RRU

HIGH EFFICIENCY HEAT RECOVERY UNIT

- ErP 2018
- High efficiency enthalpic wheel heat exchanger
- Air flows from 1.500 to 15.000 m³/h
- EC fans adjustable with 0… 10V signal

The heat recovery units in the RRU range by Roccheggiani allow all requirements on air quality and energy savings to be met. 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 units in the RRU range are equipped with high-efficiency thermal wheels with a very large heat exchange surface in proportion to their volume. This feature enables greater yields compared to other types of heat exchanger, reaching efficiencies of 78%, with the advantage of low pressure drop and extremely modest dimensions for units with considerable air flow rates.
The high level of recovered heat also allows the use of normal heating/cooling systems to be considerably reduced with obvious economic advantages. To cover a vast range of applications, these RRU units are available in 7 sizes, with nominal air flows from 1.500 to 15.000 m³/h and available operating static pressure of 400 Pa.
A rapid selection software is available.

Publication: Technical bulletin High efficiency heat recovery unit (RRU)

Regulatory Compliance

All RRU 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 RRU 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

Roccheggiani offers the ideal solution for air renewal inside offices and for heat regulation inside individual rooms, through an integrated system consisting of an RRU air handling unit with built-in control system and of TCU ductable terminal units.
The heat recovery units in the RRU 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
- Sports facilities
- Cinemas/Theatres
- Wellness centres
- Supermarkets
- Shops
- Medium-to-large sized shopping centres
- Offices
- Multifamily housing

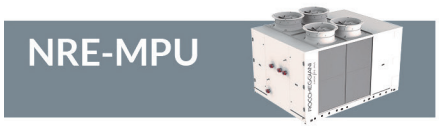
Air solutions

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 RRU range and the terminal air handling unit from the TCU range.

System for the generation of hot and cold fluids



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Primary air handling system

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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.

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Advantages

- Thanks to the high static pressure capacity available at the mouth of the supply fan, TCU terminal units can be installed away from the area requiring air conditioning (usually corridors), thus allowing easy maintenance outside occupied rooms.
- Their particular “U”-shaped construction form means that supply and return can be on the same side of the unit; this considerably simplifies the distribution of ducting in the area.
- Using a TCU terminal unit brings together high performance levels and low power consumption.
- Exceptional plant-engineering flexibility: if the layout of the rooms needs to be changed, you only have to move the flexible ducts.

Description of the Unit and main components

Casing

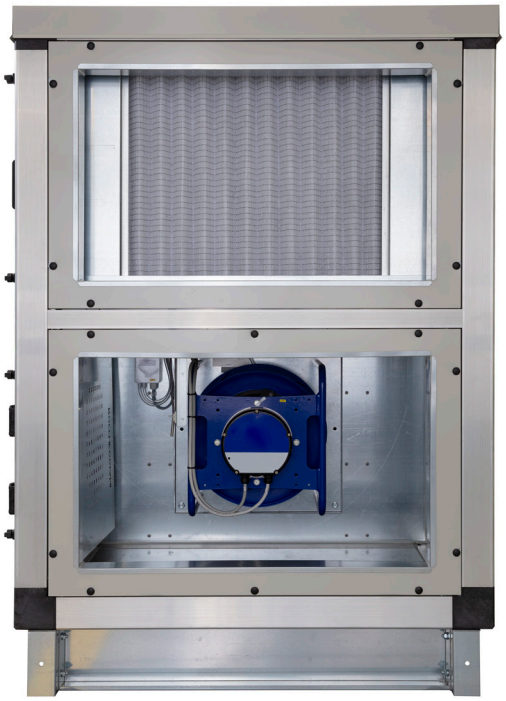
The Anticorodal UNI 9006/1 - ASTM 6060 aluminium profiles of the structure are specially shaped to improve safety and the corner couplings are made of fibreglass-reinforced nylon. The panels have a sandwich structure in pre-coated metal sheet with expanded high density polyurethane foam insulation (about 40 kg/m^3).
The internal panel surface is manufactured with a special shaping, which in coupling with the profile creates a single flush surface, improving the air-handling efficiency characteristics and making cleaning and maintenance operations far easier and safer.
In line with requirements and the installation site, one can choose the thickness of the panelling and thus the related profiles from two formats: panels with thickness of 25 mm and 40 mm profiles, or 54 mm panels and the relative 70 mm profiles. The units are also fitted with inspection doors with handles that allow easy access to components.
Upon request, the units can be fitted with a rain-proof cover; all the units are supplied with a galvanised steel base, 140 mm high, which facilitates transport and handling operations and also ensures perfectly level installation.

Heat recovery unit section

The rotary heat recovery units are of the air-to-air type, fitted with a cylindrical rotor with a large surface, a casing (complete with brush gaskets to minimise leakage between the supply and exhaust air-flows) and a drive system powered by an electric motor.
The rotor is constructed by alternating flat and corrugated aluminium sheets, ensuring excellent qualities of thermal exchange, resistance to corrosion, protection against smells, fire resistance and also a long life.
The electric three-phase 400/3/50 motor, which drives the heat exchanger, is designed with a size consistent with that of the rotor and is fitted with overheating protection. Energy recovery up to 78% efficiency.

Fan sections

It has 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, thus 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



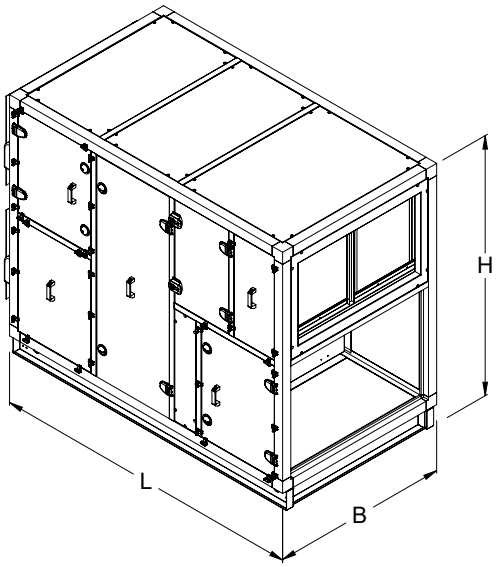
Filtration

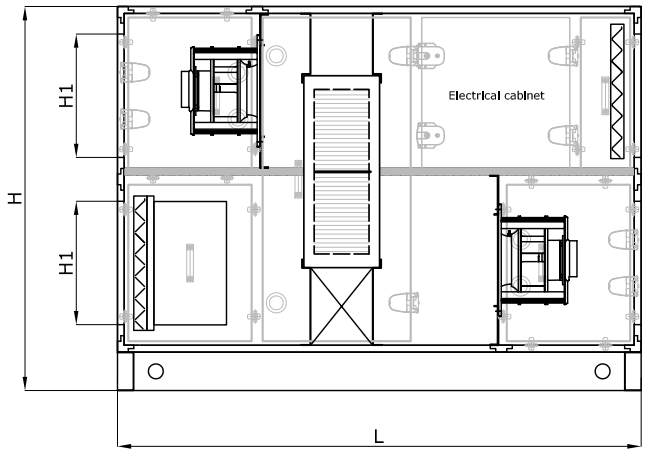
On the air supply section, near the fresh air intake, there is a pleated filter with efficiency Coarse 55% - ISO 16890 (according to G4 – EN 779), coupled to a rigid-bag filter with efficiency ePM2.5 70% - ISO 16890 (formerly F7 – EN 779).
The filter placed in the return is also pleated with efficiency ePM10 50% - ISO16890 (according to M5 – EN 779). All filters can be pulled out from the side.

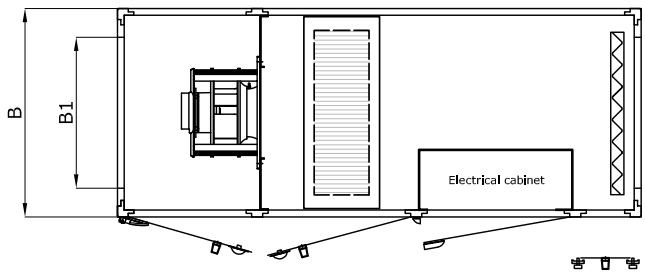
Dimensions and weights

Dimensions								
RRU Size		15	25	40	60	80	100	150
B	mm	760 (820)*	960 (1020)*	1060 (1120)*	1260 (1320)*	1560 (1620)*	1660 (1720)*	2060 (2120)*
H	mm	1400 (1460)*	1400 (1460)*	1620 (1680)*	1870 (1930)*	1940 (2000)*	2320 (2380)*	2460 (2520)*
L	mm	1910 (1970)*	1960 (2020)*	2100 (2160)*	2280 (2340)*	2460 (2520)*	2730 (2790)*	2730 (2790)*
B1	mm	550	750	850	1050	1350	1450	1980
H1	mm	450	450	510	610	710	810	910
Weight	kg	259 (311)*	315 (374)*	371 (442)*	484 (573)*	603 (710)*	749 (882)*	927 (1083)*

*Dimensions with 54 mm panel



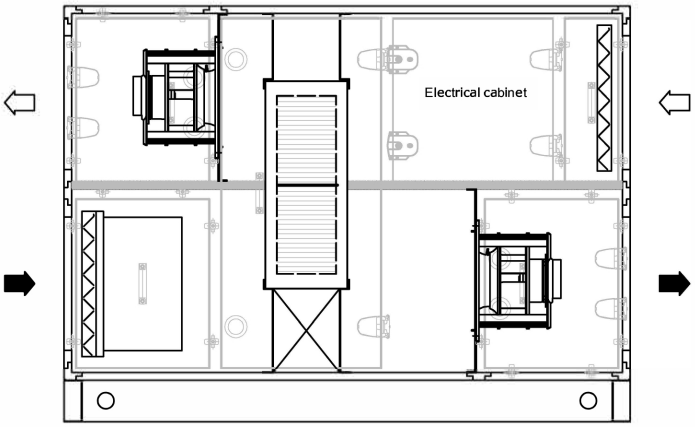




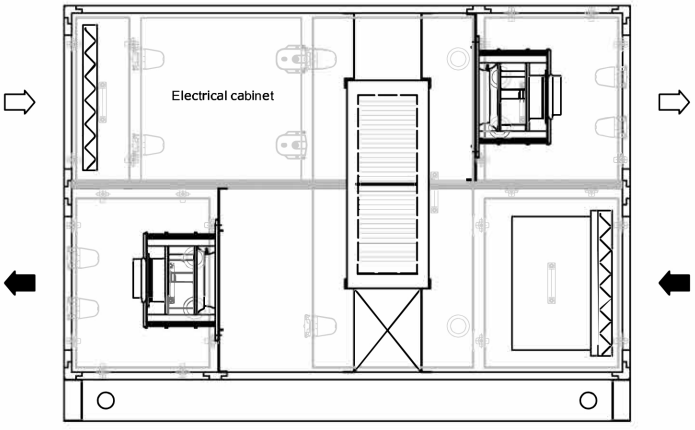
Possible positionings

THE-RRU 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

RRU Model		15	25	40	60	80	100	150
Nominal air flow	m³/h	1500	2500	4000	6000	8000	10000	15000
External Static Pressure	Pa	400	400	400	400	400	400	400
Heat recovery unit								
Energy Efficiency (3)	%	74.3	72.1	71.8	73.4	72.7	74.6	72.2
Total Heat Recovery Capacity (3)	kW	6.2	10	15.7	24.4	32.6	41.8	60.4
Supply Air Temperature (3)	° C	27.5	27.7	27.7	27.6	27.6	27.5	27.7
Supply Air Humidity (3)	%	51.7	51.7	52.1	51.9	51.7	51.7	51.7
Energy Efficiency (2)	%	76.5	74.2	74.1	75.6	74.7	76.8	74.3
Total Heat Recovery Capacity (2)	kW	14.6	23.6	37.5	57.5	75.9	97.6	141.4
Supply Air Temperature (2)	° C	14.1	13.5	13.5	13.9	13.7	14.2	13.6
Sensible Energy Efficiency (4)	%	74.5	72.3	71.4	73.2	73	75	72.4
Fans								
Supply/return fan motor rating	kW	0.78/0.78	2.50/2.50	2.50/2.50	3.30/3.30	5.40/5.40	5.40/5.40	2x3.50/2x3.50
Supply/return fan nominal current	A	3.9/3.9	4.0/4.0	4.0/4.0	5.4/5.4	8.6/8.6	8.6/8.6	2x5.6/2x5.6
Power supply	V/Ph/Hz	230/1/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
Airflow Control		0-10 V	0-10 V	0-10 V	0-10 V	0-10 V	0-10 V	0-10 V
Filtration								
Fresh Air Filter		ISO Coarse 55% (G4) + ePM2.5 70% (F7) - 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		Thermal wheel - Other HRS						
Efficiency	%	77,0	74.8	74.7	76.1	75.2	77.3	74.8
Absorbed power (1)	kW	1.01	1.63	2.81	4.46	5.09	7.36	9.30
Specific Fan Power	W/m³/s	750	693	832	880	640	796	614
Nominal Supply Airspeed	m / s	0.97	1.26	1.54	1.64	1.68	1.62	1.83
Maximum External Leakage	%	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Maximum Internal Leakage	%	< 3	< 3	< 3	< 3	< 3	< 3	< 3
Fan Static Efficiency	%	57.1	58.9	63.3	62.9	63.1	62.4	63.2
Airborne Sound Power Level	dB (A)	63.3	66	66.9	70.4	71.2	75	72.1

(1) Values referring to the base configuration, with available static pressure of 400Pa
(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

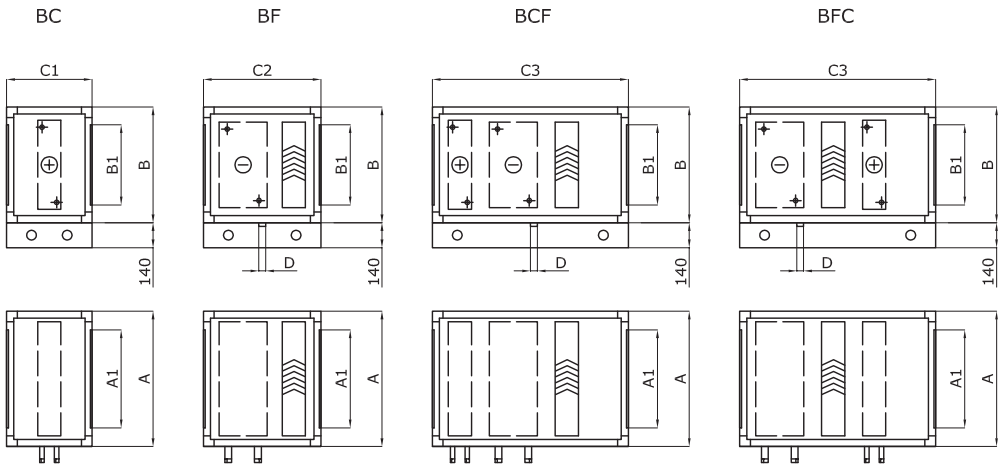
Description and dimensions of accessories

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.

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:
- **BC**: Single heating coil module.
- **BF**: Single cooling coil module, section including droplet separator and condensation discharge pan.
- **BCF**: Module with heating coil + cooling coil, section including condensation discharge pan and droplet separator, placed after the cooling coil.
- **BFC**: Module with cooling coil + reheating coil, section including condensation discharge pan and droplet separator, placed after the cooling coil.



Coil dimensions BC - BF - BC+BF - BF+BC								
RRU Size		15	25	40	60	80	100	150
A	mm	760 (820)*	960 (1020)*	1060 (1120)*	1260 (1320)*	1560 (1620)*	1660 (1720)*	2060 (2120)*
B	mm	650 (710)*	650 (710)*	760 (820)*	920 (980)*	920 (980)*	1140 (1200)*	1180 (1240)*
A1	mm	550	750	850	1050	1350	1450	1980
B1	mm	450	450	510	610	710	810	910
C1	mm	480 (540)*	480 (540)*	480 (540)*	480 (540)*	480 (540)*	480 (540)*	480 (540)*
C2	mm	660 (720)*	690 (750)*	690 (750)*	690 (750)*	690 (750)*	690 (750)*	690 (750)*
C3	mm	1100 (1160)*	1130 (1190)*	1130 (1190)*	1130 (1190)*	1130 (1190)*	1130 (1190)*	1130 (1190)*
D	ϕ	1 1/4''	1 1/4''	1 1/4''	1 1/4''	1 1/4''	1 1/4''	1 1/4''
BC Weight	Kg	59 (69)*	69 (80)*	83 (94)*	105 (118)*	115 (128)*	127 (141)*	153 (171)*
BF Weight	Kg	107 (119)*	134 (148)*	162 (178)*	210 (230)*	247 (267)*	282 (308)*	359 (384)*
BC+BF Weight	Kg	131 (149)*	148 (162)*	215 (408)*	269 (296)*	311 (345)*	360 (432)*	451 (508)*

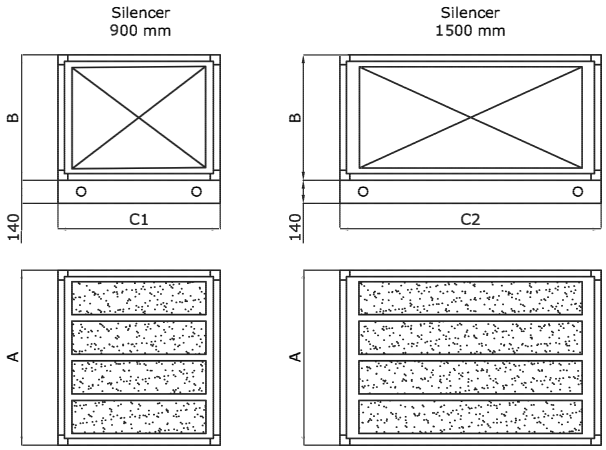
* Dimensions with 54 mm panel

Silencer (SL)

Silencer for the supply and return SL section (the installation of the return silencer is obviously tied to the decision at the same time to have the supply silencer so that they can be installed one on top of the other). The noise reduction unit consists of a galvanised steel housing, containing the sound attenuators made from rockwool, lined externally with erosion-proof fibreglass.
The silencer section is available in 2 lengths: 900 mm or 1500 mm.

SL - Silencer								
RRU Size		15	25	40	60	80	100	150
A	mm	760 (820)*	960 (1020)*	1060 (1120)*	1260 (1320)*	1560 (1620)*	1660 (1720)*	2060 (2120)*
B	mm	650 (710)*	650 (710)*	760 (820)*	920 (980)*	920 (980)*	1140 (1200)*	1180 (1240)*
C1	mm	980 (1040)*	980 (1040)*	980 (1040)*	980 (1040)*	980 (1040)*	980 (1040)*	980 (1040)*
C2	mm	1580 (1640)*	1580 (1640)*	1580 (1640)*	1580 (1640)*	1580 (1640)*	1580 (1640)*	1580 (1640)*

*Dimensions with 54 mm panel



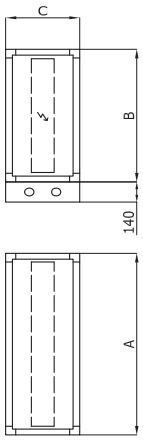
SL - Silencer with attenuators										
Octave bands			63	125	250	500	1000	2000	4000	8000
RRU 15	Noise attenuation SL900mm	dB	3	6	13	13	31	24	15	10
	Noise attenuation SL1500mm	dB	5	8	20	20	45	35	21	13
RRU 25	Noise attenuation SL900mm	dB	4	7	16	16	43	37	24	15
	Noise attenuation SL1500mm	dB	6	11	25	25	50	50	33	22
RRU 40	Noise attenuation SL900mm	dB	8	11	23	23	48	43	34	28
	Noise attenuation SL1500mm	dB	5	9	21	21	48	39	24	16
RRU 60	Noise attenuation SL900mm	dB	4	7	16	16	43	37	24	15
	Noise attenuation SL1500mm	dB	6	11	25	25	50	50	33	22
RRU 80	Noise attenuation SL900mm	dB	4	7	16	16	43	37	24	15
	Noise attenuation SL1500mm	dB	6	11	25	25	50	50	33	22
RRU 100	Noise attenuation SL900mm	dB	6	9	19	19	45	40	29	22
	Noise attenuation SL1500mm	dB	8	14	30	30	50	50	40	29
RRU 150	Noise attenuation SL900mm	dB	5	8	17	17	44	38	26	17
	Noise attenuation SL1500mm	dB	7	12	27	27	50	50	35	24

Re-heating electric heating element (BE)

To dehumidify, under specific external conditions in summer mode, it is likely that air delivery temperature is too low. A special module with an electric coil can be placed after the handling section to increase the supply temperature, thereby improving room comfort.

BE - Electric coil								
RRU Size		15	25	40	60	80	100	150
Electric coil 1 stage	kW	3	4	6	8	10	14	20
Electric coil 2 stages	kW	3+6	4+8	6+12	8+16	10+20	14+28	20+40
Power supply		400 V / 3F / 50 Hz						
A	mm	760 (820)*	960 (1020)*	1060 (1120)*	1260 (1320)*	1560 (1620)*	1660 (1720)*	2060 (2120)*
B	mm	650 (710)*	650 (710)*	760 (820)*	920 (980)*	920 (980)*	1140 (1200)*	1180 (1240)*
C	mm	440 (500)*	440 (500)*	440 (500)*	440 (500)*	440 (500)*	440 (500)*	440 (500)*
Weight	Kg	40 (48)*	46 (55)*	55 (65)*	66 (81)*	78 (94)*	99 (123)*	115 (136)*

*Dimensions with 54 mm panel

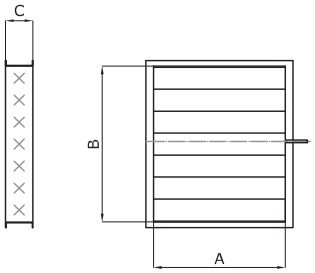


Regulation damper (SE)

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								
RRU Size		15	25	40	60	80	100	150
A	mm	550	750	850	1050	1350	1450	1980
B	mm	450	450	510	610	710	810	910
C	mm	130	130	130	130	130	130	130

*Dimensions with 54 mm panel



Electronic control

The RRU 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 with a touch screen plus an optional 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 RRU configurations. A kit consisting of temperature probes and/or pressure switches is linked to the control panel on board the unit, according to the various configurations. As an option, a touch screen terminal can be installed in the relevant area. This element is provided with a temperature and relative humidity probe.

The probes/actuators are mounted on the respective sections and cabled to the electric panel. If a configuration including electric coils is chosen, a supply temperature probe is supplied together and installation is the customer's responsibility.

The following can be fitted as regulation accessories:
- the CO2 return/room probe;
- the relative humidity return/room probe;
- the supply and return/discharge pressure probes.

The main features are as follows:
- Constant/variable speed: manual and automatic speed 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.
- Steady air flow.
- Variable air flow based on the return air CO2.
- 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 (H2O valve) (2-pipe system).
- Only winter heating (H2O valve) (2-pipe system).
- Only summer cooling (H2O valve) (2-pipe system).
- Only winter heating (electric coil).
- Heating (H2O valve) and cooling (H2O valve) (4-pipe system).
- Cooling (H2O valve), heating (H2O valve), dehumidification (4-pipe system).
- Heating (electric coil) and cooling (H2O valve).
- Cooling (H2O 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 RRU 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 CO2 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)			AHU-2xCSH1(3)		
CONTEMPORARY FUNCTIONS	AO	CONTROL 0-10V VENTILATION(1)	•	•	•				•	•	•	•	•	•
	AO	CONTROL 0-10V SUPPLY FAN				•	•	•						
	AO	CONTROL 0-10V AIR DISCHARGE FAN				•	•	•						
	AO	CONTROL 0-10V HOT VALVE	•	•	•									
	AO	CONTROL 0-10V COLD OR MIXED VALVE	•	•	•	•	•	•	•	•	•			
	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	ROTARY HEAT RECOVERY ON/OFF	•	•	•				•	•	•	•	•	•
	DO	SELECTABLE BETWEEN: ELECTRIC COIL ON/OFF ONE STAGE, EXTERNAL DAMPER/S(2) ON/OFF				•	•	•	•	•	•	•	•	•
	DO	SELECTABLE BETWEEN: ELECTRIC COIL ON/OFF ONE STAGE, 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)	•(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) if there is an electric coil, the safety thermostat contact must be brought to the analogue input.

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

RRU 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 1500 m³h	Efficiency	%	76.4	76.5	76.6	76.7
	Thermal recovery capacity	kW	17.2	14.6	11.8	9.7
	Fresh air temperature	° C	12.9	14.1	15.3	16.5
	R.H. of fresh air	%	62.8	59.5	57.1	53.5

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 1500 m³h	Efficiency	%	74.2	74.3	74.4	74.5
	Thermal recovery capacity	kW	9.6	6.2	4.1	1
	Fresh air temperature	° C	28.3	27.5	27	26.3
	R.H. of fresh air	%	53.7	51.7	51	50.1

Thermal capacity of a 3-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 45°C - 40°C	Total Capacity	kW	8.4	8.1	7.7	7.4
	Supply temperature	° C	29.3	30	30.5	31
	Waterflow	m³h	1.44	1.4	1.33	1.27
	Water pressure drop	kPa	13.5	12.6	11.8	11
Water 70°C - 60°C	Total Capacity	kW	14.9	14.6	14.3	13.9
	Supply temperature	° C	42.2	42.7	43.3	43.9
	Waterflow	m³h	1.28	1.25	1.22	1.2
	Water pressure drop	kPa	11	10.5	10.2	9.8

Thermal capacity of a 5-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	12.3	10.9	10.2	9.4
	Sensitive capacity	kW	7.7	7.4	7.3	7
	Supply temperature	° C	13.3	13.0	12.8	12.6
	Waterflow	m³h	2.11	1.88	1.75	1.61
	Water pressure drop	kPa	21.4	17.4	15.4	13.2
Water 10°C - 15°C	Total Capacity	kW	9.2	8.0	7.5	6.8
	Sensitive capacity	kW	6.5	6.3	6.2	5.9
	Supply temperature	° C	15.6	15.2	15.0	14.7
	Waterflow	m³h	1.58	1.38	1.28	1.16
	Water pressure drop	kPa	12.8	10	8.8	7.41

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	30.8	32	33.2	34.4
	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

RRU 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 2500 m³h	Efficiency	%	74.1	74.2	74.3	74.4
	Thermal recovery capacity	kW	27.7	23.6	19	15.6
	Fresh air temperature	° C	12.2	13.5	14.9	16.2
	R.H. of fresh air	%	64.4	60.6	58	54

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 2500 m³h	Efficiency	%	72	72.1	72.2	72.4
	Thermal recovery capacity	kW	15.6	10	6.6	1.6
	Fresh air temperature	° C	28.5	27.7	27.1	26.3
	R.H. of fresh air	%	53.7	51.7	51	50.1

Thermal capacity of a 3-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 45°C - 40°C	Total Capacity	kW	14.9	14.3	13.7	13
	Supply temperature	° C	29.8	30.4	31	31.5
	Waterflow	m³h	2.56	2.46	2.34	2.23
	Water pressure drop	kPa	16	15	13.7	12.5
Water 70°C - 60°C	Total Capacity	kW	26.3	25.7	25	24.4
	Supply temperature	° C	43.3	43.9	44.5	45
	Waterflow	m³h	2.26	2.21	2.15	2.1
	Water pressure drop	kPa	12.8	12.3	11.8	11.3

Thermal capacity of a 6-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	22.2	19.8	18.4	16.7
	Sensitive capacity	kW	13.5	13	12.7	12.2
	Supply temperature	° C	12.7	12.4	12.2	12.0
	Waterflow	m³h	3.82	3.41	3.17	2.88
	Water pressure drop	kPa	38.9	31.8	28	23.6
Water 10°C - 15°C	Total Capacity	kW	16.9	14.8	13.6	12.2
	Sensitive capacity	kW	11.5	11.1	10.8	10.3
	Supply temperature	° C	15.1	14.7	14.5	14.2
	Waterflow	m³h	2.91	2.55	2.33	2.1
	Water pressure drop	kPa	24	18.9	16.3	13.4

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	26.5	27.8	29.2	30.5
	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

RRU 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	%	74.1	74.1	74.2	74.3
	Thermal recovery capacity	kW	44.2	37.5	30.3	24.8
	Fresh air temperature	° C	12.2	13.5	14.8	16.1
	R.H. of fresh air	%	63.9	60.2	57.7	53.7

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 4000 m³h	Efficiency	%	71.7	71.8	71.9	72.1
	Thermal recovery capacity	kW	24	15.7	10.3	2.6
	Fresh air temperature	° C	28.6	27.7	27.1	26.3
	R.H. of fresh air	%	54.5	52.1	51.1	50.2

Thermal capacity of a 3-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 45°C - 40°C	Total Capacity	kW	23.4	21.8	21	20
	Supply temperature	° C	29.5	29.6	30.3	31
	Waterflow	m³h	4	3.75	3.6	3.45
	Water pressure drop	kPa	22	19.4	18	16.7
Water 70°C - 60°C	Total Capacity	kW	41.2	39.2	38.3	37.4
	Supply temperature	° C	42.5	42.5	43.1	43.7
	Waterflow	m³h	3.54	3.37	3.3	3.21
	Water pressure drop	kPa	17.5	16	15.4	14.7

Thermal capacity of a 6-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	33.5	29.3	27.2	24.6
	Sensitive capacity	kW	20.5	19.8	19.3	18.6
	Supply temperature	° C	13.6	13.2	12.9	12.7
	Waterflow	m³h	5.75	5.03	4.67	4.23
	Water pressure drop	kPa	18.6	14.7	12.8	10.8
Water 10°C - 15°C	Total Capacity	kW	25.3	21.7	20.0	17.8
	Sensitive capacity	kW	17.5	16.8	16.4	15.8
	Supply temperature	° C	15.8	15.4	15.1	14.8
	Waterflow	m³h	4.36	3.73	3.43	3.1
	Water pressure drop	kPa	11.3	8.6	7.4	6.1

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	18	18	18	18
	Supply temperature	° C	25.6	27	28.2	29.5
	Number of stages	N°	2	2	2	2
	Capacity step	kW	6-12-18	6-12-18	6-12-18	6-12-18
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

RRU 60

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 6000 m³h	Efficiency	%	75.5	75.6	75.7	75.8
	Thermal recovery capacity	kW	67.6	57.5	46.4	38
	Fresh air temperature	° C	12.7	13.9	15.1	16.4
	R.H. of fresh air	%	63.2	59.7	57.3	53.6

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 6000 m³h	Efficiency	%	73.2	73.4	73.5	73.6
	Thermal recovery capacity	kW	37.6	24.4	16	3.93
	Fresh air temperature	° C	28.4	27.6	27.1	26.3
	R.H. of fresh air	%	54	51.9	51	50

Thermal capacity of a 3-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 45°C - 40°C	Total Capacity	kW	36.3	34.8	32.6	31.2
	Supply temperature	° C	30.6	31	31.2	31.8
	Waterflow	m³h	6.24	5.98	5.61	5.37
	Water pressure drop	kPa	23.6	21.8	19.5	18
Water 70°C - 60°C	Total Capacity	kW	64.3	62.8	60	58.5
	Supply temperature	° C	44.4	44.8	44.6	45.2
	Waterflow	m³h	5.53	5.4	5.16	5.03
	Water pressure drop	kPa	19	18.2	16.8	16.1

Thermal capacity of a 6-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	53.4	47.5	44.5	40.2
	Sensitive capacity	kW	32.4	31.3	30.6	29.4
	Supply temperature	° C	12.6	12.3	12.2	12.0
	Waterflow	m³h	9.19	81.18	7.65	6.92
	Water pressure drop	kPa	26.7	21.7	19.3	16.1
Water 10°C - 15°C	Total Capacity	kW	40.5	35.3	32.7	29.2
	Sensitive capacity	kW	27.5	26.5	25.8	24.8
	Supply temperature	° C	15.0	14.7	14.5	14.2
	Waterflow	m³h	6.97	6.1	5.62	5.02
	Water pressure drop	kPa	16.3	12.8	11.1	9.1

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	24	24	24	24
	Supply temperature	° C	24.6	25.8	27	28.3
	Number of stages	N°	2	2	2	2
	Capacity step	kW	8-16-24	8-16-24	8-16-24	8-16-24
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

RRU 80

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 8000 m³h	Efficiency	%	74.6	74.7	74.8	74.9
	Thermal recovery capacity	kW	89.4	75.9	61.4	50.3
	Fresh air temperature	° C	12.4	13.7	15	16.2
	R.H. of fresh air	%	64.2	60.5	57.9	54

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 8000 m³h	Efficiency	%	72.6	72.7	72.7	72.9
	Thermal recovery capacity	kW	50.4	32.6	21.3	5.3
	Fresh air temperature	° C	28.5	27.6	27.1	26.3
	R.H. of fresh air	%	53.5	51.7	50.8	50.1

Thermal capacity of a 3-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 45°C - 40°C	Total Capacity	kW	47.7	45.2	43	41
	Supply temperature	° C	29.9	30.4	30.9	31.4
	Waterflow	m³h	8.14	7.77	7.4	7.1
	Water pressure drop	kPa	16.4	15	13.8	12.7
Water 70°C - 60°C	Total Capacity	kW	83.6	81.4	79.3	77.2
	Supply temperature	° C	43.3	43.8	44.3	44.7
	Waterflow	m³h	7.19	7	6.82	6.64
	Water pressure drop	kPa	13.1	12.5	11.9	11.4

Thermal capacity of a 6-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	70.7	62.8	58.8	53.5
	Sensitive capacity	kW	43.3	41.6	40.7	39
	Supply temperature	° C	12.7	12.4	12.2	12.0
	Waterflow	m³h	12.2	10.8	10.1	9.2
	Water pressure drop	kPa	32.6	26.5	3.5	19.9
Water 10°C - 15°C	Total Capacity	kW	53.8	46.7	43.3	38.8
	Sensitive capacity	kW	36.8	35.3	34.4	33
	Supply temperature	° C	15.1	14.7	14.5	14.2
	Waterflow	m³h	926	8.04	7.44	6.68
	Water pressure drop	kPa	20.1	15.6	13.6	11.3

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	30	30	30	30
	Supply temperature	° C	23.6	24.9	26.2	27.4
	Number of stages	N°	2	2	2	2
	Capacity step	kW	10-20-30	10-20-30	10-20-30	10-20-30
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

RRU 100

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 10000 m³h	Efficiency	%	76.8	76.8	76.9	77
	Thermal recovery capacity	kW	114.9	97.6	78.8	64.6
	Fresh air temperature	° C	13	14.2	15.4	16.5
	R.H. of fresh air	%	62.7	59.4	57.1	53.5

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 10000 m³h	Efficiency	%	74.5	74.6	74.7	74.8
	Thermal recovery capacity	kW	64.7	41.8	27.3	6.7
	Fresh air temperature	° C	28.3	27.5	27	26.3
	R.H. of fresh air	%	53.6	51.7	50.8	50.1

Thermal capacity of a 3-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 45°C - 40°C	Total Capacity	kW	51.5	48.2	46.4	44.6
	Supply temperature	° C	28.2	28.5	29.1	29.7
	Waterflow	m³h	8.9	8.3	8	7.7
	Water pressure drop	kPa	13.6	12.2	11.3	10.6
Water 70°C - 60°C	Total Capacity	kW	91.7	87.3	85.5	83.8
	Supply temperature	° C	40	40	40.6	41.3
	Waterflow	m³h	7.9	7.5	7.4	7.2
	Water pressure drop	kPa	11.1	10.2	9.8	9.5

Thermal capacity of a 6-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	88.2	78.8	73.7	67.7
	Sensitive capacity	kW	54.1	52.2	51	49.2
	Supply temperature	° C	12.5	12.2	12.0	11.9
	Waterflow	m³h	15.2	13.6	12.7	11.7
	Water pressure drop	kPa	34	27.8	24.7	21.2
Water 10°C - 15°C	Total Capacity	kW	66.9	58.7	54.3	49.2
	Sensitive capacity	kW	45.8	44.2	43.2	41.5
	Supply temperature	° C	14.9	14.6	14.4	14.2
	Waterflow	m³h	11.5	10.1	9.4	8.5
	Water pressure drop	kPa	20.8	16.5	14.4	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	42	42	42	42
	Supply temperature	° C	25.5	26.7	27.9	29
	Number of stages	N°	2	2	2	2
	Capacity step	kW	14-28-42	14-28-42	14-28-42	14-28-42
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

RRU 150

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 15000 m³h	Efficiency	%	74.2	74.3	74.4	74.4
	Thermal recovery capacity	kW	166.5	141.4	114.3	93.7
	Fresh air temperature	° C	12.3	13.6	14.9	16.2
	R.H. of fresh air	%	64.4	60.6	58	54

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 15000 m³h	Efficiency	%	72.1	72.2	72.3	72.4
	Thermal recovery capacity	kW	93.4	60.4	39.4	9.7
	Fresh air temperature	° C	28.5	27.7	27.1	26.3
	R.H. of fresh air	%	53.7	51.7	50.9	50.1

Thermal capacity of a 3-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 45°C - 40°C	Total Capacity	kW	76.7	73.7	70.6	67
	Supply temperature	° C	27.4	28.2	28.8	29.4
	Waterflow	m³h	13.2	12.7	12.2	11.6
	Water pressure drop	kPa	21.7	20.2	18.7	17.1
Water 70°C - 60°C	Total Capacity	kW	135.4	132.4	129.4	126
	Supply temperature	° C	39	39.7	40.4	41
	Waterflow	m³h	11.6	11.4	11.2	10.8
	Water pressure drop	kPa	17.3	16.7	16	15.3

Thermal capacity of a 6-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	131.6	117.6	109.2	99.2
	Sensitive capacity	kW	80.6	77.9	75.7	72.8
	Supply temperature	° C	12.8	12.5	12.3	12.1
	Waterflow	m³h	22.6	20.2	18.8	17.1
	Water pressure drop	kPa	31.3	25.6	22.4	18.9
Water 10°C - 15°C	Total Capacity	kW	100.0	87.5	80.2	72.1
	Sensitive capacity	kW	68.4	66	64	61.5
	Supply temperature	° C	15.2	14.8	14.6	14.3
	Waterflow	m³h	17.2	15.1	13.8	12.4
	Water pressure drop	kPa	19.2	15.2	13	10.7

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	60	60	60	60
	Supply temperature	° C	24.2	25.5	26.8	28.1
	Number of stages	N°	2	2	2	2
	Capacity step	kW	20-40-60	20-40-60	20-40-60	20-40-60
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

Noise levels

25 mm profile

Sound powers

RRU 15	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	75	71	79	73	74	73	67	64	79.1
Return	67	61	70	63	57	56	52	46	65.6
Unit external radiation	60	56	66	59	57	56	51	29	63.3
RRU 25	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	68	68	76	75	78	77	72	68	82.4
Return	62	61	67	66	61	60	55	50	67.5
Unit external radiation	53	53	63	61	61	60	56	33	66
RRU 40	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	70	69	79	76	79	77	73	70	83.2
Return	63	61	71	67	61	61	57	56	69
Unit external radiation	55	54	66	62	62	60	57	35	66.9
RRU 60	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	74	73	85	81	83	78	74	74	86.4
Return	68	65	78	71	66	64	60	60	73.8
Unit external radiation	59	58	72	67	66	61	58	39	70.4
RRU 80	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	75	80	86	84	82	78	73	69	86.5
Return	70	73	76	72	65	61	55	54	72.8
Unit external radiation	60	65	73	70	65	61	57	34	71.2
RRU 100	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	79	81	89	87	87	82	78	75	90.7
Return	74	74	80	76	70	65	60	61	77
Unit external radiation	64	66	76	73	70	65	62	40	75
RRU 150	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	76	82	87	84	83	80	76	71	87.7
Return	70	75	77	72	66	63	59	59	73.7
Unit external radiation	61	67	74	70	66	63	60	36	72.1

Sound pressure

RRU 15	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	64	59	69	63	65	63	57	54	69.5
Return	59	53	62	55	49	48	44	38	57.7
Unit external radiation	49	44	56	49	48	46	51	19	53.6
RRU 25	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	60	60	68	67	70	69	64	60	74.5
Return	54	53	59	58	53	52	47	42	59.6
Unit external radiation	45	45	55	53	53	52	56	25	58.1
RRU 40	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	62	61	71	68	71	69	65	62	75.3
Return	55	53	63	59	53	53	49	48	61.1
Unit external radiation	47	46	58	54	54	52	57	27	59
RRU 60	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	66	65	77	73	75	70	66	66	78.5
Return	60	57	70	63	58	56	52	52	65.9
Unit external radiation	51	50	64	59	58	53	58	31	62.5
RRU 80	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	67	72	78	76	74	70	65	61	78.6
Return	62	65	68	64	57	53	47	46	64.9
Unit external radiation	52	57	65	62	57	53	57	26	63.3
RRU 100	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	71	73	81	79	79	74	70	67	82.8
Return	66	66	72	68	62	57	52	53	69.1
Unit external radiation	56	58	68	65	62	57	62	32	67.1
RRU 150	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	68	74	79	76	75	72	68	63	79.8
Return	62	67	69	64	58	55	51	51	65.8
Unit external radiation	53	59	66	62	58	55	60	28	64.2

54 mm profile

Sound powers

RRU 15	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	75	71	79	73	74	73	67	64	79.1
Return	67	61	70	63	57	56	52	46	65.6
Unit external radiation	49	45	53	46	44	44	22	1	50.3
RRU 25	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	68	68	76	75	78	77	72	68	82.4
Return	62	61	67	66	61	60	55	50	67.5
Unit external radiation	46	46	50	49	52	53	14	1	56.8
RRU 40	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	70	69	79	76	79	77	73	70	83.2
Return	63	61	71	67	61	61	57	56	69
Unit external radiation	44	43	53	49	49	48	28	1	53.6
RRU 60	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	74	73	85	81	83	78	74	74	86.4
Return	68	65	78	71	66	64	60	60	73.8
Unit external radiation	48	47	59	54	53	49	29	3	57.3
RRU 80	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	75	80	86	84	82	78	73	69	86.5
Return	70	73	76	72	65	61	55	54	72.8
Unit external radiation	49	54	60	57	52	49	28	1	58.1
RRU 100	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	79	81	89	87	87	82	78	75	90.7
Return	74	74	80	76	70	65	60	61	77
Unit external radiation	53	55	63	60	57	53	33	4	61.8
RRU 150	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	76	82	87	84	83	80	76	71	87.7
Return	70	75	77	72	66	63	59	59	73.7
Unit external radiation	50	56	51	57	53	51	31	1	59.0

Sound pressure

RRU 15	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	64	59	69	63	65	63	57	54	69.5
Return	59	53	62	55	49	48	44	38	57.7
Unit external radiation	41	37	45	38	36	36	22	1	42.4
RRU 25	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	60	60	68	67	70	69	64	60	74.5
Return	54	53	59	58	53	52	47	42	59.6
Unit external radiation	38	38	42	41	44	45	14	1	48.9
RRU 40	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	62	61	71	68	71	69	65	62	75.3
Return	55	53	63	59	53	53	49	48	61.1
Unit external radiation	36	35	45	41	41	40	28	1	45.7
RRU 60	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	66	65	77	73	75	70	66	66	78.5
Return	60	57	70	63	58	56	52	52	65.9
Unit external radiation	40	39	51	46	45	41	29	1	49.4
RRU 80	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	67	72	78	76	74	70	65	61	78.6
Return	62	65	68	64	57	53	47	46	64.9
Unit external radiation	41	46	52	49	44	41	28	1	50.2
RRU 100	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	71	73	81	79	79	74	70	67	82.8
Return	66	66	72	68	62	57	52	53	69.1
Unit external radiation	45	47	55	52	49	45	33	1	53.9
RRU 150	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1000 Hz**	**2000 Hz**	**4000 Hz**	**8000 Hz**	**dB (A)**
Supply	68	74	79	76	75	72	68	63	79.8
Return	62	67	69	64	58	55	51	51	65.8
Unit external radiation	42	48	53	49	45	43	31	1	51.1

Roccheggiani S.p.a.
Via 1° Maggio, 10 - 60021 Camerano (An) Italy
Tel +39 071 730 00 23
Fax +39 071 730 40 05
info@roccheggiani.it

www.roccheggiani.it

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