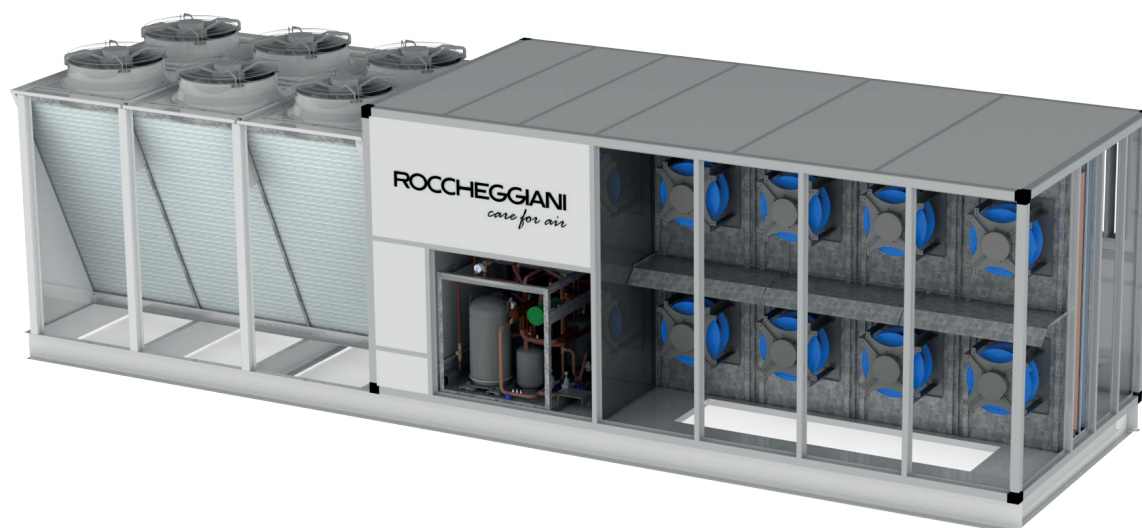


HE-RTU R410A

HIGH-EFFICIENCY ROOF TOP UNITS

- Air-to-air heat pump
- Airflows from 26.000 to 66.000 m³/h
- Cooling capacities from 117 to 417 kW
- Heating capacities from 117 to 415 kW



The High-Efficiency Roof Top Units from the Roccheggiani HE-RTU range are units designed to guarantee (based on the chosen configuration and accessories) air handling, renewal and purification inside buildings and are particularly beneficial in large production, storage and distribution areas within Industry and the tertiary sector.

The units in the HE-RTU range are packaged units, designed to be installed outdoors (typically on the roof) and use heat pump technology enabling the units to be extremely compact and efficient.

The units in the HE-RTU range ensure high seasonal energy efficiency also at partial loads, with performances that contribute towards achieving the best energy classification levels in the building where they are installed. Upon request the units can be supplied together with a "Product Compliance Report", to assist the heating engineer, architectural designer or facility manager, in understanding the contribution provided by the HE-RTU units in terms of certification points for the major world protocols in the field of Green Buildings, such as LEED®, BREEAM®, Home Quality Mark®, Estidama® and HK Beam Plus®.

From a technical point of view, compared to traditional hydronic solutions consisting typically of plants with UTA, chillers and heat generators (which normally use fossil fuels), the use of high-efficiency Roof Top units from the HE-RTU range can provide better system efficiencies, reduced energy for pumping the various media fluids and lower primary energy consumption, thus facilitating better energy assessments for the plant-building system, based on the various relevant standards.

The Roccheggiani high-efficiency Roof Top units are manufactured in compliance with the UNI EN 12100 standard and the CE marking directives, following an ISO 9001/2000-certified quality assurance system and use R410A Gas as the refrigerant, in line with the applicable legislation.

Publication: technical and commercial data sheet for the HE-RTU high-efficiency rooftop unit with R410A refrigerant gas

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Technical data and information expressed in this preliminary publication are the property of Roccheggiani S.p.A. and for general information purposes. With a view to making ongoing improvements, Roccheggiani Spa has the right to introduce at any time, without any obligation or commitment, whatever modifications it deems appropriate in order to improve the product. The pictures showing examples of components inside the units are for illustration purposes and therefore the brands of the components used to build the units, may differ from those brands shown in this document. This document was prepared with the utmost care and attention as regards the contents shown; nevertheless, Roccheggiani S.p.A. cannot accept any liability arising from the direct or indirect use of the information contained in it.

Regulatory Compliance

All the High-Efficiency Roof Top Units in the HE-RTU range are assembled, tested under pressure, dehydrated, loaded and tested at a running test standard level 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.). Specifically, the High-Efficiency Roof Top Units in the HE-RTU range are designed and manufactured in accordance with the following regulations:

- 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. 2016/2281 (ErP)

Applications



Industrial



Medium-to large sized shopping centres



Cinemas-Theatres



Sports facilities



Restaurants



Supermarkets



Airports
Railway stations



Tertiary



Logistics

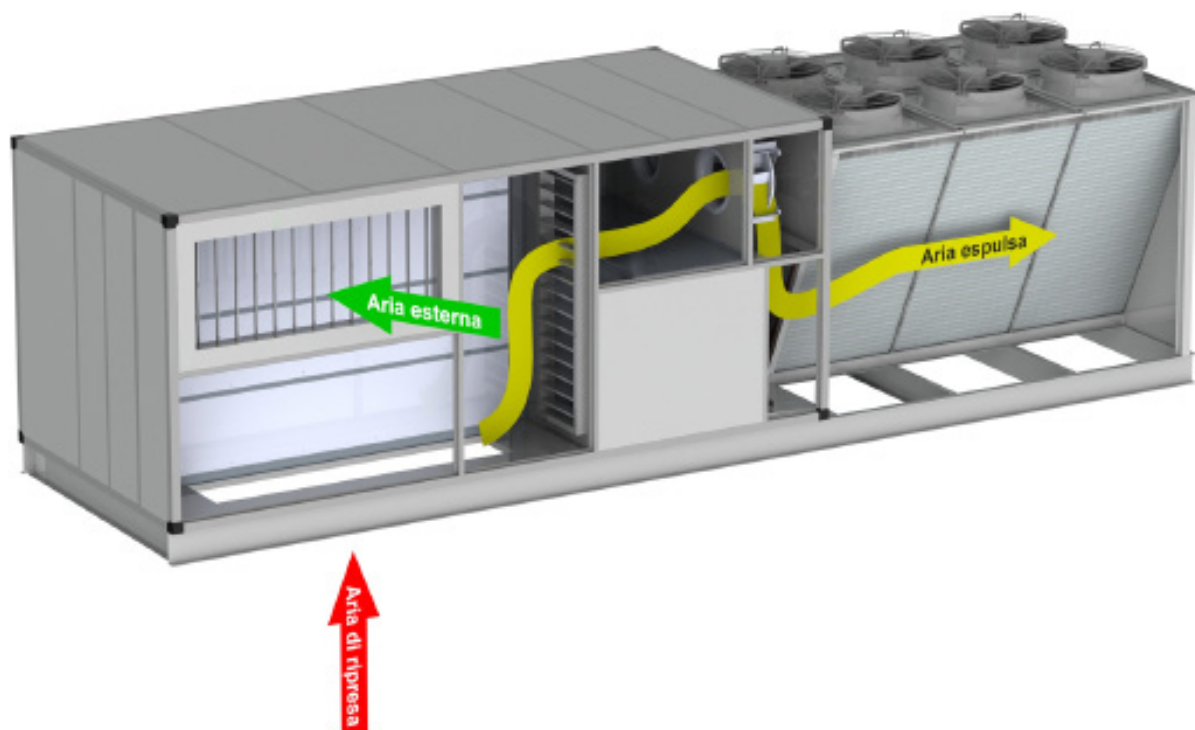
Composition of the unit: housing and frame

The High-Efficiency Roof Top Units in the HE-RTU range are made in 3 main sections:

- air handling section;
- condensing/evaporating section;
- cooling section/electric power and control section.

All sections are firmly secured to a suitably reinforced perimeter base with a standard height of 190 mm, made in thick press-formed galvanised sheet steel, which provides adequate rigidity to the unit. The base is provided with holes to allow the unit to be lifted and also positioned wherever it is to be installed, normally on the roof of the building.

The housing is produced in such a way as to allow the units to be housed outside. If needed, for the air handling section and the cooling and electric power and control section, it is possible to fit units with an additional, separate, protective roof in order to improve the unit's isolation from direct sunlight, in summer, and reduce the response times during start-up after a stationary period.

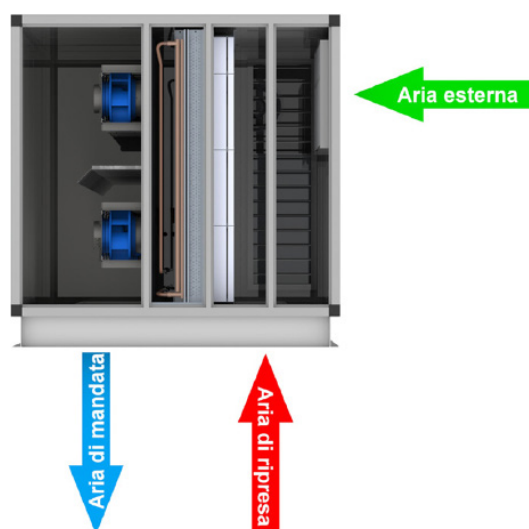


Casing

The housing in the air handling section of the High-Efficiency Roof Top Units in the HE-RTU range, is characterised by a load-bearing structure made from Anticorodal UNI 9006/1 T5 aluminium extruded profiles which are specially shaped to improve safety.

The profiles are joined together by three-way corner couplings made of fibreglass-reinforced nylon. The profile has a particular shape with the panel securing screws positioned in such a way that the interior parts of the units are completely flush and smooth. The profiles are 70 mm thick for 54 mm thick panels. The sandwich-type panels have a minimum thickness of 54 mm and are insulated with polyurethane foam (density approx. 45 kg/m³). The inside of the panel is in galvanised sheet metal and the outside is in pre-coated galvanised sheet metal. Panels can be easily removed ensuring efficient access to the internal components for routine and major maintenance.

The sandwich type panels (sheet metal/polyurethane/sheet metal) were tested by the Istituto Giordano S.p.A. according to the UNI 9177:1987 standard with the following results: - category 1 with the test method according to the UNI 8457 and UNI 8457/A1 standards - category 1 with the test method according to the UNI 9174 and UNI 9174/A1 standards.



Air handling section components

Mixing box

The air handling section includes a mixing box with the fresh air intake and return air from the air-conditioned rooms, complete with a damper for regulating the fresh air flow and an overpressure damper for discharging waste air, both made of aluminium and fitted with seals that ensure optimum airtightness when the damper is closed.

The fresh air intake damper is equipped with a servo-motor to control the air flow and, in combination with the fan control, can provide freecooling of up to 50% of the total supply air flow.

Filters

In standard configurations, units use undulated synthetic-fibre filters with regenerative cells, 48 mm thick with self-extinguishing fibre filter section jointed with chlorine-vinyl resin, complete with galvanised steel frame with U-profile th. 8/10, with double welded galvanised steel mesh. Filtering class: G4 according to standard EN 779.

In addition to the G4 filter supplied as standard, the units can be equipped with compact F7 efficiency filters, the seal between the filters and frame is guaranteed by a polyurethane sealant. Filtering class: F7 according to standard EN 779.

Handling section (heating/cooling)

Downstream of the filtering section there is one refrigerant/air heat exchanger dedicated to handling the supply air for the rooms to be airconditioned, with copper pipes and aluminium fins.

The excellent heat exchange capacity is guaranteed by the mechanical expansion of the copper pipes inside the aluminium fin pack so as to ensure adequate heat transfer between the primary and secondary exchange surfaces. The heat exchanger is equipped with a condensate collection tray made of AISI 304 stainless steel, with condensation-proof insulation and is fitted with a drain hose. The unit is complete with a hot-gas reheating heat exchange section, made with the same materials as the refrigerant/air heat exchanger dedicated to the handling of the supply air.

Utility fan section

In order for the supply of handled air towards the air-conditioned spaces, there are EC plug fans 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.

Exhaust air fan section

In order for the extraction of air from the air-conditioned spaces, there are EC plug fans 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.

External condenser/evaporator fan section

The High-Efficiency Roof Top Units in the HE-RTU range are equipped with an evaporator/condenser section with double circuit fitted with heat exchanger coils with copper tubes and aluminium fins and high efficiency axial fans with profiled blades in high-strength polymer, with IP54 internal overheating protection. Fans are equipped with Hyblade blades allowing greater air flow capacity with a reduction in the level of noise emitted.

Active thermodynamic recovery section

The High-Efficiency Roof Top Units of the HE-RTU range are equipped with an integrated recovery system of the active thermodynamic type. The exhaust air, extracted from the internal space, which usually has advantageous thermohygrometric conditions in terms of energy efficiency compared to the fresh air, before being expelled into the atmosphere, is mixed with the fresh air used for condensation or evaporation (depending on the summer-winter operating regime), thereby improving the cooling (summer) or heating (winter) performance.

During the winter, the active thermodynamic heat recovery unit enables the reduction of the number of defrosts due to the higher air temperature on the evaporator coil. The end result is a two-fold improvement of the COP, thanks to a significant increase in the evaporation temperature and a reduction in the number of defrosts that may be required.

Cooling and Electric power and control section components

Cooling section

With the exception of size 125, which is single-circuit (with 2 compressors and 3 capacity control steps), all other sizes in the HE-RTU range provide a dual circuit cooling section with 2 compressors for each circuit, this means there are 6 capacity steps and the following major components.

- Hermetic scroll compressors with orbiting spiral complete with motor protection against overheating, power surges and excessive temperatures in the supply gas. The compressors are mounted on rubber anti-vibration grommets and come complete with oil charge. The automatic oil heater prevents oil being diluted by the coolant when the compressor is shut down. The compressors are connected in TANDEM on a single cooling circuit and have bi-phasic oil equalisation.
- 4-way cycle reversing valve, electronic expansion valve, check valve, high pressure safety valve, liquid indicator, filter drier, liquid receiver, liquid separator, high pressure safety pressure switch, low pressure safety pressure switch and coolant charge.

Electric power and control section

The Electric power and control section varies according to the chosen configuration of the unit and is generally characterised by the following elements.

The power section includes:

- door-locking main isolation switch;
- compressor protection circuit breaker;
- compressor remote control switch;
- fan motor thermal protection on the internal section and external section;
- circuit breaker on auxiliary circuit.

The microprocessor control section includes:

- compressor protection and timing;
- clean contacts for remote ON-OFF, cumulative alarm, fire alarm input, fan status, compressor status, cooling/heating mode change;
- phase monitor;
- RJ45 connector placed on the external surface of the unit for inspection and maintenance operations.

Remote control with user interface:

- switching the unit ON and OFF;
- daily/weekly programming for switching the unit, or just the fan, ON or OFF;
- manual change of operating mode (hot or cold) and/or of the temperature set-point;-display of alarms and machine status;
- management of the main operating parameters (password protected);
- selective key locking with password-protected release;
- power section with dedicated electric panel;- control and user interface

The integrated automatic control of the unit controls and monitors operations and set-points. The control system is based on a programmable microprocessor control for HVAC/R systems.

General technical data calculated with R410A refrigerant
RO version

Features			Sizes						
			125	150	200	250	300	350	400
Free Cooling			-	-	-	-	-	-	-
Active Thermodynamic Heat Recovery (RTA)			-	-	-	-	-	-	-
Compliance 2016/2281 EU - ENER LOT 21 - TIER 2			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Performance-R410A									
Supply air flow rate		m³/h	26.000	32.000	40.000	48.000	56.000	60.000	66.000
Total cooling capacity	(1) (2)	kW	116,6	163,5	224,6	255,2	296,4	351,6	386,6
Sensible cooling capacity	(1) (2)	kW	86,3	116,6	174,0	193,4	22,83	263,7	289,6
Compressor absorbed power	(1) (2)	kW	23,5	39,1	54,7	67,1	72,4	84,1	98,2
EER compressors only	(1) (2)		4,96	4,18	4,11	3,80	4,09	4,18	3,94
SEER seasonal performance coefficient	(3)		4,25	4,17	4,41	4,32	4,28	4,33	4,13
Seasonal energy efficiency $\eta_{s,c}$	(4)	%	164,9	162,0	171,4	167,8	166,4	168,3	160,5
Energy efficiency class			A	A	n.a.	n.a.	n.a.	n.a.	n.a.
Heating capacity	(5) (6)	kW	117,0	171,0	234,6	266,8	303,3	360,2	401,3
Compressor absorbed power	(5) (6)	kW	22,0	37,0	48,6	56,8	61,0	72,3	82,8
COP for compressors only	(5) (6)		5,32	4,62	4,82	4,70	4,97	4,98	4,85
SCOP seasonal performance coefficient	(3)		3,37	3,40	3,53	3,42	3,37	3,40	3,30
Seasonal energy efficiency $\eta_{s,h}$	(4)	%	131,0	132,0	137,0	133,0	131,0	132,0	128,0
Bivalence temperature	(4)	°C	-7,0	-7,0	-7,0	-7,0	-7,0	-7,0	-7,0
Energy efficiency class			A	A	n.a.	n.a.	n.a.	n.a.	n.a.
Post-heating – R410A									
Heating capacity	(7)	kW	45.5	63.8	87.6	99.5	115.6	137.1	150.8

RF version

Performance-R410A									
Supply air flow rate		m³/h	26.000	32.000	40.000	48.000	56.000	60.000	66.000
Total cooling capacity	(1) (8)	kW	124,9	175,1	240,6	273,3	317,5	376,6	414,1
Sensible cooling capacity	(1) (8)	kW	85,9	116,0	173,2	192,5	227,3	262,4	288,3
Compressor absorbed power	(1) (8)	kW	24,0	39,9	55,8	68,5	73,9	85,9	100,3
EER compressors only	(1) (8)		5,21	4,39	4,31	3,99	4,29	4,38	4,13
SEER seasonal performance coefficient	(3)		4,25	4,17	4,41	4,32	4,28	4,33	4,13
Seasonal energy efficiency $\eta_{s,c}$	(4)	%	164,9	162,0	171,4	167,8	166,4	168,3	160,5
Energy efficiency class			A	A	n.a.	n.a.	n.a.	n.a.	n.a.
Heating capacity	(5) (8)	kW	118,9	173,8	238,4	271,1	308,2	366,0	407,8
Compressor absorbed power	(5) (8)	kW	23,5	39,5	51,9	60,7	65,2	77,2	88,4
COP for compressors only	(5) (8)		5,06	4,40	4,59	4,47	4,73	4,74	4,61
SCOP seasonal performance coefficient	(3)		3,37	3,40	3,53	3,42	3,37	3,40	3,30
Seasonal energy efficiency $\eta_{s,h}$	(4)	%	131,0	132,0	137,0	133,0	131,0	132,0	128,0
Bivalence temperature	(4)	°C	-7,0	-7,0	-7,0	-7,0	-7,0	-7,0	-7,0
Energy efficiency class			A	A	n.a.	n.a.	n.a.	n.a.	n.a.
Post-heating – R410A									
Heating capacity	(7)	kW	32,8	44,4	56,8	67,3	78,6	92,6	104,1

RF/RTA version

Performance-R410A									
Supply air flow rate		m³/h	26.000	32.000	40.000	48.000	56.000	60.000	66.000
Total cooling capacity	(1) (8)	kW	125,7	176,3	242,1	275,1	319,5	379,0	416,8
Sensible cooling capacity	(1) (8)	kW	86,2	116,4	173,8	193,2	228,1	263,4	289,3
Total recovered power	(1) (8)	kW	9,8	14,6	20,3	25,0	26,9	31,3	36,6
Compressor absorbed power	(1) (8)	kW	23,6	39,3	54,9	67,4	72,7	84,5	98,6
EER compressors only	(1) (8)		5,33	4,77	4,77	4,77	4,77	4,77	4,77
SEER seasonal performance coefficient	(3)		4,25	4,17	4,41	4,32	4,28	4,33	4,13
Seasonal energy efficiency $\eta_{s,c}$	(4)	%	164,9	162,0	171,4	167,8	166,4	168,3	160,5
Energy efficiency class			A	A	n.a.	n.a.	n.a.	n.a.	n.a.
Heating capacity	(5) (8)	kW	121,1	177,0	242,8	276,1	313,9	372,8	415,4
Total recovered power	(5) (8)	kW	4,5	6,6	9,0	10,2	11,6	13,8	15,4
Compressor absorbed power	(5) (8)	kW	20,8	35,0	46,0	53,7	57,7	68,3	78,3
COP for compressors only	(5) (8)		5,83	5,06	5,28	5,14	5,44	5,46	5,31
SCOP seasonal performance coefficient	(3)		3,37	3,40	3,53	3,42	3,37	3,40	3,30
Seasonal energy efficiency $\eta_{s,h}$	(4)	%	131,0	132,0	137,0	133,0	131,0	132,0	128,0
Bivalence temperature	(4)	°C	-7,0	-7,0	-7,0	-7,0	-7,0	-7,0	-7,0
Energy efficiency class			A	A	n.a.	n.a.	n.a.	n.a.	n.a.
Post-heating – R410A									
Heating capacity	(7)	kW	32,8	44,4	56,8	67,3	78,6	92,6	104,1

(1) Internal Air Temperature 27 C B.S./19 C B.U. Fresh Air Temperature 35 C B.S./24 C B.U. (According to EN14511 - Table 4 - Cooling Mode); (2) Performance with 30% fresh air and recovery activation with waste air; (3) According to EN 14825:2016; (4) According to ECODSIGN Regulation (EU) No. 2016/2281 – ENER LOT 21 (ERP); (5) Internal Air Temperature 20 C B.S./12 C B.U. Fresh Air Temperature 7 C B.S./6 C B.U. (According to EN14511 - Table 3 - Heating Mode); (6) Performance with fully recirculated air 20°C DB/12°C WB; (7) Heating capacity in hot gas post-heating mode in summer, based on an air temperature of 16°C at the inlet to the post-heating coil and an outdoor air temperature of 35°C; (8) Performance with 30% outdoor air.

Performance of the summer reheating coil with hot gas
HE-RTU 125

Fresh air temperature (°C)						
Air flow	Ta (°C)	25	27	30	32	35
		kWt	kWt	kWt	kWt	kWt
26.000m³/h	10	28,6	27,6	26,6	25,6	24,6
	12	29,6	28,5	27,5	26,4	25,4
	14	30,4	29,4	28,3	27,2	26,1
	16	31,3	30,3	29,2	28,1	27
	18	31,4	30,3	29,2	28,1	27
	20	32,3	31,2	30,1	29	27,8

HE-RTU 150

Fresh air temperature (°C)						
Air flow	Ta (°C)	25	27	30	32	35
		kWt	kWt	kWt	kWt	kWt
32.000m³/h	10	40,3	38,9	37,4	35,8	34,3
	12	41,6	40,1	38,6	37	35,4
	14	42,8	41,3	39,7	38,1	36,4
	16	44,1	42,5	40,9	39,2	37,6
	18	44,1	42,6	41	39,3	37,6
	20	45,4	43,8	42,2	40,5	38,7

HE-RTU 200

Fresh air temperature (°C)						
Air flow	Ta (°C)	25	27	30	32	35
		kWt	kWt	kWt	kWt	kWt
40.000m³/h	10	55,4	53,3	51,2	49	46,8
	12	57,2	55,1	52,9	50,6	48,4
	14	59	56,8	54,5	52,2	49,9
	16	60,8	58,5	56,2	53,8	51,4
	18	61	58,7	56,4	53,9	51,5
	20	62,8	60,5	58,1	55,6	53,1

HE-RTU 250

Fresh air temperature (°C)						
Air flow	Ta (°C)	25	27	30	32	35
		kWt	kWt	kWt	kWt	kWt
48.000m³/h	10	62,3	59,8	58,5	55,4	52,1
	12	64,4	61,7	60,3	57,1	53,7
	14	66,4	63,6	62,0	58,8	55,3
	16	68,3	65,5	63,8	60,5	56,9
	18	68,5	65,7	63,9	60,6	57,0
	20	70,6	67,7	65,7	62,3	58,6

HE-RTU 300

Fresh air temperature (°C)						
Air flow	Ta (°C)	25	27	30	32	35
		kWt	kWt	kWt	kWt	kWt
56.000m³/h	10	73,9	71,0	67,9	64,6	61,2
	12	76,3	73,2	70,0	66,6	63,1
	14	78,4	75,3	72,0	68,5	64,9
	16	80,8	77,6	74,1	70,5	66,9
	18	80,9	77,6	74,2	70,6	66,9
	20	83,2	79,8	76,3	72,6	68,9

Note:

Ta = temperature of air leaving the handling coil and entering the reheating coil

kWt = heating capacity provided (kW)

The reheating coil is fed by hot gas taken from the condenser coil

Performance of the summer reheating coil with hot gas
HE-RTU 350

Fresh air temperature (°C)						
Air flow	Ta (°C)	25	27	30	32	35
		kWt	kWt	kWt	kWt	kWt
60.000 m³/h	10	87,5	84,1	80,5	76,7	72,9
	12	90,2	86,7	83,0	79,1	75,2
	14	92,8	89,2	85,4	81,4	77,4
	16	95,6	91,9	87,9	83,8	79,7
	18	95,7	92,0	88,0	83,9	79,8
	20	98,5	94,6	90,6	86,3	82,1

HE-RTU 400

Fresh air temperature (°C)						
Air flow	Ta (°C)	25	27	30	32	35
		kWt	kWt	kWt	kWt	kWt
66.000 m³/h	10	96,7	92,8	88,6	84,3	79,9
	12	99,7	95,7	91,4	86,9	82,4
	14	102,5	98,4	93,9	89,3	84,7
	16	105,6	101,3	96,7	92,0	87,2
	18	105,7	101,4	96,8	92,1	87,3
	20	108,7	104,2	99,5	94,6	89,8

Note:

Ta = temperature of air leaving the handling coil and entering the reheating coil

kWt = heating capacity provided (kW)

The reheating coil is fed by hot gas taken from the condenser coil



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