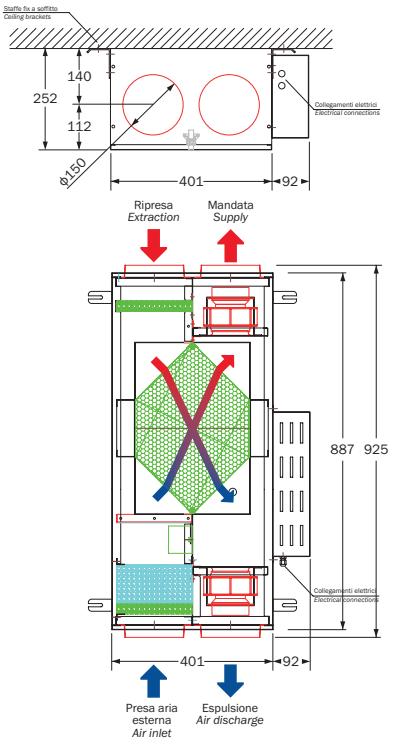
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 150 m³/h	Efficiency	%	87.1	87.1	87.1	87.1
	Thermal recovery capacity	kW	0.4	0.3	0.2	0.1
	Fresh air temperature	°C	27.2	26.8	26.5	26.1
	R.H. of fresh air	%	78.6	67.8	61.4	52.7



Horizontal DRU 15

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 150 m³/h	Efficiency	%	90.4	89.4	87.9	85.8
	Thermal recovery capacity	kW	1.4	1.1	0.9	0.6
	Fresh air temperature	°C	17.1	17.3	17.6	17.9
	R.H. of fresh air	%	10.4	16	24	25.3

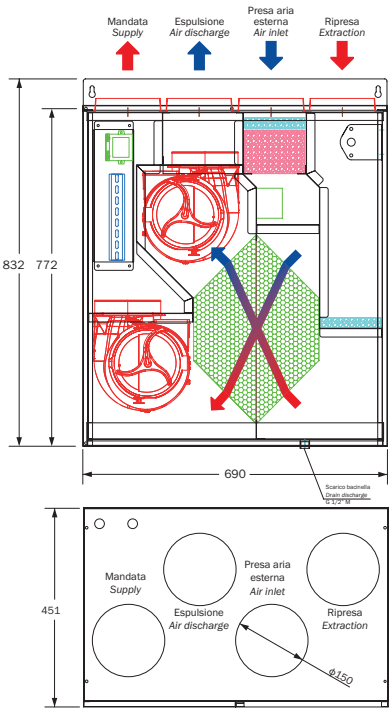
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 150 m³/h	Efficiency	%	84.9	84.9	84.9	84.9
	Thermal recovery capacity	kW	0.4	0.3	0.2	0.1
	Fresh air temperature	°C	27.4	26.9	26.6	26.2
	R.H. of fresh air	%	77.6	67.3	61.1	52.6



DRU 25

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 250 m³/h	Efficiency	%	91	90.0	88.5	86.7
	Thermal recovery capacity	kW	2.3	1.9	1.5	1.1
	Fresh air temperature	° C	17.3	17.5	17.7	18
	R.H. of fresh air	%	10.3	15.8	23.8	25.1

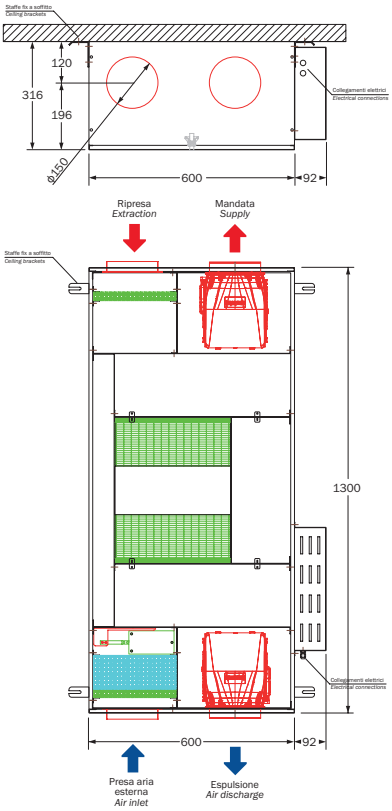
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 250 m³/h	Efficiency	%	85.6	85.6	85.6	85.6
	Thermal recovery capacity	kW	0.6	0.4	0.3	0.1
	Fresh air temperature	° C	27.3	26.9	26.6	26.1
	R.H. of fresh air	%	77.9	67.5	61.2	52.6



Horizontal DRU 25

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 250 m³/h	Efficiency	%	91	90.0	88.5	86.7
	Thermal recovery capacity	kW	2.3	1.9	1.5	1.1
	Fresh air temperature	° C	17.3	17.5	17.7	18
	R.H. of fresh air	%	10.3	15.8	23.8	25.1

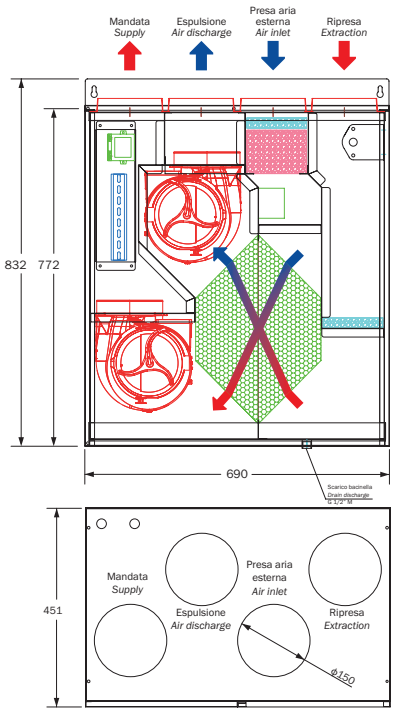
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 250 m³/h	Efficiency	%	85.6	85.6	85.6	85.6
	Thermal recovery capacity	kW	0.6	0.4	0.3	0.1
	Fresh air temperature	° C	27.3	26.9	26.6	26.1
	R.H. of fresh air	%	77.9	67.5	61.2	52.6



DRU 35

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 350 m³/h	Efficiency	%	89.2	88.2	86.7	84.6
	Thermal recovery capacity	kW	3.1	2.6	2	1.5
	Fresh air temperature	° C	17.1	17.1	17.3	17.7
	R.H. of fresh air	%	10.7	16.3	24.4	25.6

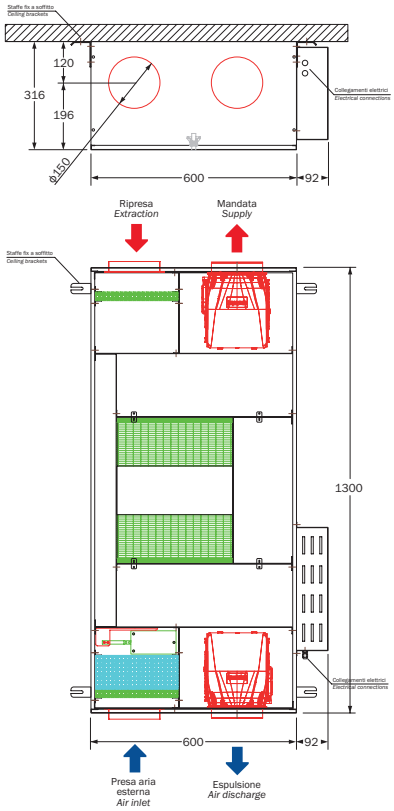
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 350 m³/h	Efficiency	%	83.6	83.6	83.6	83.6
	Thermal recovery capacity	kW	0.9	0.6	0.4	0.1
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	77.1	67.0	60.9	52.6



Horizontal DRU 35

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 350 m³/h	Efficiency	%	89.2	88.2	86.7	84.6
	Thermal recovery capacity	kW	3.1	2.6	2	1.5
	Fresh air temperature	° C	17.1	17.1	17.3	17.7
	R.H. of fresh air	%	10.7	16.3	24.4	25.6

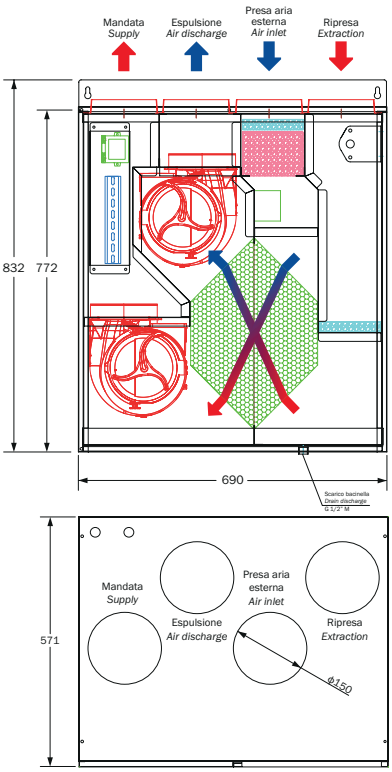
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 350 m³/h	Efficiency	%	83.6	83.6	83.6	83.6
	Thermal recovery capacity	kW	0.9	0.6	0.4	0.1
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	77.1	67.0	60.9	52.6



DRU 50

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 500 m³/h	Efficiency	%	89	88.0	86.4	84.3
	Thermal recovery capacity	kW	4.5	3.7	2.9	2.1
	Fresh air temperature	° C	16.7	17.0	17.3	17.6
	R.H. of fresh air	%	10.7	16.3	24.5	25.7

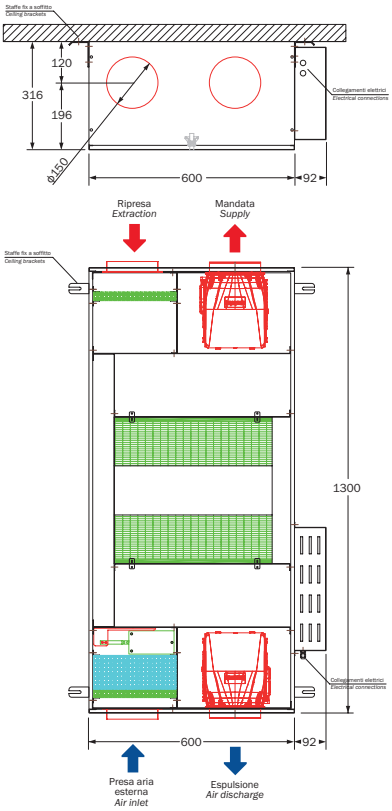
Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 500 m³/h	Efficiency	%	83.3	83.3	83.3	83.3
	Thermal recovery capacity	kW	1.3	0.8	0.6	0.1
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	77	66.9	60.8	52.5



Horizontal DRU 50

Thermal capacity of the heat recovery unit with winter setting						
Performance referring to a return temperature of 20°C						
Fresh air conditions			**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Flow rate 500 m³/h	Efficiency	%	89	88.0	86.4	84.3
	Thermal recovery capacity	kW	4.5	3.7	2.9	2.1
	Fresh air temperature	° C	16.7	17.0	17.3	17.6
	R.H. of fresh air	%	10.7	16.3	24.5	25.7

Thermal capacity of the heat recovery unit with summer setting						
Performance referring to a return temperature of 26°C						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Flow rate 500 m³/h	Efficiency	%	83.3	83.3	83.3	83.3
	Thermal recovery capacity	kW	1.3	0.8	0.6	0.1
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	77	66.9	60.8	52.5



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