

HE-HRU

HIGH EFFICIENCY HEAT RECOVERY UNIT



- ErP 2018
- Heat recovery efficiency above 85%
- Air flows from 1.000 to 8.000 m³/h
- EC fans adjustable with 0... 10V signal



The heat recovery units in the HE-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 units are equipped with heat recovery units with aluminium plates and high-efficiency cross flows. The exchange surface of the heat recovery device is very large in proportion to its volume. This feature enables greater yields compared to other types of heat exchanger, reaching efficiencies of 85%, with the advantage of a low pressure drop and extremely modest dimensions for units with considerable air flow rates.

The high level of recovered heat allows the use of normal heating/cooling systems to be considerably reduced with obvious economic advantages. To cover a vast range of applications, these units are available in 5 sizes, with nominal air flows from 1.000 to 8.000 m³/h and available operating static pressure of 300 Pa.

A rapid selection software is available.

Publication: Technical Bulletin for high-efficiency heat recovery unit (HE-HRU)

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Regulatory Compliance

All HE-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 HE-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 HE-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



Sports facilities



Wellness centres



Supermarkets



Medium-to-large sized shopping centres



Shops



Offices

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 HE-HRU range and the 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.

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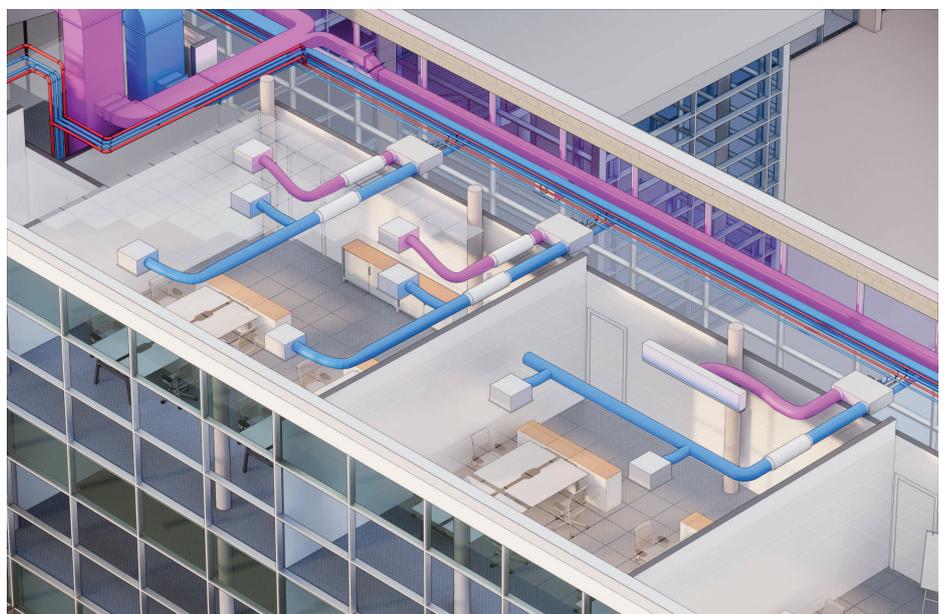
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Advantages

- 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.
- Nessun limite di potenzialità disponibile.
- 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 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/m³).

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 exterior 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.

All units are supplied with a galvanised steel base, 140 mm high, which facilitates transport and handling operations and also ensures perfectly level installation. Units that are installed externally will be provided with a covered shelter in galvanised steel that fits closely to the profile.

Heat recovery unit

Air-air heat exchangers with cross flows, consisting of aluminium plates and typical performance above 85% and sized to achieve reduced air pressure drops. Frame in aluminium with non-silicon sealant. Maximum pressure differential 1500 Pa, operating temperature from -40°C to 80°C.

Airtightness tests are performed for each recovery unit with the issue of a certificate applied to the component.



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.

Thermal contacts are provided in the motor windings for protection against overheating during operation: the maximum air temperature allowed onto the motor during operation is 55°C.

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.

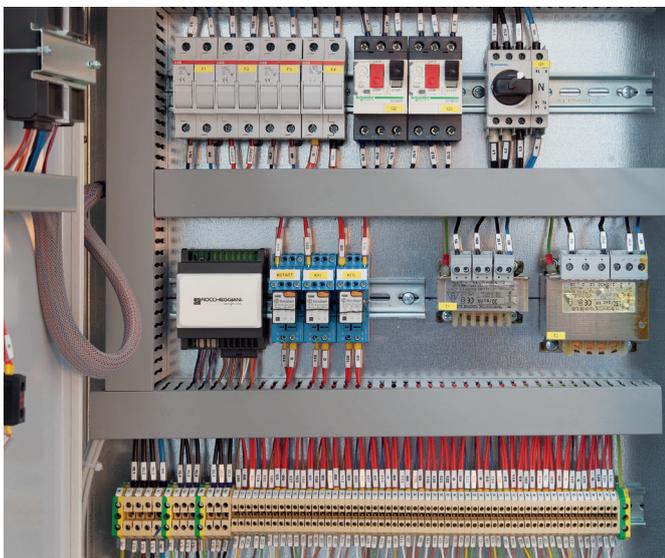
Fully compliant with Directive 2014/35/EU and Directive 2014/30/EU.

In addition, a fully-wired electrical box is supplied with both fans with 0-10 V analogue input to control the flow rate.

Filters

There are two filters used on the air supply section, positioned near the fresh air intake: the first is a pleated filter with efficiency Coarse 55% - ISO 16890 (formerly G4 – EN 779), coupled to a rigid-bag filter with efficiency ePM2.5 70% - ISO 16890 (formerly F7 – EN 779).

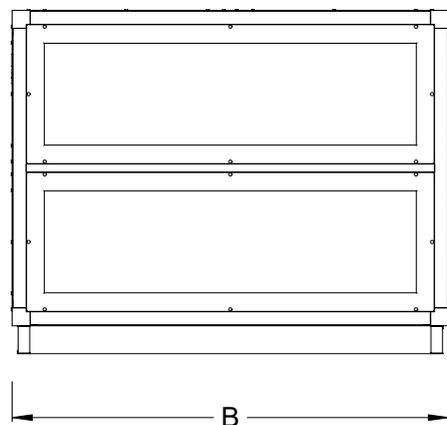
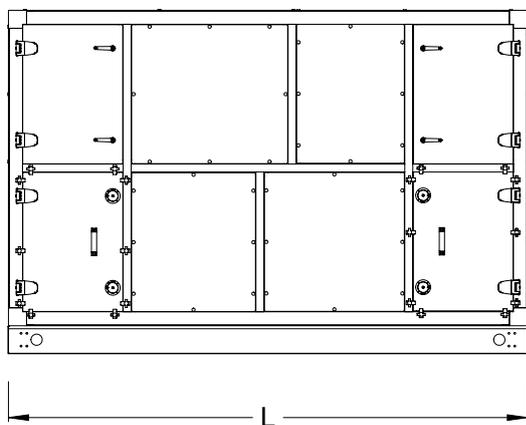
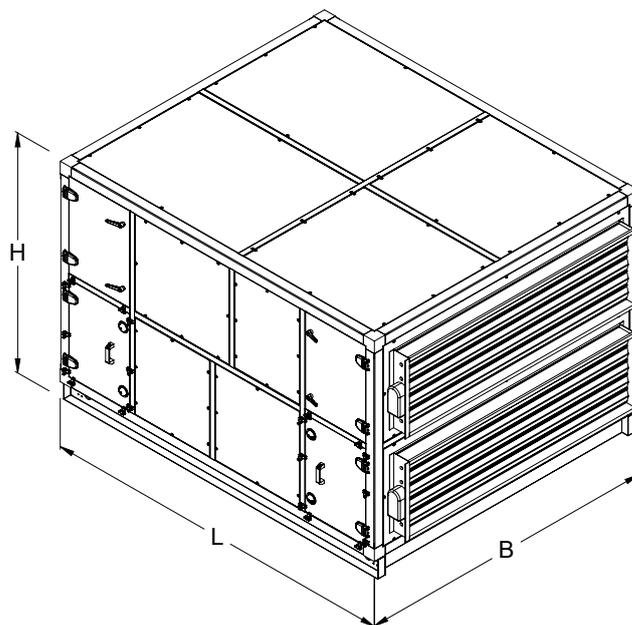
The filter placed in the return is also a bag filter with efficiency ePM10 50% - ISO16890 (formerly M5 – EN 779). All filters can be pulled out from the side.



Dimensions and weights

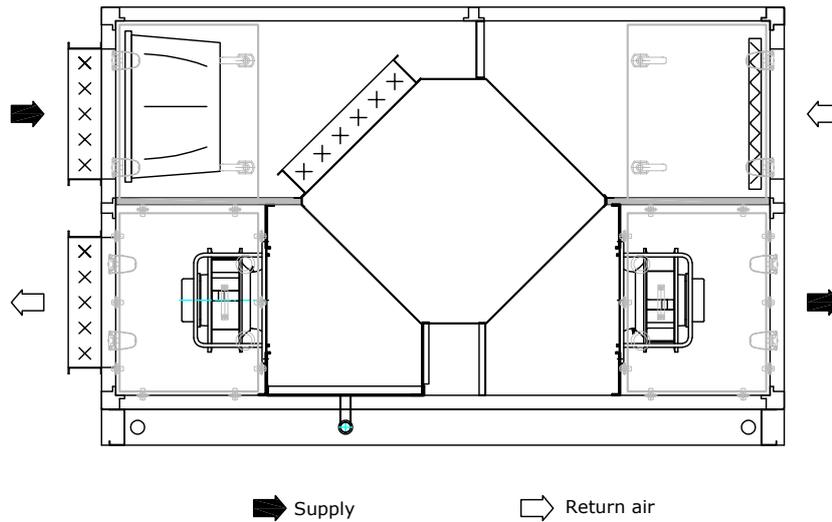
Dimensions						
HE-HRU		10	20	40	60	80
B	mm	800 (860)*	1280 (1340)*	1510 (1570)*	2110 (2170)*	2710 (2770)*
H	mm	1260 (1320)*	1460 (1520)*	1660 (1720)*	1660 (1720)*	1860 (1920)*
L	mm	2050 (2110)*	2280 (2340)*	2600 (2660)*	2520 (2580)*	2290 (2350)*
Weight	kg	300 (340)*	493 (540)*	658 (719)*	856 (924)*	1074 (1170)*

*Dimensions with 54 mm panel

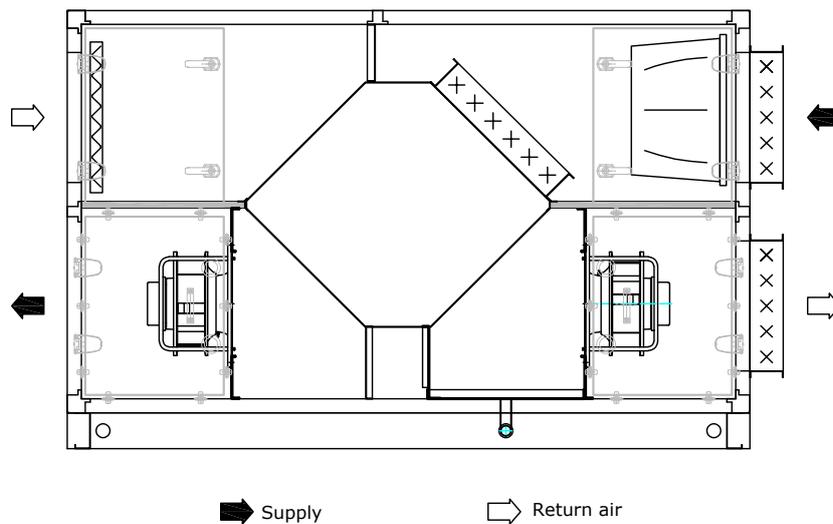


Possible positionings

The HE-HRU series is designed to meet plant engineering flexibility and singularity needs as required for every different application. The units are available with inspection points and couplings on the right side or left side. The side for inspections and couplings must be indicated when making an order. Therefore, depending on your requirements, you can choose from the two available types shown below.



RIGHT INSPECTION SIDE



LEFT INSPECTION SIDE

General technical data

Model HE-HRU		10	20	40	60	80
Nominal air flow	m ³ /h	1000	2000	4000	6000	8000
External Static Pressure	Pa	450	500	800	800	800
Heat recovery unit						
Energy Efficiency (3)		84.8	87.5	87.0	86.5	86.3
Total Heat Recovery Capacity (3)	kW	1.7	3.5	7.0	10.4	13.8
Supply Air Temperature (3)	° C	26.9	26.7	26.8	26.8	26.8
Supply Air Humidity (3)	%	67	68	68	67	67
Energy Efficiency (2)	%	84.7	88	88.0	88.1	88.4
Total Heat Recovery Capacity (2)	kW	7.5	15.6	31.3	47.0	62.9
Supply Air Temperature (2)	° C	16.2	17.0	17.0	17.0	17.1
Sensible Energy Efficiency (4)	%	78.4	83.4	83.3	83.5	84.1
Fans						
Supply/return fan motor rating	kW	0.50/0.50	0.78/0.78	2.50/2.50	5.00/5.00	5.00/5.00
Supply/return fan nominal current	A	2.17/2.17	3.39/3.39	3.80/3.80	7.60/7.60	7.60/7.60
Power supply	V/Ph/Hz	230/1/50	230/1/50	400/3/50	400/3/50	400/3/50
Airflow Control		YES	YES	YES	YES	YES
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		BVU				
Ventilation Control		Variable turns				
Heat Recovery		Cross-flow recovery device - Other HRS				
Efficiency		78.4	83.4	83.3	83.5	84.1
Absorbed power (1)	kW	0.57	0.97	2.28	3.68	4.74
Specific Fan Power	W/m ³ /s	538	318	553	661	644
Nominal Supply Airspeed	m / s	0.71	0.73	1.05	1.12	1.02
Maximum External Leakage	%	4.39	3.52	2.43	1.91	1.28
Maximum Internal Leakage	%	0.1	0.1	0.1	0.1	0.1
Fan Static Efficiency	%	52.5	60.7	62.7	59.6	63.4
Airborne Sound Power Level	dB (A)	60.9	60.9	65.5	70	68.5

(1) Values referring to the base configuration, with available static pressure of 250 Pa

(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 manages the heat recovery section from two air flows (fresh air and room air), the supply air to the room itself and the discharge of stale air, as well as the filtering of the air flows in question.

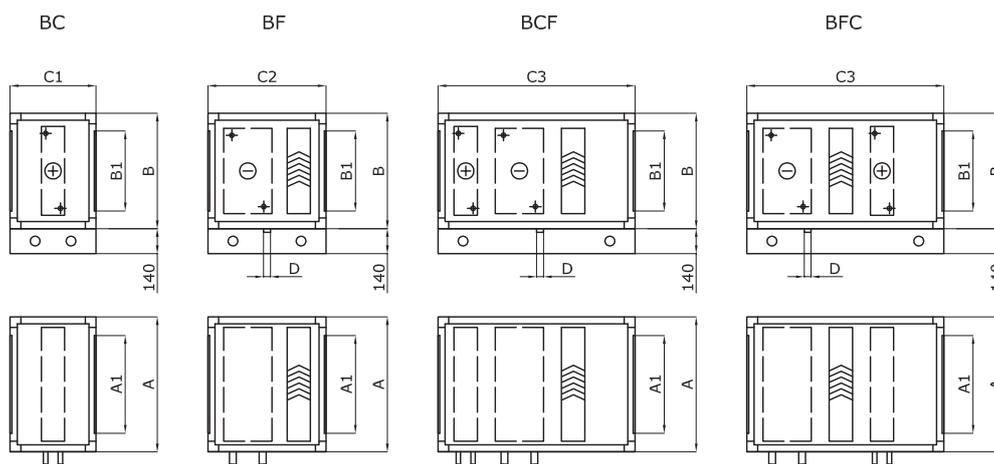
In addition to these functions, you can complete the base unit with additional air handling sections, such as heating, cooling and reheating sections that can be installed downstream of the air supply section according to procedures described below.

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

HE-HRU Size		10	20	40	60	80
A	mm	800 (860)*	1280 (1340)*	1510 (1570)*	2110 (2170)*	2710 (2770)*
B	mm	580 (640)*	680 (740)*	780 (840)*	780 (840)*	880 (940)*
A1	mm	540	1020	1250	1850	2000
B1	mm	310	410	510	510	610
C1	mm	480 (540)*	480 (540)*	480 (540)*	480 (540)*	480 (540)*
C2	mm	620 (680)*	620 (680)*	620 (680)*	620 (680)*	620 (680)*
C3	mm	800 (860)*	800 (860)*	800 (860)*	800 (860)*	800 (860)*
D	φ	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)*
BF Weight	Kg	107 (119)*	134 (148)*	162 (178)*	210 (230)*	247 (267)*
BC+BF Weight	Kg	131 (149)*	148 (162)*	215 (408)*	269 (296)*	311 (345)*

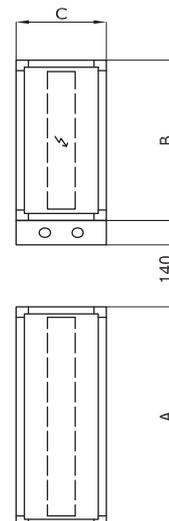
Re-heating electric heating element (BE)

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.

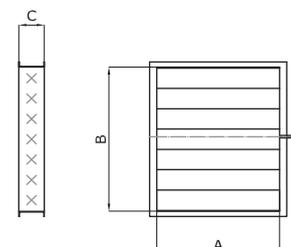


BE - Electric coil						
HE-HRU Size		10	20	40	60	80
Electric coil 1 stage	kW	2	3	5	8	10
Electric coil 2 stages	kW	4	5	10	14	20
Electric coil 3 stages	kW	-	8	15	22	30
Power supply	V/ph/Hz	400/3/50				
A	mm	800 (860)*	1280 (1340)*	1510 (1570)*	2110 (2170)*	2710 (2770)*
B	mm	580 (640)*	680 (740)*	780 (840)*	780 (840)*	880 (940)*
C	mm	440 (500)*	440 (500)*	440 (500)*	440 (500)*	440 (500)*

* 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						
HE-HRU Size		10	20	40	60	80
A	mm	540	1020	1250	1850	2000
B	mm	310	410	510	510	610
C	mm	130	130	130	130	130

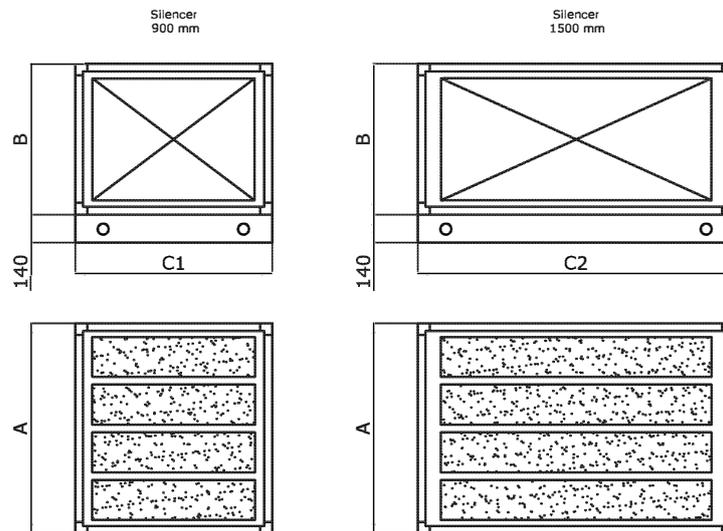
Silencer (SL)

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		10	20	40	60	80
HE-HRU Size						
A	mm	800 (860)*	1280 (1340)*	1510 (1570)*	2110 (2170)*	2710 (2770)*
B	mm	580 (640)*	680 (740)*	780 (840)*	780 (840)*	880 (940)*
C1	mm	980 (1040)*	980 (1040)*	980 (1040)*	980 (1040)*	980 (1040)*
C2	mm	1580 (1640)*	1580 (1640)*	1580 (1640)*	1580 (1640)*	1580 (1640)*

*Dimensions with 54 mm panel



SL - Silencer with attenuators			63	125	250	500	1000	2000	4000	8000
HE-HRU	Noise attenuation SL900mm	dB	6	11	18	21	22	16	12	9
	Noise attenuation SL1500mm	dB	8	16	26	33	35	25	19	15

Electronic control

The HE-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 HE-HRU configurations. A kit consisting of temperature probes, heat recovery unit by-pass actuator 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

- fresh air and/or discharge air damper actuators;
- CO2 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 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 (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.
- Heating (H2O valve) and cooling (H2O valve) (4-pipe system).
- Cooling (H2O valve), heating (H2O valve), dehumidification (4-pipe system).
- Heating (2-stage electric coil) and cooling (H2O valve).
- Cooling (H2O valve), heating (2-stage 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 HE-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 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-0xC SH1(3)				AHU-1xC SH1(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

Product performance

HE-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 m ³ h	Efficiency	%	86.3	84.7	82.6	79.7
	Thermal recovery capacity	kW	9.3	7.5	5.8	4.2
	Fresh air temperature	°C	15.9	16.2	16.5	17.0
	R.H. of fresh air	%	13.0	18.0	26.0	36.0

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 m ³ h	Efficiency	%	85.0	84.8	84.6	84.6
	Thermal recovery capacity	kW	2.5	1.7	1.1	0.3
	Fresh air temperature	°C	27.4	26.9	26.6	26.2
	R.H. of fresh air	%	77	67	61	53

Thermal capacity of a 2-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	3.1	3.1	3.0	2.9
	Supply temperature	°C	25.2	25.3	25.5	25.6
	Waterflow	m ³ h	0.5	0.5	0.5	0.5
	Water pressure drop	kPa	5.5	5.3	5.1	4.8
Water 45°C - 40°C	Total Capacity	kW	5.2	5.2	5.2	5.9
	Supply temperature	°C	31.5	31.7	31.8	32.0
	Waterflow	m ³ h	0.9	0.9	0.9	0.9
	Water pressure drop	kPa	13.7	13.5	13.2	12.8
Water 70°C - 60°C	Total Capacity	kW	9.8	9.7	9.6	9.6
	Supply temperature	°C	44.9	45.1	45.2	45.5
	Waterflow	m ³ h	0.8	0.8	0.8	0.8
	Water pressure drop	kPa	12.1	12.0	11.9	11.7

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	10.19	8.29	7.22	5.87
	Sensitive capacity	kW	4.2	4.2	4.2	4.2
	Supply temperature	°C	15.18	14.6	14.24	13.76
	Waterflow	m ³ h	1.8	1.4	1.2	1.0
	Water pressure drop	kPa	30.6	21.2	16.6	11.5
Water 10°C - 15°C	Total Capacity	kW	8.15	6.28	5.25	4.2
	Sensitive capacity	kW	3.5	3.5	3.5	3.5
	Supply temperature	°C	17.34	16.77	16.42	15.8
	Waterflow	m ³ h	1.4	1.1	0.9	0.7
	Water pressure drop	kPa	20.5	12.9	9.4	6.3

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	4	4	4	4	
Supply temperature	°C	27,8	28,1	28,4	28,9	
Number of stages	N°	2	2	2	2	
Capacity step	kW	1-3-4	1-3-4	1-3-4	1-3-4	
Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50	

HE-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 m ³ /h	Efficiency	%	89.3	88	86.6	84.7
	Thermal recovery capacity	kW	19.25	15.6	12.19	8.86
	Fresh air temperature	°C	16.8	17.0	17.3	17.7
	R.H. of fresh air	%	12.0	17.0	25.0	34.0

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 m ³ /h	Efficiency	%	87.7	87.5	87.5	87.3
	Thermal recovery capacity	kW	5.2	3.5	2.3	0.6
	Fresh air temperature	°C	27.1	26.7	26.5	26.1
	R.H. of fresh air	%	78	68	61	53

Thermal capacity of a 2-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	6.1	5.9	5.8	5.7
	Supply temperature	°C	25.9	25.8	25.9	26.1
	Waterflow	m ³ /h	1.1	1.0	1.0	1.0
	Water pressure drop	kPa	7.8	7.2	7.1	6.8
Water 45°C - 40°C	Total Capacity	kW	10.5	10.41	10.3	13.5
	Supply temperature	°C	32.4	32.5	32.6	32.4
	Waterflow	m ³ /h	1.8	1.8	1.8	1.7
	Water pressure drop	kPa	20.2	19.9	19.5	18.2
Water 70°C - 60°C	Total Capacity	kW	19.9	19.9	19.7	19.6
	Supply temperature	°C	46.5	46.5	46.6	46.7
	Waterflow	m ³ /h	1.7	1.7	1.7	1.7
	Water pressure drop	kPa	18.4	18.3	18.1	17.9

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	22.95	19.04	16.53	13.48
	Sensitive capacity	kW	9.3	9.3	9.3	9.3
	Supply temperature	°C	13.5	13.08	12.82	12.5
	Waterflow	m ³ /h	3.9	3.3	2.8	2.3
	Water pressure drop	kPa	38.1	27.3	21.2	14.8
Water 10°C - 15°C	Total Capacity	kW	18.55	14.68	12.18	9.59
	Sensitive capacity	kW	7.6	7.6	7.7	7.7
	Supply temperature	°C	15.95	15.55	15.31	14.85
	Waterflow	m ³ /h	3.2	2.5	2.1	1.6
	Water pressure drop	kPa	26.0	17.2	12.3	8.1

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	8	8	8	8	
Supply temperature	°C	28.7	28.9	29.2	29.6	
Number of stages	N°	2	2	2	2	
Capacity step	kW	3-5-8	3-5-8	3-5-8	3-5-8	
Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50	

HE-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 m³/h	Efficiency	%	89.2	88.0	86.5	84.6
	Thermal recovery capacity	kW	38.4	31.3	24.4	17.7
	Fresh air temperature	°C	16.7	17.0	17.3	17.7
	R.H. of fresh air	%	12.0	17.0	25.0	34.0

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 m³/h	Efficiency	%	87.1	87.0	86.9	86.8
	Thermal recovery capacity	kW	10.4	7.0	4.6	1.2
	Fresh air temperature	°C	27.2	26.8	26.5	26.1
	R.H. of fresh air	%	78	68	61	53

Thermal capacity of a 2-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	11.1	10.6	10.4	10.2
	Supply temperature	°C	25.0	24.9	25.0	25.3
	Waterflow	m³/h	1.9	1.8	1.8	1.8
	Water pressure drop	kPa	10.7	9.9	9.6	9.3
Water 45°C - 40°C	Total Capacity	kW	18.5	18.34	18.2	23.9
	Supply temperature	°C	30.5	30.6	30.8	31.0
	Waterflow	m³/h	3.2	3.2	3.1	3.1
	Water pressure drop	kPa	26.75	26.3	25.8	25.3
Water 70°C - 60°C	Total Capacity	kW	36.0	35.8	35.6	34.4
	Supply temperature	°C	43.5	43.6	43.7	43.2
	Waterflow	m³/h	3.1	3.1	3.1	3.0
	Water pressure drop	kPa	25.4	25.1	24.9	23.4

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	41.44	34.26	29.28	23.94
	Sensitive capacity	kW	16.8	17.0	17.1	17.2
	Supply temperature	°C	14.91	14.35	14	13.51
	Waterflow	m³/h	7.1	5.9	5.0	4.1
	Water pressure drop	kPa	36.0	25.7	19.4	13.6
Water 10°C - 15°C	Total Capacity	kW	33.24	26.15	21.35	17.09
	Sensitive capacity	kW	13.8	14.0	14.1	14.3
	Supply temperature	°C	17.11	16.57	16.21	15.06
	Waterflow	m³/h	5.7	4.5	3.7	2.9
	Water pressure drop	kPa	24.3	15.9	11.1	7.4

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	15	15	15	15
	Supply temperature	°C	27,9	28,2	28,5	28,9
	Number of stages	N°	2	2	2	2
	Capacity step	kW	5-10-15	5-10-15	5-10-15	5-10-15
	Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50

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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 m ³ /h	Efficiency	%	89.3	88.1	86.5	84.7
	Thermal recovery capacity	kW	57.7	47.0	36.6	26.6
	Fresh air temperature	°C	16.8	17.0	17.3	17.7
	R.H. of fresh air	%	12.0	17.0	25.0	26.0

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 m ³ /h	Efficiency	%	86.7	86.5	86.5	86.3
	Thermal recovery capacity	kW	15.6	10.4	6.9	1.7
	Fresh air temperature	°C	27.2	26.8	26.5	26.1
	R.H. of fresh air	%	78	67	61	53

Thermal capacity of a 2-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	15.6	15.0	14.7	14.4
	Supply temperature	°C	24.3	24.4	24.6	24.8
	Waterflow	m ³ /h	2.7	2.6	2.5	2.5
	Water pressure drop	kPa	4.7	4.3	4.2	4.0
Water 45°C - 40°C	Total Capacity	kW	27.4	27.16	26.9	36.5
	Supply temperature	°C	30.4	30.5	30.6	30.8
	Waterflow	m ³ /h	4.7	4.7	4.6	4.5
	Water pressure drop	kPa	12.66	12.5	12.2	11.8
Water 70°C - 60°C	Total Capacity	kW	52.2	52.0	51.7	51.2
	Supply temperature	°C	42.7	42.8	42.9	43.0
	Waterflow	m ³ /h	4.5	4.5	4.4	4.4
	Water pressure drop	kPa	11.6	11.5	11.4	11.2

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	63.84	51.69	44.82	36.47
	Sensitive capacity	kW	25.9	26.2	26.2	26.2
	Supply temperature	°C	14.58	14.02	13.72	13.27
	Waterflow	m ³ /h	11.0	8.9	7.7	6.3
	Water pressure drop	kPa	14.3	9.8	7.6	5.3
Water 10°C - 15°C	Total Capacity	kW	51.03	38.78	32.44	26.01
	Sensitive capacity	kW	21.3	21.4	21.5	22.0
	Supply temperature	°C	16.87	16.37	16.02	15.38
	Waterflow	m ³ /h	8.8	6.7	5.6	4.5
	Water pressure drop	kPa	9.6	5.9	4.3	2.9

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	22	22	22	22	
Supply temperature	°C	27,7	27,9	28,2	28,6	
Number of stages	N°	2	2	2	2	
Capacity step	kW	8-14-22	8-14-22	8-14-22	8-14-22	
Power supply	V Ph Hz	400/3/50	400/3/50	400/3/50	400/3/50	

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Thermal capacity of the heat recovery unit with winter setting

Performance referring to a return temperature of 26°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 m ³ /h	Efficiency	%	89.7	88.4	87.0	85.2
	Thermal recovery capacity	kW	77.4	62.9	49.1	35.6
	Fresh air temperature	°C	16.9	17.1	17.4	17.8
	R.H. of fresh air	%	12.0	17.0	25.0	26.0

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 m ³ /h	Efficiency	%	86.5	86.3	86.3	86.1
	Thermal recovery capacity	kW	20.7	13.8	9.2	2.3
	Fresh air temperature	°C	27.2	26.8	26.5	26.1
	R.H. of fresh air	%	78	67	61	53

Thermal capacity of a 2-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	21.0	20.7	20.3	19.1
	Supply temperature	°C	24.7	24.8	24.9	24.9
	Waterflow	m ³ /h	3.6	3.6	3.5	3.3
	Water pressure drop	kPa	2.9	2.9	2.7	2.5
Water 45°C - 40°C	Total Capacity	kW	36.8	36.55	36.2	49.0
	Supply temperature	°C	30.6	30.7	30.9	31.1
	Waterflow	m ³ /h	6.3	6.3	6.2	6.1
	Water pressure drop	kPa	7.91	7.8	7.7	7.5
Water 70°C - 60°C	Total Capacity	kW	69.5	69.3	69	68.5
	Supply temperature	°C	42.8	42.9	43.0	43.2
	Waterflow	m ³ /h	6.0	6.0	5.9	5.9
	Water pressure drop	kPa	7.1	7.1	7.1	7.0

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	84.65	68.93	60.04	48.99
	Sensitive capacity	kW	34.3	34.8	34.8	34.8
	Supply temperature	°C	14.66	14.08	13.76	13.32
	Waterflow	m ³ /h	14.6	11.855	10.328	8.4
	Water pressure drop	kPa	30.1	20.9	16.3	11.4
Water 10°C - 15°C	Total Capacity	kW	68.06	52.44	43.81	34.89
	Sensitive capacity	kW	28.3	28.6	28.6	29.1
	Supply temperature	°C	16.9	16.35	16.03	15.46
	Waterflow	m ³ /h	11.7	9.0	7.5	6.0
	Water pressure drop	kPa	20.4	12.8	9.3	6.2

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	28,1	28,3	28,6	29,0	
Number of stages	N°	3	3	3	3	
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	

Noise levels

Sound powers

HE-HRU 10	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	74	63	73	64	59	51	49	44	62.9
Return	74	69	80	70	69	67	62	59	75.6
Unit external radiation	59	54	67	56	52	50	46	24	60.9
HE-HRU 20	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	65	57	65	65	60	56	53	48	61.8
Return	67	63	73	71	73	71	66	63	77.2
Unit external radiation	52	48	60	57	56	54	50	28	60.9
HE-HRU 40	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	65	61	72	69	64	60	56	57	63
Return	68	67	78	75	78	75	71	69	81.8
Unit external radiation	53	52	65	61	61	58	55	34	65.5
HE-HRU 60	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	69	65	72	73	69	66	60	57	69
Return	71	71	80	79	82	81	76.5	72	86.4
Unit external radiation	56	56	67	65	65	64	60	37	70
HE-HRU 80	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	68	64	75	72	67	63	59	59	66.6
Return	71	71	81	78	81	78	74	72	84.8
Unit external radiation	56	56	68	64	64	61	58	37	68.5

Note
The sound levels refer to the individual base unit in nominal working conditions with useful static pressure of 300 Pa. If the unit is installed under conditions other than nominal test conditions, the sound levels may be subject to changes. Tolerance +/- 4dB

Sound pressure

HE-HRU 10	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	66,1	55,1	65,1	56,1	51,1	43,1	41,1	36,1	59,2
Return	66,1	61,1	72,1	62,1	59,1	54,1	51,1	67,7	61,1
Unit external radiation	51,1	46,1	59,1	48,1	44,1	42,1	46	16,1	53,0
HE-HRU 20	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	57,1	49,1	57,1	57,1	52,1	48,1	45,1	40,1	57,9
Return	59,1	55,1	65,1	63,1	63,1	58,1	55,1	69,3	65,1
Unit external radiation	44,1	40,1	52,1	49,1	48,1	46,1	50	20,1	53,0
HE-HRU 40	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	57,1	53,1	64,1	61,1	56,1	52,1	48,1	49,1	62,4
Return	60,1	59,1	70,1	67,1	67,1	63,1	61,1	73,9	70,1
Unit external radiation	45,1	44,1	57,1	53,1	53,1	50,1	55	26,1	57,6
HE-HRU 60	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	61,1	57,1	64,1	65,1	61,1	58,1	52,1	49,1	66,4
Return	63,1	63,1	72,1	71,1	73,1	68,1	64,1	78,5	74,1
Unit external radiation	48,1	48,1	59,1	57,1	57,1	56,1	60	29,1	62,1
HE-HRU 80	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dB (A)
Supply	60,1	56,1	67,1	64,1	59,1	55,1	51,1	51,1	65,4
Return	63,1	63,1	73,1	70,1	70,1	66,1	64,1	76,9	73,1
Unit external radiation	48,1	48,1	60,1	56,1	56,1	53,1	58	29,1	60,6

Note
The sound levels refer to the individual base unit in nominal working conditions with useful static pressure of 300 Pa. If the unit is installed under conditions other than nominal test conditions, the sound levels may be subject to changes. Tolerance +/- 4dB



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