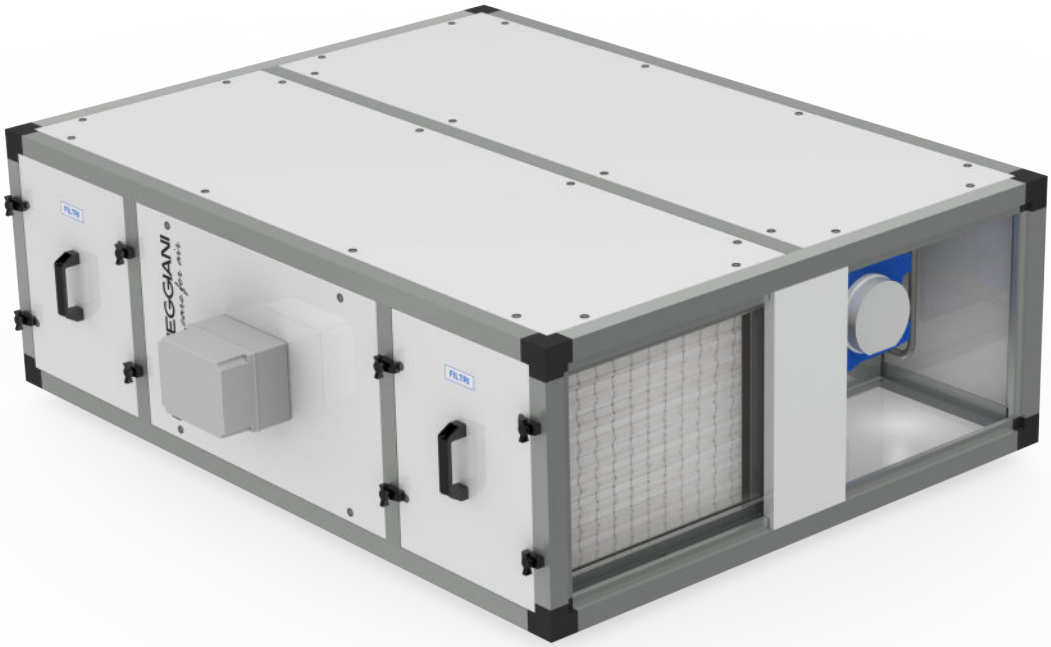
HRU

HIGH EFFICIENCY HEAT RECOVERY UNIT

- ErP 2018
- Heat recovery efficiency above 85%
- Air flows from 1.000 to 4.000 m³/h
- EC fans adjustable with 0… 10V signal



The heat recovery units in the HRU range by Roccheggiani meet change of air and energy saving requirements in a wide range of applications. Ecodesign Directive 2009/125/EC requires the control of air quality through the use of forced ventilation for the change of air, causing however greater energy consumption and an increase in costs.
The purpose of heat recovery units is to minimise the cost of changing air, by using a high-efficiency heat recovery device. This makes it possible to save over 85% of energy which would otherwise be discharged together with the stale air. The high efficiency heat recovery unit from the HRU range by Roccheggiani combines high levels of comfort in the occupied space together with large energy savings.
The HRU units operate in both summer and winter and are totally suitable for use together with traditional systems including fan coil units, air-conditioning units, radiators and floor-level heating units.
The series is available in 4 sizes with air flow rates ranging from 1.000 m³/h to 4.000 m³/h. The type of construction is especially suitable for false ceiling installation. Heat recovery units are suitable for use in civil and commercial premises, offices, shops, bars and restaurants and smoking areas.
A rapid selection software is available.

Publication: Sales technical data sheet for high efficiency heat recovery unit (HRU)

Regulatory Compliance

All HRU 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 Roccheggiani product ranges from the most important European bodies (TÜV, EUROVENT, Istituto Giordano, VKF-AEAI, GOST, Achilles JQS, etc.). More specifically, the HRU 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. 1253/2014 (ErP);
- UNI EN 1886:2008.

Application fields

The heat recovery units in the HRU range have been designed to respond in a specialised manner to a wide spectrum of applications and are particularly suitable for the following applications:

- Hotel
- Supermarkets
- Shops
- Sports facilities
- Medium-to-large sized shopping centres
- Offices
- Wellness centres

Air solutions

Roccheggiani provides complete systems, taking care of their production and, upon request, of the installation of all components.
The aim is to offer our customers the most appropriate solution so as to satisfy every need related to air quality and to the wellness of users in several application fields.
The Roccheggiani solutions are capable of guaranteeing excellent values in terms of Total Life Cost and they represent the best choice for those who are making investments in the construction or use of buildings.

High efficiency hydronic air conditioning with TCU fan coil terminal units.

Roccheggiani has designed this solution for air conditioning in individual, independent spaces such as offices.
The system consists of a multi-purpose unit for the generation of hot and cold fluids, a heat recovery unit with a control system on board the machine, capable of renewing the air required by the structure and by TCU ductable terminal units which ensure heat regulation inside the rooms.
More specifically, the system includes a multi-purpose unit from the NRE-MPU range, a high-efficiency heat-recovery unit from the HRU range and a terminal air handling unit from the TCU range.

System for the generation of hot and cold fluids

+

Primary air handling system

+

Air handling and distribution system

The compactness, silent operation, the high static pressure available and the high air flow are all features that make the TCU ductable terminal unit particularly suitable for office applications.
The primary air provided by the air handling unit is sent directly to the TCU terminal unit, which has a height of just 280 mm and as such is specifically designed to be installed inside false ceilings.
Any type of diffuser connected to the TCU unit by means of thermally and acoustically-isolated flexible ducts can be used for the supply and return air sections. A recommended solution provides for the use of DER swirl diffusers as supply terminals and DIF linear-slot diffusers as return terminals.

Description of the Unit and main components

Casing

The UNI 9006/1 - ASTM 6060 aluminium structure is joined together using fibreglass-reinforced nylon corner couplings. The panels have a sandwich structure in pre-coated metal sheet with expanded high density polyurethane foam insulation (about 40 kg/m^3).
Upon request, the unit can be fitted with a rain-proof cover in pre-coated metal sheet for outdoor installations and small feet 100 mm high, if the machine needs to be installed on the ground.

Fan sections

In order for the supply of handled air and the discharge of stale air, there are EC plug fans with reverse blades that have electronic rotation speed control, allow substantial energy savings compared to conventional double-suction ventilation systems and do not involve belt and pulley transmission, improving both reliability and durability.
Electronic speed control, typically from 10% to 100% allows ample margins for adjustment to the characteristics of the plant and ensures comfort during operation of the unit.
Fully compliant with: Low voltage Directive - 72/23/EEC and EMC Directive 89/336/EEC
In addition, a fully-wired electrical box is supplied with both fans with 0-10 V analogue input to control the flow rate.

Heat recovery section

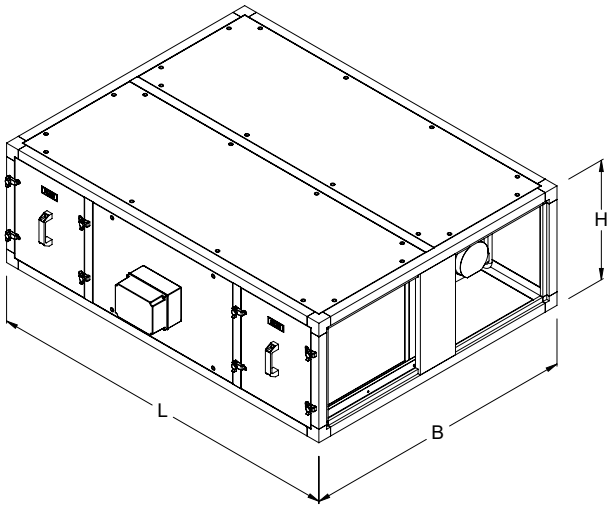
The installed heat exchange unit is made from Aluminium due to its heat exchange properties, resistance against corrosion, fire resistance and durability. The variously-sized heat recovery units have excellent recovery performance, above 85%.
In addition, the section is prepared with a modulating by-pass damper, integrated on board the machine, which complies with Directive 1253/2014 requirements and includes free-cooling and antifreeze system.

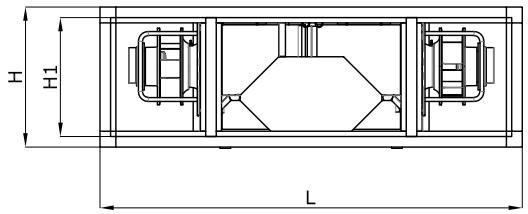
Undulated synthetic filters

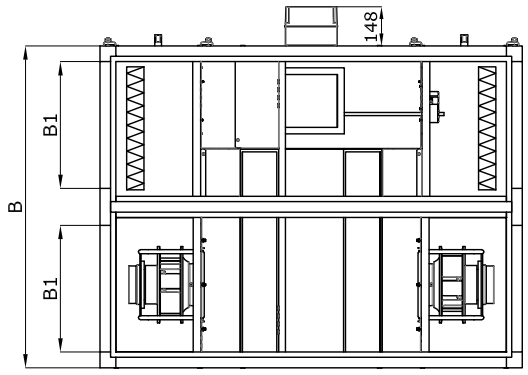
High efficiency filters that are 98 mm thick and removable from the side are installed on the fresh air intake and room return section. Efficiency ePM10 of 50% according to ISO16890 (formerly M5 – EN 779).

Dimensions and weights

Dimensions					
HRU Size		10	20	30	40
B	mm	1220	1500	1600	2000
H	mm	530	580	730	730
L	mm	1600	1900	2000	2000
B1	mm	480	620	670	870
H1	mm	450	510	650	650
Weight	kg	195	252	315	369



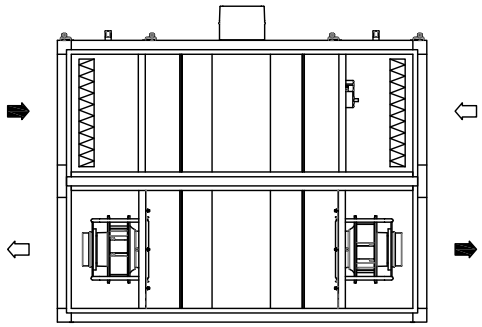




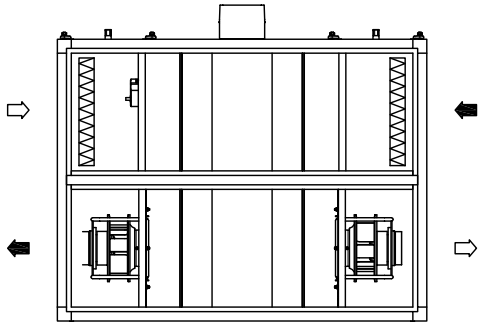
Possible positionings

The HRU series is designed to meet the needs of plant engineering flexibility and singularity as required in the various applications. There are two possible configurations for each size of HRU based on available space and the configuration of the air system.
Therefore, depending on your requirements, you can choose from the two available types shown below (TYPE A-B).

TYPE A



TYPE B



Supply *Air discharge*

General technical data

HRU model		10	20	30	40
Nominal air flow	m^3/h	1000	2000	3000	4000
External Static Pressure	Pa	250	250	250	250
Heat recovery unit					
Energy Efficiency (3)	%	82.7	82.7	83.6	83.2
Total Heat Recovery Capacity (3)	kW	1.7	3.3	5.0	6.7
Supply Air Temperature (3)	° C	27.0	27.0	27.0	27.0
Supply Air Humidity (3)	%	67.0	67.0	67.0	67.0
Energy Efficiency (2)	%	85.4	85.0	85.0	85.2
Total Heat Recovery Capacity (2)	kW	7.6	15.1	22.7	30.3
Supply Air Temperature (2)	° C	16.4	16.2	16.2	16.3
Sensible Energy Efficiency (4)	%	78.7	78.0	78.4	78.8
Fans					
Supply/return fan motor rating	kW	0.50/0.50	0.78/0.78	2.50/2.50	2.50/2.50
Supply/return fan nominal current	A	2.5/2.5	3.9/3.9	4.0/4.0	4.0/4.0
Power supply	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50
Airflow Control		0-10V	0-10V	0-10V	0-10V
Filtration					
Fresh Air Filter		ISO ePM10 50% (M5) - ISO 16890			
Return Air Filter		ISO ePM10 50% (M5) - ISO 16890			
Compliance EN 1253/2014 (5)		-			
Unit type		NRVU/BVU			
Ventilation Control		Variable speed			
Heat Recovery		Cross-flow recovery device - Other HRS			
Efficiency	%	79.1	78.3	78.8	79.2
Absorbed power (1)	kW	0.55	1.12	1.76	2.75
Specific Fan Power	$W/m^3/s$	574	674	661	729
Nominal Supply Airspeed	m / s	1.20	1.60	1.73	1.82
Maximum External Leakage	%	< 3	< 3	< 3	< 3
Maximum Internal Leakage	%	< 3	< 3	< 3	< 3
Fan Static Efficiency	%	52.8	60,0	58.5	55.2
Airborne Sound Power Level	dB (A)	57.4	61.2	66.5	71.5

(1) Values referring to the base configuration, with available static pressure of 250Pa;
(2) Performance referring to winter conditions: Fresh air -5°C / 80% - Return 20°C / 50%;
(3) Performance referring to summer conditions: Fresh air 32°C / 50% - Return 26°C / 50%;
(4) Dry recovery conditions with temperature difference of 20°C between fresh and return air;
(5) Compliance with the Ecodesign Directive entails the presence of differential pressure switches to alert for soiled filters: if not expressly indicated, these accessories must be paid for by the customer.

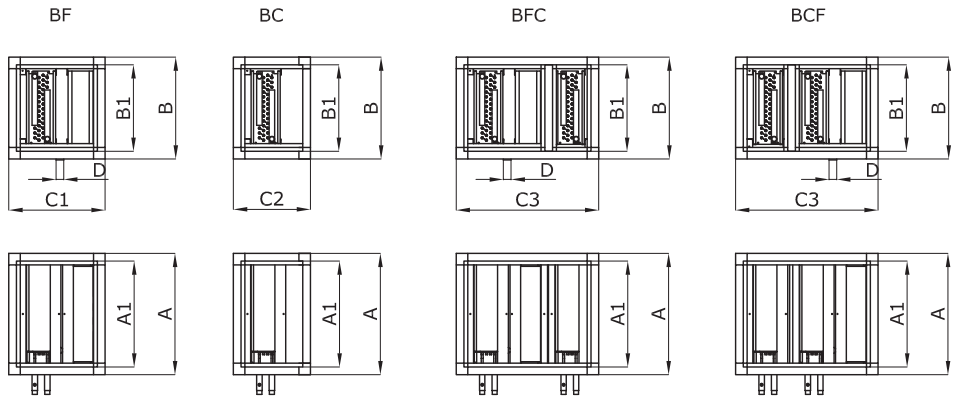
Description and dimension of accessories

The base unit manages: the heat recovery section with two air flows (fresh air and room air), the supply air to the room, the discharge of the stale air and the filtering of the air flows in question.
In addition to these functions, you can complete the base unit with additional air handling sections, such as pre-heating, heating, cooling and reheating sections according to procedures described below.

Water coils

Downstream of the supply fan section and in line with the various needs required by the air-conditioned area, you can include an additional air handling section with water coils.

According to the required handling, the additional module can be ordered with the following configurations:
- **BF**: Single cooling coil module, section including droplet separator and condensation discharge pan.
- **BC**: Single heating coil module.
- **BFC**: Module with cooling coil + reheating coil, section including condensation discharge pan and droplet separator, placed after the cooling coil.
- **BCF**: Module with heating coil + cooling coil, section including condensation discharge pan and droplet separator, placed after the cooling coil.



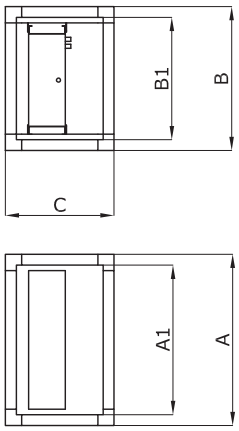
Coil dimensions BC - BF - BC+BF - BF+BC					
HRU Size		10	20	30	40
A	mm	630	770	820	1020
B	mm	530	580	730	730
A1	mm	550	690	740	940
B1	mm	450	500	650	650
C1	mm	500	500	500	500
C2	mm	400	400	400	400
C3	mm	740	740	740	740
D	Φ	1"	1"	1"	1"
Water headers	Φ	3/4"	1"	1 1/4"	1 1/2"

Undulated synthetic filters (optional) ISO ePM2.5 65% (F7) - ISO 16890

In addition to the filter with efficiency ePM10 50% - M5 as standard supply, the units can be fitted with pleated type filters with ePM2.5 65% - F7 with 98 mm thickness and galvanised steel frame.

Re-heating electric heating element (BE)

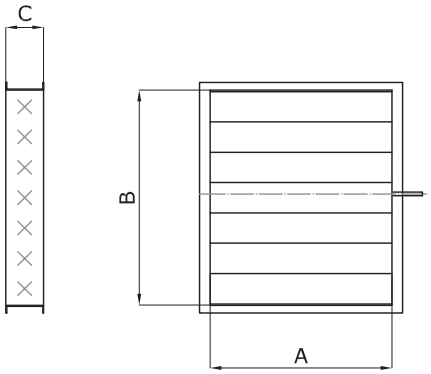
In particularly harsh climates and where it may be necessary to pre-heat the fresh air using electricity you can (optionally) provide for an electric coil heating element. It is installed prior to the supply filtering section.
Similarly, under particular external conditions in summer mode, if it is necessary to dehumidify, one very often risks having an air supply temperature that is too low. The same unit with an electric coil can be exploited if it is placed after the handling section in order to increase the supply temperature, thereby improving room comfort.
The electric heating element requires mains power supply with a three-phase 400/3/50 line for all sizes. It is also supplied complete with safety thermostats; line protection and any control relays are the responsibility of the installer.
With both installation types, the heating element can be controlled via the control panel.



BE - Electric coil					
HRU Size		10	20	30	40
A	mm	630	770	820	1020
B	mm	530	580	730	730
C	mm	400	400	400	400
A1	mm	550	690	740	940
B1	mm	450	500	650	650

Regulation damper (SE)

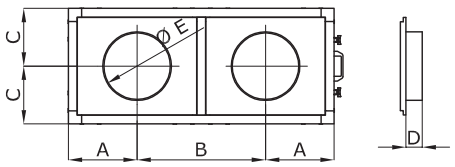
The opposed blade aluminium damper, with an extended damper shaft for external servo control mounting, allows the air flow to be controlled or shut down, as required. This accessory can be installed at the fresh air intake, at the air discharge outlet or both. According to requirements, they can be made with manual control or fitted for electronic servo control.



SE - Regulation damper					
HRU Size		10	20	30	40
A	mm	480	620	670	870
B	mm	450	510	650	650
C	mm	130	130	130	130

Round connectors (AC)

The round connectors ensure easy adaptability of the HRU unit to various system engineering requirements, since they allow connection with round couplings or ducts for air distribution.



AC - Round connectors					
HRU Size		10	20	30	40
A	mm	315	385	410	510
B	mm	590	730	780	980
C	mm	265	290	365	365
D	mm	75	75	75	75
E	Φ	315	400	500	560

Electronic control

The HRU unit can be fitted with two different regulation systems. The first one (**RIR** "Roccheggiani integrated regulation") is more complete and consists of an on-board control panel plus a remote location touch screen terminal. The second one (**RAC1** "accompanying room regulator") consists of a room regulator fitted with quick access keys for the most common functions.

RIR Regulation

This type of built-in regulation system on the unit enables full control over all possible HRU configurations. According to the various configurations, the on-board control panel is provided with a kit consisting of 4 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. 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
- fresh air and/or discharge air damper actuators;
- CO_2 return probe;
- the relative humidity return probe;
- the supply and return/discharge pressure probes.

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 CO_2 probe or a relative humidity probe. These three modes are alternatives to each other.
- Steady air flow.
- Variable air flow based on the return air CO_2.
- Variable air flow based on return or room relative humidity.
- Variable air flow based on the heating/cooling requirement.
- Steady pressure.
- Possibility to regulate based on the room, return or supply temperature.
- Winter heating/summer cooling (H_2O valve) (2-pipe system).
- Only winter heating (H_2O valve) (2-pipe system).
- Only summer cooling (H_2O valve) (2-pipe system).
- Only winter heating (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.
- Heating (H_2O valve) and cooling (H_2O valve) (4-pipe system).
- Cooling (H_2O valve), heating (H_2O valve), dehumidification (4-pipe system).
- Heating (electric coil) and cooling (H_2O valve).
- Cooling (H_2O valve), heating (electric coil), dehumidification.
- Air handling logic on 4-pipe system with double water-coil configuration, with change of season on the first coil.
- Air handling logic on 4-pipe system with water coil + electric coil configuration, with change of season on the first coil.
- 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 o 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 RAC1 regulation consists of a room regulator to which all utilities are connected: fans, actuators, pressure switches and probes.

Therefore, the regulator and the various accessories are supplied together with the HRU unit according to the chosen configuration.

The following accessories go together with the room regulator:
- temperature probes in the flush/duct/wall versions;
- humidity probes in the duct/wall versions;
- the CO_2 probe in the duct/wall versions;
- differential pressure switches to detect spoiled filters;
- bypass damper actuator in the 24V AC or 230V AC version;
- fresh air/discharge air damper actuator in the 24V AC or 230V AC version;
- fresh air/discharge air damper manual control;
- 230/24V transformer required to supply power to the auxiliary circuit when accessory CO2 or relative humidity probes are used or modulating valve actuators.

The regulator also has a relative humidity probe in addition to the room temperature probe.
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)								REG-AMB-V2 / REG-AMB-V2-M			
CONTEMPORARY FUNCTIONS	AO	CONTROL 0-10V VENTILATION(1)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	AO	CONTROL 0-10V HOT VALVE	•	•	•	•												
	AO	CONTROL 0-10V COLD VALVE	•	•	•	•	•	•	•	•	•	•	•	•				
	AI	AIR DISCHARGE TEMPERATURE PROBE (for heat 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	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

(1) Both the supply and return air fans are controlled by the same analogue output. In order to control them separately, you need two analogue outputs.
(2) If there are two dampers, they must be controlled via the same digital output.
(3) x = S without Modbus; x = M with Modbus;
(4) the safety thermostat contact of the electric coil must be brought to the analogue input while the digital input must be set as the total shut down alarm contact.

NB. The REG-AMB models which have a cooling coil + heating coil configuration can perform cooling/heating/dehumidification + post-heating. In post-heating mode, the supply regulation probe is followed

RAC1 regulation is provided with Modbus RTU (slave) connectivity, according to the selected regulator model.
Time period programming is available with this type of regulation.
The regulator can be supplied with pre-programming and fitted with a simplified wiring diagram at the customer's request.

Product performance

HRU 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 1000 m³h	Efficiency	%	87.1	85.4	83.3	80.5
	Thermal recovery capacity	kW	9.4	7.6	5.9	4.2
	Fresh air temperature	° C	16.1	16.4	16.7	17.1
	R.H. of fresh air	%	12	18	26	27

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 1000 m³h	Efficiency	%	82.8	82.7	82.6	82.5
	Thermal recovery capacity	kW	2.5	1.7	1.1	0.3
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	76	67.0	61	52

Thermal capacity of a 4-row heating coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Water 35°C - 30°C	Total Capacity	kW	4.8	4.7	4.6	4.5
	Supply temperature	° C	30.3	30.3	30.4	30.5
	Waterflow	m³h	0.82	0.8	0.79	0.78
	Water pressure drop	kPa	18.3	17.7	17.1	16.4
Water 45°C - 40°C	Total Capacity	kW	7.7	7.6	7.5	7.4
	Supply temperature	° C	39.1	39.1	39.2	39.2
	Waterflow	m³h	1.34	1.33	1.31	1.29
	Water pressure drop	kPa	40.5	39.7	39	38
Water 70°C - 60°C	Total Capacity	kW	14.4	14.3	14.3	14.2
	Supply temperature	° C	59	59.2	59	59
	Waterflow	m³h	1.27	1.26	1.25	1.24
	Water pressure drop	kPa	30.6	30.3	30	29.6

Thermal capacity of a 4-row cooling coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Water 7°C - 12°C	Total Capacity	kW	10.6	9.2	8.3	6.8
	Sensitive capacity	kW	4.3	4.4	4.4	4.5
	Supply temperature	° C	14.7	14.1	13.6	12.8
	Waterflow	m³h	1.8	1.6	1.4	1.2
	Water pressure drop	kPa	84.5	65.5	54.5	39.3
Water 10°C - 15°C	Total Capacity	kW	8.6	7.3	6.4	5
	Sensitive capacity	kW	3.5	3.6	3.6	3.8
	Supply temperature	° C	17	16.4	15.8	14.9
	Waterflow	m³h	1.5	1.3	1.1	0.9
	Water pressure drop	kPa	58.2	43	34.3	22

Thermal capacity of an electric coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
	Total Capacity	kW	4	4	4	4
	Supply temperature	° C	28	28.3	28.6	29
	Number of stages	N°	2	2	2	2
	Capacity step	kW	1,5-2,5-4	1,5-2,5-4	1,5-2,5-4	1,5-2,5-4
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

HRU 20

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 2000 m³h	Efficiency	%	86.3	85.0	82.2	79.6
	Thermal recovery capacity	kW	18.6	15.1	11.6	8.3
	Fresh air temperature	° C	15.9	16.2	16.4	16.9
	R.H. of fresh air	%	13	18	26	27

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 2000 m³h	Efficiency	%	82.8	82.7	82.6	82.5
	Thermal recovery capacity	kW	5	3.3	2.2	0.6
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	76	67.0	61	52

Thermal capacity of a 4-row heating coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Water 35°C - 30°C	Total Capacity	kW	8	7.8	7.7	7.5
	Supply temperature	° C	27.8	27.9	27.9	28.1
	Waterflow	m³h	1.39	1.36	1.34	1.3
	Water pressure drop	kPa	8.7	8.4	8.2	7.7
Water 45°C - 40°C	Total Capacity	kW	14.5	14.4	14.3	14
	Supply temperature	° C	37.5	37.6	37.7	37.7
	Waterflow	m³h	2.53	2.5	2.48	2.44
	Water pressure drop	kPa	23.5	23.1	22.8	22
Water 70°C - 60°C	Total Capacity	kW	27.2	27	26.9	26.6
	Supply temperature	° C	56.4	56.5	56.5	56.6
	Waterflow	m³h	2.39	2.37	2.37	2.34
	Water pressure drop	kPa	17.8	17.6	17.5	17.2

Thermal capacity of a 4-row cooling coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Water 7°C - 12°C	Total Capacity	kW	18.9	16.3	14.7	12.1
	Sensitive capacity	kW	7.6	7.8	7.9	8.2
	Supply temperature	° C	16.1	15.4	14.9	14
	Waterflow	m³h	3.24	2.79	2.52	2.1
	Water pressure drop	kPa	44.5	34.5	28.6	20.4
Water 10°C - 15°C	Total Capacity	kW	15.3	12.8	11.2	8.5
	Sensitive capacity	kW	6.2	6.4	6.6	7
	Supply temperature	° C	18.2	17.5	16.9	15.8
	Waterflow	m³h	2.63	2.2	1.92	1.46
	Water pressure drop	kPa	30.1	22.2	17.5	10.8

Thermal capacity of an electric coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
	Total Capacity	kW	9	9	9	9
	Supply temperature	° C	29.3	29.6	29.8	30.3
	Number of stages	N°	2	2	2	2
	Capacity step	kW	3-6-9	3-6-9	3-6-9	3-6-9
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

HRU 30

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 3000 m³h	Efficiency	%	86.5	85.0	82.9	80.1
	Thermal recovery capacity	kW	28	22.7	17.5	12.6
	Fresh air temperature	° C	16	16.2	16.6	17
	R.H. of fresh air	%	13	18	26	27

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 3000 m³h	Efficiency	%	83.7	83.6	83.5	83.4
	Thermal recovery capacity	kW	7.5	5.0	3.4	0.9
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	77	67.0	61	53

Thermal capacity of a 4-row heating coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Water 35°C - 30°C	Total Capacity	kW	11.9	11.8	11.5	11.2
	Supply temperature	° C	27.9	27.9	28	28.1
	Waterflow	m³h	2.1	2.05	1.99	1.94
	Water pressure drop	kPa	10.4	10.1	9.7	9.3
Water 45°C - 40°C	Total Capacity	kW	19.6	19.5	19.2	18.9
	Supply temperature	° C	35.5	35.5	35.7	35.8
	Waterflow	m³h	3.42	3.39	3.34	3.29
	Water pressure drop	kPa	23.6	23.3	22.7	22.1
Water 70°C - 60°C	Total Capacity	kW	36.7	36.6	36.3	36
	Supply temperature	° C	52.5	52.6	52.7	52.8
	Waterflow	m³h	3.23	3.22	3.19	3.17
	Water pressure drop	kPa	17.9	17.8	17.5	17.3

Thermal capacity of a 4-row cooling coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Water 7°C - 12°C	Total Capacity	kW	24.8	21.5	19.5	16.7
	Sensitive capacity	kW	9.9	10.2	10.5	10.8
	Supply temperature	° C	17.6	16.9	16.3	15.5
	Waterflow	m³h	4.26	3.69	3.36	2.86
	Water pressure drop	kPa	42.6	33.2	28	21.3
Water 10°C - 15°C	Total Capacity	kW	20.2	17	15.1	12.2
	Sensitive capacity	kW	8	8.4	8.7	9.2
	Supply temperature	° C	19.5	18.7	18.1	17.1
	Waterflow	m³h	3.47	2.93	2.6	2.1
	Water pressure drop	kPa	29	21.6	17.5	12

Thermal capacity of an electric coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
	Total Capacity	kW	12	12	12	12
	Supply temperature	° C	27.9	28.1	28.5	28.9
	Number of stages	N°	2	2	2	2
	Capacity step	kW	4-8-12	4-8-12	4-8-12	4-8-12
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

HRU 40

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 4000 m³h	Efficiency	%	86.8	85.2	83.2	80.5
	Thermal recovery capacity	kW	37.5	30.3	23.5	16.8
	Fresh air temperature	° C	16	16.3	16.6	17.1
	R.H. of fresh air	%	13	18	26	27

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 4000 m³h	Efficiency	%	83.3	83.2	83.1	83
	Thermal recovery capacity	kW	10	6.7	4.5	1.2
	Fresh air temperature	° C	27.5	27.0	26.7	26.2
	R.H. of fresh air	%	77	67.0	61	53

Thermal capacity of a 4-row heating coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
Water 35°C - 30°C	Total Capacity	kW	15.9	15.6	15.3	14.8
	Supply temperature	° C	27.8	27.9	28	28.1
	Waterflow	m³h	2.75	2.7	2.65	2.6
	Water pressure drop	kPa	10.3	9.9	9.6	9
Water 45°C - 40°C	Total Capacity	kW	26	25.8	25.5	25
	Supply temperature	° C	35.4	35.5	35.6	35.7
	Waterflow	m³h	4.54	4.49	4.44	4.36
	Water pressure drop	kPa	23.3	22.9	22.5	21.7
Water 70°C - 60°C	Total Capacity	kW	48.8	48.5	48.2	47.7
	Supply temperature	° C	52.4	52.5	52.6	52.7
	Waterflow	m³h	4.29	4.27	4.24	4.2
	Water pressure drop	kPa	17.7	17.5	17.3	17

Thermal capacity of a 4-row cooling coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**35°C/50% R.H.**	**32°C/50% R.H.**	**30°C/50% R.H.**	**27°C/50% R.H.**
Water 7°C - 12°C	Total Capacity	kW	33	28.7	26.1	22.3
	Sensitive capacity	kW	13.2	13.6	13.9	14.4
	Supply temperature	° C	17.7	16.9	16.3	15.5
	Waterflow	m³h	5.67	4.92	4.47	3.82
	Water pressure drop	kPa	42.2	33	27.9	21.2
Water 10°C - 15°C	Total Capacity	kW	26.9	22.7	20.2	16.3
	Sensitive capacity	kW	10.7	11.2	11.5	12.2
	Supply temperature	° C	19.5	18.7	18.1	17.1
	Waterflow	m³h	4.62	3.9	3.46	2.8
	Water pressure drop	kPa	28.8	21.5	17.4	12

Thermal capacity of an electric coil at nominal flow rate						
Heating performance considering the contribution of the recovery unit						
	Fresh air conditions		**-10°C/80% R.H.**	**-5°C/80% R.H.**	**0°C/80% R.H.**	**5°C/60% R.H.**
	Total Capacity	kW	16	16	16	16
	Supply temperature	° C	27.9	28.2	28.5	29
	Number of stages	N°	2	2	2	2
	Capacity step	kW	5,4-10,6-16	5,4-10,6-16	5,4-10,6-16	5,4-10,6-16
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

Noise levels

Sound powers

HRU 10	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	70	65	75	68	67	65	59	57	72.6
Return	69	59	69	61	58	50	47	43	64.1
Unit external radiation	55	50	62	54	50	48	43	22	57.4

HRU 20	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	68	63	73	71	73	72	66	63	77.5
Return	66	58	66	65	61	57	54	49	66.4
Unit external radiation	53	48	60	57	56	55	50	28	61.2

HRU 30	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	67	67	77	76	79	77	72	68	82.9
Return	66	62	69	70	66	62	57	53	71.1
Unit external radiation	52	52	64	62	62	60	56	33	66.5

HRU 40	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	72	72	81	81	84	82	77	74	87.9
Return	71	66	74	75	71	66	62	59	75.9
Unit external radiation	57	57	68	67	67	65	61	39	71.5

Sound pressure

HRU 10	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	62	56	67	60	60	57	51	49	65
Return	61	51	61	54	50	42	39	35	56.5
Unit external radiation	47	41	54	46	43	40	43	14	49.7

HRU 20	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	60	55	65	63	65	64	58	55	69.6
Return	58	50	58	57	53	49	46	41	58.5
Unit external radiation	45	40	52	49	48	47	50	20	53.3

HRU 30	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	59	59	69	68	71	69	64	60	75
Return	58	54	61	52	58	54	49	45	63.2
Unit external radiation	44	44	56	54	54	52	56	25	58.6

HRU 40	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	64	64	73	73	76	74	69	66	80
Return	63	58	65	67	63	58	54	51	68
Unit external radiation	49	49	60	59	59	57	61	31	63.6

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